

**SILENCE IN TEXT-BASED COMPUTER MEDIATED
COMMUNICATION: THE INVISIBLE COMPONENT**

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A Thesis Submitted for the Degree of “Doctor of Philosophy”

University of Haifa

Graduate Studies Authority

Committee for Doctoral Studies

October, 2007

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Acknowledgments

A quick online search taught me that writing a Ph.D. dissertation (or a book) is like: “*developing software*”, “*going to the gym*”, “*swimming in the ocean*”, “*a relationship*”, “*making a good stew*”, “*doing a huge jigsaw puzzle*”, “*giving birth to a child*”, “*raising a child*”, “*trying to find sex*”, “*a journey*”, “*digging a grave, for oneself*”, “*climbing a mountain*”, “*driving a car at night*”, “*having a jar of paperclips at your desk*”, “*eating an elephant*”, “*running a marathon*”, “*walking through a maze*”, “*becoming the seven dwarves*”, and on and on and on... I won't dare add another analogy to this endless list. For me, the work on this dissertation was different things at different times, but it was always an opportunity to interact with people who were willing to lend me a hand, to support, and to offer advice. To all of these people I am indebted.

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I dedicate this dissertation to those who use research and education to improve our understanding of ourselves and of others.

Yoram M Kalman

Netaim Village, June 2008

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YORAM M. KALMAN

Abstract

This dissertation explores the nature of online silence, its causes and its consequences.

The dissertation comprises three studies. The first study explores over 170,000 response latencies from highly diverse sources, and reveals a mathematical uniformity which not only suggests a practical definition of online silence, but might also be the numeric expression of a fundamental regularity which underlies human communication, online as well as offline. The definition of online silence suggested by the first study is based on the identification of three normative chronemic zones delineated by multiples of the average response latency τ (tau). These chronemic norms are explored in the second study, which confirms that the norms measured in the first study are reflected in the perception of e-mail users, and that when these norms are violated, for example by not responding to an e-mail, or by responding after a very long pause, these violations could damage the way the violator is perceived by others with whom the violator is communicating. These findings propose a role for response latencies as a nonverbal cue in text-based computer mediated communication (CMC) media, and support the claim that text-based CMC is not as poor in nonverbal cues as asserted by some. The third study analyzes the reports of e-mail users who were asked to recount specific cases in which they caused online silence by not responding to an e-mail, and cases in which they experienced expecting but not receiving a response to an e-mail. The analysis reveals a wealth of data about the causes and consequences of online silence, including uncertainty and

hurt feelings. The analysis also reveals three main categories of explanations for online silence, as well as a few sub-categories.

The three studies apply a host of methodologies, quantitative and qualitative, to the analysis of data collected from diverse sources, while using both obtrusive and unobtrusive measures.

The theoretical and practical implications of each of the individual studies are presented.

Moreover, the triangulation of the results of the three studies leads to a model of online responsiveness and online silence, and to additional theoretical and practical implications.

The dissertation establishes the centrality of online silence to the study of CMC, and it proposes directions for further explorations of the nature of online silence in text-based CMC, as well as its causes and consequences.

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1 Introduction

This dissertation explores the way silence is expressed, experienced and interpreted in text-based computer mediated communication (CMC). The dissertation comprises three key studies. In the introduction, the three studies are presented in brief, and the key attributes of each study are summarized in Table 1; an overview of the content of the dissertation is provided; an annotated list of the publications of the author of the dissertation is presented; and, the chapter concludes with a few comments on the language used in the dissertation.

1.1 *The three studies*

The first study examines response latencies in asynchronous CMC by analyzing three datasets comprising a total of more than 170,000 responses: e-mail responses created by corporate employees, responses created by university students in course discussion groups, and responses to questions posted in a public, commercial online information market. This study attempts to reach a deeper understanding of online silence through the examination of very long response latencies. This study reveals a power law distribution of the response latencies in all three datasets. This mathematical uniformity in the distribution of the response latencies links diverse types of text-based CMC. This uniformity also links text-based CMC with traditional spoken conversation. This mathematical uniformity allows the delineation of three zones that quantitatively define norms of responsiveness in text-based CMC. The violation of these norms is suggested to be an expression of online silence. Conceptualizing online silence as the violation of online responsiveness norms allows us to propose a context sensitive quantitative definition of online silence: "no response after a period of ten times the average response latency (τ)"

The second study is based on the responsiveness norms identified in the first study, and explores the consequences of violations of these norms in the context of organizational e-mail communication. The study applies the Expectancy Violations Theory, which was developed for understanding the results of violating normative expectations in nonverbal communication. The results clearly show that under the experimental circumstances normative response latencies are more expected, and result in more positive evaluations than non-normative responses such as online silence. This study validates the norms identified in the first study, and validates the importance of response latency as a nonverbal cue in text-based computer mediated communication.

The third study is based on a survey in which knowledge workers in an online services company were asked to recall specific cases in which they experienced online silence in e-mail communication, and specific cases in which they created online silence in e-mail communication. The questionnaire covers various aspects of the experiences, allowing the exploration of issues related to online silence, including uncertainty, hurt feelings, and causes of online silence. The study identifies “hot-spots” along a CMC cycle in which online silence is more likely to be created. The study also identifies three main categories of explanations for online silence.

Taken together, the three studies form a first step toward an answer to the question how silence is expressed, experienced and interpreted in text-based CMC. The answer to this question is then presented in a model that unifies the findings of the three studies. The model presents the manner in which online silence is perceived by the sender of the message, and by the intended recipient of the message.

Methodologically, we show that in order to understand online silence, researchers need to employ quantitative and qualitative methodologies, as well as both obtrusive and unobtrusive approaches, and use theories from multiple disciplines including communication, information systems and behavioral sciences.

The combined results of these three studies provide a preliminary mapping of the nature of online silence, with study 1 providing a quantitative and a general bird’s eye view definition of online silence, while study 2 and study 3 explore specific cases of online silence. Table 1 summarizes the three studies, the parts of the research question that were explored in each study, the nature of the research populations, the methodologies that were employed, and the text-based CMC technologies that were investigated.

Table 1: The three studies and their key attributes

	Study 1	Study 2	Study 3
Population	Highly diverse N=170,000+	Israeli MBA students N=55	European knowledge workers N=36
Elements of research question explored	The way online silence is expressed	The way online silence is experienced and interpreted	The way online silence is experienced and interpreted
Key methodology employed	Unobtrusive mathematical analysis of large datasets	Experimental paper- based vignette	Online survey: multiple choice and open text questions
Communication technologies studied	e-mail, discussion forum, online marketplace	e-mail	e-mail

The table demonstrates that the first study was of a more general nature, and that it led to generalizations about the way online silence is expressed in a wide range of populations, contexts and technologies. These generalizations were afforded by the objective and unobtrusive nature of the analytic methodologies employed, and by the large sample size comprising tens of thousands of instances. The table also demonstrates the more specific nature of the second and third studies. These studies looked at the subjective nature of the experience of online silence, as it is experienced and interpreted by specific people in specific contexts. These two studies allow us a glimpse into the complexity and context-sensitivity of the experience of online silence. Despite the very specific nature of studies 2 and 3, and the focus of both on the most established of text-based CMC's, namely e-mail, each of the studies employed a different methodological approach and examined a different population, thus diversifying the scope of the studies, and consequently increasing the generalizability of the findings.

The three studies also demonstrate the challenge of interdisciplinary research. Study 1 encompasses two disciplines, information systems (IS) and communication; study 2 focuses on nonverbal communication, a multidisciplinary topic that integrates behavioral sciences and communication; and, study 3 brings together IS, behavioral research and communication research. The fact that the dissertation is interdisciplinary and deals with an emerging field, means that each discipline will view parts of the dissertation with a certain level of distancing. For example, where IS researchers see “users”, communication researchers see “communicators”, and psychologists see “subjects” or “participants”. The differences go well beyond terminology, into the territory of the type of questions that should be asked, and the types of results that constitute an answer; into the purpose of the investigation; and, into the

requirements from the researched populations. In the context of this disciplinary diversity, it is important that we clearly state the purpose of this dissertation, and by purpose we mean not the research question, but rather the rationale and ontology that guided our quest for the answers to the research question. The ontological approach taken here is a positivist one, and the search is for generalizations, either classifications or rules, that can produce empirically falsifiable predictions. We attempt to provide foundational classifications and rules that describe online silence in the most general terms, in a manner that will provide a basis for future research. This future research will then seek to identify exceptions to the classifications and rules, thus describing the diversity of responsiveness related behavior of online communicators.

1.2 Overview

A review of the literature that relates to silence, nonverbal communication, social cognition and interactivity initiates the literature review section. The review then focuses on nonverbal cues in CMC, leading to a presentation of online chronemics. The review continues by a detailed presentation of the literature on various forms of online silence, online unresponsiveness, and online ostracism, in contexts such as online survey methodologies, organizational behavior, education, customer relations management, and more. The review concludes with a summary of key theories and concepts, and with the presentation of a schematic model of a text-based computer mediated communication cycle. The model summarizes the literature on the stages of text-based CMC.

After the literature review the research question (RQ) of the dissertation is presented: “How is silence expressed, experienced and perceived in text-based CMC?” This is followed by a

brief description of the theoretical and practical importance of answering the RQ. Finally, the detailed RQ's and hypotheses that guided each of the three studies are presented.

The next two chapters are the method and the results chapters. In the method section, the methods that were used in each of the studies are presented, and in the results section the results of each of each of the studies. These are followed by the discussion chapter in which the results of each of the studies are discussed. These three chapters form a unit that can either be read sequentially, or as three separate studies, first reading the method, results and discussion of study 1, then the method, results and discussion of study 2, and finally the three sections of study 3. The discussion chapter concludes with a general discussion section in which a model of online responsiveness and of online silence is presented, additional contributions to theory and practice are discussed, and a theoretical exposition on the topic of “synchronicity modulation” proposes to re-evaluate the concept of synchronicity in CMC, in light of the findings of study 1.

1.3 List of publications

Sections of this dissertation have already been published as conference papers, conference abstracts, a book chapter and a journal article. Below is an annotated list of these publications in ascending chronological order. These publications of the dissertation's author are not referenced again in the text of the dissertation.

Kalman, Y. M. (2004). *Response times in email correspondence*. Paper presented at the Association of Internet Researchers 5.0, University of Sussex, England.

This conference presentation presented the first findings from the Enron dataset, showing the asymmetric distribution described in study 1.

Kalman, Y. M., & Rafaeli, S. (2005). *email chronemics: unobtrusive profiling of response times*. Paper presented at the 38th Annual Hawaii International Conference on System Sciences, Big Island, Hawaii.

This conference paper presents the full findings from the Enron dataset described in study 1.

Rafaeli, S., Raban, D., & Kalman, Y. M. (2005). Social Cognition Online. In Y. Amichai-Hamburger (Ed.), *The social net: The social psychology of the Internet* (pp. 57-90). Oxford, England: Oxford University Press.

This book chapter is about online social cognition. Sections from it were used in the literature review section on social cognition ([2.4 Social cognition](#)).

Kalman, Y. M., Ravid, G., Raban, D. R., & Rafaeli, S. (2006). *Speak* now* or forever hold your peace: power law chronemics of turn-taking and response in asynchronous CMC*. Paper presented at the 56th Annual Conference of the International Communication Association, Dresden, Germany.

This conference paper presents the full findings from the three datasets described in study 1, and focuses on the implications for turn-taking in CMC.

Kalman, Y. M. (2006). *Online silence: investigating the online event that did not happen*. Paper presented at the ILAIS conference and doctoral consortium, Haifa University, Israel.

This doctoral consortium presentation turns the attention of information systems researchers to the importance of better understanding online silence. The presentation is echoed in parts of the section [6.4.2 Contributions to theory and practice](#).

Kalman, Y. M., Ravid, G., Raban, D. R., & Rafaeli, S. (2006). Pauses and response latencies: a chronemic analysis of asynchronous CMC. *Journal of Computer Mediated Communication*, 12(1), 1-23.

This journal paper presents the full findings from the three datasets described in study 1, and focuses on the normative aspects of the findings (aspects that led to study 2), and on the reasons for the relatively rapid responses (leading to the below ICA 2007 paper).

Kalman, Y. M. (2006). *Unobtrusive measures in Internet research*. Paper presented at the Doctoral consortium: Internet and technology researchers, Bar Ilan University, Israel.

This doctoral consortium presentation focused on the importance and underutilization of unobtrusive research methods for Internet researchers in diverse disciplines and various methodological orientations. Elements from this presentation appear in the method section [4.1 Study 1: response latencies](#).

Kalman, Y. M., & Rafaeli, S. (2007). *Modulating synchronicity in computer mediated communication*. Paper presented at the ICA, San Francisco, CA.

This conference paper considers the implications of the findings of study 1 on the nature of synchronicity in CMC. The section [6.4.3 Modulating synchronicity in CMC](#) is based on this paper.

Kalman, Y. M. (2007). *They just don't understand: on the allure of synchronicity to users of computer mediated communication*. Paper presented at the ILAIS conference and doctoral consortium, Bar Ilan University, Israel.

This doctoral consortium presentation presents to information systems researchers the importance of the insights presented in the section [6.4.3 Modulating synchronicity in CMC](#) to IS research and to the development of specifications for information systems. The presentation is echoed in sections of the [6.4.2 Contributions to theory and practice](#) section.

Kalman, Y. M., Ravid, G., Raban, D. R., & Rafaeli, S. (2007). *Are you still waiting for an answer? The chronemics of asynchronous written CMC*. Paper presented at the Chais conference on instructional technologies research, Open University, Israel.

This conference presentation focuses on chronemic aspects of moderating online forums in general, and online classrooms in particular. The presentation is echoed in the section [6.4.2.2.1 Moderating online forums and other online conversations](#).

Kalman, Y. M. (2007). *Response times in text-based CMC*. Paper presented at the 11th conference of the Israel Communication Association, The Open University, Israel.

*This conference presentation was a part of a panel that was arranged by the author of this dissertation, titled “*Not* being there: silence and unresponsiveness in computer mediated communication”. In this panel four researchers presented different aspects of silence and unresponsiveness in CMC, discussed the definition of online silence, compared and contrasted online silence with face-to-face silence, explored the positive aspects of silence, and finally explored various*

reasons for online silence, and ways of engaging silent participants in computer mediated conversations.

1.4 Comments on language usage

Below are a few comments on the language used in this dissertation.

This dissertation is written in English for an academic institution which writing guidelines refer to writing dissertations in Hebrew. In addition, some of the research was carried out in English, while other elements (especially study 2) were carried out in Hebrew. All of the results are presented in English, to maximize the potential audience who can access the dissertation. The resulting format is a combination of APA guidelines (APA, 2001), of University of Haifa guidelines, and of several individual decisions taken by the author in consultation with the dissertation advisor.

The dissertation is written in first person, plural. This choice was made, following comments on the dissertation proposal, so as to acknowledge the fact that no scientific work is accomplished in isolation. The author's collaboration with colleagues and with his supervisor was central to his work. Notwithstanding, the work presented in this dissertation is by and large the work of the author of this dissertation, with the exception of section [2.4 Social cognition](#), which source is acknowledged in a footnote. Consequently it is needless to say that all omissions, inaccuracies, oversights and errors are the author's responsibility and his alone.

For the convenience of readers who might read only sections of the dissertation, acronyms were in general avoided, and were used only when repetition of the longhand would have

made the text awkward. An exception to this rule is the common acronym CMC (computer mediated communication).

In several places, internal hyperlinks reference sections and chapters within the dissertation. To aid those reading the dissertation in print (offline), these links ([underlined, and blue](#)) are preceded by the decimal section number.

The term e-mail can be spelled in many ways such as E-mail, e-mail, e mail or email, and the accepted use is still evolving. The spelling that was used in this dissertation is “e-mail”, as suggested by APA (2007), unless an alternative spelling was used in a cited work. In the questionnaire used in study 3, the spelling which was used was “email”. The term e-mail was used to refer to the noun, and it was not used in the more colloquial manner as a verb that refers to the action of sending an e-mail message.

The term “forum” should be made into plural using the Latin “fora”, or using the suffix “s”. The latter alternative “forums” was used in this dissertation.

Many sections of the dissertation refer to a sender, and an intended recipient. The intended recipient is the party who is expected to reply. Since the topic of this dissertation is online silence, one can't assume that the “intended recipient” is necessarily the “recipient”, for example since the message might not have arrived, or might not have been seen by the intended recipient. In some places, “recipient” is used instead of the longer term “intended recipient”, to ease readability. In all of these cases, the intention is to refer to the “intended recipient”.

2 Literature review

2.1 Computer mediated communication

The last decade has seen a significant move of Computer Mediated Communication (CMC) into the mainstream. Ongoing longitudinal surveys performed by organizations such as the Pew Internet & American Life Project (<http://www.pewinternet.org>) the Oxford Internet Institute (<http://www.oii.ox.ac.uk>) and the World Summit on the Information Society – WSIS (<http://www.itu.int/wsis/index.html>) reveal increasing levels of penetration of CMC in the general population. Over 70% of Americans use the Internet to access e-mail (91%), search for information (91%), or for dozens of other tasks including recreational, educational, financial and social tasks (Pew, 2007). 85% of Internet users in the UK said that the Internet has made their life easier, and at the same time a majority of e-mail users are concerned about bad experiences such as spam, viruses, or online fraud when using e-mail (Dutton & Helsper, 2007). The global digital divide seems to be shrinking, especially with the accelerated introduction of mobile phones to populations in developing countries, though issues of access to Information and Communication Technologies are still significant challenges (International Telecommunication Union, 2007).

Central to the understanding of CMC is the concept of “persistent conversation”, which is described as:

“...the transposition of ordinarily ephemeral conversation into the potentially persistent digital medium. Persistent conversations occur via instant messaging, text and voice chat, email, blogs, web boards, MOOs, graphical and 3D virtual environments, gaming systems, video sharing sites, document annotation systems, mobile phone texting, etc. Such

communication is persistent in that it leaves a digital trace, and the trace in turn affords new uses. It permits conversations to be saved, visualized, browsed, searched, replayed, and restructured. Persistence also means that conversations need not be synchronous: they can be asynchronous (stretching out over hours or days) or supersynchronous (with multiple parties 'talking' at the same time). Finally, the creation of persistent and potentially permanent records from what was once an ephemeral process raises a variety of social and ethical issues” (Erickson & Herring, 2007)

The increased importance of CMC in general, and of text-based CMC in particular, in the lives of individuals, led to challenges such as information overload (Q. Jones, Ravid, & Rafaeli, 2004; Whittaker & Sidner, 1996; Zeldes, Sward, & Louchheim, 2007), and new types of distractions and interruptions (Gonzalez & Mark, 2004; Mark, Gonzalez, & Harris, 2005; Russell, Purvis, & Banks, 2007). These challenges are interesting from a research point of view since they represent classical communication challenges that have been researched in the past (e.g. Meier, 1963), that now need to be re-examined in light of the introduction of novel computer-mediated communication channels. Do the new technologies fundamentally change the way we communicate, or is technology simply one of the variables in the equation?

Like communication overload and like distractions in the age of ubiquitous CMC, anecdotal evidence led us to believe that silence too is a classical topic in communication which time has come to be reexamined. It seemed that online silence is experienced widely, while its nature, causes and consequences are poorly understood. In the following section some of the classical research on silence is reviewed, research which formed the foundation for the exploration of online silence.

2.2 Silence

The quote “*Silence is to speech as the white of this paper is to this print*” (Bruneau, 1973 p. 18), attempts to capture the ubiquity and the centrality of silence in communication, while also acknowledging that silence is treated by most people as an insignificant background, a meaningless default, and a useless emptiness. “*One cannot not communicate*” (Watzlawick, Beavin & Jackson, 1967 in Wilder, 1978) also captures the uniqueness of silence which, like other forms of nonverbal communication, is central to communication. It is *how* something is said that communicates at least as much as *what* is being said (Burgoon, Buller, & Woodall, 1996b; Jaworski, 1999). Like the empty page, which carries little meaning without graphic symbols, and the graphic symbols which can’t exist without a substrate, so do silence and speech coexist in a mutual dependence, each one providing the context, and thus the meaning, to the other. In addition to the speech that surrounds it, silence need also be understood in other contexts, such as other nonverbal signs, as well as in the context of culture (C. A. Braithwaite, 1999; Saville-Troike, 1985).

Because it is so context dependent, silence can express and be interpreted as expressing a wide range of meanings. The scope is so wide that actually silence can, in different contexts, mean opposites. Jaworski (1999) gives as an example Jensen’s work (Jensen, 1973) where five functions of silence which can have contrasting, positive and negative values, are described: (a) a linkage function: Silence may bond two (or more) people or it may separate them; (b) an affecting function: Silence may heal (over time) or wound; (c) a revelation function: Silence may make something known to a person (self exploration) or it may hide information from others; (d) a judgmental function: Silence may signal assent and favor or it

may signal dissent and disfavor; (e) an activating function: Silence may signal deep thoughtfulness (work) or it may signal mental inactivity.

Another example Jaworski gives is the work of Lebra (1987) where on the one hand reticence is interpreted as a sign of honesty, sincerity and straightforwardness, but on the other hand it is associated with concealing the truth. Silence amongst young spouses in the Japanese culture is an expression of affection, while in the same society silence is used to express social defiance, disagreement with a person, anger and hatred. In Bruneau's work (1973) one can find additional examples of contrasting meanings of silence: as an empowering as well as an oppressive tool, as a promoter of interpersonal closeness, as well as a sign of aggressive alienation, as a respectful act, as well as a way to signal disrespect. Silence can signal the end of an interaction with a clear finality, as well as represent closeness and intimacy. The polite behavior for a person joining an English group is to join in silence, while the same behavior will be considered inappropriate and impolite in a Mediterranean country like Greece (Sifianou, 1997). In educational settings silence can be a sign of active learning and concentration, as well as of idleness and ignorance (Jaworski, 1999). In an organizational context, silence can be attributed to lack of motivation and isolationism, while it actually originates in stress and ambiguous communication (Jenkins, 2000; Milliken & Wolfe, 2003). The silence and silencing of women received special attention in some of the earliest treatises on silence (Courtenay, 1916 in Clair, 1998) and continues to provide examples of the negative power of silence, such as disciplinary and oppressive silence, silence enforced by institutions, or the role of silence in sexual harassment and in the objectification of women (Clair, 1998; Morgan & Coombes, 2001). This use of silence against women in many societies is an example of the way "*Within a*

single speech community, social values and norms are closely tied to the amount of talk vs. silence that is prescribed – according to social distinctions such as rank in the social hierarchy...” (Saville-Troike, 1985, p. 4)

2.2.1 Defining silence

The many possible interpretations of silence, compounded by the fact that many of these possible interpretations are at odds with each other, make silence a topic which is difficult to categorize and define, and consequently difficult to research. A definition is elusive and quite futile since *“We are likely...to sense the strangeness, frustrations, and ambiguities of silence no matter how we define the concept. Since silence is a sort of absence of something, it suggests a potential... Concepts of the sort of silence, then, may be peculiarly difficult if one’s purpose is to objectify the state, that is, to say that it is something”* (Scott, 1993, p. 11). Even language itself is an obstacle to clearly defining silence, since the English language does not distinguish between two important types of silence, which are described by at least two words in some languages. The first definition the Oxford English Dictionary (OED) (Oxford English Dictionary, 1989) gives to silence is (1a) *“The fact of abstaining or forbearing from speech or utterance (sometimes with reference to a particular matter); the state or condition resulting from this; muteness, reticence, taciturnity”*. In German (which, like English, belongs to the West Germanic group of languages) this type of silence would be “schweigen”, and in Hebrew (a Semitic language) “shtika”. The second definition provided by the OED is (2a) *“The state or condition when nothing is audible; absence of all sound or noise; complete quietness or stillness; noiselessness”*. In German this type of silence would be “stille”, and in Hebrew “dmama” or “dumia”. Its closest equivalent in English is “stillness” (Fernando, 2002). Definition 3b of the OED, a definition which we will later

propose to adopt for the purpose of the present research, is “*Neglect or omission to write (about something); failure to communicate or reply*”, and would also be translated in German into “schweigen” and in Hebrew into “shtika”.

More quantitative attempts to define silence have taken place in the context of the study of pauses in conversation. Pauses are a normal part of conversation, and the question that is raised by researchers of conversation is “when is a pause a silence” (Tannen, 1985).

Tannen’s answer is that a pause is silence “...*when it is longer than expected, or in an unexpected place, and therefore ceases to have its ‘business as usual’ function and begins to indicate that something is missing*” (p. 109). McLaughlin & Cody (1982) chose to define such lapses (or extended silences) at three seconds or more, citing a few researches showing that normal switching pauses in conversation were of a duration of less than one second; that pauses of over three seconds were absent from spontaneous speech; and, that silences of more than 3 and 4 seconds significantly impacted ratings of social competence.

2.2.2 Silence – an interdisciplinary research topic

Some of the confusion over the meaning of silence stems from the fact that silence has been researched within the confines of several academic disciplines. Jaworski (1997) looks at silence in a multidisciplinary manner, as a linguistic, discursal, literary, social, cultural, spiritual and meta-communicative phenomena. Tannen and Seville-Troike (1985) explore silence in diverse contexts including not only communication but also psychology, anthropology, religion and education, to name a few. Each of the disciplines looks at silence with a different toolset, and the resulting confusion adds to the difficulty of comprehending this essentially ambiguous subject.

Despite the risk of inconsistency stemming from these difficulties, we would like to present a few classification systems suggested for categorizing various types of silence. Bruneau (1973) defines three forms of silence: Psycholinguistic Silence, Interactive Silence and Socio-cultural Silence. Psycholinguistic Silence, such as pauses which slow down speech while it is being created, are a result of either the need of the speaker for extra time to perform the linguistic tasks (Rubinstein, 2004), or to give the listener time to process the speech effectively. Interactive Silences, such as the pauses that allow turn-taking in dyads or in small groups (Cappella, 1979; Sacks, Schegloff, & Jefferson, 1978), are mutual silences shared by the members of the dyad or of the small group, until one or more of the parties chooses to break the silence. These are presented in more detail in the discussion section of study 1 ([6.1.2.2 Possible explanations for the findings](#)). Socio-cultural Silence is silence used by entire social and cultural orders in specific situations. For example, the silence associated with religious worship: silent Trappist monks, Buddhists practicing Vipassana, and silence in Judeo-Christian prayer to name a few (Maltz, 1985; Quinney, 1988). Poyatos (2002) lists and categorizes many forms of silence (and stillness) at the human level (language, paralinguistic, audible kinesics, other body sounds, direct/indirect acts upon objects/substances), animal, cultural environment and natural environment. Every form of silence is presented as a silent alternative to a specific sound, and next to its corollaries of movement and stillness. For example, silent footsteps can alternatively be noisy, and feet may either move or remain still. Kurzon (1995) looks at silence in the context of “the right of silence” and analyses it from the point of view of “intention” and “ability”. A silent response could be a result of the lack of ability to speak (either due to ignorance or to psychological disabilities such as shyness or embarrassment) or of the “ability not to speak”, or “ability not to say anything”: intentional

silence. An interesting and diverse list of “types of silence” can be extracted from the index to Jaworski’s (1997) interdisciplinary book and consists of the following types: absolute, acoustic, antecedent, anterior, arbitrary, contemplative, displayed, gustatory, inter and intra turn, olfactory, spiritual, static, surrogate, tactile, temporal and visual.

Psychology explores the role of silence in several contexts. We will focus on the role of silence in social exclusion, namely ostracism (Williams, 2001). Ostracism is both pervasive and powerful, playing on deeply seated fears of rejection and exclusion, and threatening fundamental human needs such as a sense of belonging, self-esteem, feeling of control, and a belief in a meaningful existence. Ostracism even depletes psychological resources of the ostracizer. Ostracism is evident in most civilizations and cultures, as well as in the animal kingdom (Ciarocco, Baumeister, & Sommer, 2001; Williams, 2001, 2005).

Silence has an important role in the daily operations of organizations, and interesting examples of the important and complex role of silence in organizations come from the workplace, as well as from the classroom. In the workplace, employee silence not only hurts the organization by preventing the identification of illegal or unethical practices, and hampering organizational learning, but rather it also affects the employees. For example, it increases their sense of helplessness and reduces job satisfaction. Such affects harm the long-term well-being of the employees and of the organization (Milliken & Wolfe, 2003; Van Dyne, Ang, & Botero, 2003). In the classroom, silence has often been discussed in the context of power relations between teachers and students, and among students, as well as in the context of examining the influence of “wait time” after questioning the class, showing that longer wait times increased inclusiveness (Bruneau, 1973; Nakane, 2003).

The controversial “spiral of silence” theory was developed by Elisabeth Noelle-Neumann (1991), claiming that people who hold a minority view are less likely to express it in public, due to fear of isolation. This reticence results in a spiral, which leads to silencing minority views. This process is accelerated by mass media (Neuwirth, Frederick, & Mayo, 2007).

No discussion of human silence can be complete without mentioning the topics of time and perception of time. Silence is defined by time and by the way time is perceived by communicators, and time is perceived differently in monochronic cultures in comparison to polychronic cultures (Hall, 2000), is embedded in the social fabric in diverse ways (Julkunen, 1977), and evolves historically (Nowotny, 1997; Strate, 1995). An interesting link between physiology and the perception of time is described by Poppel (2004), who points out a 3-second window that appears to delimit the difference between what is perceived as “now” or as “the present”, and what is the past or the future. This window defines these boundaries across experiments and observations that employ different paradigms “...covering perceptual processes in audition and vision, cognitive evaluation, movement control, speech, cultural artifacts, mnemonic representation, perceptual accentuation, or temporal integration...” (p. 300). It seems like this period of time, or “window”, reflects a general principle of the neurocognitive machinery. The topic is further discussed in [2.6.4.1 Time in communication](#)

2.2.3 Defining the boundaries – what is *online* silence?

It is clear that the nomenclature of silence is so extensive and diverse, that it is impossible to fit “online silence” into one clear category. Silence in CMC can be intentional or unintentional; it can be psycholinguistic, interactive or socio-cultural; it can be arbitrary, contemplative, visual, and so on. In this work, we focus on one paradigmatic type of silence, the one which is represented in definition 3*b* from the Oxford English Dictionary (1989):

“Neglect or omission to write (about something); failure to communicate or reply”. This definition covers situations which we find as the most commonplace and intuitive examples of online silence or stillness: an unanswered e-mail message, a posting to an online forum (e.g. chat forum, Usenet, online classroom) which does not receive a response, or an unanswered instant message. The definition is not an objective and independent definition. As already demonstrated in the above review of previous research on “traditional” (i.e. offline) silence, silence cannot be defined in any manner other than a subjective and context dependent one. Nevertheless, we believe this definition is a sufficient starting point to allow the exploration of the unique nature of online silence, based on the understanding that has been accumulated to date, of the nature of silence. This definition leaves for later research forms of online silence such as large white spaces between paragraphs in online messages, empty postings, the silence in online synchronous audiovisual events, slow, outdated and unavailable links, and empty spaces in web pages.

2.3 Nonverbal cues

Silence in communication is one example of nonverbal communication. Some identify silence and stillness as the passive opposite of all sound and movement (Poyatos, 2002b). While acknowledging the pervasiveness and omnipresence of silence and stillness in every aspect of human communication and human culture, we still treat silence as an example of one category of nonverbal cues, that category being chronemics.

Various researchers classify nonverbal cues in various ways, depending on their disciplinary inclination, and on their definition of nonverbal communication. Some define nonverbal communication in a highly inclusive manner. For example, Poyatos (1983b) defines

nonverbal communication as: “*the emissions of signs by all the nonlexical, artifactual and environmental sensible sign systems contained in the realm of a culture, whether individually or in a mutual costructuration, and whether or not those emissions constitute behavior or generate interaction*” (p.69). Others provide a more narrow definition, such as “*...all the messages other than words that people exchange in interactive contexts*” while clarifying that “*to qualify as a message, a behavior typically must be sent with intent and/or it must typically be interpreted by others*” (Hecht, DeVito, & Guerrero, 1995, p.5). A similar definition is offered by Burgoon & Hoobler (2002) who define nonverbal communication as “*...those behaviors other than words themselves that form a socially shared coding system*” (p.244). Those who provide a wider definition of nonverbal communication naturally provide a longer and more inclusive list of nonverbal cues, while those who use a more strict definition, suggest a shorter list. In the dissertation we chose the latter approach, which is more restrictive and less encompassing. This choice is in agreement with our relatively narrow definition of online silence, as described above. Taking the classification of nonverbal codes suggested by Burgoon et al. (1996b), and by Burgoon and Hoobler (2002) there are three general categories of codes: Visual and auditory codes (kinesics, physical appearance and vocalics), contact codes (proxemics and haptics), and place and time codes (environment and artifacts, and chronemics).

2.3.1 Classifications of nonverbal cues

According to the classification by Burgoon et al. (1996b) and by Burgoon and Hoobler (2002): kinesics refer to all forms of visual body movements, excluding physical contact with another’s body, and including gestures, facial expressions, trunk and limb movements, posture, gaze and gait; physical appearance includes both the natural physical features of the

communicator, as well as body adornments which are manipulable, such as clothing, hairstyle, cosmetics, and fragrances; vocalics include audible behaviors that augment or modify the spoken word, such as pitch, loudness, tempo, pauses, and inflection; proxemics include physical distance and space between communicators; haptics include touch, including the frequency, intensity and type of contact; environment and artifacts are the physical objects and environmental attributes that form the context of the communication; and, finally, chronemics is the component of time in interpersonal communication. Silence is only one example of a chronemic cue, along with others such as the time of the day, of the month, or of the year, punctuality and waiting time, etc. It is also possible to classify silence as a vocalic feature (an infinitely long pause) though we assert that silence is more similar to other chronemic signals than to other vocalic signals.

2.3.2 Interpreting nonverbal communication

Nonverbal communication is highly context sensitive and subjective. It is, thus, both illusive and ambiguous, and any attempt to interpret nonverbal communication cannot heavily rely on any single cue. The fact that we all engage in nonverbal communication, constantly sending and receiving nonverbal cues, encoding and decoding nonverbal messages, could mislead us into a false sense of security about the subject of nonverbal communication. As Hecht et al. (1995) point out, misunderstandings can and do occur, depending on (1) whether or not the sender intends to send a message, (2) whether or not the receiver pays attention to and interprets the message, and (3) whether or not the receiver's interpretation is accurate.

2.3.3 Nonverbal communication research

A lot of the basic research in nonverbal communication focuses on the specific types of cues described above, and how they are used to express emotion, to persuade, to deceive, etc. Nevertheless, this research is only the foundation for lines of research that explore how verbal and nonverbal communication relate to each other (S. E. Jones, 2002; Key, 1980), as well as how the nonverbal behavior of one person influences other people (Guerrero, DeVito, & Hecht, 1995). These include the study of nonverbal adaptation, of reciprocity (or convergence) and of compensation (or divergence), as well as of expectancy violations.

2.3.4 Expectancy violations theory

Expectancy Violations Theory (EVT) (Burgoon et al., 1996b) initially attempted to explain why some invasions of private space resulted in a negative reaction, while in other cases similar violations of proxemic norms resulted in positive reactions. Later, EVT was expanded to apply to other nonverbal behaviors and to involvement violations in general (Burgoon & Hale, 1988; Burgoon, Newton, Walther, & Baesler, 1989). The theory describes what happens when expectations about a communicator's nonverbal behavior are violated. It asserts that once such a violation occurs (for example, when a person we are comfortably conversing with significantly decreases conversational distance), our attention to this nonverbal aspect of the conversation is heightened, and we attempt to assign a valence to this violation: is it positively valenced (e.g. the other person's decreased conversational distance is a pleasant act of increased intimacy) or is it negatively valenced (e.g. the decrease in distance is a threatening act). EVT research has shown that often the assignment of violation valence is a result not only of the type of violation, but is influenced by our assessment of the

person who committed the violation. To take the above example, the decrease in the conversational distance by a high valence person who is attractive and appealing to us, is more likely to be judged as a positive violation than the same action by a low valence person whom we judge as unattractive or even as repulsive.

In a pivotal study of nonverbal expectancies, Burgoon and Walther (1990) set out to understand how expected or unexpected various nonverbal behaviors are, what evaluations are assigned to these behaviors, and how these evaluations are moderated by communicator valence, as well as by communicator gender. In that study, the authors asserted that “...communication expectancies are cognitions about the anticipated communicative behavior of specific others, as embedded within and shaped by the social norms...” (p. 236). They go on to make the distinction between “expectancy” for what is predicted to occur, rather than what is desired. By making that distinction, they separate *expectancies* from *evaluations*. The results of that study clearly demonstrate which nonverbal behaviors are more expected than others (i.e. normative), how various nonverbal behaviors are evaluated, and how they affect variables such as communicator credibility, attractiveness and relational message interpretation. Relational communication (Burgoon & Hale, 1987) resembles identity and impression management, though it follows a participant (rather than observer) perspective, it is directed to a specific target, it focuses on the dyadic interaction, and it focuses on meanings attached to nonverbal behavior (Walther & Parks, 2002). EVT reveals interesting interactions between expectancies and communicator valence, as well as between evaluations and communicator valence. EVT has been applied to online communication and online expectancies too (e.g. Burgoon, Burgoon, Broneck, Alvaro, & Nunamaker Jr, 2002; Krikorian, Lee, Chock, & Harms, 2000).

2.4 Social cognition¹

A research of online silence tackles many of the issues discussed by researchers of online social cognition, issues such as attribution, uncertainty reduction, impression formation online, perception of self online, groups online, and online social presence.

Social cognition (SC) deals with the mutual influences of cognition on social life, and of social environments and processes on cognition. Cognition is fundamentally influenced by the social environment (Levine & Resnick, 1993). Research on social facilitation, social loafing, social roles, and mental representations has shown distinct social influences on cognitive abilities and task performance. SC is about the cognitive underpinnings of social behavior (Devine, Hamilton, & Ostrom, 1994). SC studies how social structures and social processes are mentally represented, and how social interaction is important for the development and practice of cognition. Individuals are viewed as being engaged most of the time in information processing. Information is encoded from a social context, as well as interpreted, elaborated, evaluated, inferred and attributed. Processed information, or knowledge, is later used in judgment processes and for guiding behavior.

Research into SC shows that judgment and behavior need not always be the result of a thorough mental process, but rather the result of short-cuts known as heuristics. SC draws from both social and cognitive psychology. It deals with how people make sense of themselves and of others. Some refer to social structures as concepts or schema (Kunda, 1999).

¹ Significant parts of this section are based on Rafaeli, Raban & Kalman (2005). See [1.3 List of publications](#)

2.4.1 Attribution theory

One key theory related to the way social inferences are made is attribution theory (Heider, 1958), asserting that people constantly answer a need to make sense of the world they live in by attributing traits to others. The traits are attributed by drawing inferences from the behaviors of others. Attribution is a three-step process: perception of the action, judgment of intention, and, finally, attribution of disposition (Griffin, 2003). Behaviors, verbal as well as nonverbal (Manusov, Floyd, & Kerssen-Griep, 1997), can, for example, be attributed to internal or external factors, to controllable or uncontrollable factors, and to stable or unstable causes. The attribution is based on antecedents such as prior information about the event and its circumstances, beliefs, and motivations (Kelley & Michela, 1980), and the consequences of the attribution can influence not only behavior, but also produce emotional or affective reactions, as well as alter expectations about others as well as about self (DeJoy, 1994). An important element in the attribution process is the concept of intentionality, which is distinguished from the concept of intention (Malle & Knobe, 1997). The judging of intention is fraught with various biases such as the correspondence bias (overestimating the role of dispositional causes), the self-serving bias (the tendency to attribute ones own positive outcomes to internal factors, but negative outcomes to external causes), and other effects of the actor-observer gap (R. Baron & Byrne, 1997; Gilbert & Malone, 1995; Malle & Pearce, 2001). The complexity of intentionality is increased further by its high culturally and linguistic dependency (Duranti, 2006).

2.4.2 Uncertainty reduction

An interesting angle on attribution theory looks at the early stage of personal relationships, and emphasizes that attempting to explain the behavior of others at these early stages is fraught with uncertainty. Berger's uncertainty reduction theory (Berger & Calabrese, 1975) proposes eight axioms to explain the connection between uncertainty and eight variables: verbal communication, nonverbal warmth, information seeking, self disclosure, reciprocity, similarity, liking and shared networks (Griffin, 2003). This theory has been extended in several directions. Those of interest to this dissertation include the work by Brashers (2001) as well as that of Goldsmith (2001) who enriched the theory by taking into account the fact that the uncertainty is highly context dependent, multilayered and interconnected, and has temporal dimensions. Most importantly, these researchers removed the negative undertone that accompanied the theory, acknowledging that uncertainty can also be associated with neutral emotional responses, as well as positive ones.

2.4.3 Social cognition online

Social cognition is not limited to the study of individual cognition and how it is affected by the social environment. SC impacts the way in which individuals and cultures perceive, define, and interpret media in general, and specifically online media.

Research on SC among individuals, dyads, and groups has focused on behavior and perception in physical environment (Fiske, 1993; Fiske & Taylor, 1991). When turning to the virtual, it is tempting to set up a contrast with the "natural" way that people interact, i.e. face-to-face (Chapanis, 1975; Lantz, 2001). The question then is, of course, if face-to-face should be treated as the benchmark against which all innovations and new contexts need be

judged? One prime example of elevating face-to-face traditional set-ups to ideal/standard status is the media richness approach (Daft & Lengel, 1986). Media richness theory argues that task performance will be improved when capabilities of the media (cues, feedback, personal focus, and language variety) are matched to task ambivalence and uncertainty. In this approach, face-to-face communication is considered the richest communication medium in a hierarchy followed by the telephone, electronic mail, letter, note, memo, special report, and finally, flier and bulletin. Some observations and predictions are made regarding the propriety and efficiency of different media. Specifically, this theory suggests that performance in equivocal tasks would be better when using “rich” media. According to this theory, in the case of unequivocal tasks, performance would be better if leaner media are used. Unfortunately, empirical data to support media richness theory fall somewhat short (A R Dennis, Kinney, & Hung, 1999; A R Dennis & Valacich, 1999; El-Shinnawy & Markus, 1997; Morris & Ogan, 1996; Riva, 2002). An interesting theory which developed from a critical examination of media richness theory is the theory of media synchronicity (A R Dennis & Valacich, 1999) which proposes that media choice is influenced by five media capabilities (feedback, symbol variety, parallelism, rehearsability, reprocessability) to support two fundamental communication processes (conveyance and convergence).

The social information processing (SIP) theory of CMC interaction (Walther, 1992; Walther & Parks, 2002) provides a more constructive analysis of the limitations of online communication. According to SIP, users of CMC find alternative methods to reduce interpersonal uncertainty, to form impressions or to develop affinity, and that they perform these tasks using whatever cues the medium allows them. SIP claims that the apparent superiority of face-to-face communication is a result of the fact that CMC is often slower

than face-to-face communication. But, when these time restrictions are lifted, and users are provided with enough time to exchange online messages, they are able to reach levels of impression and relational development comparable with those achieved in face-to-face communication (Walther, Anderson, & Park, 1994). This fact that time has such a central role in the quality and effectiveness of online communication, underlines the importance of chronemics in online communication (Walther & Tidwell, 1995). Walther (1996) as well as Herring (1999) have taken this concept one step further, showing how CMC users leverage the unique attributes of specific CMC media to achieve communication goals that go beyond the interpersonal levels typically achieved in face-to-face communication. These findings might be surprising in light of the dire descriptions of the limitations of CMC in relation to face-to-face interactions, but are not surprising in light of the incredible success and penetration of certain forms of CMC.

It is thus clear that face-to-face interactions are neither an ideal nor should be treated as an ultimate standard. Social cognition develops in a variety of loci/media. Previous research has already contested the standard of face-to-face asserting that interpersonal interactions and social influences affect media choice (Fulk, Schmitz, & Steinfield, 1990), and online relationships have been shown to be healthy, a complement to face-to-face relationships (Peris et al., 2002), and based on unique information seeking strategies (Ramirez Jr, Walther, Burgoon, & Sunnafrank, 2002). With the Internet there is the possibility that face-to-face be demoted from its ostensibly classic preordained position/status as ultimate yardstick. The Internet itself is a plurality of media operated by diverse technologies which constitute a culture or a social space in its own right. In fact, the “richness” of CMC is a variable, not a characteristic.

A fruitful alternative to contrasting the “real world” with the “virtual world” and discussing the superiority of one over the other is to find creative and instructive analogies between new media and well established institutions and forms of communication. Two excellent examples of books that successfully achieve this goal are Danet’s (2001) “Cyberpl@y: Communicating Online” and Laurel’s (1993) classic “Computers as Theatre”. These analogies then enhance our understanding of new and emerging trends, while throwing new light back on traditional forms of art and communication.

2.4.3.1 Impression formation in CMC

The perception of the “other” online, and how the impression of those we interact with online is formed, have been a focus of research from the first days of online communication. The initial focus was on the gap between the impressions formed online, and impressions in “real life”, with an emphasis on anecdotal cases of fraud and deception. This approach follows a historical pattern of focusing on the sensational, as well as on the faults and deficiencies of a new medium in relation to traditional communication media. Similar claims were made historically with the introduction of early electric media (Standage, 1998) and appears in social science research about the first days of telephone and telegraph (Marvin, 1990; Pool, 1983). Much of the early work focused on the reduced social cues in comparison to face-to-face communication. The reduced social cues approach highlighted the surprise and disappointment that arose when those who formed the impressions were confronted with “real life”. These works concluded that online impression formation is faulty and wrought with stereotypical and prejudiced assumptions used to “fill in the blanks” (Albright, 2001) of the reduced social cues. Terms such as “fluid identities” (Turkle, 1997) were used to warn about the unsound and shifting sands of CMC.

In retrospect it is clear that many of the early works on CMC may have failed to distinguish between the various contexts of online activities. Some popular activities such as Multi-user Dungeons (MUD's) were purposely structured for "play" purposes, wherein impersonation and identity experimentation were the expressed purpose of these settings. Such environments flourished on university campuses among students, close to the eye and attention of researchers. This, too, may have given these contexts some increased salience. No wonder that a "reality check" in such cases reveals that the (generally) young and often experimentally minded people playing behind the screen names in a online role-playing game are different than imagined.

As indicated above, impersonation, (a form of self-presentation), ranges from simply using an alias name in order to save typing or time, or avoid revealing one's real name through assuming an identity for playful purposes, and, finally, to creating a complete false identity in order to engage in criminal or terrorist activity. The latter form was given the most media attention but the other two forms of self-presentation are by far more widely used. All these forms of self-presentations indicate a high degree of awareness of others, your own and others' perception, combined with a high degree of understanding of the computerized and networked environment.

Research shows that senders often try to optimize their self-presentation by mentioning information they perceive as impressive, while holding back information which is less so (Walther & Burgoon, 1992). The receiver in the online case sometimes idealizes the sender, "filling in the blanks" with information that tends to be too rosy (Tidwell & Walther, 2002). Such a combination can result in disillusion when eventually a face-to-face meeting occurs. This disenchantment received much attention in literature dealing with online dating and

online relationships (Turkle, 1997), but is apparent in other online contexts too (Rouse & Haas, 2003). As Rouse and Haas point out, inaccuracies in personality perception of online “others” are mainly a result of three important differences between Internet-mediated factors and face-to-face communication: The first is that physical appearance has a less meaningful effect, the second is that people may behave different online than in a face-to-face situation, and third, that online there is a heightened level of ambiguity due to the lack of vocal inflection and facial expression. In contrast, it is important to point out that such assertions about the inferiority of online vs. offline impression formation ignore some more basic questions. For example, is the ability to present an idealized self online similar to the ability to idealize one's physical appearance through the choice of clothing, haircut, makeup, accessories and even plastic surgery or over-polite behavior? Are humans gradually becoming more skilled at detecting signs of such online attempts, integrating them into the emerging impression, just as they would detect and interpret an attempt to conceal physical imperfections in traditional offline interaction? Is the ambiguity of an online smiley or online silence analogous, to some extent, to the different interpretation a smile or silence can have in an Eastern culture like Japan in comparison to its meaning in a Western country like England? Are some people better at putting on an online “poker face”, while others' “online face” is easily interpreted by competent users? Is the reaction to a slick and overly polite used cars salesperson offering us a once in a lifetime deal if we make our minds immediately before someone else grabs it, similar to the reaction to “spam” promising us the opportunity to make thousands of dollars a month working from home in our spare time? It may be too early in the evolution of human online communication to simply conclude that the ability to discern authenticity online is inferior to face-to-face. Rather, it is important to focus on

understanding the dynamics and evolution of the emergence of the human capability to communicate online, on the way skilled users are using it to fine-tune their perceptions, or to influence the way they are perceived. Reeves and Nass (2000) point out in their discussion of the “perceptual bandwidth” of computer mediated communication: “... *the assumption that more is always less is misguided. An increase in the breadth and depth of media representations certainly turns up the volume knob on perceptual responses, but greater presence does not translate into greater efficacy or desirability; intensity does not equal quality.*” (p.70)

Once the issue of the superiority of face-to-face over CMC is removed, the questions that arise are questions that focus on aspects of SC online, and mainly questions of what influences the way users translate the special social cues of CMC (especially text-based CMC) into impressions, what influences these impressions, and how do CMC users try to influence the way they are perceived by others. Online impression formation occurs in stages. First impressions are formed based on very initial signs such as the e-mail addresses or the screen names as well as on the context of the online occurrence (Wallace, 1999). As the interaction progresses, more information accumulates: the sentence structure, vocabulary, grammar, spelling, use of capital letters, typographical marks such as emoticons, as well as self-testimonials about matters such as gender, age, location, occupation, hobbies and marital status. Additional elements that can influence this impression are less linked to pure linguistic aspects and can include the length of the message, the amount devoted to talking about oneself, number of opinions expressed, level of friendliness, the content of the message, strength of expressed opinions, (Savicki, Kelley, & Oesterreich, 1999), as well as

non-verbal cues such as response time (Tyler & Tang, 2003; Walther & Tidwell, 1995). Such cues will be further elaborated on in the later section [2.6 Nonverbal cues in CMC](#).

How do all of these cues translate into an impression of the “other” online? As in offline situations, this process is in essence inductive, and may be based on social stereotypes, categorizing people based on the signals they give off. Success of this process depends on factors such as the context of the interaction, the interpreter’s capabilities and information sources, the self presentation of the “other” and his or her willingness to present truthfully. Cognitive psychology has developed a keen interest in the introspective notion of heuristics. How do people form impressions, perceptions, cognitions and attitudes by relying on shortcuts. Prospect theory (Kahneman & Tversky, 1979) explains a wide variety of perceptual and attitudinal peculiarities of human choice, preference and behavior. Much of prospect theory has been developed in traditional contexts. How does prospect theory translate to the online arena? It seems that, at least in the case of one effect, the endowment effect (Thaler, 1980), the predictions that applied to the physical, tangential world work well for the abstract, virtual and online milieu. In their experiments, Raban and Rafaeli (2006) for instance, found that people apply similar decision making biases and heuristics in online contexts. Consistency in behavior overpowers opportunity for change. Such attempts to understand the online manifestation of established theories (such as socio-cognitive theories) are imperative to both advancing human behavior online, as well as to expanding the scope and hopefully validity of the theories.

One of the theories dealing with the way these scarce cues are translated into impressions is the Social Identity model of Deindividuation Effects (SIDE) developed by Spears and Lea (Spears & Lea, 1994), theorizing that these limited cues undergo an “over-attribution”

process, which may also result in a stereotypical assignment of attributes to group members (Chenault, 1998). Even few social cues can make a significant impact on the quality of impressions people form of each other, and it is through interpersonal and “intimate” contact that people are able to cross the boundaries of ethnocentrism and stereotypes (Tanis & Postmes, 2003).

2.4.3.2 Perception of self online

In addition to understanding how others are perceived online, it is also important to understand how people perceive themselves when online. Self perception or self concept may seem fixed or constant. In fact, self perception is very malleable. Sociocognitive research has identified a variety of selves: Self concept varies in private versus public circumstances, and it varies with the different roles we assume (e.g. parents, employees, spouses) and contexts or situations we experience. Thus, self-concept is dynamic, with attention focused on the context-specific self rather than on one 'global' self (Devine et al., 1994). Sherry Turkle in a seminal article (Turkle, 1980) provided computers and networks' impact on perception of self with a slogan that captures the variability of self-perception, perhaps amplified, by computers and networks. In "Computers as Rorschach" she says that users project meaning to computerized activities rather than being passive recipients. This sentiment was then echoed in much human-computer interaction work on user-centered computing (Shneiderman, 1998), and naturally percolated into the very design of systems and networks. The projected meaning is influenced by a variety of environmental or social effects, in addition to the personality of the actor. Further research in Turkle's tradition evolved in the landmark book "The Second Self" and in "Life on the Screen" (Turkle, 1984, 1997). The Internet provides numerous opportunities to affect what Goffman called “the

presentation of self” (Donath, 1998; A. R. Stone, 1991). The construction of a personal home page, the introduction one is expected to make when entering an online forum, the “about me” descriptions many provide as a rite of inclusion into various social software arenas, and the profiles one accumulates for oneself willingly or not on a variety of online systems, all influence presentation of self. In a work on response time to e-mail messages, the researchers (Tyler & Tang, 2003) found evidence that e-mail users used response time as a tool to influence the way they self-present their “responsiveness profile”.

2.4.3.3 Groups online

An additional area of interest in online impression formation is the way people perceive themselves as members of online groups. What are online groups? Many terms have been used to describe influential Internet based interactions between several participants, including “virtual communities” (Rheingold, 1993), “virtual teams” (Lipnack & Stamps, 2000) and “virtual groups” (Wallace, 1999). We will use the more generic term virtual groups. The tools used by people to congregate online are diverse, and include electronic mailing lists, forums, synchronous chat systems such as IRC, asynchronous discussion forums, MUDs and MOOs, Usenet newsgroups, virtual classrooms, blogs, and social networking sites. Some of these are very rich media, allowing real-time transmission of audio, video and text, as well as online application sharing, while others are very rudimentary, and based only on the asynchronous transmission of ASCII text. People participate in online groups for work, education and leisure, acquiring, disseminating and sharing information and knowledge, collaborating, and socializing.

Initially, there was a lot of excitement about the possibilities opened by online virtual groups, with the combination of a widely dispersed but closely-knit community. A good example is The Well, established in 1985 and described in the book “The Virtual Community” (Rheingold, 1993). At about the same time, virtual communities were contrasted with “real” communities, while mourning the damage inflicted by “Technopoly” (Postman, 1992). Later the term “Internet Paradox” was coined (Kraut et al., 1998), claiming that the Internet actually reduces the level of social involvement of its users. An additional element in this process of disillusion was the accumulation of online communities that disintegrated, or simply stopped functioning. Unlike “real world” social connections which can disappear without leaving a trace, online communities often leave behind artifacts (Q. Jones, 1997) which can confuse people who might attempt to join or interact with such communities, only to discover that they are totally silent (Wallace, 1999). The disillusion was supported by reports of discussions in online groups that resulted in flaming and polarization (Spears, Russell, & Lee, 1990). When put into perspective, such a dichotomous debate becomes meaningless (Etzioni & Etzioni, 1999; Wellman & Gulia, 1999). Online groups are as “real” as any other groups, and are simply different in some aspects from traditional face-to-face groups. Online groups are social units in which the participants are interdependent, and behave according to explicit or implicit social norms. Online groups show, just like other groups, both examples of social compensation as well as social loafing, and even effects such as crowding and deindividuation (Spears, Postmes, Lea, & Wolbert, 2002) have been documented.

An interesting angle on online groups and attribution comes from an exploration of misattribution in virtual groups (Walther & Bazarova, 2007). In this study it was shown that

even in the context of completely virtual groups, members take into account the physical or geographical location of the other members. For example, members of a virtual group were more likely to blame others for their own poor performance (self-serving bias) when the virtual group they were in was geographically distributed, in comparison with a virtual group which members were collocated.

“Lurking” is a special form of social cognition in groups. Participation in online groups, such as forum discussions, is not symmetric. Usually, a small number of participants contribute. A much larger number remain receivers. Often, reticent receivers are named “lurkers” (Nonnecke & Preece, 2000). Receivers who remain passive are either intimating a social cue – or at the very least are understood as imparting a message. Thus, lurking is not just a behavior. It is a perception and is perceived by self and by others in social contexts. Lurking has been a social and cognitive concern since the early years of public CMC. Even in participatory virtual communities, many people limit their participation to reading, and never post themselves. The reported proportion of lurkers varies from around 90% (Katz, 2003; Mason, 1999) to around 50% (Nonnecke & Preece, 2000; Soroka, Jacovi, & Ur, 2003). Lurking usually means "lying in wait", often with malicious intent. But interestingly enough, “lurking” does not have to carry a negative connotation. The Merriam-Webster dictionary definition of the verb "lurk" has one unexpected meaning – "to persist in staying". Thus lurkers can be defined as a persistent but silent audience. Lurkers have been recognized by many researchers as an important and integral part of any community. Rafaeli and Sudweeks (1997) point out that though lurkers are an important part of any online group, there is little information about their activity. Whittaker, Terveen, Hill, & Cherny (1998) also

acknowledge lurking as a very popular activity among virtual community participants, an activity that leaves no traces.

The reasons for lurking range from concerns for privacy, through respect for others' time and attention limits, to those rooted in personality (Rafaeli, Ravid, & Soroka, 2004). In any case, both the reasons for lurking and its outcomes are central to the understanding of social cognition among the less salient and available, but probably more numerous, participants in online groups.

2.4.3.4 Online social presence

Social presence is the awareness of others' being there. As early as 1976, Short et al. (1976) identified social presence as crucial to the understanding of mediated behavior. Presence was postulated to affect trust, compliance, attraction, motivation, and more. More recent work on virtual presence looks at virtual presence as both an independent and a dependent variable. As computerized systems and networks are designed by humans, the degree to which they elicit a sense of presence is an important variable. Thus, for instance, Biocca and Levy (1995) experiment with the interaction effect between user factors and media factors on feelings of social presence. They provide strong evidence for human's automatic social responses to artificial representations possessing humanistic properties such as language and personality. Clearly the more immersive CMC systems become, with a wider range of sensory and cognitive appeals, and a longer average exposure people have to these systems, the degree to which such systems are actually social in the full sense of the word comes into focus. Lombard and Ditton (1997) remind us that virtual presence might be an illusion or a hoax, and that its effects are worthy of further examination.

2.5 Interactivity

One central driving force in the induction of computers into our social circles is the notion of interactivity. Interactivity refers to the extent to which communication reflects back on itself, feeds on and responds to the past. Interactivity is the degree of mutuality and reciprocation present in a communication setting. The term interactivity is widely used to refer to the way content expresses contact, and communication evolves into community. And, of course, interactivity is a major option in governing the relation between humans and computers (Rafaeli, 1984, 1988; Rafaeli & Ariel, 2007). Interactivity is an essential characteristic of effective online communication, and has an important role in keeping message threads and their authors together. Interactive communication (online as well as in more traditional settings) is engaging, and loss of interactivity will result in a breakdown of the communicative process. Research of rhythms in e-mail and other CMC media resulted in claims that text-only CMC is “Interactionally Incoherent”: disjointed, without clear turns, and in general “chaotic”. But, as mentioned earlier, Herring (1999) noted that text-only CMC is extremely popular, despite obstacles such as disrupted turn adjacency and lack of simultaneous feedback. The online interaction is highly desired, and almost addictive in nature (Caplan, 2003; Morahan-Martin & Schumacher, 2000).

2.6 Nonverbal cues in CMC

In previous sections we reviewed theories such as “Cues-filtered-out” (Culnan & Markus, 1987) that point to the apparent lack of nonverbal cues in text-based computer mediated communication (CMC). In contrast, others acknowledge the existence and role of various nonverbal cues in written CMC, and have explored their impact (e.g. Byron & Baldrige,

2007; Masterson, 1996; Panteli, 2002; Walther & D'Addario, 2001; Walther & Tidwell, 1995; Zviran, Te'eni, & Gross, 2006).

2.6.1 Defining nonverbal cues in text-based CMC

What are nonverbal cues in text-based CMC? We do not intend to elaborate here on the much debated definition of nonverbal communication (e.g. Burgoon, Buller, & Woodall, 1996a; Guerrero & Floyd, 2006; Knapp & Hall, 2002; Poyatos, 1983a; Vargas, 1986). Instead, as described previously in [2.3 Nonverbal cues](#), we have chosen one of the more popular classifications of nonverbal codes, the classification that was suggested by Burgoon, Buller & Woodall (1996b). We consider some of the nonverbal cues that can be classified under each category of codes: Visual and auditory codes (kinesics, physical appearance and vocalics), contact codes (proxemics and haptics), and place and time codes (environment and artifacts, and chronemics). We present evidence that each of these categories has one or more written CMC counterparts that perform similar or equivalent functions.

To be considered a nonverbal cue in text-based CMC, an element must be expressed differentially by different writers or in different contexts, and this variance must be communicated to the reader. For example, the fact that a writer hits the keypad with force can't serve as a nonverbal cue (expressing, for example, anger or excitement) since this forceful typing does not create any variance observable by the reader, who is not co-located with the writer. On the other hand, if the angry typing results in many typos, these typos can already be classified as a nonverbal cue that could signify distraction while typing. Given that a specific cue does exhibit observable variance, we mark it as a candidate online nonverbal cue, and then look for evidence that this variance either guides or influences the interpretation of the message, or that it *could* be used to guide or influence the interpretation

of the message. A good analysis of such behavior is presented by Ramirez Jr., Walther, Burgoon, & Sunnafrank (2002). If the cue exhibits variance that can be observed by the reader of the message, and if it has at least the potential to guide or influence the interpretation of the written message, it is then classified by us as a potential nonverbal cue, and is listed and briefly described below. Examples are taken from, and could apply to all forms of text-based CMC, including e-mail, chat, instant messaging, IRC, textual websites, SMS, bulletin boards, wikis and blogs.

A significantly more extensive analysis of nonverbal cues in written texts is presented in the first six chapters of Poyatos's third volume in his treatise on nonverbal communication, titled "Nonverbal Communication Across Disciplines: Narrative literature, theater, cinema, translation" (2002a). It includes many of the cues proposed below, as well as many additional ones. For example, a full chapter (chapter 5) is devoted to punctuation as nonverbal communication, in which one subchapter discusses the role of punctuation in communicating paralinguistic features such as pitch level, pitch interval, syllabic duration, loudness, speech tempo, rhythm, and silence. We have not gone into such details in this section on nonverbal cues in CMC, though in principal all nonverbal cues in written texts are actually a subset of nonverbal cues in text-based CMC.

In the limited context of this literature survey we present in detail only one sub-category of nonverbal cues (visual codes). Other categories of nonverbal cues, with examples from text-based CMC, but without supporting citations, are presented in Table 2. The table extends the section on visual codes, suggesting a list of possible nonverbal cues in text-based CMC. Note that the analogy to specific traditional nonverbal cues is presented as a suggestion, and as a preliminary tool to start tackling the challenge of actually defining what one means by a

nonverbal cue in text-based CMC. For example, the use of five consecutive exclamation marks in an e-mail header could be classified as a vocalic cue (the written equivalent of a vocal emphasis through modified intonation and rhythm), as a visual cue that makes the message stand out in the inbox, or, some could even claim that since it is a written sign, it can't be classified as a nonverbal cue at all, and that nonverbal cues are only nontextual ones such as response times, background colors, etc.

2.6.2 Examples of nonverbal cues in text-based CMC: visual codes

2.6.2.1 Kinesics

Kinesics refers to all forms of body movement, excluding physical contact with another's body (Burgoon et al., 1996a).

2.6.2.1.1 *Written gestures*

Text-based CMC media are relatively static, and body movements are often described by the written description of gestures, describing movements performed by a person. For example, in a study of the message board of the X-Filesaholics, Honeycutt (2005) describes cases of hazing that took place in early December 2000. The events that took place included a significant number of written gestures. For example, following an introduction posting by a newcomer, Bethanie, one of the board's members responds with the following message:

“:::hands her another tooth brush:::: ::::points to the bathroom::::
Welcome =D
- **Bethanie**”

Bethanie's nonverbal cue of pointing is understood by Allison the newcomer, who reacts by posting the following message:

“:::takes toothbrush:::
:::peers in bathroom:::
:::wrinkles nose:::
:::throws toothbrush back:::
I think I'll pass. . .
- Allison”

Allison clearly uses written gestures to express her displeasure with the assigned task, and supplants the nonverbal kinesic cues of wrinkling the nose and throwing the toothbrush with a short sarcastic verbal message “I think I’ll pass”.

2.6.2.1.2 Emoticons

Emoticons are probably the most frequently quoted nonverbal cues in text-based CMC.

These sequences of ordinary characters are usually focused on facial expressions that convey a nonverbal message such as a smile :-), a wink ;-), or a sad face :-(. Extensive research has been carried out on the use and interpretation of emoticons in text-based CMC (e.g. Provine, Spencer, & Mandell, 2007; Walther & D'Addario, 2001), with some emphasis on the interaction of gender and expression of emotions using emoticons (e.g. Huffaker & Calvert, 2005; Wolf, 2000).

2.6.2.1.3 Animated graphics

Users can add small moving graphic elements to their text-based CMC, which may exhibit gestures and movements. We are not aware at present of any studies that exemplify the role of animated graphics as nonverbal cues, though in a study of international websites it was shown that animated effects were more prominent and elaborate in websites in high context cultures than those in low context cultures, where animated effects were reserved for relatively subtle effects (Wurtz, 2005).

2.6.2.2 Physical appearance

Physical appearance includes both the natural physical features of the communicator, as well as body adornments (Burgoon et al., 1996a). Text-based CMC allows plenty of manipulations of the appearance of the message, as well as the additions of adornments to the message itself. In this section we first describe cues to the physical appearance of the communicator, and move on to elements in the appearance of the message that can act as nonverbal cues.

2.6.2.2.1 Pictures of the writer

The most obvious way to exhibit the communicator's physical appearance is through a photograph. Many text-based CMC media allow the attachment or embedding of a picture. There is clear evidence that these pictures influence our impression of the communicator (Walther, Slovacek, & Tidwell, 2001), and that pictures are used purposefully by the communicator to manage the impressions of the reader, for example in online dating sites (Ellison, Heino, & Gibbs, 2006; Hitsch, Hortacsu, & Ariely, 2005).

2.6.2.2.2 Verbal description of the physical appearance of the writer

Another obvious way to convey physical appearance in text-based CMC is through a verbal description of the communicator, by the communicator. Such descriptions are common, for example, in dating websites, where physical features are considered to be an important attribute of a potential date. Research shows that such descriptions can be skewed and idealized to a certain extent (Ellison et al., 2006), though this idealization is not necessarily carried out with an intent to deceive. For example, Ellison et al. describe the case of a woman

who misrepresented her weight online, and who “used an upcoming meeting as incentive to minimize the discrepancy between her actual self and the ideal self articulated in her profile“.

2.6.2.2.3 Fonts

The letters that are used to create the text-based messages can, in many CMC media, be manipulated by modifying font attributes such as typeface, color, size, etc. All of these influence the physical appearance of the message, and can serve as nonverbal cues. Usability studies have shown that varying font attributes can significantly influence not only reading effectiveness, reading time, and legibility, but also the perception of the writer of an e-mail message (Shaikh, Fox, & Chaparro, 2007), and font attractiveness (Bernard, Lida, Riley, Hackler, & Janzen, 2002) and that typography can influence reader mood (Larson & Picard, 2005). Moreover, using hard-to-read fonts and bright colors was a part of the justification given for the harsh welcoming (“hazing”) of a new member to an online forum (Honeycutt, 2005).

2.6.2.2.4 Line and paragraph spacing

Usability studies have shown that the spacing of the words and the paragraphs of a written document can influence the reader (Larson & Picard, 2005), and that good spacing improves usability, and induces a good mood in the reader, though we are not aware of studies that have shown how the spacing of words or paragraphs influences the impression formed of the writer, or how these are used to manage impressions. Based on this limited data it can be assumed that paragraph and line spacing is an important nonverbal cue. It could be expected, for example that two identical texts, one written in a single block of tightly typed text with no paragraphs, and the other organized into a few clearly delineated paragraphs, will create a

different impression, the latter inducing a better mood in the reader and consequently reflecting more positively on the writer of that text.

2.6.2.2.5 Icons and ASCII art

Icons (small graphics) and ASCII art are probably the closest equivalent to body adornments in text-based CMC. ASCII art are diagrams drawn using the ASCII character set (FOLDOC, 1996), and are incorporated into messages and signatures. They can be humorous, functional, or simply ornamental. In an ethnographic study of an electronic community, Rice-Lively (Rice-Lively, 1994) describes how the use of ASCII art was slowly incorporated into the group's communication, resulting in a better ability to express emotions in the absence of face-to-face cues. The addition of small icons, not only emoticons, is also a common way to adorn messages, though we are not aware of research describing the way icons that are not emoticons are used or interpreted.

2.6.2.2.6 Spelling and capitalization

Carelessly typed text can project an unkempt impression, analogous to an unkempt physical appearance. Lea & Spears (1992) have shown that cues such as misspellings and mistyping can have an effect on reader perception of the writer's intelligence, dominance, competence, originality, liveliness, self-confidence, verbal fluency, responsibility, and assertiveness.

Ellison et al. (2006) describe a participant in an online dating environment who found spelling errors "unattractive", and consequently used a word processor to compose his e-mails. They also quote participants saying "*If I am getting email from someone that obviously can't spell or put a full sentence together, I'm thinking what other parts of his life suffer from*

the same lack of attentiveness?”, as well as “I just think if they can't spell or... formulate sentences, I would imagine that they're not that educated” (p. 424).

2.6.2.2.7 Signatures

Signatures are the part of a message (usually in asynchronous messages) that is added to the end of the message, and includes personal information. Signatures vary significantly between various people and contexts, and this variance suggests the role of signatures in impression formation. In a content analysis of 193 corporate signatures Rains and Young (2006) showed how the choices made about what information to include in the signature, and what information to exclude, provide evidence for the use of signatures as a tool for impression management. In most cases, the signature is an element that is repeated by default in all of the e-mail messages sent by the employee, thereby becoming a part of the appearance of all of the employee's e-mails messages. Moreover, sometimes corporate users are required to stick to a specific signature format, in an effort to convey a uniform corporate look to all of the messages created by the employees of the company. These uniform signatures sometimes include legally worded disclaimers that are sometimes very lengthy and interfere in the look of the messages, especially when a conversation results in a threaded message with a few quotations of previous messages. Such lengthy signatures are also considered by some users as a “waste of bandwidth” and as un-prestigious (FOLDOC, 2001). An in-depth analysis of signatures in Usenet postings (Donath, 1999) shows the vast amount of information about the poster than can be gleaned from his or her choice of signature, including information about dress style, body piercings, or hair style (and lack thereof), strengthening the claim that the signature is an important nonverbal cue analogous to physical appearance. A final and interesting example of a status and hierarchy symbol encoded in the signature is presented by

the aforementioned 2005 paper by Honeycutt (Honeycutt, 2005), and it is a “couch cushion number” provided to the forum’s members in an ascending order as they join the forum. A signature that includes a low couch cushion number signifies seniority in the forum.

2.6.2.2.8 Nicks, names and addresses

Every text-based CMC message includes an identification of the sender. In the case of e-mail, it is usually an e-mail address that includes a “mail box” name and a host name. In other cases, it might only include a name chosen by the user. These names are sometimes called “user name”, “screen name”, “nick” (nickname), etc. Donath (1999) details the information about a person that can sometimes be gleaned about a person from his or her e-mail address, including their nationality, location, and institutional affiliation. Moreover, the nick or name serve as one’s virtual “face” and can be used to identify various posts and messages written by the same person, and posted in different places and at different times. Rintel & Pittam (1997) emphasize the centrality of these names: *“the choice of name, as the first impression-making device a user has, becomes highly significant in the construction of both an IRC persona and for perceptions about other interactants. Innocuous standard names allow an interactant to use other verbal tokens as the main initial impression-making devices, whereas offensive, strange, or funny names make impressions more quickly but may also lead to sanctions”* (p. 530). Bechar-Israeli (1995) closely analyses the various types and categories of IRC nicknames, and shows how this short word or single expression projects to other users who the person behind the nick is. In her analysis of the linguistics, psychology, and sociology behind the choice and utilization of nicks, Bechar-Israeli demonstrates how nicks are incorporated into the complexity of activities that take place during IRC sessions.

Heisler & Crabill (2006) show that usernames are actually used by recipients of e-mail messages as a nonverbal cue that assists them in forming an impression of the sender.

2.6.2.2.9 Attributes of subject line

Postings and messages written in asynchronous CMC media contain a subject line. It is common to use the subject line to write a short description of the content of the message. In an original posting (for example a new e-mail message), the content of the subject line is determined by the writer. When a message is created by replying to a previous message, most systems insert a default subject line that includes the original subject line, and some indication that the message is a reply to a message with that subject line (for example an addition of the prefix “Re:”). Most systems also allow an empty subject line. The subject line is a verbal cue, but it can also have attributes that act as nonverbal cues. We are aware of one research that investigated subject lines and their effect on web survey viewing, and on responsiveness. Most of the findings had to do with the verbal content of the subject lines, but interestingly one of the findings was that in one subset of the sample (low involvement) a blank subject line yielded the highest click through and response rates (Porter & Whitcomb, 2005).

2.6.2.2.10 Backgrounds

Using HTML, users can send messages that include colorful and patterned backgrounds. Research findings about the significant differences in preference for website background colors between various cultures (Callahan, 2005; Duncker, Theng, & Mohd-Nasir, 2000) suggest that they can play an important role as nonverbal cues. For example, Zviran et al. (2006) showed that specific e-mail background colors can increase response rates by up to

1.72%, a small but statistically significant difference in their large 1.4 million research population.

2.6.2.2.11 *Priority sign*

E-mail systems allow the marking of a specific e-mail message as high importance through a priority sign which is visible to the recipient. This priority sign signifies that the sender believes the message is of high importance, and in this respect it is clearly analogous to a nonverbal cue. On the other hand, it is a cue that is easy to fake, and is often abused.

Research has shown that it does not influence responsiveness (Lewis, Thompson, Wuensch, Grossnickle, & Cope, 2004), though this research looked only at the role of priority signs in messages received from strangers.

2.6.2.2.12 *Emoticons*

Emoticons have already been discussed in the context of kinesics in [2.6.2.1.2 Emoticons](#).

They can also be classified as physical appearance cues.

2.6.3 Additional categories of nonverbal cues

In the following table we propose several more nonverbal cues that might be afforded by text-based CMC.

Table 2: Examples of nonverbal cues afforded by text-based CMC

Category	Nonverbal Cue	Example
Visual and auditory codes		
Vocalics		
	Capitalization	I AM SO ANGRY (Signifies shouting)
	Written sounds	Agggghh
	Graphic indicators of spoken emphasis	Bold, italics, *emphasis*
	Written vocalics	LOL: “Laughs out loud”
	Dialect	British vs. American spelling: color vs. colour
	Foreign accent	Inadvertent leftovers of foreign language e-mail applications, e.g. Swedish “SV:” instead of “Re:”
	Noise	Trolling in a discussion board
	Accents, diacritics, cantillations	וַיֹּאמֶר אֱלֹהִים יְקוּן הַיָּמִים A biblical Hebrew text with diacritics (red) and cantillations (green). (Niqqud, 2007)
	Punctuation marks	Question mark, indicating a rise in tone
Contact codes		
Haptics		
	Written gestures	<hug>
Place and time related codes		
Environment & artifacts		
	Mobile communication cues	“sent by Blackberry”
	Path information in header	Received: (qmail 68233 invoked from network); 2 Jun 2005 09:36:47 -0000 Received: from s01060010dcf9b811.vc.shawcable.net (24.81.25.151) by mail.example.com with SMTP; 2 Jun 2005 09:36:47 -0000 Received: from paypal.com (smtp1.sc5.paypal.com [64.4.244.74]) by S01060010dcf9b811.vc.shawcable.net with esmtp id ABEFB123 for <ageddyn@minitru.org>; Thu, 02 Jun 2005 09:36:35 -0700 Path information of a “phishing” e-mail pretending to come from Paypal (Beardsley, 2005)
	Domain name in e-mail address and in IP address	Bill@microsoft.com
	Timestamp	Evidence for sender’s time zone
	Background colors and graphic patterns	Corporate colors or logo

	Sending of message as evidence of being at a specific location	Receiving an e-mail message from a work colleague as evidence that the colleague is back at his or her desk
	Status icons in IM software	  : the “away” and “online” status icons of ICQ (ICQ, 2007) indicate whether the computer senses that the user is at their computer or not
	Addressing additional people	Adding names to an e-mail message (To or CC) brings them into the conversation
Time		
	Length of message	“The answer is no.” being the full text of an e-mail message.
	Response latency	Quick or slow reply (Walther & Tidwell, 1995)
	Silence	See the results of study 2 described in this dissertation
	Timestamp	A work related message sent at 2am

2.6.4 Online chronemics

Online chronemics are time related cues that are present in CMC, such as those cues conveyed by timestamps (Liu, Ginther, & Zelhart, 2001; Walther & Tidwell, 1995). The importance of chronemics in interpersonal communication is a direct result of the key role of time, and specifically of temporal rhythms as underlying organizing factors in social life in general, and in communication in particular (e.g. Golder, Wilkinson, & Huberman, 2006)

2.6.4.1 Time in communication

Chronemics research studies the role of time in communication. As Schefflen (1982) points out, the discovery of interactional rhythms was a part of the maturation of the understanding of human communication. Communicators need to act in synchrony, and synchronization is based on timing and sequencing. Feldstein (1982) focuses on the importance of temporal patterning in face-to-face impression formation, where cues such as speech rates, tempo, pauses and the frequency of talking turns influence and reflect the way the participants in the conversation perceive each other. A key concept in understanding the interplay between time

and social behavior in “Entrainment”, defined by Bluedorn (2002) as “... *the process in which the rhythms displayed by two or more phenomena become synchronized, with one of the rhythms often being more powerful or dominant and capturing the rhythm of the other.*” (p. 149). Probably the most powerful entraining mechanism we know is the light and darkness cycle, which affects natural rhythms such as sleep, as well as social rhythms such as working hours. The strength of this powerful entraining principle is evident when these natural rhythms are forced to resynchronize following rapid travel across time zones – commonly known as “jet lag” (e.g. Arendt, Skene, Middleton, Lockley, & Deacon, 1997; Reddy, Field, Maywood, & Hastings, 2002). Examples of strong biological entraining rhythms are the menstrual cycle and circadian rhythms. Through entrainment, people learn what rhythms to expect: they learn that finding an academic in the office is much less likely in August than it is in October (at least in the Northern hemisphere), and that finding a parking place in a commercial zone is far easier at 7 am than it is four hours later. Moreover, people learn that divergence from these patterns is a sign that something may be wrong: if an acknowledgement to the receipt of an academic manuscript by a journal is expected to be a few weeks, once a month has passed, the researcher will probably inquire what went wrong at the journal office. Another example given by Bluedorn is the expected time to receive a reply on an e-mail message. An excessively quick response (within seconds of delivery) is usually a sign of something gone wrong: an “undeliverable” response or an auto-reply (see also Kryssanov, Rinaldo, Kuleshov, & Ogawa, 2006). The centrality of time in communication is the underlying reason for the importance of chronemics, both offline and online.

2.6.4.2 Online rhythms and chronemics

Chronemics plays an important role in online communications, and is a clear example of what at first might sound like a contradiction in terms: a nonverbal cue in text-based CMC. Chronemics is an online non-verbal communicative cue that affects interpersonal perceptions of CMC senders and recipients (Doering & Poeschl, 2007; Walther & Tidwell, 1995). Despite the initial surprise that a “reduced cues” medium such as text based CMC can convey subtle “non-verbal” cues, it is evident that chronemics is a part of CMC, and understanding the role of chronemics is key to understanding CMC (Lane, n.d.). For example, as described above in the section [2.5 Interactivity](#), chronemics has a central part in the explanation of the apparent paradox raised by Herring (1999) regarding the supposedly interactional incoherence of CMC. From a chronemics point of view, text-only CMC allows interactional rhythms not available in other communicative forms, such as multiple simultaneous exchanges. Moreover, text-only CMC allows people to achieve “hyperpersonal communication” “... *that is more socially desirable than we tend to experience in parallel FtF interaction.*” (Walther, 1996, p.17). One of the key principles behind this enhanced social desirability is that when the qualities of CMC are put to good use, CMC allows people to “disentrain” their own rhythms from those of others, without losing the ability to continue effective communication. Thus, people are able to keep their activities synchronized, without the common requirement that the activities be also simultaneous. An important example of a corporate-wide effort to enhance the disentraining elements of e-mail communication is the “Yourtime” initiative at Intel (Intel Corporation, 2003). We argue that chronemics should play a central role in enhancing the translucence of systems. Efforts to increase the social translucence (Erickson & Kellogg, 2000) of CMC are still exploratory in nature (Lockerd,

2002), and raise technological, social and ethical dilemmas (Zweig & Webster, 2002).

However, chronemic measures such as response time in CMC, its expression, mapping and interpretation are among the more promising and perhaps least threatening of the potential translucence cues. Interesting research into the visualization of temporal properties of CMC (J B Begole, Tang, & Hill, 2003; J B Begole, Tang, Smith, & Yankelovich, 2002) reveal that such visualizations can be useful not only to the researcher, but also to the user, and that making these rhythms explicit has potential to improve the work experience, but also raises important issues of privacy.

Another interesting example of rhythms and turn-taking in CMC is found in relation to SMS messages (Spagnolli & Gamberini, 2007). In their study of turn-sequences in SMS messages, the researchers have shown that more than 85% of the SMS exchanges (an exchange is two SMS messages and above) have an even number of turns. 44% have two turns, and 40% have four turns, but only 6% have three turns. By showing that the termination of the exchange is less a result of action completion, and more a result of turn reciprocation, they show the overriding importance of reciprocity, expressed through a specific rhythm.

2.7 Online silence

Online silence and unresponsiveness have already been implied in theories and studies of online interactivity (Rafaeli, 1988; Rafaeli & Sudweeks, 1997). Anecdotal evidence to the need to acknowledge silence as a factor in human-computer communication is nicely described by Nicholas Negroponte from MIT's Media Lab (Brand, 1988) in work that was carried out already in 1978 (Negroponte, 1994). A significant amount of work published about CMC touches on issues related to silence and unresponsiveness, as well as on issues of

their complement, i.e. responsiveness to online messages. Responsiveness and unresponsiveness are, like voice and silence, two perspectives on the same issue, and thus there is no clear line that separates research on responsiveness from research on unresponsiveness. Moreover, we are not aware of any clear definition of online silence or unresponsiveness that has been put forth by any previous researcher. We will, thus, focus this section of the review on literature that reveals one or more of the following categories of quantitative chronemic information, in various forms of text-based CMC: (a) response rates, or their complement, silence rates; (b) average response latencies or average response times; and, (c) the (statistical) distribution of response latencies or response times.

We will focus on literature that measured or estimated the actual quantities, and/or the expectations in regards to these quantities, and/or factors that influence these quantities, and/or the factors that are influenced by these quantities. This focus mirrors the three elements of the dissertation's research question: the definition of online silence, its causes, and its consequences. In this section we will also cover literature that does not reveal quantitative chronemic information, but still discusses causes and consequences of various forms of online chronemic phenomena. The literature review of online silence contains a few sections: the first two sections deal with two areas in which a lot of data about online responsiveness and unresponsiveness were collected, those being online surveying and online customer relations management. These are followed by a section that deals with silence in the context of virtual teams, and in the context of online education. After a short section on cyberostracism, we dedicate a section to the attempts to predict responsiveness to online communications, followed by a section that includes miscellaneous topics not covered previously. We conclude with a section on pauses and latencies in online communication.

2.7.1 Responsiveness and unresponsiveness to online surveys

An extensive amount of literature describes attempts to understand responsiveness to online surveys. A significant proportion of these researches compare online surveys with alternative survey methodologies including traditional mail, fax, and telephone (Cobanoglu, Warde, & Moreo, 2001; Couper, Blair, & Triplett, 1999; Frazee, Hardin, Brashears, Haygood, & Smith, 2003; Hayslett & Wildemuth, 2004; McMahon et al., 2003; Pitkin & Burmeister, 2002; Raziano, Jayadevappa, Valenzuela, Weiner, & Lavizzo-Mourey, 2001; Tse, 1998; Yun & Trumbg, 2000). The results of these researches are not conclusive, and usually focus on the fact that online surveys provide faster responses, but are still more prone to biases that are not yet well understood. Literature reviews and meta-analyses more focused on the most important goal of online surveyors, i.e. maximizing response rates (Bosnjak, Wittmann, & Tuten, 2005; D. Braithwaite, Emery, de Lusignan, & Sutton, 2003; Cook, Heath, & Thompson, 2000; Schaefer & Dillman, 1998; K B Sheehan & Hoy, 1999; K B Sheehan & McMillan, 1999) reveal response rates to online surveys from close to 0%, up to 94%, and discuss various methods to maximize responsiveness, such as reminders, pre-contacts, a high quality list of contacts, personalization of the request to participate, and incentives. The importance of follow up reminders is of special interest, and it has been clearly shown that sending reminders significantly increases the response rates (Claycomb, Martin, & Porter, 2000). Couper et al. (1999) asked, in follow up calls, for the reasons e-mail questionnaires were not returned. Although about a third either did not provide an answer or were classified as “other”, they found that almost one half of those who did not respond to the e-mail questionnaires said that they either did not receive the e-mail message, or lost/deleted it. Gueguen (2002) showed the effectiveness of the “foot-in-the-door” technique to online

requests to fill out a survey. An interesting non-academic publication by a commercial company (Hamilton, 2005) reports the results of 199 online surveys covering more than 500,000 survey invitations. Similarly to previous findings, this report also identifies a wide range of response rates in different surveys, placing the average survey response rates at ~30-40%. Hamilton (2005) also provides highly detailed response time distribution data, showing that despite an average response time of just under 3 days, 25% of the responses were submitted within 2-3 hours, 50% of the responses were submitted within 16.5 hours, and 73% of the responses within 3 days. This skewed distribution is in line with the response time distributions reported in other academic and peer-reviewed publications (e.g. Cobanoglu et al., 2001; Hayslett & Wildemuth, 2004; Kypri, Gallagher, & Cashell-Smith, 2004; Schaefer & Dillman, 1998; K B Sheehan & Hoy, 1999; Yun & Trumbg, 2000).

An interesting and unrelated aspect of response latency and surveys is the importance of the short latencies that precede a response in a phone survey (Johnson, 2004). These silences (that exhibit a heavy-tailed distribution) are supposedly indicative of internal cognitive processes that reveal additional information about the interviewee's responses, in addition to the actual content of the responses themselves. For a review of the importance of response times in inferring mental processes see Luce (1991)

2.7.2 Responsiveness and unresponsiveness to customer inquiries

Consultancy groups, business publications and journalists constantly point to the importance of e-mail responsiveness in customer relations management (CRM) (Greenspan, 2004; Haberle-Delmonico, 2003; Hirsh, 2002; Keizer, 2003; e.g. Martin, 2002; RoCRM, 2003; Stellan, 2001, 2003). They show that despite high expectations of customers, companies often fail these expectations by responding slowly, or not responding at all to customer inquiries.

The Customer Respect Group Inc. (www.customerrespect.com) conducts ongoing surveys that measure, amongst other things, response rates and response times of companies in various industries. In a publication of cross-industry comparisons (Customer Respect Group, 2003), the group recorded response rates from 90-100% in the airline industry, travel firms, hotels, resorts & casinos, and packaged goods, down to response rates of worse than 60% in furniture/home equipment, pharmaceuticals, apparel, and food/beverage/tobacco. Across industries, the average response rate was 74%, with 58% of the responses received within 48 hours, 12% within 72 hours, and 28% after 3 days or more. Academic and peer-reviewed publications, many of which focused on the hotel and tourism industries (Bergus, Sinift, Randall, & Rosenthal, 1998; Leuenberger, Schegg, & Murphy, 2003; Mattila & Mount, 2003; Matzler, Pechlaner, Abfalter, & Wolf, 2005; Murphy & Gomes, 2003; Murphy & Tan, 2003; Strauss & Hill, 2001; Voss, 2000) show that response rates to customer inquiries and customer complaints vary significantly across different organizations and locations, some exceeding 80%, while some barely reaching 40%. Average response latencies also vary significantly, though in most cases they hover around 1-2 days, and are skewed so that a majority of the responses occur quickly, within the first hours and days, and only a small minority of the responses take place later. These researches also document the strong customer dissatisfaction that is linked to a response which is late, or that does not arrive at all. This phenomenon is not surprising in light of the importance of waiting time in the creation of a positive or negative customer experience (Nie, 2000). An interesting breakdown of customer expectations about response time, in the case of patients contacting health care providers (Couchman et al., 2005) shows that response time expectations are influenced by

the type of the clinical service they expected, so that an answer to a medical question is expected to be faster than a response to a query about a routine laboratory test.

2.7.3 Responsiveness and online silence: the organizational perspective

A significant amount of research looked into issues of responsiveness and silence in the workplace and/or within virtual groups, all of them emphasizing the role of chronemics and of the temporal experience (Ballard & Seibold, 2004) of employees and of members of online groups.

Some of the more interesting and extensive research was carried out by corporations with a vested interest in the results. An interesting example is PalmOne Inc. (www.palm.com), a developer of handheld smartphones that can also handle e-mails. A survey commissioned by PalmOne of 750 European employees and managers (PalmOne, 2004; PalmOne & Collett, 2005) reported, for example, that a quarter of those surveyed had to chase for a response to more than half of their e-mails (70% in Italy) and that 11% of the responders in the UK admitted to lying about not receiving e-mails, when in fact they had.

The British telecom Telewest Business (www.ntltelewestbusiness.co.uk) surveyed more than 1,400 professionals across the UK, and published a study (NTL: Telewest, 2006). The survey reveals that 43% of the respondents have their e-mail application “always on”, and another 40% use it every single day, leading to high expectations about responsiveness: 77% of the respondents believed it was rude if they did not receive a response to an e-mail within 24 hours, or even (44% of all respondents) within one morning or one afternoon. A relatively high percentage reported that they are unsure about appropriate response times to SMS and

IM messages, and those who did express an opinion, expected most of the responses to arrive within a few minutes to a few hours.

An in-depth qualitative study of employee e-mail usage in two corporations (Sun Microsystems Inc. and Hewlett-Packard) was carried out by Tyler & Tang (2003). It revealed a depth of beliefs and attitudes towards e-mail responsiveness, including a construction of expectations about the responsiveness of others which is based on previous interactions, on the work culture, and on the urgency of the message. In cases where there wasn't a lot of contextual information about the recipient, the expectation was usually for a response within one day. The researchers made the following observations of e-mail usage and responsiveness (p. 5): users display typical patterns of response behavior; users maintain a responsiveness image (e.g. signal availability and responsiveness through short response latencies); users take advantage of contextual cues to explain (slow) responsiveness of other users, for example by taking into account that the person is in meetings all day; users use e-mail in conjunction with other media such as voice mail, IM, and face-to-face; users use e-mail peri-synchronously (a thread of quick messages sent in a nearly synchronous manner) when quick replies are expected, and; users reciprocate the e-mail behavior of others.

A series of studies explored the role of silence in virtual teams, focusing on the challenge of interpreting silence in virtual teams. We have already shown that silence is a complex, highly context dependent communicative cue in any environment. Interpreting this cue in the context of a virtual group, where interdependency between members is high, and where mutual knowledge of the others' context and circumstances is often shrouded in uncertainty, is not a simple task. Cramton (2001) documented the important disruptive effect silence can have on teams attempting to collaborate online. Her work shows that the difficulty of

interpreting online silence leads to uncertainty in some cases, and to wrong conclusions in other cases. Difficulty interpreting the meaning of silence was identified in Cramton's work as one of the most common problems, negatively affecting 100% of the researched teams, and the reasons included misinterpreting silence as consent when it stemmed from disagreement or inattention, and silence due to technical problems or faulty information, misinterpreted as intentional nonparticipation. Ter Bush (2006) and Ter Bush & Mittleman (2005) have built upon Cramton's work by showing the importance of mutual knowledge problems in virtual teams, and how information about the context of other team members can assist in correctly attributing silence and thus alleviating some of the harms online silence can inflict on virtual teams. Interestingly, in this research, the accuracy of the female participants' attributions was significantly better than the accuracy of attributions made by male team members.

Work by Jarvenpaa & Leidner (1999) and by Kayworth and Leidner (2001) demonstrated the central role substantive and timely responses within the virtual team have in establishing and maintaining trust within the group, as well as the importance of this communicative dimension in the profile of the effective online team leader. Panteli & Fineman (2005) and Panteli (2004) have shown the importance of silence in the articulation of presence in virtual teams, as well as its importance within a virtual organizing context. It is important to mention that these papers do not treat silence only as a negative aspect of virtual teams, but rather emphasize that it is an inherent element of the virtual environment, emphasizing that it is mainly unexplained silences or breaks in the communication which are harmful.

2.7.4 Silence in the (online) classroom!

Online communication between students provides a unique opportunity to explore issues of responsiveness and silence. For example, work on e-mail use by elementary school students (Van Der Meij & Boersma, 2002; Van Der Meij, De Vries, Pieters, Boersma, & Wegerif, 2005) teaches about response rates to different speech acts, showing that the chances of getting a response to questions is almost seven times higher than that of getting a response to a statement; that about a third of all questions received a response in one of the studies; and that 59% of the questions in another study led to a response. The corollary is that a third to two thirds of the questions did not receive a reply, and were met with silence. Some of the researchers focused specifically on the special challenge of silence in an online classroom (Beaudoin, 2002; Benfield, 2000), including cross-cultural communication (J. F. Jones, 1999) and gender issues (Wolfe, 1999), and showing that online silence of some minorities might have a special significance and reflect a gap between the culture which is dominant in the online classroom and the culture of the minority. Lastly, one interesting study found that students who are more reticent [students who tend to avoid communication because they believe it is better to remain silent than to risk appearing foolish (Keaten & Kelly, 2000)] tend to prefer e-mail communication over face-to-face communication (Kelly, Duran, & Zolten, 2001).

2.7.5 Cyberostracism

The term “cyberostracism” was coined by Williams, Cheung, & Choi. (2000) to describe ostracism (Williams, 2001) (see the section [2.2.2 Silence – an interdisciplinary research topic](#)), a “silent treatment”, that takes place online. In a series of studies, Williams and his

colleagues have shown that cyberostracism leads to negative feelings that are comparable to those caused by face-to-face ostracism: a feeling of being excluded, dampened mood, and lower levels of belonging, control, self esteem and meaningful existence. This occurred when cyberostracism was mediated via an online game (Williams et al., 2000; Williams et al., 2002; Zadro, Richardson, & Williams, 2004), via online chat (Williams et al., 2002), and even through cell phone text messages (Smith & Williams, 2004). Moreover, they have shown, through fMRI studies of the brains of subjects experiencing cyberostracism that the negative feelings are similar to those that result from physical pain. Taken together, these findings point to the fact that people are highly sensitized to search for and to detect ostracism and social exclusion (Williams, 2005), and that this sensitivity does not go away when the communication takes place online. It is important to note that all of these studies focused on highly synchronous CMC media.

2.7.6 Predicting (un)responsiveness

Several lines of research attempt to predict the probability that messages that appear in users' inboxes or in online forums, will receive a response. In fact, these lines of responsiveness research explore the action which is reciprocal of, or complementary to, online silence, and are thus of special interest here.

Some of the researchers looked at specific elements that influence the tendency to respond, showing that: an e-mail request addressed to a single person received a higher response rate, more helpful responses, and lengthier responses, than requests which the recipients see were addressed to several people (Barron & Yechiam, 2002); the same "diffusion of responsibility effect" was shown to occur, when messages sent to a discussion group were less likely to receive a response than requests sent individually to the members of the group (Yechiam &

Barron, 2003); that newcomers to a newsgroup were 12% more likely to post again if their initial post received a reply (Joyce & Kraut, 2006); that specific rhetorical strategies in the personal introduction and in the way a request is made in a thread-starting Usenet posting can significantly alter the chance of receiving a response (Burke, Joyce, Kim, Anand, & Kraut, 2007); that priority signs on e-mail messages did not increase the likelihood of a response (Lewis et al., 2004); and, that the “bystander effect” was replicated online too, where as the number of chat participants increased, so increased the average time for a response to a request for assistance by a participant in the chat (Markey, 2000).

Others looked at the behavior of individual e-mail users, and tried, through observations and interviews, to understand how people react to e-mails as they land in their inboxes, and what factors influence decisions such as creating an immediate response, filing the mail for a later response, deleting it, etc. Dabbish, Kraut, Fussell, & Kiesler (2005) found that users kept about one half of the new messages in their inbox, categorized about two thirds of them as “do not require a reply”, and of the third that were categorized as requiring a reply, immediately responded to about two thirds, and kept one third for a postponed reply. People kept messages in their inbox as a reminder to themselves to act on the message. A model to predict the probability of replying to a message showed: that people were more likely to respond to messages they rated as important (though the importance rating accounted for only a small amount of the variance in reply action); that messages sent to a list of individuals were 18% less likely to receive a reply, and those sent with only one recipient were 20% more likely to receive a response; that having a work relationship with the sender actually lowered the probability of response by 9%; that information requests were 22% more likely to receive a response; and, finally, that messages with social content were 23%

more likely to receive a response, even when they were classified as less important messages. A complex and interesting model is presented, to describe the influence of message characteristics and work context on probability of replying. The authors point out that individual differences between users did not factor significantly into the decision to respond, and that only 15% of the variance was explained by differences between respondents. They conclude that *“Replying is the most public of the behaviors that we studied. External social factors having to do with communication norms and relationships and organizational structure, may be a much stronger influence on replying than internal factors such as perceived message importance”* (p. 699). Dredze, Blitzer, & Pereira (2005) tried to apply similar principles in order to automatically predict whether an e-mail message requires a response, and assist users in prioritizing their e-mails. These early steps are promising, and the features that will be identified as important in future refinements will certainly be instructive.

Russell et al. (2007) explored this issue from the perspective of interruptions in general, and of e-mail as an interruption in particular (Gonzalez & Mark, 2004; Jackson, Dawson, & Wilson, 2001; T W Jackson, R Dawson, & D Wilson, 2003; Mark et al., 2005). As a part of this research, the investigators collected information about users’ e-mail habits, including how often inboxes are checked (64% check them continuously), what strategies are used to deal with e-mail messages (close to 40 strategies identified), how these strategies change when users are under a deadline, etc. Their research shows that whether an e-mail is responded to immediately upon arrival is mainly dependent on the task users are on at the time of arrival. Still, many users constantly review e-mails, and respond to them immediately when possible. Somewhat different results are presented in a Swedish study (Lantz, 2003)

that attempted to understand how the use of e-mail changed over a period of five years. This study of six employees revealed that in comparison to the past 5 years, in 1998 they responded more slowly and expected others to respond more slowly. We are not aware of any studies that corroborate these findings.

In a different study, responsiveness and compliance with e-mail requests to participate in a self administered online survey were explored (Bosnjak et al., 2005). The authors review several possible lines of research, including survey design factors influencing response rates, respondent factors associated with responsiveness, and integrative models describing the psychological processes leading to survey (non)participation. The authors then use an extended version of Ajzen's theory of planned behavior to predict and to explain intention to participate, as well as actual participation, in web-based surveys.

An interesting approach to the question of unresponsiveness was reported by Hewitt (2005). In his attempt to understand the "death" of threads in an online classroom forum, he discovered that a seemingly complex pattern of classroom dynamics, to which students provided highly elaborate explanations, can be replicated quite effectively by a simulation that assumes only that (a) students login and read only unread messages, and (b) students then reply to a portion of those unread messages. The simulation shows that these two simple assumptions result in the observed dynamics of discussion thread growth and death. An analysis we performed on the results reported in the paper, as well as on results provided by Hewitt's online simulator, revealed that the distribution of thread lengths also follows a power law pattern. This pattern was not recognized by Hewitt.

2.7.7 More examples of online unresponsiveness

This section is dedicated to several miscellaneous lines of research that touch on online unresponsiveness, namely online lurking, online spiral of silence, and non-responses on IRC.

A key area of specific research on unresponsiveness, already described in the [2.4.3.3 Groups online](#) section, is the research of “lurking” (Nonnecke, Andrews, & Preece, 2006; Nonnecke & Preece, 2000; Rafaeli et al., 2004). Obviously, lurking is a special form of online silence: usually people post into forums expecting to receive a response to their messages. Lurkers who read and do not respond are, in essence, silent, but do they fulfill the definition of silence we chose for the purpose of this work: “Neglect or omission to write (about something); failure to communicate or reply”? On the one hand, they are silent and do not respond. On the other hand, it is obviously expected that many of the readers of such forums will not post a response to each and every message posted to the group, otherwise threads will become endless, and the number of posted messages will swell exponentially, especially as the number of participants increases. In addition, lurking focuses on people who never take active part in the discussion, while silence focuses on specific instances of unresponsiveness. Thus, lurking is a manifestation of silence in a group situation, similar in many respects to “traditional” silence in situations involving an observing audience, with varying degrees of audience involvement (e.g. religious worship, public music performance). The silence looked into in the work described in this dissertation is more focused (though not exclusively) on dyadic relationships.

Early research on the “spiral of silence” in CMC has been carried out by McDevitt et al. (McDevitt, Kioussis, & Wahl-Jorgensen, 2003). The work was performed in the context of

chat room discussions of an abortion related scenario, and did not reveal evidence to support the model in this specific setting.

An exploration of nonresponses and silences in IRC (Rintel & Pittam, 1997; Rintel, Pittam, & Mulholland, 2003), documents the increased frustration and hostility of a user who was ignored and received no responses to postings for a period of approximately five minutes. The studies identified and explored the nature of four categories of non responses: non-responses in opening turn-coordination, non-responses in presenting or determining user identity, non-responses arising from transmission-reception and, non-responses and accounts for non-responses afforded by IRC commands.

2.7.8 Short silences or long pauses?

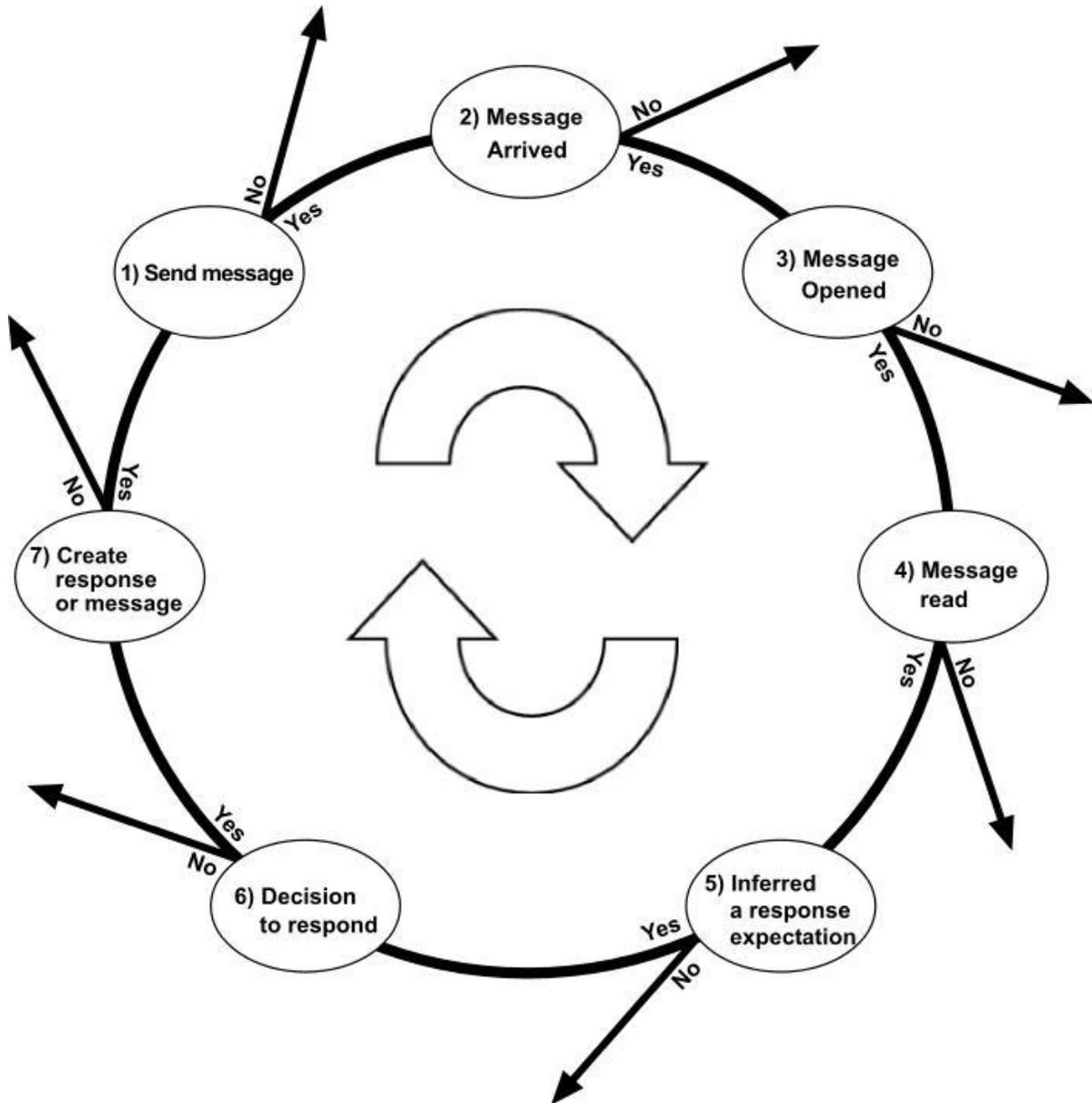
The subject of online chronemics has already been mentioned several times before in this review. Time and chronemic cues have an important role in our impression of others we communicate with, offline, as well as online (Walther, 1992). An interesting chronemic cue is a pause, or a short silence. As discussed previously in the section [2.2.1 Defining silence](#) the answer to the question “when is a pause a silence” can be based on expectations (a pause longer than expected) or on an objective number (e.g. a pause of more than 3-4 seconds in a Western face-to-face conversation). The role of pauses in online communication has been explored by Walther & Tidwell (1995) who have shown that the length of the pause between e-mail message and response influenced perceptions of intimacy/affection and of dominance/submissiveness. This influence interacted with other factors in the study: the time of day the message was sent, and the task-orientation or socioemotional orientation of the text of the message. Another study (Liu et al., 2001) explored the influence of messaging

frequency on impression formation in online forums, showing that high frequency messaging (shorter pauses) resulted in higher impression scores.

2.8 A schematic model of a text-based CMC cycle

Some of the scope of the research on responsiveness and unresponsiveness in text-based CMC can be visualized through a schematic model that describes the various stages that comprise online conversation. This model, presented in Figure 1, divides a dyadic text-based online communicative cycle into seven stages. Each stage can result in a continuation of the cycle, or in its disruption. If the disruption is temporary, the result will be a delayed response, or a pause. If the disruption is not temporary, the result will be full silence. This model echoes the communication/persuasion model developed by McGuire (1981). That model, too, resulted in a cumulative prediction, that explained the cascading stages in persuasion, and the potential failure that will result from a failure at any single stage. It served as a summative aggregation of theories relating to communication and persuasion.

Figure 1: A schematic model of a text-based CMC cycle



The cycle in Figure 1 is presented not as an all encompassing theoretical model of dyadic CMC conversation, which it certainly is not, but rather as a part of the literature survey of this dissertation, mainly as a scheme that summarizes current research on responsiveness and unresponsiveness. This model divides the communicative process into discrete stages, making it more convenient to discuss various stages of the process.

The frame of reference of the model's cycle (Figure 1) is the point of view of the message, as the message moves between two communicators who are carrying out a conversation. This model describes all of the stages that need to occur in order for the exchange to continue: a message needs to be created and sent, it needs to arrive at the intended recipient who needs to open the message, read it and infer that a response is expected. Then a decision needs to be taken to respond, the response needs to be created, and after it is sent, the cycle begins again. A disruption at any of the stages could result in a termination of the exchange. For example, in stage 1, e-mail silence can be caused by: a writer who writes a reply but decides not to send it because s/he is not happy with the result; by a writer who writes a reply but wants to take time to consider it, or have a later look at it for possible modifications; by a writer who thinks he or she has sent the e-mail, but in fact the e-mail message is left in the outbox and does not go out (for example due to a mistake in offline e-mail synchronization); by a writer who mistakenly places the e-mail message in the draft folder and does not notice the mistake; by a fault in the server of the sender which results in no release of the e-mail message; or by a fault in routing of the message to the intended recipient.

At each of the seven stages, at least four factors may be involved: the user, the client, the server, and the network. Each of these factors is involved in the various stages, and the multiplicity of factors involved, as well as the various interactions between them, add to the inherent uncertainty of online silence.

For the sake of parsimony the model presents a highly simplified view of text-based CMC exchanges. For example, it assumes linearity as well unidirectional movement. Both of these assumptions are, of course, not true in real life situations where a person might, for example,

decide not to respond to an e-mail even before reading its content, or possibly glance at the content of an e-mail, mark it as unread, and return to it days later.

2.9 A summary of key theories and concepts

Table 3 summarizes key concepts and theories mentioned in the chapter, providing the page on which it is first mentioned in the literature review.

Table 3: Key theories and concepts in literature review

Theory/concept	Page first mentioned
Attribution theory	Page 27
Chronemics	Page 23
Computer Mediated Communication	Page 12
Cyberostracism	Page 65
Expectancy violations theory	Page 24
Hyperpersonal communication	Page 56
Impression formation	Page 26
Information overload	Page 13
Interactional (in)coherence	Page 41
Interactivity	Page 41
Interruptions	Page 13
Lurking	Page 39
Media richness theory	Page 29
Mutual knowledge problem	Page 63
Nonverbal cues	Page 21
Online silence	Page 57
Online social presence	Page 40
Ostracism	Page 19
Pause	Page 17
Persistent conversation	Page 12
Self presentation	Page 36
Silence	Page 14
Social cognition	Page 26
Social identity model of deindividuation effects	Page 35
Social information processing	Page 29
Spiral of silence	Page 20
Time	Page 20
Uncertainty reduction	Page 28

3 The Research Question

The context of this research of online silence in the early years of the 21st century was detailed in the section [2.1 Computer mediated communication](#), describing a short period of time during which CMC has rapidly moved into the mainstream. CMC now plays an increasing role in the private and professional lives of individuals around the world, impacting political, economical and social organizations and institutions (Friedman, 2005). Moreover, CMC is influencing the nature of interpersonal communication of large and rapidly increasing portions of the world’s population. The centrality of silence in theoretical and practical aspects of communication, underscores the timeliness of researching online silence. Plenty of the research reviewed in the section [2.7 Online silence](#) touches on aspects of online silence, but what is lacking is a comprehensive treatise of online silence. The research question of this dissertation is the first step towards such a treatise, asking: **How is silence expressed, experienced and perceived in text-based CMC?** In order to answer this research question, it is necessary to define online silence, and to identify the causes and consequences of online silence.

3.1 Import of the research question

The importance of silence in communication is well established, and was described in detail in the previous section [2.2 Silence](#). Indirect evidence for the importance of silence can be found in the many expressions idioms and quotations associated with silence, as well as its omnipresence in various arts, including plastic arts such as painting, performance arts such as music, and the literary arts (Jaworski, 1997; Poyatos, 2002a; Tannen & Saville-Troike, 1985). Text-based CMC is an emerging form of communication which is a key

communication channel for interpersonal and organizational exchanges (Wellman & Haythornwaite, 2002). It has already been established that the appearance of new communicative technologies has more than superficial effects, and may have major social impacts, and even restructure consciousness (Ong, 1988). Thus, the research of online silence has theoretical as well as practical importance.

3.1.1 Contributions to theory

Silence has traditionally been a multi-disciplinary research topic, and findings about online silence are expected to impact many of the research topics covered in the chapter [2 Literature review](#), and in Table 3, including topics in information systems, topics in traditional communication as well as in CMC, topics in the behavioral sciences, and topics in more applied disciplines such as education and marketing.

Some of the key theories, as well as related concepts, that would be impacted by a better understanding of online silence include: ostracism and cyberostracism (Williams, 2001; Williams et al., 2002), pauses and silences in linguistics (N. S. Baron, in press; Sacks, 1992), attributions, uncertainty reduction and expectancy violations theory (e.g. Afifi & Burgoon, 2000), organizational temporality (Ballard & Seibold, 2004), interactivity (Rafaeli & Sudweeks, 1997), customer relations management (Nie, 2000), sociocognitive psychology of CMC (Riva, 2002), linguistics of e-mail (N. S. Baron, 1998, 2002), theories of media choice and media effectiveness, (reviewed in Walther & Parks, 2002), theories of trust in distributed groups (Jarvenpaa & Leidner, 1999), theories of effective online leadership (Kayworth & Leidner, 2001), theories of uncertainty in the context of unfair events online (Tangirala & Alge, 2006), and mutual knowledge in distributed teams (Cramton, 2001).

3.1.2 Contributions to practice

The ubiquity of text-based CMC, in combination with the strong negative feelings that have been linked to online silence (e.g. PalmOne & Collett, 2005; Williams et al., 2000) underscore the need of the general public to be better informed about this non-verbal cue. There is plenty of anecdotal evidence that online silence impacts almost every user of text-based CMC. The curiosity about the nature and sources of online silence is high. For example, a quick search on Yahoo answers (<http://answers.yahoo.com>) identifies hundreds of questions and responses relating to online silence, in contexts such as romantic relationships and workplace relationships.

The knowledge gained from this dissertation research will inform about norms and attitudes towards responsiveness and silence in text-based CMC, thus lowering the overall level of uncertainty linked to long pauses and silence in text-based CMC.

3.2 *Research questions of study 1*

This first study is a result of the observation (detailed in the section [2.7 Online silence](#)) that different types of text-based CMC express a similar chronemic distribution pattern. The distribution has two characteristics: a) a significant proportion of the responses occur relatively quickly, and; b) only a small proportion of the responses take much longer. These findings, though repeated in many studies, are often reported as surprising and unexpected. The challenge was to find a mathematical expression of this uniformity. In addition we assumed that this uniformity could lead to a better understanding of very long response latencies, and thus suggest a definition of online silence in text-based CMC. These goals are summarized in the following two research questions:

The superscript 1 denotes all of the research questions of study 1.

RQ¹1: What traits are shared by chronemic distributions of response latencies that are found across various types of text-based CMC?

RQ¹2: Are there properties of the chronemic distribution of long response latencies in text-based CMC that can be used to define online silence in text-based CMC, and if there are, how do these properties define online silence?

3.3 Research questions and hypotheses of study 2

Study 1 identifies three chronemic zones that describe response latencies in various text-based CMC media: the majority of the responses occur within zone I, a minority of the responses occur within zone II, and a small minority of the responses occur within zone III.

The three zones are defined by multiples of τ (tau), the average response latency. Expectancy violations theory (Burgoon et al., 1996b), in conjunction with the findings of study 1 on online silence and on the three chronemic zones, enabled us to hypothesize about how online response latency influences the impressions formed in online communication. In other words, study 2 explores the role of response latency as a nonverbal chronemic cue in text-based CMC. In the study, we compare the impressions formed of a job applicant whose response latency to an e-mail message was normative, with the impressions formed of a job applicant whose response latency was either nonnormative and long, or whose response was online silence. The three latency levels were chosen based both on the empirical results of study 1, as well as on more qualitative studies such as that of Tyler & Tang (2003). The zone I *one-day* response latency was chosen as a typical normative latency, in the vicinity of τ ; the zone III response latency of *two-weeks* was chosen as a typical nonnormative long pause, above

10 τ ; and, the third point was *never*, continued silence deep into zone III, after one month, well beyond 20 τ .

The hypotheses were based on the assumption that norms of behavior that were mathematically deduced from empirical measures of response latencies in study 1, will also be reflected in the expectations of communicators. The assumption was that experienced e-mail users will perceive a normative response latency as more expected than nonnormative response latencies. Thus:

H²1: Normative (one day) latency is more expected than (a) long latency (two weeks) and (b) “never”.

Having no a-priori reasons to assume otherwise, and based on the results of Burgoon & Walther (1990), it was also assumed that expectancy violations will result in a lower assessment of the communicator by the recipient of the cues, for all variables measured, and thus:

H²2: (a) evaluation, (b) social attraction, (c) task attraction, (d) immediacy/affection, (e) similarity/depth, (f) receptivity/trust, and (g) credibility, will be more favorable when latency is normative (one day) than when it is (I) long (two weeks) or (II) “never”.

A nonnormative response latency that would lower the evaluation and attraction of a job candidate is also likely to lower the likelihood of recommending hiring that candidate (e.g. Burgoon, Manusov, Mineo, & Hale, 1985), and thus:

H²3: Likelihood of recommending hiring will be higher when latency is normative (one day) than when it is (a) long (two weeks) or (b) “never”.

EVT teaches us that in cases of ambiguous nonverbal cues, when there is more than one interpretation for a violation, the valence of the communicator might influence the way the violation is interpreted, and thus:

H²₄: The main effect of response latency on (a) expectedness, (b) evaluation, (c) social attraction, (d) task attraction, (e) immediacy/affection, (f) similarity/depth, (g) receptivity/trust, and (h) credibility, will be moderated by applicant valence

And, this fourth hypothesis leads to a final research question:

RQ²₁: If H₄ is supported, how is the main effect of response latency on expectations, evaluation, credibility, attractiveness and relational message interpretation, moderated by sender valence?

The superscript 2 denotes the hypotheses and the research question of study 2.

In summary, the first three hypotheses suggest a main effect of latency on the independent variables. The prediction is that normative behavior will lead to higher evaluations of the candidate. The fourth hypothesis predicts that candidate valence will interact with the main effect. If hypothesis 4 is supported and candidate valence interacts with latency, the research question explores the nature of this interaction.

3.4 Research questions of study 3

The research questions of study 3 are focused on understanding the causes and the consequences of online silence in e-mail communication both from the perspective of the person who experiences the silence (the sender), as well as from the perspective of the person who causes the silence (the intended recipient).

3.4.1 Causes of online silence

RQ³1: At what stages of the CMC cycle ([Figure 1](#)) does online silence occur?

RQ³2: What explanations are suggested as causes for online silence?

3.4.2 Consequences of online silence

RQ³3: What are the consequences of online silence for those who do not receive the response?

RQ³4: What are the consequences of online silence for those who do not respond?

The superscript 3 denotes all of the research questions of study 3.

4 Method

The research question of the dissertation is explored using three different methodological approaches. A diverse set of methods was chosen in the attempt to provide, through triangulation, a multi-faceted description of online silence, its causes, and its consequences.

The first study is based on the statistical analysis of unobtrusively collected behavioral data on the response latencies of a large number of users in diverse contexts using three different text-based CMC technologies. The analysis reveals a common mathematical pattern, a power law distribution, which allows the delineation of three chronemic zones. The zones suggest a quantitative, context-sensitive definition of online silence.

The second study is an experimental manipulation based on six different vignettes. The vignettes describe six situations involving the sending of an e-mail message to a job applicant. The six situations are identical in all details other than in respect to the independent variables: response latency (short, long, total silence, as defined by the chronemic zones identified in Study 1) and personal applicant valence (high, low). The experiment measures the effect of response latency and silence on impression formation, and explores the interaction of response latency and silence with valence.

The third study is based on a survey of online experiences of information workers. In it, respondents recount situations in which they experienced, as well as caused, online e-mail silence. The survey explores various aspects of those situations, including causes and explanations, and hurt feelings associated with the situation. A statistical analysis of the multiple choice sections of the survey provides a detailed picture of personal experiences

linked to online silence. An analysis of the content of the open text sections of the survey seeks a systematic categorization of explanations for online silence.

4.1 Study 1: response latencies

This study is based on the methodological approach of “unobtrusive measures”. The term unobtrusive measures was first coined by Webb, Campbell, Schwartz, & Sechrest (1966), to describe methodologies which do not involve direct elicitation of data from the research subjects (Lee, 2000b). Unobtrusive measures are contrasted with interviews and questionnaires, in that they try to find indirect ways to obtain the necessary data. As described in detail in Webb et al.’s and in Lee’s books, the unobtrusive approach often seeks unusual data sources, such as garbage, graffiti and obituaries, as well as more conventional ones such as published statistics.

Unobtrusive measures should not be perceived as an alternative to more reactive methods such as interviews surveys and experiments, but rather as an additional tool in the tool chest of the social researcher. Unobtrusive measures can assist in tackling known biases such as selection bias and experimenter’s bias. Webb et al (2000) emphasize the importance of triangulating (Jick, 1979) the results obtained through various methodologies, each with its own unique set of (usually unknown) biases.

The proliferation of digital media opened a new era for communication researchers in search of unobtrusively obtained data sources (Newhagen & Rafaeli, 1996). CMC creates digital footprints that can allow an analysis of data that are obtained through unobtrusive methods, and are also massively larger than most corpora obtained via elicitation and human transcription. These footprints can now be used to analyze topics such as the content of

communication events, the process of communication, and the structure of the communicative network (Lee, 2000a). The surge of Internet-sourced research data rekindled the discussion of the ethical aspects of using unobtrusively obtained data. For example, can all data collected in the public domain be used for research purposes? When should we seek consent, and is it realistic to require informed consent from sources of unobtrusively collected data? These questions do not have a simple answer, and the solution is a result of a careful and ongoing dialogue between researchers, and between researchers and society in large (Ess & AoIR, 2002; Kraut et al., 2004; Walther, 2002).

Three distinct datasets of asynchronous computer-mediated communication were analyzed in this study. All three were unobtrusively obtained. One of the datasets was extracted for this dissertation, while the other two were extracted by other researchers, for other purposes, and then used in secondary analysis for this study. Below is a detailed explanation of the methods used to extract the first dataset, “Enron e-mails”, as well as a brief description of the source of the other two datasets, with reference to the original studies. In the analysis of the datasets, no personal information about the communicators was reported, and only the response latencies were used. Thus, the anonymity of the users was fully preserved. In the case of the Enron corpus, the research was based on a mandated release to the public of a significant amount of content that was, beforehand, private. There is no doubt that the users at Enron, as well as those who communicated with them, did not expect their communications to become public. The analysis of the cumulative response latencies of these users did not add insult to injury though, as it did not reveal any information that sets them apart from other e-mail users, nor did it compromise their privacy any further.

4.1.1 Enron e-mails

The first dataset, "Enron e-mails," includes the response latencies of corporate e-mail users. The messages analyzed in this study were collected from a database (iConect, 2003) published by the US Federal Energy Regulatory Commission (FERC) as part of its investigation of the manipulation of energy prices by the Enron Corporation (Federal Energy Regulatory Commission, 2003, 2005). This dataset has been used in several other studies (e.g. Diesner, Frantz, & Carley, 2005; Klimt & Yang, 2004; Zhang & Ackerman, 2005). The dataset contains various types of documents produced by Enron employees, including e-mails (work related messages, as well as private correspondence carried out using corporate e-mail accounts), scans of printed documents, transcripts, trading floor audio files, and more (Berman, 2003; Nestruck, 2003). The e-mail messages are of two types: regular (titled .pst), and scanned e-mails which were produced by OCR'ing scans of printed e-mails. In addition, a small portion of the e-mails were removed from the database for privacy reasons, and were later partially re-released (Federal Energy Regulatory Commission, 2004). The database that we chose to use in this study was the largest and most stable subset, titled "Enron email (.pst)". It includes 1,368,755 documents. Another database, based on scanned documents, was not reliable enough for automated analysis, and one with re-released e-mails was unstable, as well as relatively small in comparison (slightly more than 20,000 documents). Selecting only the subset described here is justified and not expected to affect the results, since the folder location and the response latencies are independent factors.

This study focuses on the content of "sent mail" folders of individuals. The study aims to generate representative chronemic profiles for each user. The response latencies of each user are measured through an analysis of the timestamps of their e-mail replies. This produces a

profile of the individual response behavior of each user, as well as a composite (aggregate) responsiveness profile of all Enron e-mail users.

The messages were harvested from the FERC website using the provided search engine, which is able to search for the occurrence of individual words in the texts, as well as provide meta-information about each document such as a reference number (SDOC_NO), Sender (From), Recipient (To), date and time of message, subject, and the body of the document. The above seven items were extracted for every e-mail message in a “sent” folder, and which “body” contained the word “original (since “original message” is the standard text that accompanies every e-mail that has the original message in it. The original e-mail was required for the purpose of extracting the timestamp of the original message to which the reply was created). The e-mail messages of each sender were exported into a separate spreadsheet, and analyzed separately.

Of the 1,368,755 documents, about 15% were in “sent” folders, ranging in date from 1998 to 2002. A few dozen messages from senders which could not be assigned to individuals (such as “@ECT”, or “Legal Temp 7”) were not included in the analysis. User names were replaced by codes. The spreadsheet was used to perform the following four tasks:

(a) Remove empty messages. For an unknown reason, the results included a significant number (at least 5-10%) of empty (no attributes and no body) messages with an SDOC_NO of 0. These were discarded.

(b) Verify that there was only one sender in the exported data file. Since the “From” field was inconsistent in its representation of last names and first names, as well as of initials, there were many occurrences of the “from” field containing both the “last_name first_name”

and the “first_name last_name” (for example “John Doe” and “Doe John”). These were assumed to originate with the same person.

(c) Calculate the first timestamp (date and time) in the body of each e-mail message, hence isolating the time and date of the initiating message that was replied to. This timestamp was subtracted from the time and date attributes of the analyzed message, to calculate reply time. Most time attributes were labeled “GMT”, and a calculation was made of the time zone differences, based on the content of specific messages, as well as on comparing timestamps in “Peri-synchronous” (Tyler & Tang, 2003) message threads. The best estimate of the time zone difference between the time attributed by the time stamp, and the timestamp in the message body was five hours, and this number was used in the response time formula. In cases where the time attribute of the user’s messages was not in GMT, this correction was not performed, and in rare cases where some times were in GMT and some without GMT, an attempt was made to manually adjust calculations individually.

(d) Identify identical messages which were repeated throughout the database (probably due to the fact that the database contained an aggregate of .pst files collected from several servers or sources in Enron). In case of identical messages, the response time of all identical messages was treated as a single occurrence.

4.1.2 University forums

The second dataset, "University forums", is described in Ravid and Rafaeli (2004). In that study, the researchers investigated discussion groups formed by users of a learning management system of a university. The university offers around 400 courses (undergraduate and graduate); the courses are supported by an Internet site that includes a discussion forum

that is used for discussions among students registered in a particular course, as well as between those students and the faculty. Participation in the forums was voluntary. Data collected by the researchers included discussion groups that were active from the winter semester of 1999 to the end of the summer semester of 2002, totaling eight regular semesters and four summer semesters. Response latencies were calculated for 8,830 active members, resulting in 115,416 measures of response latencies. Each measure reflected the time it took to create one of the responses in the dataset.

4.1.3 Google answers

The third dataset, "Google Answers" is described in Rafaeli, Raban & Ravid. (2005). It contains 40,072 response latencies of answers to questions posted to Google Answers (<http://answers.google.com>). Google Answers was a commercial website where designated and certified responders provided paid answers to questions posted by users who paid the responders according to a price bid they placed with the questions. The response latencies refer to questions posted during a period of 29 months (June 2002-October 2004). This period did not include the first two months of activity of Google Answers or the last month and one week of activity before data collection. Since the average response latency is less than two hours, this truncation would have a negligible effect on a chronemic profile spanning a period of 29 months.

4.1.4 Analysis of the datasets

Each of these three aggregate response latency datasets was analyzed separately by the same methods used for identifying power law distributions (Newman, 2005) and response latencies in traditional spoken communication (e.g. Jaffe & Feldstein, 1970). The response latencies

were grouped into bins and plotted on a log-log graph; regression analysis was performed for the power distribution and a coefficient of determination (R) was calculated. Various binning methods and truncation possibilities were tried to refine the presentation, alterations that did not materially affect the R of the regression analysis. The bins presented here were of one day for the Enron dataset, 100 minutes for the University forum dataset, and one hour for the Google Answers dataset. The percentiles of the average response latency (labeled τ) as well as the percentiles of ten times that average response latency (10τ) were calculated. The percentile analysis was then repeated for all individual users in the Enron e-mails dataset, as well as for 15 individuals from the Google Answers dataset (the five users with the largest number of responses and ten of the users with 100-120 responses). Finally, a small sample of e-mail responses that were created after a long delay was selected, and its contents inspected.

4.2 Study 2: expectancy violations

The methodology tool employed in this research is a vignette. Vignettes have been used in diverse ways in questionnaires and interviews. A typical vignette is based on a relatively short description of a concrete situation, followed by questions that elicit a judgment or a decision from the responder (Alexander & Becker, 1978). In the methodology employed in study 2, different responders receive vignettes which differ only in the parameters under investigation, the independent variables. All other elements of the situation are held constant. This allows the researchers to examine the effect of the independent variables on the respondent's judgment of the situation. This technique is especially effective in evaluating normative judgments, as well as beliefs and values (Alexander & Becker, 1978; Finch, 1987). The use of vignettes is often an effective alternative to experiments and to

observational techniques, but is also limited by the fact that no vignette can fully reproduce the complexity of real life situations (Hughes & Huby, 2002).

The fact that the vignette method is an effective tool for measuring norms and attitudes made it an appropriate method to explore the sensitivity of e-mail users to chronemic norms. The methodology allowed holding constant all factors other than response latency and candidate valence. Moreover, this experiment was in line with previous work on online chronemics (Walther & Tidwell, 1995).

A short paper-based vignette was handed out to each of the participants. The vignette was followed by a set of identical questions, and a brief demographic questionnaire. The versions of the vignette were physically mixed, and unanswered or partially filled questionnaires were collected and discarded.

4.2.1 Participants

Participants were 55 graduate students enrolled in an MBA program at an Israeli university. Average age was 36 years (s.d.=6.8), 31% were female. All participants use e-mail at least a few times a week. The students were asked to volunteer and dedicate 10-15 minutes between classes to complete the questionnaire. No compensation or class credit was offered. The questionnaires were collected during, and immediately after class.

4.2.2 The research design

The anonymous vignette (an English translation, as well as a sample original version in Hebrew appear in [9.1 Appendix A](#)) was inspired by a similar face-to-face EVT experiment carried out by Burgoon et al. (1985). In the vignette, the participants read about a job candidate, were asked to form an impression of the candidate, and then respond to a

questionnaire about the candidate. Each respondent was randomly assigned one version of a total of six (2x3) versions of the vignette. The vignettes varied by the candidate's valence (high valence and low valence) and by the candidate's e-mail response time (one day, two weeks, no response at all for a month). This research design allowed holding constant all of the factors other than the independent variables: candidate valence and response latency. After reading the vignette, the participants were asked to respond to a set of questions that measured their impression of the candidate's attributes (see [4.2.3 Dependent variables](#) below), and of the likelihood that they will recommend the candidate for the position.

4.2.3 Dependent variables

The dependent variables were based on adaptations of existing scales commonly used in EVT research. The adaptation was two-fold: a translation from English into Hebrew, and an adjustment of the scales that were used for face-to-face situations, for the measurement of impressions from online behavior. The adaptation resulted in a set of eight scales with acceptably high standardized Cronbach alpha reliabilities: *expectedness* and *evaluation* (Burgoon & Walther, 1990) were 0.81 and 0.86 respectively, *social attraction* and *task attraction* (McCroskey & McCain, 1974) were 0.85 and 0.87 respectively, *immediacy/affection*, *similarity/depth* and *receptivity/trust* (Burgoon & Hale, 1987) were 0.72, 0.75 and 0.75 respectively, and *credibility* (McCroskey & Young, 1981) was 0.76. Likelihood to recommend was based on a single question adapted from Burgoon et al. (1985). All responses are on a seven-interval Likert-format scales. A high score denotes a more positive evaluation. These eight scales allow us to measure expectedness, evaluation, attraction (social attraction & task attraction), three relational message interpretations (immediacy/affection, similarity/depth and receptivity/trust) and credibility.

4.3 Study 3: Causes and consequences of online silence

4.3.1 Questionnaire and target population

The methodology and format of this study into the causes and consequences of online silence was inspired by the structure of studies that explored the causes and consequences of unpleasant situations such as hurting feelings, ostracism, unreciprocated courtship, and angering or embarrassing others (Baumeister, Stillwell, & Wotman, 1990; Leary, Negel, Ansell, Evans, & Springer, 1998; Sharkey, Kim, & Diggs, 2001; Sinclair & Frieze, 2005; Sommer, Williams, Ciarocco, & Baumeister, 2001; Vangelisti, Young, Carpenter-Theune, & Alexander, 2005; Vangelisti & Young, 2000). Like these other studies, online silence is usually an unpleasant occurrence that is, nevertheless, experienced by almost everyone. Questionnaires that ask people to recount such situations are an effective way to capture these subjective experiences. In the case of e-mail silence, it was important to explore the experiences of a population of skilled e-mail users. The knowledge workers who were chosen use e-mail on a daily basis at work, to communicate with clients and colleagues distributed around the world.

Sections of the questionnaire were based on the model presented in [2.8 A schematic model of a text-based CMC cycle](#). A link to a web based questionnaire (for full text of the questions, see [9.2 Appendix B: the questionnaire of study 3](#)) was circulated to all employees in a midsized (about 90 employees) European company that provides online services. The employees were asked to anonymously fill out the questionnaire on a voluntary basis. It was also suggested to them that they forward the link to a friend, though apparently none, or very few, have done so. 57 entered the survey, 40 of whom provided a useful response. In five of

the cases, one or both of the reports were not about specific cases, but rather about general opinions regarding unresponsiveness to e-mails. These reports were removed, leaving reports by 36 participants, 17 male, 17 female and 2 unidentified). 32 of them recalled a case when they expected but did not receive an answer to an e-mail (experienced silence), and 27 of them recalled a case when they did not respond to an e-mail despite the fact that a response was expected (created silence). The average age of the responders was 36 (range: 23-60).

4.3.2 Response analysis

The questionnaire included two categories of questions: closed and multiple choice questions, and open text questions. The responses were analyzed in two phases. In the first phase all of the closed and multiple choice questions were analyzed and the results tabulated. The results of this first phase then served to guide a second phase, a content analysis of those open text questions that were not included in the first phase. The analysis of the open text explanations for online silence and for the responder' opinions followed the methodology suggested by Potter & Wetherell (1987), consisted of a few iterations, and aimed to reach a sufficient yet small set of classifications of explanations for online silence.

5 Results

5.1 Study 1: response latencies

This section reports the detailed results of the Enron e-mail response latencies study, as well as an analysis of the distributions of the three datasets.

5.1.1 Results of the Enron e-mails analysis

16,093 e-mail messages met all of the following criteria: (a) In the sent folder of an identified individual user; (b) A message header starting with “Re:”; (c) Message body contains a retrievable timestamp of the original message to which the user replied; and, (d) In case of multiple identical messages, the message was counted only once.

In all, the messages in the sample were created by 144 separate individuals (Average: 112 messages per person. Min: 1 message. Max: 662 messages. Median: 52.) Four outlying messages (unreasonably high or negative response times) were removed. The resulting average response time of the users was 1.2 days (28.8 hours). The remaining negative response times (about 5% of the sample) were not removed, and were grouped with the responses within 1 day. A distribution of the aggregated response times of all users, grouped by days, is described in Figure 2. A sample responsiveness profile of a representative individual user is described in Figure 3.

Figure 2: Aggregate responsiveness profile of all employees.

Number of messages all users responded to within x to x-1 days, grouped by days.

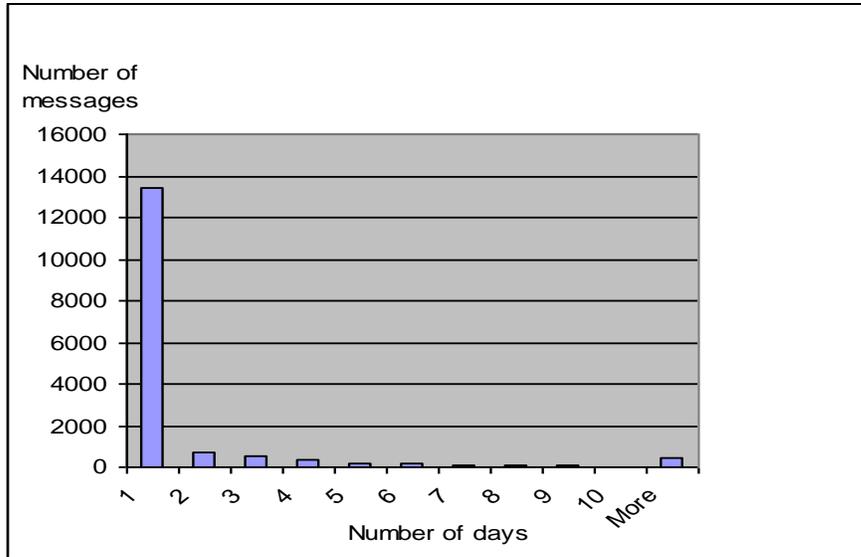
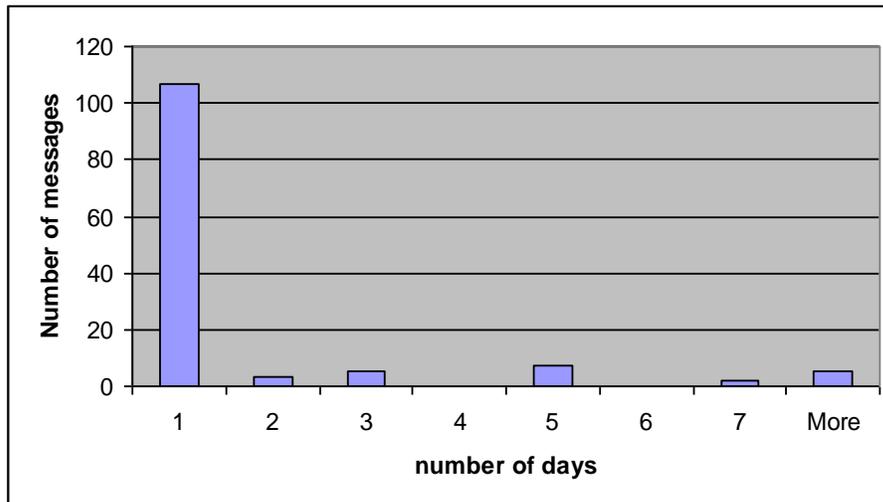


Figure 3: Responsiveness profile of a typical user

Number of messages user "BG" responded to within x to x-1 days, grouped by days.



To achieve an initial overview of response latencies of the users, distinguishing parameters were used to describe the response patterns of individual e-mail users: the cumulative proportion of e-mails the individual responded to within 1 day, and the cumulative proportion

of e-mails the individual responded to within 5 days. The denominator of the proportion is always the total number of reply messages of the individual user. These are described in Figure 4. Figure 4 (i) indicates that a vast majority (97%) of the population responded to at least 30% of the e-mails within the first day. Figure 4(ii) indicates that 97% responded to at least 70% of the e-mail messages within 5 days. 5% of the users fall outside of these boundaries. Based on this, it is possible to generalize and estimate that a typical e-mail user (95% of the population) in this sample responded to at least 30% (30-100%, on average 84%) of the e-mail messages within one day, and to at least 70% (70-100%, on average 95%) of the e-mails within five days.

An additional analysis of the distribution of all positive response times up to 10 days (14,740 observations) was performed. Of the five distributions checked (Weibull, Normal, Exponential, Lognormal and Gamma), the Gamma distribution best approximated the observed aggregate distribution. This distribution is presented in Figure 5.

Figure 4: Cumulative responsiveness after one day and five days

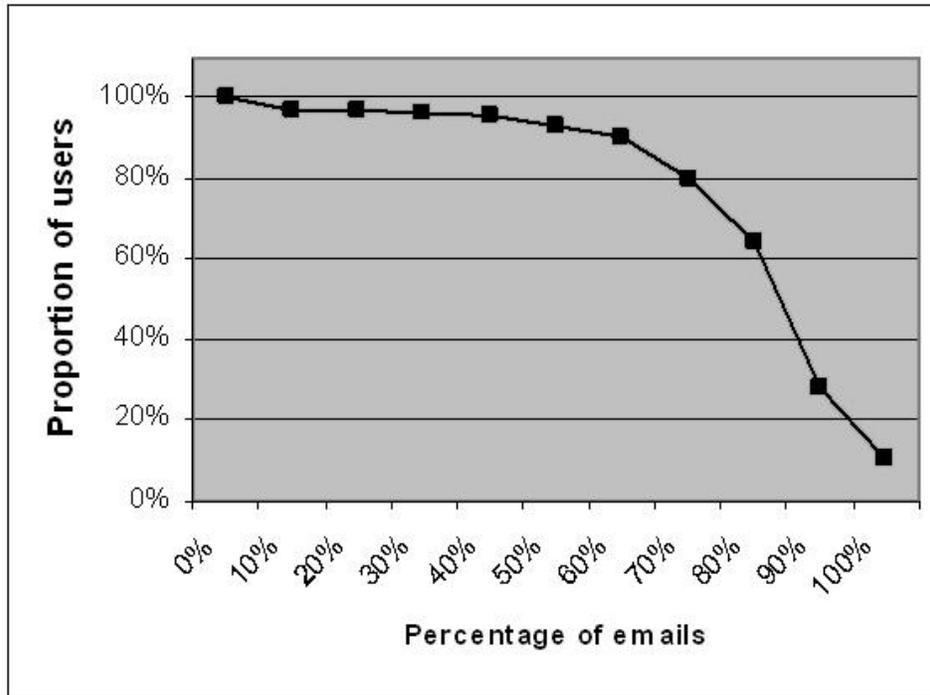


Figure 4(i): Proportion of users who replied to at least x% of the e-mail messages within one day

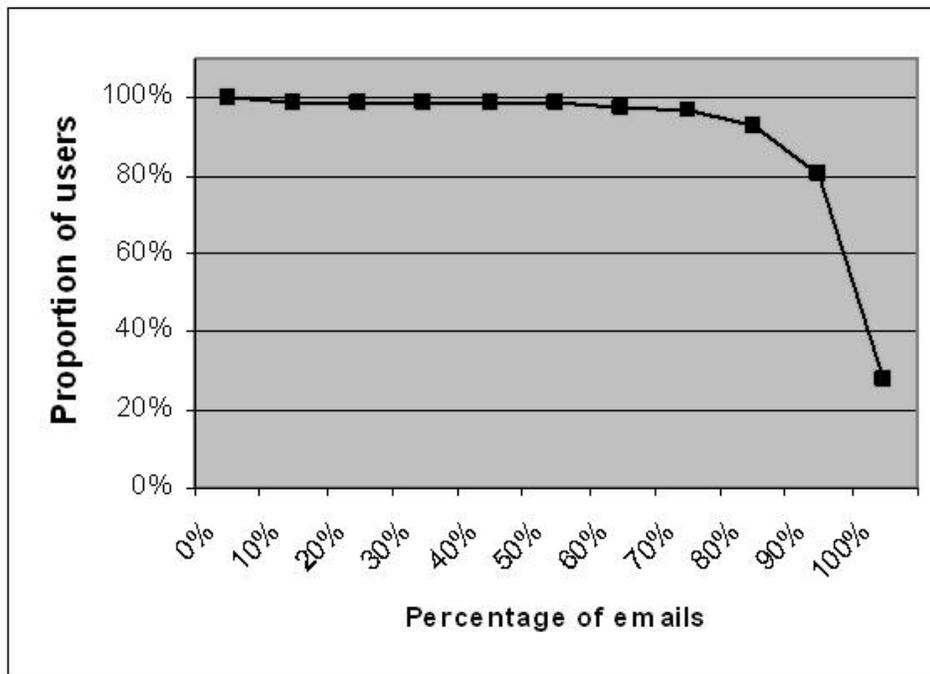
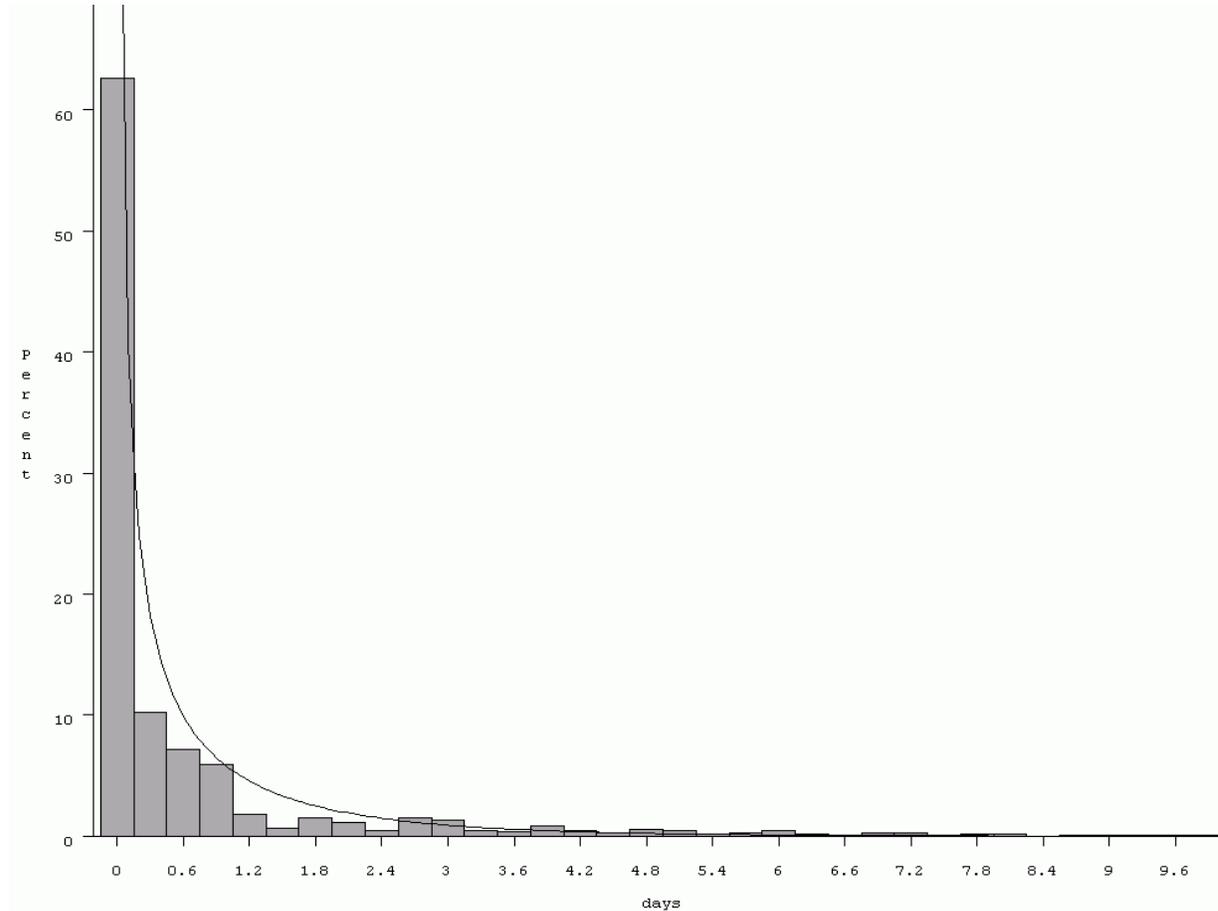


Figure 4(ii) Proportion of users who replied to at least x% of the e-mail messages within five days

Figure 5: Gamma distribution of the aggregate responsiveness profile

Optimized Gamma distribution ($\alpha=0.37$, $\beta=1.72$) superimposed on the aggregate responsiveness profile of all users



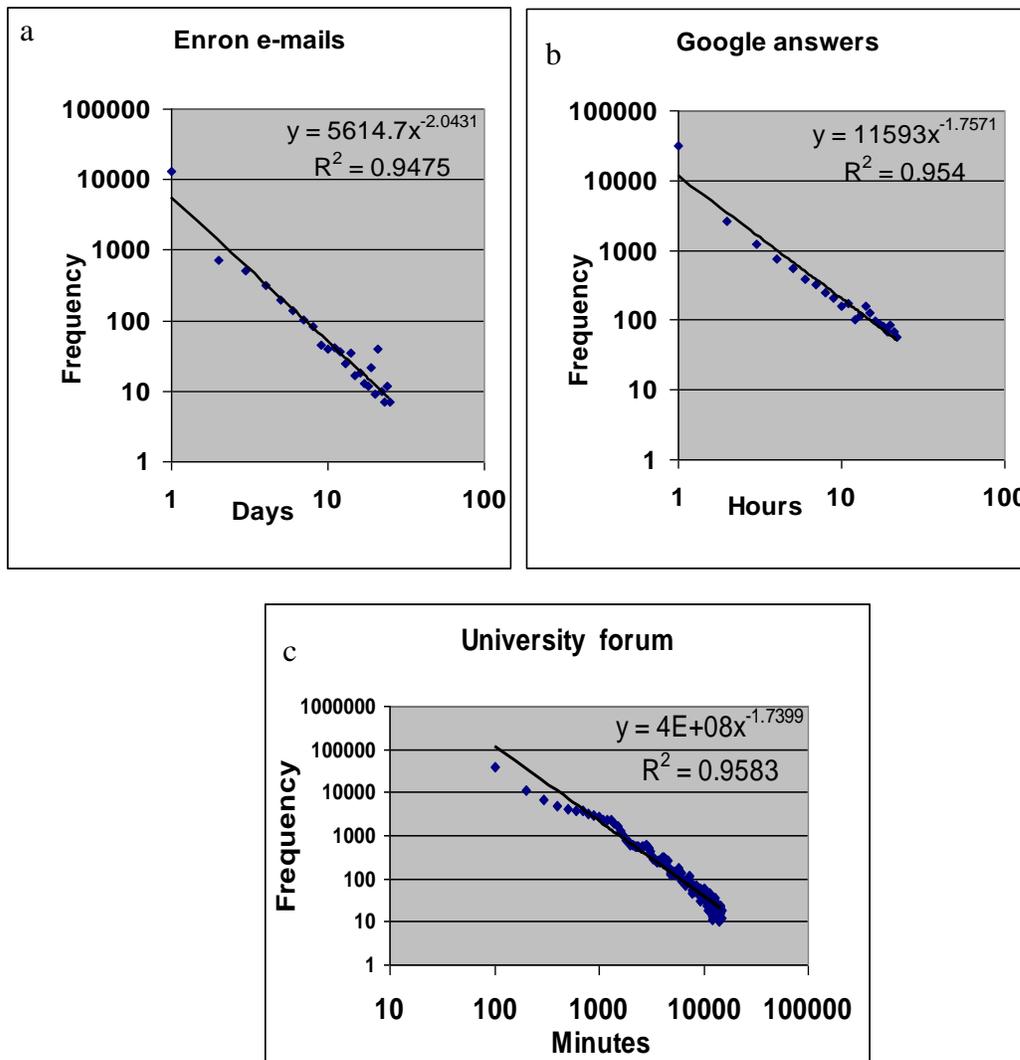
5.1.2 Distribution of response latencies

The response latencies from Enron e-mails, University forums and Google answers were analyzed using several statistical approaches. A visual inspection of the three distributions revealed a clear uniformity in the distribution of response latencies. Nevertheless, traditional statistical packages failed to reveal a statistical distribution common to the datasets. Further explorations revealed that a power law distribution is the solution: despite the diverse sources of these responsiveness profiles, when plotted on a log-log graph, all three datasets presented

the straight line characteristic of the power-law distribution (Figure 6 a-c) with similar slopes: (-1.74), (-1.76), (-2.04), and with a high R^2 : (~ 0.95).

Figure 6: Power law distributions in the three datasets

Power law plots of the cumulative response latencies of the three datasets: (a) Enron e-mails; (b) Google Answers; and, (c) University forum.



An analysis of the distribution of each of the datasets revealed that the average response latency in each of the datasets falls at or above the 80th percentile. The average response

latency was labeled with the Greek letter tau (τ). The analysis also revealed that 10 times that average latency (10τ) in each of the datasets falls at or above the 97th percentile (Table 4).

Table 4: Comparison of the three datasets

Average response latencies (τ) in each dataset, and the percentile rank of τ and of 10τ for each dataset

Dataset	Average response latency (τ)	Percentile rank of τ	Percentile rank of 10τ
Enron e-mails	28.76 hours	86%	97%
University forum	23.52 hours	80%	99%
Google Answers	1.58 hours	84%	97%

This remarkable similarity across datasets comprising aggregate responses created under diverse circumstances, by diverse populations, and by many individuals, elicited the question whether this generalization about percentiles is a result of the aggregation of many response latencies, or whether it also reflects the behavior of individual users. In other words, if we look at the τ of each individual user, would that τ also define similar percentiles to those described in Table 4? An analysis of the 74 Enron e-mail users for whom more than 50 unique responses existed, showed that only 65% of them (48) met the strict criterion that their average response latency (τ) was at or above the 80th percentile. However, a slight relaxation of the criterion revealed that 95% of them (70) created 70% or more of their responses within less than their τ . Moreover, of these 74 users, only five users' 10τ was below the 97th percentile, and none were below the 96th percentile. The 15 users selected from the Google Answers database displayed a similar behavior: 93% (14) created more than 70% of their responses within their τ or less, and all of them created at least 96% of their responses within less than their 10τ . In summary, the vast majority of the individual users

created most (70% or more) of their responses within their τ , and almost all (96% or more) of their responses within a latency equal to 10 times their τ . This relaxed generalization also holds for the cumulative results.

5.2 Study 2: expectancy violations

This section reports the results of the vignette study. We report the influence of the dependent factors (response latency and applicant valence) on the independent factors, and report on the acceptance or rejection of each of the hypotheses. Finally, an answer to the research question originating from the fourth hypothesis is suggested.

5.2.1 Manipulation checks

Manipulation checks were performed to confirm that the valence manipulation was perceived by the respondents. A t-test comparing two independent samples was performed to compare evaluation of high and low valence candidates. As expected, evaluation differed significantly $t(53) = -2.99, p = 0.0042$. In addition, a chi-square analysis of the likelihood that the candidate will be recommended for the job (described below in [5.2.3.3 Likelihood of hiring](#)) showed strong dependency ($p = 0.0005$) between high candidate valence and the likelihood of being recommended.

5.2.2 Hypotheses and research question

Note that the research question stems from hypothesis 4.

Two-way ANOVA was performed to identify main effects of response latency and of valence, as well as interactions between latency and valence. The ANOVA was followed by a post-hoc test, Duncan's multiple range test, to see which effects of response latencies are

statistically significant ($p < .05$). In order to gain a deeper understanding of interactions between valence and response latency, a one-way ANOVA was performed separately for each of the two valence levels, measuring the main effect of response latency at each valence. This test too was followed by Duncan's multiple range test, as described above. The main effects are summarized in Table 5, the means by latency are summarized in Table 6, and the means by latency split by valence are summarized in Table 6 and in Figure 7.

A t-test revealed no significant differences between the responses of males and of females for any of the independent variables.

Table 5: Main effects of valence and latency, and interactions

Main effects of valence and latency, and interactions, on expectedness, evaluation, attraction (two variables), relational message interpretation (three variables), and credibility following two way ANOVA. $n=55$

	F value: Model	F value: Valence	F value: Latency	F value: Valence*Latency
Expectedness	F(5,49)=4.41**	2.49	4.90*	4.35*
Evaluation	F(5,49)=4.72**	8.75**	4.74*	1.79
Social attraction	F(5,49)=9.43**	31.96**	2.13	4.5*
Task Attraction	F(5,49)=7.62**	30.85**	1.60	0.67
Immediacy/affection	F(5,49)=3.53**	0.87	5.92**	1.49
Similarity/depth	F(5,49)=8.29**	0.00	18.05**	1.33
Receptivity/trust	F(5,49)=4.38**	0.28	8.24**	1.45
Credibility	F(5,49)=3.89**	6.80*	4.22*	1.09

* $p < 0.05$

** $p < 0.01$

Table 6: Main effect means and standard deviations for the effect of latencies.

Main effect means and standard deviations for the effect of normative (one day) vs. non-normative (two weeks or never) latencies on expectedness, evaluation, attraction (two variables), relational message interpretation (three variables), and credibility. n=55

	Normative response latency		Non-normative response latencies			
	1-day	SD	2-weeks	SD	never	SD
Expectedness	4.51	1.45	3.67*	1.08	3.26*	1.24
Evaluation	4.39	1.6	3.59	1.34	3.08*	0.98
Social attraction	3.69	1.83	2.85*	1.26	3.24	1.16
Task Attraction	4.38	1.53	3.71	1.51	3.62	1.13
Immediacy/affection	4.92	1.11	3.98*	1.63	3.43*	1.09
Similarity/depth	5.24	0.82	4.21*	1.45	2.93*	1.13
Receptivity/trust	5.15	0.97	4.52	1.19	3.63*	1.15
Credibility	4.83	1.12	3.97*	1.20	3.86*	0.90

* Significantly different ($p < 0.05$) from mean for one-day latency, based on Duncan's multiple range test.

Table 7: Main effect means and standard deviations for the effect of latencies, by valence.

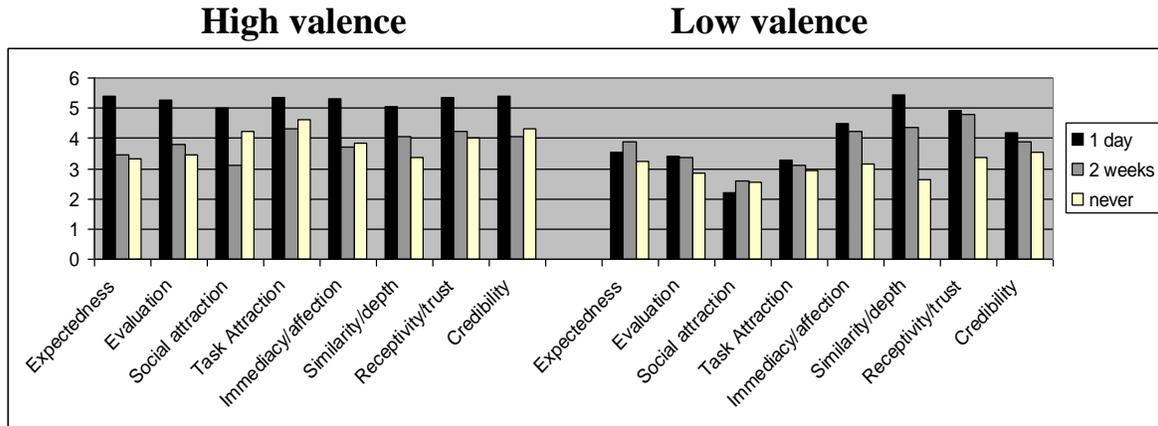
Main effect means and standard deviations, by valence, for the effect of normative (one day) vs. non-normative (two weeks or never) latencies on expectedness, evaluation, attraction (two variables), relational message interpretation (three variables), and credibility. n=55

	Normative response latency		Non-normative response latencies			
	1-day	SD	2-weeks	SD	never	SD
High valence						
Expectedness	5.39	1.21	3.47*	1.01	3.31*	1.53
Evaluation	5.27	1.17	3.81*	1.44	3.44*	1.05
Social attraction	5	1.19	3.12*	1.37	4.22	0.83
Task Attraction	5.37	1.12	4.32	1.53	4.6	0.73
Immediacy/affection	5.3	1.11	3.71*	1.85	3.85*	1.02
Similarity/depth	5.07	0.97	4.04	1.44	3.35*	1.08
Receptivity/trust	5.35	0.87	4.23*	1.33	4*	0.95
Credibility	5.41	0.98	4.06*	1.30	4.3*	0.45
Low valence						
Expectedness	3.53	1.01	3.87	1.17	3.23	1.06
Evaluation	3.41	1.48	3.37	1.30	2.83	0.89
Social attraction	2.21	1.14	2.58	1.18	2.56	0.81
Task Attraction	3.26	1.11	3.1	1.29	2.94	0.80
Immediacy/affection	4.5	1.01	4.25	1.44	3.14*	1.08
Similarity/depth	5.42	0.64	4.37	1.54	2.64*	1.11
Receptivity/trust	4.93	1.09	4.8	1.05	3.37*	1.25
Credibility	4.19	0.94	3.88	1.17	3.55	1.03

* Significantly different ($p < 0.05$) from mean for one-day latency, based on Duncan's multiple range test.

Figure 7: Means for the three latencies, by candidate valence

Means for the three latencies, of expectedness, evaluation, attraction (two variables), relational message interpretation (three variables) and credibility, by candidate valence



5.2.3 Hypotheses

5.2.3.1 H²1: Main effect on expectedness

The two way ANOVA showed a significant main effect for latency on expectedness, $F(49,2)=4.90$, $p=0.0115$. The expectedness for a one-day latency was significantly higher ($M=4.51$) than for two-weeks ($M=3.67$) or for never (3.26). H²1 was supported.

5.2.3.2 H²2: Main effects on evaluation, attraction, relational message interpretation, and credibility

5.2.3.2.1 Evaluation

The two way ANOVA showed a significant main effect for latency on evaluation, $F(49,2)=4.74$, $p=0.0131$. The evaluation for a one-day latency was significantly higher

(M=4.39) than for never (M=3.08). However, it was not significantly higher than for a two-week latency (M=3.59). H²2aI was not supported, and H²2aII was supported.

5.2.3.2.2 Attraction

The two way ANOVA did not show a significant main effect for latency on **social attraction**, $F(49,2)=2.13$, $p=0.1294$. However, an interaction was detected between valence and latency, as presented below (H²4). H²2b was not supported.

A two way ANOVA did not show a significant main effect for latency on **task attraction**, $F(49,2)=1.60$, $p=0.2125$.

H²2c was not supported.

5.2.3.2.3 Relational message interpretation

The two way ANOVA showed a significant main effect for latency on **immediacy/affection**, $F(49,2)=5.92$, $p=0.0050$. The immediacy/affection for a one-day latency was significantly higher (M=4.92) than for two-weeks (M=3.98) or for never (M=3.43). H²2d was supported.

The two way ANOVA showed a significant main effect for latency on **similarity/depth**, $F(49,2)=18.05$, $p<0.0001$. The similarity/depth for a one-day latency was significantly higher (M=5.24) than for two-weeks (M=4.21) or for never (M=2.93). H²2e was supported.

A two way ANOVA showed a significant main effect for latency on **receptivity/trust**, $F(49,2)=8.24$, $p=0.0008$. The receptivity/trust for a one-day latency was significantly higher (M=5.15) than for never (M=3.63) but not significantly higher than for two-weeks (M=4.52). H²2fI was not supported, and H²2fII was supported.

5.2.3.2.4 Credibility

The two way ANOVA showed a significant main effect for latency on credibility, $F(49,2)=4.22$, $p=0.0204$. The credibility for a one-day latency was significantly higher ($M=4.83$) than for two-weeks ($M=3.97$) or for never ($M=3.86$). H^2g was supported.

5.2.3.3 H²3: Likelihood of hiring

A chi-square analysis of the effect of latency (normative versus nonnormative) on likelihood of recommendation resulted in too many cells and a low average number of measures per cell. Thus, the possible answers were dichotomized by removing the equivocal responses (“my opinion is balanced between yes and no”), and grouping in one group all those who said they will recommend the applicant (in 3 various likelihoods), and in the second group all those who said that they will not recommend the candidate (also, in 3 various likelihoods). The resultant chi-square analysis yielded a slightly less than significant result that did not support H^23a : $\chi^2=3.2143$ $p=0.0730$, and a significant result that supported H^23b : $\chi^2=5.4106$ $p=0.0200$.

5.2.3.4 H²4: Interactions between latency and valence

5.2.3.4.1 Expectedness

The two way ANOVA revealed an interaction between latency and valence on expectedness $F(49,2)=4.35$, $p=0.0183$. The expectedness of high valence candidates was significantly higher for a one-day latency ($M=5.39$) than for two weeks ($M=3.47$) or never ($M=3.31$). However, the expectedness of low valence applicants was the same, regardless of response latency (one-day: $M=3.53$, two-week $M=3.87$, never $M=3.23$). H^24a was supported.

5.2.3.4.2 Evaluation

The two way ANOVA did not reveal a significant interaction between latency and valence on evaluation $F(49,2)=1.79$, $p=0.1779$. However, there is some evidence for such an interaction, since the evaluation of high valence applicants who responded within one day was significantly higher ($M=5.27$) than for those who responded within two weeks or not at all ($M=3.81$, $M=3.44$, respectively), while the evaluation of low valence applicants was the same regardless of response latency (one-day: $M=3.41$, two-week $M=3.37$, never $M=2.83$ respectively). H^2_{4b} was partially supported.

5.2.3.4.3 Attraction

The two way ANOVA revealed an interaction between latency and valence on **social attraction** $F(49,2)=4.50$, $p=0.0160$. The social attractiveness of high valence candidates was significantly higher when they responded within one day ($M=5.00$) than when they responded within two weeks ($M=3.12$). However, there was no significant difference between the social attractiveness of low valence applicants regardless of response latency (one-day: $M=2.21$, two-week $M=2.58$, never $M=2.56$). H^2_{4c} was supported.

The two way ANOVA did not reveal a significant interaction between latency and valence on **task attraction** $F(49,2)=0.67$, $p=0.5169$. H^2_{4d} was rejected.

5.2.3.4.4 Relational message interpretation

The two way ANOVA did not reveal a significant interaction between latency and valence on **immediacy/affection** $F(49,2)=1.49$, $p=0.2359$. However, there is some evidence for such an interaction, since the immediacy/affection of high valence applicants who responded within

one day was higher ($M=5.30$) than for those who responded within two weeks or not at all ($M=3.71$, $M=3.85$, respectively), while the immediacy/affection of low valence applicants was not significantly higher when they responded within one day ($M=4.5$) or within two weeks ($M=4.25$), and was significantly lower only if they did not respond at all ($M=3.14$). H^2_{4e} was partially supported.

The two way ANOVA did not reveal a significant interaction between latency and valence on **similarity/depth** $F(49,2)=1.33$, $p=0.2736$. H^2_{4f} was rejected.

The two way ANOVA did not reveal a significant interaction between latency and valence on **receptivity/trust** $F(49,2)=1.45$, $p=0.2443$. However, there is some evidence for such an interaction, since the receptivity/trust of high valence applicants who responded within one day was significantly higher ($M=5.35$) than of those who responded within two weeks or not at all ($M=4.23$, $M=4.00$, respectively), while the receptivity/trust of low valence applicants was the same when they responded within one day ($M=4.93$) or within two weeks ($M=4.80$), and were significantly lower only if they did not respond at all ($M=3.37$). H^2_{4g} was partially supported.

5.2.3.4.5 Credibility

The two way ANOVA did not reveal a significant interaction between latency and valence on credibility $F(49,2)=1.09$, $p=0.3448$. However, there is some evidence for such an interaction, since the credibility of high valence applicants who responded within one day was significantly higher ($M=5.41$) than of those who responded within two weeks or not at all ($M=4.06$, $M=4.30$, respectively), while the credibility of low valence applicants was the same

regardless of response latency (one-day: M=4.19, two-week M=3.88, never M=3.55). H²4h was partially supported.

5.2.3.5 RQ²1: how does valence moderate the main effect of response latency on expectedness, evaluation, attraction, relational message interpretation, and credibility

Evidence for a significant interaction between valence and the main effect of response latency was found in expectedness, and in social attraction; some evidence for this interaction was also found in evaluation, immediacy/attraction, receptivity/trust, and credibility; no evidence at all for such an interaction was found in task attraction, and similarity/depth. Due to the complexity of the interactions, a detailed discussion of these interactions will be presented in the below section “[6.2.2 The effects of response latency on expectedness, evaluation, attraction, relational message interpretation, and credibility](#)”. One generalization that can be made about all of the cases where at least some significant interaction was detected is that in these cases, the absolute differences between the score for the normative behavior, and the score for the nonnormative behaviors, was greater in the case of high valence candidates than in the case of low valence candidates. Or, in other words, the effect of response latency on the assessment of the candidate for these variables is a greater effect in the case of high valence candidates, than in the case of low valence candidates.

5.3 Study 3: causes and consequences of online silence

In this survey we explore self reports of situations in which survey participants experienced or caused online silence. The first section reports the findings on experiencing online silence,

the second section reports on creating online silence, and the last section reports the results of a content analysis of the explanations for online silence.

5.3.1 Experiencing silence

Of the 32 cases, almost one half could be classified as clearly work related and had to do with e-mails sent to co-workers, managers, customers, potential customers, and suppliers; about a quarter were of an interpersonal nature such as communicating to friends about future plans, and exchanging news with friends, or communicating with individual professionals in regards to services they provide; and about a quarter were of a personal nature communicating with organizations such as financial institutions, and government. Some of the cases could not be classified. In 56% (18) of the cases the responders reported that the original e-mail message was sent within the last four weeks, 25% (8) were sent more than four weeks ago, and 19% either were not sure (3) or left the answer blank (3).

Table 8 describes the results of the multiple choice questions about the possible explanations the participants have for the silence they experienced.

Table 8: Possible reasons for cases of online silence as reported by those who experienced the silence

	Yes	Possibly	No	Blank
1. I wrote the email but actually did not send it to the recipient			27	5
2. I sent the email but it never arrived in the recipient's account		15	12	5
3. The email arrived, but was never opened	1	23	4	4
4. The email was opened but not read	1	20	7	4
5. The email was read, but not fully	1	21	5	5
6. The email was fully read, but the recipient did not understand that I am expecting a response		14	13	5
7. The recipient understood that I am expecting an answer, but decided not to respond	1	27	1	3
8. The recipient intended to write a response, but did not	2	26	1	3
9. The recipient started writing a response, but did not finish it		22	5	5
10. The recipient wrote a response, but never sent it		18	9	5
11. The recipient sent the response, but I did not receive it		15	12	5
12. I received the response, but did not see it		5	22	5
Total	6	206	118	54

The answers to the question whether the participants believe the silence was intentional or unintentional were that 25% (8) thought it was intentional, 34% (11) thought it was unintentional, and 41% either responded that they did not know (11) or left the answer blank (2).

In answer to the question whether any further steps were taken to try and receive an answer to the e-mail, and if so what steps, the responses were that in 56% (18) of the cases one of the following actions was taken: (a) resending the e-mail; (b) sending a new e-mail; (c) calling; (d) leaving voice mail; and (e) file a complaint. In the rest of the cases either no action was taken (9), or the answer was left blank (4). In one case the participant wrote that a read receipt was requested (and received) but it was not clear to the researchers if the request was done after the participant experienced silence, or in the message for which no answer was received.

In answer to the question whether their feelings were hurt, 45% (17) reported that their feelings were not hurt at all, 26% (10) slightly hurt, 8% (3) quite hurt and 21% (8) left the answer blank.

5.3.2 Creating silence

Of the 27 cases, about one half of the responses that could be classified were classified as work related and about one half were of an interpersonal nature. In 44% (12) of the cases the participants reported that the original e-mail was sent within the last four weeks, 44% (12) were sent more than four weeks ago, and 11% (3) were not sure.

Table 9 describes the results of the multiple choice questions about the possible explanations the participants have for the silence.

Table 9: Possible reasons for cases of online silence as reported by those who created the silence

	Yes	Possibly	No	Blank
1. I never received the email	2	1	20	4
2. I received the email, but never opened it	0	0	23	4
3. I opened the email but never read it	1	1	20	5
4. I read the email, but not fully	2	1	20	4
5. I fully read the email, but did not understand that I am expected to respond	3	1	19	4
6. I understood that I am expected to respond, but decided not to respond	9	3	12	3
7. I intended to write a response, but did not	8	7	10	2
8. I started writing a response, but did not finish it	4	2	17	4
9. I wrote a response, but never sent it	1	2	20	4
10. I sent the response, but it was never opened	0	3	20	4
Total	30	21	181	38

56% (15) reported that the silence was intentional, 37% (10) reported that it was unintentional, and 7% (2) responded that they did not know.

In answer to the question whether any further steps were taken to try and receive an answer to the e-mail, and if so what steps, the responses were that in 30% (8) of the cases the sender chased the recipient, resent the e-mail, or sent a new e-mail. In 52% (14) of the cases the answer was “no”, and in the rest of the cases the answer was either left blank or was unclassifiable. In answer to the question whether they think the sender’s feelings were hurt, 37% (10) thought that the feelings were not hurt at all, 48% (13) slightly hurt, 7% (2) hurt, and 7% (2) quite hurt.

5.3.3 Content analysis of explanations

The content analysis of the open text answers to the questions about the reasons for the silence and for the responses to the questionnaire was informed by the results of the first

phase described in the above sections, and discussed in the discussion section. It was also informed by the literature on online silence reviewed in [2.7 Online silence](#), and on attributions reviewed in [2.4.1 Attribution theory](#). The content analysis started with an analysis of the explanations provided for the silence created by the participants. The reason for that is that the explanations for the participants' own silence were provided with significantly more certainty. This certainty about the explanations made it easier to identify key categories. Three key categories were identified, two of which were divided into sub-categories, as detailed below. Each category is supplemented by several illustrative verbatim (italicized) quotations as provided by the participants. Researcher comments appear in square brackets, and are not italicized.

5.3.3.1 Category A: recipient has not seen the incoming message

Examples:

- *“This is a broken communication. It was sent but never received. If it were received I would have answered. It was my intention to reply !”*
- *“I never recieved the email i was supposed to reply to”*

5.3.3.2 Category B: recipient did not intend to respond

This category has three sub-categories:

5.3.3.2.1 Recipient did not think it was necessary to respond

Examples:

- *“i don't think it is necessary [to respond to an invitation], unless I'm not able to make the meeting.”*
- *“The customer did not request a confirmation that the change had been made. The change was minor and was actually actioned by another department so I did not regard a reply as required of me.”*
- *“Assigned to another to respond. [sender], however, didn't consider that [response sent by another, to be] related to the email sent to me.”*

5.3.3.2.2 Recipient did not want to continue the communication

Examples:

- *“I did not feel like responding as I get many such emails and was weary of responding to them, even on an informal basis.”*
- *“We are irrelevant to each other at this point in time and I didn't understand why the sender would wish to contact me at this late date. I was unwilling to open up the potential for further communication.”*
- *“I decided that my response was not going to be productive to finding a solution as the person seemed uninterested in hearing another perspective.”*

5.3.3.2.3 Recipient did not respond as a way to say “no”

Examples:

- *“Someone tried to sell me a product that I did not need.”*
- *“The purpose was to arrange a future meeting. [...] I unintentionally lead the person believe that I was interested in further contact when I was not. Therefore when I received the email I did not reply.”*
- *“he asked for something I could not provide”*

5.3.3.3 Category C: recipient intended to respond or even started

responding; nevertheless, the recipient did not send a response for a long period of time.

This category has three sub-categories:

5.3.3.3.1 A response has not yet been sent

Examples:

- *“due to lack of time I have not responded...I will later”*
- *“I recieved the e-mail to my work e-mail address I then got very busy and as the e-mail was not a business related matter I felt I should do my work before responding and did'nt get around to it.”*
- *“I began a response, but have not yet sent it due to some changes in my life. Since the changes have settled though, admittedly I have not yet finished and sent the email.”*

5.3.3.3.2 A response has eventually been sent, late

- *“I wanted to respond with news and detail. This takes time and I didn't allow for the time to complete the message [...] The message was finally sent and with full explanation. However, the response was not timely.”*

- *“The email not being top priority and a high number of other emails to respond to.[...] they emailed again and this prompted me to respond immediately”*

5.3.3.3 Finally too much time passed to respond

Examples:

- *“Being too involved in a life that does not include that person so [...] and then conveniently forgetting the email. Never seemed the right time to take time to respond”*
- *“By the time a response would have been forthcoming the sender and I had both already decided through other forums that the initial request was not important and therefore did not necessitate a response.”*

These three main categories allowed classifying 23 of the 26 open text explanations for the intended recipient’s silence. Two of the cases were classified as category A, 11 were classified as category B, and 10 were classified as category C. Three were left unclassifiable, mainly due to an unclear open text explanation.

These three categories were then applied to the explanations offered for the silence that senders experienced. These explanations were, as expected, expressed with less certainty, and their tone was more tentative. Nevertheless, the three classifications proved useful in categorizing the possible explanations reported by the participants.

Of the 30 open text explanations, in three cases the participants gave a possible reason that was classified as A (example: “I actually have no idea why the person has not responded. Except to think that they have changed their email or that the email address I used is not their primary account.”); in eight cases the explanation was classified as B (example: “In my opinion, the key reason I did not receive a response to my e-mail was because the recipient chose not to respond.”); in seven cases the explanation was classified as C (example: “By neglecting to respond immediately, he has perhaps put it aside til a more convenient time and as a consequence has forgotten, [the subject of my email] is not all that important or he is

simply taking his time.”); in four cases the explanation could be classified under more than one of the three categories (example:” I am not sure if the owner does not use that e-mail address on his website anymore or if the owner decided not to respond because he/she is no longer interested in renting the apartment. I suspect the first one is most likely.”); in four cases the responders could not provide any possible explanation (example: “I have no idea, and dont really mind”); and, in four cases it was impossible to classify the explanation (example: “Organisational chaos and lack of good clear processes”).

6 Discussion

6.1 Discussion of results of study 1

The discussion of the results of study 1 is divided into two parts. The first discusses the results of the Enron e-mail analysis. The second part, discusses the analysis of the distribution of response latencies of the three datasets, including the Enron dataset. This second analysis was driven by the results of the first analysis of the Enron e-mail, and by the challenge of proving that the highly asymmetric distribution of response latencies observed in the Enron e-mail dataset is not an exception but is, rather, representative of response latencies in text-based CMC's.

6.1.1 The Enron e-mail analysis

6.1.1.1 Discussion of the quantitative results

The results of the Enron e-mail analysis describe, in quantitative terms, the fact that most e-mail responses are created shortly after the incoming message is received, and that later responses are few and far between. These results corroborate the “24 hour expectation” mentioned in the literature review (e.g. Tyler & Tang, 2003). While not counterintuitive, these findings are not self evident, and were, at the time of publication in 2004, unique in their broad quantitative foundation and unobtrusiveness as well as in the wide range of e-mail types analyzed post factum and in a “real world” (non-laboratory) setting. The fact that the results are based on an unobtrusively collected, quantitative, “real world” dataset adds validity to the results of this study, in relation to previous qualitative, interview-based work. One of the most intriguing findings is the *strength* of the 24 hour phenomenon: on average,

84% of all the replies are created within 24 hours. A closer inspection of higher resolution data is somewhat more difficult due to inherent measurement biases that will be discussed later, but even allowing for some imprecision, detailed data (Table 10) demonstrate that on average more than half of all replies are created within about 2-3 hours, and more than two thirds within about 5-6 hours.

Table 10: Cumulative % of answers created within n hours from receipt, from all answers created

See text for explanation of apparently negative response times.

Hours (n)	Cumulative %
-6	0.15%
-5	0.81%
-4	2.62%
-3	3.35%
-2	3.87%
-1	4.22%
0	4.85%
1	25.61%
2	49.39%
3	58.76%
4	63.97%
5	66.53%
6	68.16%

The resulting gamma distribution which is highly skewed to the left, with a stretched out and rapidly diminishing right tail, seemed to be similar in shape to other responsiveness profiles described in the literature survey, an observation that led us to the second part of study 1, in which this distribution is compared to distributions from two additional large datasets of

response latencies in text-based CMC. Another important finding which is an extension of the “24 hour” finding is that the e-mail responsiveness profile of the various users at Enron is relatively similar. As the relatively sharp “knee” in Figure 4 shows, 95% of the users still show a relatively wide spectrum of responsiveness profiles, but a somewhat tighter focus on 80% of all of the users already shows significantly more uniformity: they respond to at least 70% of the e-mails within the first day, and to at least 90% within 5 days. A tighter focus on 50% of the responsiveness profiles shows that they fall within 5% of the average 5 day aggregate responsiveness percentage of 94.6%.

6.1.1.2 Limitations

This study has several major limitations. First, the sample is limited in scope. It uses e-mail messages of employees of a single corporation. These are users who have probably logged in to their accounts on a daily basis, and many of whom probably monitored their inboxes continuously throughout the work day. Different user populations may log on to their accounts less often [for example as a result of a corporate effort like Intel’s “Yourtime” initiative (Intel Corporation, 2003)], or only once or twice a week. The response latency profiles of such users will probably be different. Their responsiveness profile will probably have a similar distribution though with different parameters, due to a random addition of many hours, days and sometimes weeks to response times. Also, it is impossible to know why some of the “sent mail” folders were populated by few or many messages: it could be the result of the level of activity of the individual user, but it can alternatively be a result of the archiving behavior of the individual, as well as depend on the archives that the FERC investigators managed to seize. In addition, since the extraction of the timestamp from the original message body was automated, and failed in some of the cases, it can be assumed that

the extraction was more likely to fail in replies to differently formatted messages from users outside of Enron, than in replies to the uniformly formatted messages originating from Enron e-mail server or servers. Research of additional “sent mail” boxes of individuals in academia, at home and in other situations should augment the picture generated from the Enron database. Moreover, it is possible to investigate the inboxes and incoming e-mail archives of users (including those in the Enron database) and uncover the responsiveness profile of various people who responded to the messages of these users.

A second limitation is the tool used to measure response time: computer generated timestamps. Estimates based on these timestamps are inevitably inaccurate due to factors such as being located in various time zones, computer (and mail server) clock inaccuracies, delays in updating computers to daylight saving time (DST) as well as varying DST regimes, and the apparently inconsistent use of GMT in the database generated timestamps.

Compounded, these inaccuracies can result in imprecise response time estimations. The most obvious manifestation of these inaccuracies is the appearance of ostensibly negative response times. About 4% of the response times are 0 to (-5) hours, and almost 1% are even less than (-5) (Table 10). This means that the granularity of the usable results is of at least a few hours, and that any higher resolution analysis is subject to unpredictable deviations. Nevertheless, we do not believe that these variations influence the generalizations about responses within one and five days, since adding or subtracting a few hours from the one day or the five days boundaries do not materially affect the generalizations reached. The most important issue that a higher granularity will allow to investigate is the responsiveness profile during the first day, and specifically within the first few hours. The granularity that should be attempted is of minutes, to allow the corroboration of the finding that many replies are produced almost

immediately following the receipt of a message. Another source of bias resulting from the timestamp tool used is the inability to measure responses which did not have a “RE:” header, or did not include the original message. A third limitation is that the response times were aggregated, regardless of message content and the identity of the recipients. The analysis does not treat perisynchronous (Tyler & Tang, 2003) messages differently, or distinguish between personal and work related messages. The analysis does not check if the originating message was “urgent”, or asked for an immediate response, nor does it look at who else was copied on this message. It does not check if the response was really a reply to the e-mail message, or if the sender simply used a reply to save the retyping of the recipient’s e-mail address. All of the above, as already mentioned in the literature survey, can influence responsiveness.

Another limitation is that this research provides a “bird’s eye” view of the results. It looks at response times while ignoring important contextual parameters such as the organizational role, the location, or the gender of the user, parameters that are likely to influence e-mail communication (e.g. Boneva, Kraut, & Frohlich, 2001; Burgoon, Bonito et al., 2002; Guadagno & Cialdini, 2002; Herring, 2003; Pagnucci & Mauriello, 1999; Thomson, 2006). Even when looking at individual communicators, the analysis is still of all of that user’s response latencies, without regard for the context of that reply. This limitation is also a strength of this study, which is able to identify mathematical generalizations which are independent of context. These generalizations provide a benchmark against which to contrast results from specific cases in which context will be taken into account.

A final limitation lies in the challenge of finding similar datasets to replicate the results. Access to a dataset like Enron’s was a windfall, and similar large bodies of e-mail are hard to

come by ethically. Nevertheless, at least one more such analysis that has been published since the original publication of our Enron results, and the same asymmetrical distribution of response latencies was identified (Eckmann, Moses, & Sergi, 2004).

6.1.1.3 For further research

Despite the limitations of this study, these findings do provide answers to a few important questions, and open the door to new and interesting questions. Some of the questions that can now be tackled have to do with online silence. One of the major obstacles in researching online silence is the lack of a benchmark for online silence. This deficiency stems, in part, from the difficulty of obtaining access to relevant databases, a difficulty resolved by the auspicious release to the public domain of the Enron Corpus. The results reported here provide such a benchmark. They suggest a methodology to produce such a generic “responsiveness profile” for all media and settings. The drawing of a responsiveness profile of individual or cumulative users allows a likelihood estimate for receiving a response as a function of the time since sending, and thus silence can be defined as no response after an x period of time, at which, say, 99% or 97% of the responses have already been created. For example, according to the aggregate Enron e-mail data, x will equal to 20 and 8 days, respectively. When no empirical data exists, the gamma distribution can be estimated, and used to provide a first approximation. This direction is pursued in the second part of study 1, in which the Enron results are evaluated together with the responsiveness profiles in two more datasets.

The findings reported here require us to reassess one of the prominent attributes of e-mail technology: its purported asynchronicity. As already mentioned in regards to

perisynchronous e-mail (Tyler & Tang, 2003), e-mail is sometimes used in a synchronous manner, and from the aggregate response time profile of the Enron users, the ubiquity of this phenomenon is established: a significant percentage of replies are created very shortly after receipt of the initiating message, sometimes within short minutes. We wish to suggest that the level of synchronicity is actually not an attribute of a specific technology (e-mail, chat, discussion group, instant messaging). With today's efficient networks, a traditionally asynchronous medium like e-mail can be, and is, used synchronously, for a rapid exchange of thoughts and ideas, and a traditionally synchronous medium like chat or instant messaging can be used to communicate asynchronously. We hypothesize that the choice of medium is less a result of its level of synchronicity, and more a function of variables such as availability, context, cost and security. This hypothesized blurring of boundaries is important to consider when discussing convergence of electronic media. This idea is further elaborated in a later section titled [6.4.3 Modulating synchronicity in CMC](#).

In summary, the methodology of measuring the responsiveness profile of individual CMC users and of aggregates, as well as the findings about the responsiveness profiles of Enron users show that e-mail is not as asynchronous as it is sometimes portrayed, and that most replies are created shortly after receipt. Together, these results lead us to the second part of study 1, in which we expand the Enron e-mail research by comparing responsiveness profiles of users who use various media in various contexts, as well as develop the initial definition of online silence suggested above, into a more generalizable definition.

6.1.2 Distribution of response latencies in the three datasets

The results of the distribution analyses of the three datasets, Enron e-mails, Google Answers and university forum, are that all three user groups show, in aggregate, a similar

mathematical distribution of response latencies. This mathematical uniformity exists despite the significant differences among the types, purpose, and context of the asynchronous conversations taking place within each group. An inspection of the distributions (Table 4) shows in all three datasets, that at least 80% of the responses were sent within the average response latency (τ) of that group, and at least 97% of the responses were sent within 10 times that average response latency (10τ). In cases where analysis was possible, even individual users show the same asymmetry: at least 70% of almost every individual's responses were made within that user's average response latency, and at least 96% within ten times his or her average response latency (RL). These findings allow us to delineate three normative chronemic zones of response latencies in asynchronous CMC, based on the average response latency τ :

Zone I - quick to average ($RL < \tau$). The majority of the responses fall in this zone

Zone II - above average ($\tau < RL < 10\tau$). A minority of the responses fall in this zone

Zone III - long silence ($RL > 10\tau$). A negligible minority of the responses fall in this zone

6.1.2.1 Generalizability of the Findings

The findings point to common chronemic characteristics of asynchronous CMC. The three datasets described are very diverse in their characteristics: They represent different user populations (business people, students, and varied Internet users in a public arena), assorted asynchronous text-based CMC technologies (e-mail, discussion forum, web pages), a variety of contexts (academic education, major corporation, competitive online bidding), a range of average response latencies (from 1.5 hours to a little over one day) and of cohort sizes (more than 15,000 to more than 100,000, a total of over 170,000 responses), a period spanning at

least seven years, and respondents from the U.S. as well as from other countries. Despite these differences, a recurring pattern surfaces when analyzing the aggregates: an asymmetric distribution of the response latencies that can be described by the generalization that regardless of the average response latency (τ), most (at least 80%) of the responses are already created within that average latency, and almost all (at least 97%) of the responses are created within 10τ of the average response latency.

The strength of this generalization is further revealed when drilling down to the level of individual users. We see that the generalizations at the aggregate level need to be only slightly relaxed (from 80% to 70% and from 97% to 96%) in order to describe the vast majority of individual users from the two datasets in which personal identification was possible, and users for whom a sufficiently large sample of response latencies was available. This finding is an indication that users of asynchronous CMC, similar to the users of Internet Relay Chat observed by Bays (1998), tend to create responses within a relatively short time, in the order of magnitude of the average response latency (τ), and are unlikely to respond after a duration longer than one order of magnitude above τ .

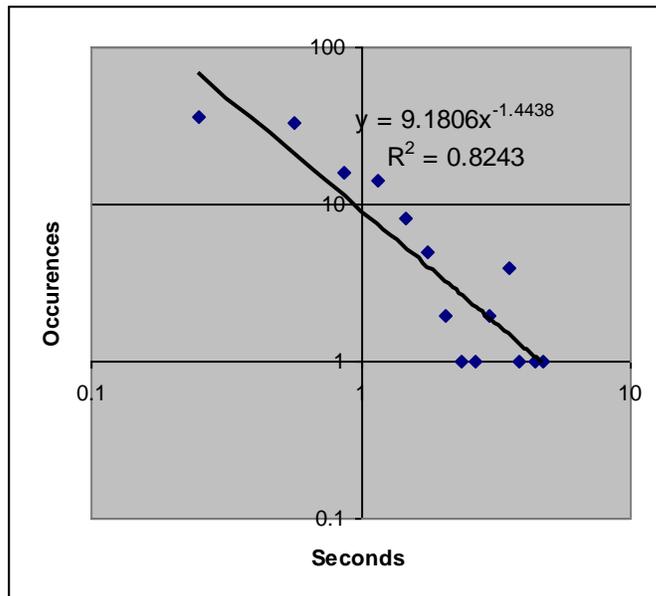
Why can we make this generalization? What is the source of the uniformity? Is it more than simply a rule of thumb? We wish to suggest that this generalization postulates a power law distribution. Power law distributions are not new, but awareness to the ubiquity of power law distributions in nature, as well as in human artifacts and constructs has risen significantly in the last 10 years (Barabasi, 2003). Barabasi, as well as others, show that power laws are at the heart of diverse phenomena including the structure of links on the World Wide Web, the size of human cities, and the network of biochemical reactions in the cell. As can be seen in Figure 6, power law is also the best way to describe the distributions of response latencies in

the three datasets. An inspection of Figure 6 suggests that the generalization about τ and 10τ is a direct result of the slopes identified in the datasets (-1.7 to -2.0). When the average response latency covers 70-85% of the responses, then a move to the right on the x-axis of one order of magnitude translates to a move of roughly two orders of magnitude on the y-axis. Thus, the percentage of responses that take longer than 10 times the average response latency (10τ) will be a few percentages at the most.

The robustness of the power law postulate receives further support when one looks at well established rules describing latencies and response latencies in traditional forms of communication. For example, in Jaffe and Feldstein's work (1970) in traditional spoken contexts, the quantitative results for the duration of pauses by one speaker in a dialogue (p. 76, Figure IV-9) present the same characteristics as any of the three CMC datasets described in study 1: 70-80% of the pauses are shorter than the average pause length (τ estimated at 0.97 seconds), and a pause of above 10τ , (9.7 seconds) did not occur even once in that 50-minute dialogue. Moreover, when the plot is reconstructed (Figure 8) using modern statistical tools, and regression analysis is performed, the power law distribution yields a high R^2 value of .82, even better than that for the exponential distribution reported by the authors (a reconstruction of the data by the authors yields an R^2 of 0.74 for an exponential distribution). The reconstruction was carried out by scanning the graph from the original book, and using graphical software to measure the coordinates of the pixels of each data point, as well as the pixels of the marks on the axes. Similar behavior apparently appears in telephone-based conversations such as those described by Brady (1968), although precise analysis is difficult due to the partial presentation of results in Brady's study.

Figure 8: Power law distribution in spoken conversation

Re-plotting Jaffe and Feldstein (1970, p. 76) on a log-log scale reveals a statistically significant power-law distribution of response latencies in spoken conversation



6.1.2.2 Possible explanations for the findings

Why do people create most of their responses within a relatively short period? One of the promises of online communication was thought to be its asynchronicity: the ability to respond at one's convenience, even after a relatively long wait (e.g. Lantz, 2003; Newhagen & Rafaeli, 1996). Why then do we see that in practice most responses are created quickly, and that if a response is not created within a short period of time, the probabilities for a response drop precipitously?

One possible answer is the well-documented phenomenon of online information overload (Davenport & Beck, 2001; Shenk, 1999; Zeldes et al., 2007): As messages flow in, people either respond to them at once, or put them aside and rarely return to them. Evidence for this behavior resulting from information overload was presented by Jones et al. (2004). This

possible explanation is further strengthened by a weak but positive correlation (0.19) that we find in the Enron dataset between the total number of responses created by users and the percentage of the responses created within one day. On the assumption that users who create a larger overall number of responses experience more information overload, we observe that the behavior of these busy users tends to be even more skewed than the average user. Further evidence to support this possible explanation is the much shorter average response latency in the Google Answers dataset. We can see here evidence that when there is a financial incentive for a quick response, the average response latency drops by more than an order of magnitude. Given information overload, we could expect that activities that carry the potential of immediate financial gain and which are competitive, will be less likely to be delegated to a later time than messages that do not have this financial incentive.

Another possible explanation for the behavior pattern identified in this study is linked to the signaling power of a quick response: In asynchronous CMC, a quick response is one of the only non-verbal tools that can be used to signal immediacy, care, and presence. Thus, there is a preference for quick replies (Aragon, 2003; Danchak, Walther, & Swan, 2001; Feldman & March, 1981; Goodwin, 2002; Walther & Tidwell, 1995). Anecdotal evidence for the positive signaling power of a quick response comes from the observation we made while inspecting some of the actual texts in the Enron corpus. In an inspection of texts of e-mail messages created after a relatively long period of time and well beyond average response time, suggests that these responses are different from the responses created within the average response time (Table 11). These responses are more likely to mention the long response time, often apologize about the delay and/or provide an explanation. In addition, these are sometimes not really responses, although they were created by replying to a

previous e-mail message. They might show the user sending a reply asking about the progress of an issue mentioned in the original e-mail, or even not connected at all to the text of the original e-mail, possibly as a shortcut to typing an e-mail address. Examples of these responses are reproduced in Table 11.

Table 11: Examples of late responses

Examples (verbatim, anonymized) of texts from e-mail responses created after a long latency

Response latency	Quoted text	Category
16 days	sorry for the delay	Apology
14 days	Sorry it has taken me so long to write	Apology
18 days	i got back from almost three weeks vacation yesterday and am back at work	Explanation
14 days	i just got back into town from almost 3 weeks vacation. sorry i didn't get in touch over the holidays, but...	Explanation + apology
23 days	Only took me 3 weeks to respond. That's pretty good for me. I think things started collapsing the day I got your original email	Humorous apology + explanation
16 days	Just following up to see if the recruiting season has started and to make sure everything is going okay. If you need anything, just say	Reference to subject in original e-mail. Not an answer to question
51 days	D, how are we coming on this project in relation to the info E sent you? Do you need anything else from E? Thanks.	Reference to subject in original e-mail. Not an answer to question
109 days	Hey Mom... thought i would give a call but don't have your number at work. send it if you get a chance. love,	Response probably a short-cut to typing e-mail address

A fuller explanation for the rapid answers probably lies in a combination of both principles mentioned in the previous paragraph: due to practical constraints on online communication in an age of information overload and constant interruptions (Mark et al., 2005), a quick response is the best way to ensure that a response will be created. Moreover, by sending a quick response, one conveys rapport, immediacy, and presence. The practicality of interactive communication depends on immediate responses. It is difficult to imagine a world in which every message, even one that was delivered a long time ago, has a high probability of receiving a response.

A third explanation could come from the logging-in habits of CMC users. A study by Dezsó, et al. (2006) of an online news portal shows a visitation pattern that is similar to the chronemic pattern we identified in our datasets. Most importantly, the visitation pattern decays as a power law. Dezsó, et al. show that a power law chronemic distribution pattern of the time between the posting of a news item and its reading can be explained by the power law distribution of the time intervals between consecutive visits by the same user. This interesting link between the distribution of intervals between user log-ins and the subsequent distribution of visitations to the individual news items might help explain, by analogy, the pattern we see when aggregating response latencies of many online communicative exchanges. We do not have chronemic logging-in information for any of our datasets, but it is reasonable to assume that the same power law distribution describing the frequencies of logging-in to a news portal would also describe (with different slopes) the dynamics of logging-in to check ones' e-mail, online classroom forum, or the Google Answers website. Thus, by drawing a possible analogy between clicking on a news item and choosing to

respond to an online message, we reach another possible explanation for the power law chronemic distributions revealed in our datasets.

Another approach to explaining the results is to extrapolate from the similarity in the distribution of pauses in traditional conversation, and ask how the rules of traditional turn-taking apply to asynchronous CMC. The set of rules suggested by Sacks, et al. (1978) was structured to accommodate 14 facts about any traditional "mouth to ear" conversation (p. 10-40). Most of these conditions also apply to asynchronous conversational CMC, for example the conditions that state that the sequence, content, distribution, and length of each turn are not specified in advance. There are, however, three important exceptions that result from the asynchronous nature of the conversation: in asynchronous CMC, conditions 2 and 3 ("overwhelmingly, one party talks at a time" and "occurrences of more than one speaker at a time are common, but brief") do not apply, due to the strict linearity of message posting by most CMC systems (Herring, 1999). At the same time, due to the persistence (Erickson & Herring, 2005) of the conversation, in CMC the message is available as well as retained longer, for further and repeated examination. Persistence of messages overcomes the aural and cognitive difficulty of synchronously processing more than one stream of talk, and allows a separation in time between the receipt of the words and their processing. In addition, rule 4 ("transitions from one turn to a next with no gap and no overlap between them are common. Together with transitions characterized by slight gap or slight overlap, they make up the vast majority of transitions") needs to be restated in light of the findings reported in this study.

Our proposal for the restatement of conditions 2 and 3 is that "The words of each party are presented separately and linearly, and persist for a period of time." For condition 4, the

proposed restatement is "the vast majority of the transitions occur within a relatively short time." The use of the word "relatively" is intentional. It alludes to the relativity reported in this study, that regardless of whether the average response latency in a specific conversation is a few hours or a few days, the majority of the responses are sent within that average latency, and the vast majority of the rest of the responses are sent shortly thereafter.

It is important to note here that we measured the response latency when there was a response. If there was no response, we considered that no conversation had taken place in this medium. We use the inclusive definition of "persistent conversation" proposed by Erickson and Herring (2005), a definition that extends the notion of conversation from traditional face-to-face to computer-mediated contexts. In both cases, a conversation is no longer a conversation when silence takes over. The turn-taking rules restated below apply as long as the conversation continues.

After having restated three of the 14 conditions, the rules for turn-allocation in asynchronous written CMC, at least for those types examined in this study, can be restated, and serve to explain the chronemic distribution of asynchronous CMC:

1. At the moment a message is sent by one party (the sender) to one or more parties (the recipients):
 - (a) If the sender has selected the next speaker, the party so selected has rights, and is obliged, to send a response as soon as is practicable. Other recipients too have the right to send a response
 - (b) If the sender has not selected the next speaker, each recipient has the right but not the obligation to send a response

(c) The sender may continue with an additional message

2. If, after a message is sent by the sender, either 1(a) 1(b) or 1(c) has operated, each party who created a reply is assigned the role of sender and the rule-set 1(a)-1(c) reapplies.

A similar and interesting attempt to examine the turn-taking rules in CMC was made by Garcia & Jacobs (1999), in which the rules of Sacks et al. are re-examined for the case of quasi-synchronous text-based CMC.

In summary, we present here four possible explanations for the highly-skewed distribution patterns of response latencies found in the asynchronous CMC. Two of the explanations are direct, and two are based on an analogy. One of the direct explanations is positive, and suggests that a quick response is a way to signal immediacy, care, and closeness. The other explanation is direct and negative suggesting that due to overload, users tend either to reply immediately or not to reply at all. Of the two explanations by analogy, one analogy is to traditional face-to-face conversation, showing a very similar chronemic distribution; we explore the relation between the rules governing traditional conversational exchanges and those that apply to asynchronous CMC. The last analogy is to online behavior, suggesting that the power law distribution of accumulated CMC response latencies might be a result of the power law distribution of log-ins. None of these four explanations is a sufficient or complete explanation for the chronemic distribution of response latencies in asynchronous CMC, however, and further work will need to be devoted to finding a full explanation of the empirical regularities revealed here. For a more speculative discussion of the possible explanations of the results of study 1, see the section titled [6.4.3 Modulating synchronicity in CMC](#)

A paper published by Barabasi (2005) reported similar findings to those reported in study 1. He too identified the power law distribution of response latencies in e-mail use, and he too tried to explain the “bursty” behavior which results in the power law distribution. Barabasi shows that this behavior can be modeled mathematically if one assumes that e-mail users cue their responses, prioritize them, and then proceed to create and send the e-mail responses based on their priority. The prioritization is not only in relation to other e-mail messages, but rather also in relation to other activities. Though rooted in structural modeling rather than social or behavioral theories, Barabasi’s proposal is interesting, because his study and ours arrive at similar observations from different departure points, and as the findings corroborate each other. Barabasi’s proposal will be further discussed in relation to the findings of study 3.

6.1.2.3 Unresponsiveness and Silence in Asynchronous CMC

These findings on responsiveness, interactivity, and the maintaining of conversational threads in CMC provide tools to investigate instances when unresponsiveness and silence disrupt an online conversation. The results of study 1 suggest a quantitative definition of online silence. We can now confidently state that **"no response after a period of ten times the average response latency"** constitutes silence. This definition yields a better than 95% confidence level that a response is not likely to occur in the future, since as shown before (Table 4) only 3-4% of the responses are created after that time. As already mentioned before, the fact that only a very small percentage of the responses are created after 10τ is a direct result of the slopes (-1.7 to -2.0) of the power law functions. We believe the "above 10τ " definition to be conservative, mainly since, as reported in the literature survey, response rates are usually significantly less than 100%. Moreover, as exemplified in Table 11, at least a minority of the very late responses created seems not to include actual answers to the original message.

This definition of online silence is also in line with Tannen's (1985) definition of a silence as a pause which is longer than expected, as well as with McLaughlin & Cody's (1982) more quantitative definition of a lapse of more than three to four seconds. It is actually an interesting combination of both approaches. Both definitions are discussed in the above section [2.2.1 Defining silence](#).

The strength of this definition of a "CMC lapse" is that it combines the rigor of a quantitative, statistical definition with the ability to adjust for qualitative differences among datasets through its context sensitivity. Thus, when researching online silence in a specific context, researchers will calculate the average response latency (τ) relevant for the context of that specific study. Once that τ is identified (through the analysis of a large enough dataset, or through the use of a relevant benchmark τ), it can be assumed that if a response was not created within the 10τ period of time, there is a better than 95% chance that a response will no longer be created, sent, and received. Nevertheless, whenever possible, it is important that researchers use diligence and look for evidence that the dataset does not show hints of an unusual distribution, especially one that is different from the power law. For example, the e-mail responsiveness profile of an employee who has been away from e-mail due to a two-week holiday will not show a power-law distribution in the first few days after the holiday, and in that case the above definition of online silence is not applicable.

This definition of silence using τ might be criticized as a tautology (or, if you will excuse the pun, a **tautology**), claiming that since τ is calculated from the conversation itself, it can not then be used again to define silence in that same conversation. We would counter this argument by pointing out that the calculation of τ is based on the average length of the pauses in the conversation, both long pauses and short pauses. The calculation is *not* based

on silences, i.e. unanswered messages. So, even if a person replies to only 10% of the messages, averaging the latencies of the responses produced by that person allows calculating a threshold of 10τ , a period of time after which the probability of receiving a response is very low. The appearance of tautology is a result of the fact that τ is calculated in a context dependent manner, and that defining what subset of response latencies is the appropriate one to take into consideration, requires subjective judgment. But, this context sensitivity should not be deterring researchers as well as practitioners from using the method suggested here. For example, it is perfectly sensible to assume that, as a first approximation, it is possible to use the τ calculated from the Enron dataset as a typical τ for business correspondence, and assume that a pause of more than 12 days will be interpreted as silence.

6.1.2.4 Methodological Implications

A key factor in human communication research has been the difficulty of obtaining large amounts of naturally-occurring conversational data. The work presented here highlights the potential that CMC holds for providing such data, processed and ready for analysis. We have shown that CMC persistent conversations (Erickson & Herring, 2007) can be analyzed using tried and proven tools used for the analysis of face-to-face conversation, and that it shares important attributes with traditional "mouth-to-ear" communication. Moreover, since the raw data of CMC are already digitized, and thus require less human effort to transform from the raw recordings to, for example, analyzable response latencies, significantly greater amounts of information can be processed and results that are more robust quantitatively can be obtained. Moreover, the unobtrusively (Webb et al., 1966) collected datasets we describe, represent a natural conversation. The availability of large datasets containing digitized and

ready-for-analysis natural conversations could revolutionize the methodology of studying human communication (Newhagen & Rafaeli, 1996).

An interesting twist on this theme is a study by Oliviera & Barabasi (2005). This study was inspired by the insights gained while exploring response latencies in e-mail (Barabasi, 2005). The researchers looked for power law distributions in response latencies in letter writing. In their analysis of the letter writing response latencies of two prolific correspondents, Darwin and Einstein, they have shown that the response latencies span four orders of magnitude (from days to years), and that most of the responses were created within about ten days from the date of receipt. The power law distribution is evident in the datasets of both scientists. We believe this study is an excellent complement to our re-analysis of the historic data described in Figure 8, bringing into one model human response latencies spanning at least eight orders of magnitude, from fractions of a second, to years. The Oliviera & Barabasi study reports another parameter of interest to researchers of unresponsiveness and silence, which is the response rate to letters. The response rates of Darwin and Einstein were 0.32 and 0.24, respectively.

6.1.2.5 Practical Implications

The quantitative findings described here allow quantifying the probabilities of response events, based on estimated or measured average response latencies. The practical implications of these findings lie, for example, in the potential to increase social translucence in online communication. Social translucence is described as a system that makes social information visible and enables participants to be both aware of what is happening and to be held accountable for their actions as a consequence of public knowledge of that awareness

(Erickson & Kellogg, 2000). For example, it is relatively simple to construct a tool that will be able to use these quantitative findings to analyze the responsiveness profiles of specific people one is communicating with via e-mail, and estimate the probability of a response from each of them within a specified period of time. Nevertheless, like any extraction of explicit information from implicit data, some users might feel that such an analysis is indiscreet. Users may also introspectively “turn this tool on themselves”, observe their own responsiveness profiles, and utilize the information captured by it, for example to improve or fine tune their responsiveness. An interesting attempt to achieve such a goal is DriftCatcher (Lockerd & Selker, 2003). Future research on responsiveness profiles of various users using different media in a variety of contexts can use the responsiveness profile and the distribution information reported here as a benchmark.

The fact that the aggregate profile and the distribution represent many thousands of messages created by dozens of different users over a long period of time, means that the profile can be utilized for more than one purpose. Firstly, it can be used to assess how varying parameters such as those mentioned above, influences the profile. Moreover, it can be used to estimate a responsiveness profile in cases where the number of observations is smaller, and there is a need to extrapolate.

Another application is for those leading discussions of CMC, such as educators in asynchronous classes and moderators of online forums. Their challenge is to make people aware of the chronemic zones described above and ensure that users attempt to create the responses within Zone 1. For example, given a forum in which τ is about one day, then if a specific posting does not start receiving responses within a few hours, it is very likely that this posting will not develop into a "healthy" and active thread. If an asynchronous online

classroom has about 15 participants and its τ is about 20 hours, then the participants should be required to post at least three to four times a week to maintain a dynamic discussion consisting of a few threads. A student who logs in only once a week will find that most of the threads are no longer active. For an interesting example of this see Hewitt (2005). For further discussion of this see the section [6.4.2.2.1 Moderating online forums and other online conversations](#).

6.1.2.6 Future Directions

Apparently, these mathematical properties of the chronemics of online and traditional communication are a universal characteristic of typical human response latencies. This finding should be corroborated by further analysis of additional datasets originating in traditional as well as online communication. One such analysis by Barabasi (2005) has already been discussed before. Another example is a dataset that originates in an online report (Hamilton, 2005) which summarizes response latencies in 199 online surveys in which 523,790 invitations were sent and almost 70,000 responses were received. We do not have direct access to the dataset. However, the report describes a similar pattern to the one observed here, where an estimated 70% of the responses were created within the average response latency (a little less than 3 days), and where over 99% of the responses were created in four weeks (10x the average response latency). Additional published work in various disciplines suggests behavior that is in agreement with these generalizations (Burke et al., 2007; Q. Jones et al., 2004; Matzler et al., 2005; Strauss & Hill, 2001). We are not aware of published work on synchronous CMC. A quick compilation we performed on the delays between messages in a synchronous chat group reveals the same skewed distribution, with about 70% of the delays at or below the average delay (Park, 2007). It would be interesting

and instructive to find occasions in which the same rules apply, as well as exceptions to the rules. This can be achieved by further analysis of published data, as well as by dedicated original research that focuses on asynchronous CMC, including areas not mentioned here, such as response latencies within blogs. Furthermore, research should measure response latencies in synchronous CMC such as instant messaging, chatting, and text messaging (SMS).

Further analysis should explore the distribution of the shorter and most abundant response latencies. Due to our specific interest in the longer latencies and their relation to online silence, in the present study most of these response latencies were bundled in the largest bins. It is now also possible to explore the implications of CMC chronemics as a nonverbal cue, in a manner similar to the way proxemics and other nonverbal cues affect interpersonal communication. For example, one could study the correlation between the normative zones described here and the expectations of users. An initial indication that these norms *are* reflected in the expectations of users is the often quoted (e.g. Tyler & Tang, 2003) expectation in workplace e-mail correspondence of receiving an e-mail reply within "24 hours." Given the added delay caused by weekends and holidays, the average response latency measured in the Enron dataset ($\tau=28.76$ hours) is close enough to 24 hours, and it is at the point that separates Zone I from Zone II. Since Zone I defines the range where the majority of the responses actually occur, the 24-hour expectation is in line with the norms of workplace e-mail chronemics revealed in this study. This relationship between chronemic norms and chronemic expectations is explored in study 2.

6.1.2.7 Conclusion of the discussion of study 1

The analysis of response latencies in a range of CMC systems reveals a mathematical regularity. The significance of this regularity is in the insights it offers into the underlying uniformity of human conversation, whether computer mediated or traditional. Computer mediated communication is further established as an organic extension of traditional human communication, influenced by the constraints of technology, but ultimately shaped by human nature.

6.2 *Discussion of the results of study 2*

In this study of response latencies, we test hypotheses about response latency as a nonverbal cue that can influence impressions. The role of response latency as a cue is established, the influence of response latency on various aspects of impression formation is discussed, and the implications of the findings are elaborated.

6.2.1 Response latency as a nonverbal cue in CMC

The results of this study allow us to assert that response latency acts as a nonverbal cue in CMC. The study extends the findings of study 1 which analyzed the chronemic behavior of large numbers of CMC users, and that identified normative and nonnormative response latency zones. The results of study 2 demonstrate that CMC users are sensitive to these response latency zones: they expect other users to stay within the normative zones, and react when these expectations are violated. The existence of chronemic cues in CMC has already been convincingly demonstrated in the past, and this study strengthens and extends those early findings. It also strengthens the evidence against the claim that CMC media, especially

asynchronous written CMC, are poor media (Daft & Lengel, 1986; Daft, Lengel, & Trevino, 1987) devoid of the richness afforded by non verbal cues used in spoken communication.

6.2.2 The effects of response latency on expectedness, evaluation, attraction, relational message interpretation, and credibility

The results presented in Table 6 show that on average, respondents presented with normative response latency consistently judged the candidate more positively than those presented with a nonnormative response latency. Thus, as a generalization, this is evidence that longer than normative response latencies, as well as total unresponsiveness, are interpreted as negative violations. These results are in line with the findings on reticence in face-to-face situations (Burgoon & Koper, 1984). These results come as no surprise, since long latencies in e-mail correspondence slow down communication and make it less efficient, and since total silence results in a loss of interactivity. A rapid response to an e-mail message signals immediacy, care and presence (Danchak et al., 2001; Feldman & March, 1981; Goodwin, 2002; Walther & Tidwell, 1995), and failure to respond creates negativity and hostility, as already presented above. It is also evident that in the case of high valence applicants, for all of the variables, the mean for one-day latency was always higher than that for the other two latencies. This difference was not always statistically significant, but since the direction was the same in all cases, i.e. that the one-day latency was more positively rated than the other, nonnormative long latencies, it is possible that the lack of significance is due to an insufficient sample size. Future studies could use this observation about directionality to test directional hypotheses, effectively increasing the power of the analysis in comparison with the non-directional ANOVA employed in this exploratory study.

Below is a discussion of the effect of response latency on each of the dependent variables, by candidate valence (Table 7).

6.2.2.1 Expectedness

In the case of high valence candidates, one can see that a one-day response was significantly more expected than a two-week latency or a never latency. On the other hand, when the candidate's valence was low, the three response latencies had the same level of expectedness. This difference is surprising, and begs an explanation. One possible explanation is that the negative first impression that is created by the vignette has a primacy effect that increases the salience of the negative impression and overshadows the effect of response latency on expectedness. A similar, but alternative explanation is based on the fact that the information about valence was obtained, according to the vignette, based mainly upon a face-to-face interview. It is possible that a negative face-to-face impression has an overwhelmingly strong influence on future computer mediated interactions. Lastly, it is possible that the weight and importance of the interview, which is the formal selection tool, overcomes that of the less important minor e-mail follow-up. These three explanations are not mutually exclusive, and the data at hand do not allow ruling out one or more of these explanations.

6.2.2.2 Evaluation

In the case of high valence candidates, a one-day response was significantly more highly evaluated than a two-week latency or a never latency. On the other hand, when the candidate's valence was low, the evaluations did not differ significantly. This finding is similar to the behavior on expectedness from the previous section, and reflects the strong correlation between expectedness and evaluation (the Pearson correlation coefficient in this

study was 0.77, $p < 0.0001$), which expresses the strong link between normative behavior and positive evaluation. Such a high correlation has already been reported by Burgoon & Walther (1990).

The drop in evaluation of a candidate who violates expectations is explained well by EVT. Nevertheless, the lack of sensitivity to latency in the case of a low valence candidate is as surprising in this case as it is for expectedness, and the same three possible and non-mutually exclusive explanations mentioned for expectedness might apply in this case too.

6.2.2.3 Social attraction

In the case of high valence candidates, the one-day latency was significantly more socially attractive than the two-week latency. Nevertheless, this difference was not significant in the case of candidates who did not respond at all. This surprising result, that the damage to one's social attractiveness is more significant when one reacts after two weeks than if one does not react at all, is not easy to explain. It might be a result of insufficient statistical power due to small sample size. It might also be a result of the role played by uncertainty in cases of silence. The centrality of uncertainty in "traditional" silence has been long established (Bruneau, 1973; Jaworski, 1999; Tannen & Saville-Troike, 1985), and, if at all, is only increased in CMC. Possibly, if no response at all is received, the drop in social attraction is not as great, since there are possible alternative explanations which are face-saving, such as that the candidate did not receive the e-mail due to some technical fault, or another, independent factor. Nevertheless, if an answer is received after a very long time, after two weeks, it might be more apparent that the reason for the delay is in the hands of the candidate, and not of a third party, and the negative attribution follows. On the other hand,

when the candidate's valence was low, the three response latencies were evaluated at the same level, reflecting the same phenomenon already discussed in our discussion of the effect of latency on expectedness and evaluation in low valence candidates.

6.2.2.4 Task attraction

Task attraction was not significantly influenced by latency, neither in low valence nor in high valence applicants. Possibly, task attraction is not influenced by latency. Alternatively, as already discussed above, this result might be a consequence of insufficient sample size and of a non-directional hypothesis.

6.2.2.5 Immediacy/affection

In the case of high valence candidates, the one-day response was evaluated significantly higher than the two-week latency or the never latency. On the other hand, when the candidate's valence was low, only the never latency resulted in a significant drop in immediacy/affection, while the two-week latency did not. It seems like in the low valence case, the delay in response did not matter, as long as some response was received, while only total silence sent a message of decreased immediacy/affection.

6.2.2.6 Similarity/depth

Both in the case of high valence and in the case of low valence candidates, one sees a significant drop in similarity/depth following a never latency, and a weaker, not statistically significant, drop in the case of the two-week latency. It is possible that with a larger sample or a directional hypothesis, the two-week drop too would be significant.

6.2.2.7 Receptivity/trust

In the case of high valence candidates, one can see that a one-day latency was significantly more highly evaluated than a two-week latency or a never latency. On the other hand, when the candidate's valence was low, only the never latency resulted in a significant drop in receptivity/trust, while the two-week latency did not. It seems like in the low valence case, the delay in response did not matter, as long as some response was received, while only total silence sent a message of decreased receptivity/trust. The behavior of this variable is very similar to that of immediacy/affection, which is not surprising, since both of these variables reflect aspects of intimacy.

6.2.2.8 Credibility

In the case of high valence candidates, one can see that a one-day response elicited significantly more credibility than a two-week latency or a never latency. On the other hand, when the candidate's valence was low, the three response latencies elicited the same level of credibility. This phenomenon reflects the behavior of the expectedness and evaluation variables, and the same speculations about the reasons for this behavior can be made in this case too.

6.2.3 Implications for EVT

EVT provided the theoretical and methodological frameworks for this study. The main effects detected support its main tenets (Burgoon et al., 1996b): people hold expectancies about response latencies in e-mail communication, and these expectations are both predictive and prescriptive. They are predictive in the sense of reflecting typical behavior (as described by the three chronemic latency zones described in study 1), and they are prescriptive in the

sense of reflecting what is appropriate: we expect people to respond to e-mail queries, and we expect the response to be within the normative zones. Expectancies and evaluations are closely correlated. Nevertheless, our results are not easily explained by EVT when we compare the reaction to expectancy violations by high valence applicants, versus low valence applicants. As predicted by the theory, there was at least some evidence for interaction between valence and the means of all of the dependent variables, except task attraction and similarity/depth. However, the reaction to valence was different than might have been predicted, and the difference between high valence and low valence candidates is that the response latency of the former is noticed and influences the evaluation of the candidate, while the response latency of the latter seems to have only a minor effect on the evaluation of the candidate. We believe this result does not weaken EVT, but rather strengthens it. The result emphasizes the success of EVT in predicting key parameters that affect evaluations. Moreover, EVT correctly predicted that violator valence will be a key parameter that interacts with those evaluations.

6.2.4 Implications for nonverbal cues in text-based CMC

The results of study 2, as well as previous research (e.g. Walther & Tidwell, 1995) confirm that chronemic cues are an influential category of nonverbal cues in text-based CMC. On the other hand, several theories point to the apparent lack of nonverbal cues in text-based computer mediated communication (CMC), and suggest that this lack of cues is a key reason why text-based CMC is inferior to face-to-face communication.

“Cues-filtered-out” (Culnan & Markus, 1987) and “Lack of Social Context Cues” (Sproull & Kiesler, 1986) claim that the lack of these cues leads to reduced social presence. Media richness theory (Daft & Lengel, 1986) categorizes text-based CMC like e-mail low on the

media richness scale, consequently labeling it as inappropriate for the communication of highly equivocal information. These theories emerged in the early days of CMC, when the general public was only starting to adopt this form of mediated communication. These theories are based on the claim that text-based CMC is devoid, or almost devoid, of nonverbal cues. The findings reported in study 2 beg the question whether chronemics is the exception to the rule, or whether text-based CMC has turned out to be richer than assumed by theories that were developed two decades ago?

Research that shows that text-based CMC is desired and is used extensively to accomplish complex social tasks, sometimes more successfully than purportedly “cue rich” media such as face-to-face conversation (Herring, 1999; Walther, 1996; Walther & Tidwell, 1995), as well as work that shows that CMC can be an effective tool to convey emotion (Derks, Fischer, & Bos, in press), as well as our findings, lead us to assert that text-based CMC is rich in nonverbal cues. There is a preponderance of evidence that such cues are actually quite prevalent. Some of this evidence is reviewed in the section [2.6 Nonverbal cues in CMC](#). Moreover, we suggest that the early hypotheses and theories that deterministically labeled some technologies as inferior and poor, led to a delay in the exploration of a significant portion of the communication taking place during computer mediated communication.

In order to provide further evidence to the claim that CMC is rich in nonverbal cues, cues such as those suggested in the above cited literature review section should be investigated using methodologies such as those employed by us in study 1 and in study 2. These methodologies should be used to explore whether, as well as how, these cues are used to encode and decode nonverbal messages. Like traditional nonverbal communication research, the first stage is to establish the norms and ranges of each of the cues, as we did in study 1 in

relation to response latencies. After these are established, it would be possible to measure the encoding of these cues, as well as the impact of staying within the norms and of violating the norms, as we did in study 2. Like all nonverbal communication, we expect online cues to be ambiguous and highly context dependent, as well as highly influential, and to interact with the verbal content of the message.

We predict that such research will reveal that chronemic cues are not the exception to the rule, and that experienced users of text-based CMC use and are sensitized to dozens of cues and codes which make text-based communication as rich, complex and context dependent as other forms of human communication.

6.2.5 Limitations of the study

Participants in this study were drawn from students in an MBA class at a single university.

On the one hand, this was an advantage: a typical student in such a class is a full-time employed professional who studies part-time. The average age and the standard deviation demonstrate that this is a relatively heterogeneous group of students, with diverse backgrounds and life experiences. However, participants were still recruited as a convenience sample from one segment of the population, and further research should explore additional segments of the e-mail using public.

The vignette described a single, clearly defined relational hierarchy: a job applicant and a potential recruiter. This fact limits the ability to generalize from this specific example, to other situations in which a host of other relational hierarchies may exist.

Only three of the relational message interpretations were incorporated, out of eight possible interpretations suggested by Burgoon and Hale (1987). That means that the analysis was less

comprehensive. This was a result of two challenges: the first was to keep the number of questions in the vignette as low as possible in order to allow it to be administered to an academic class under a tight schedule. The second was a challenge in translating the existing scales from one language to another. For example, where English has two synonyms, “casual” and “informal”, Hebrew does not have a synonym. Consequently, the richness of the “formality” scale was diminished, and the scale was not useable in our study.

The ambiguity of some nonverbal cues is central to EVT, and the “never” latency chosen for this study was supposed to represent this ambiguity. When no response is received to an e-mail, there are plenty of possible explanations, some of which reflect badly on the intended recipient, the addressee of the e-mail, while some do not. For example, it is not possible to know if the addressee actually received the e-mail message. Nevertheless, it is possible that the ambiguous status of the “never” latency was not salient enough in this vignette, and no manipulation check that can verify if it was perceived as ambiguous or not, was employed.

The vignette versions that had the “never” latency included less information about the candidate (one less e-mail) than the other versions. No manipulation check was designed to assess the impact of this added information. We have no reason to assume this had a major impact, since in many cases the evaluations of the never latency and two-week latency (which does have that extra e-mail) were not significantly different. Nevertheless, without a manipulation check this remains a potential obstacle.

Lastly, the vignettes methodology is limited. On the one hand, it offers a very noise-free background against which to test hypotheses and modify variables (e.g. Alexander & Becker, 1978; Alves & Rossi, 1978; Denk, Benson, Fletcher, & Reigel, 1997; Finch, 1987; Ganong & Coleman, 2005; Hughes & Huby, 2002; Kasic, Mannetti, & Lackland Sam, 2005; Miller et

al., 1997). It is also an efficient alternative to lengthy experiments. For example, carrying out an experiment in which participants would be asked to evaluate candidates with whom they actually correspond over e-mail, would have been much more resource demanding than the present vignette. On the other hand, the vignette is a tool that requires the participants to imagine a situation, and imagine the way they would react to that situation. Real behavior might be different from imagined behavior. For example, we know that individuals who experience social exclusion experience the passage of time as slower (Twenge, Catanese, & Baumeister, 2003). Such an effect could not be reproduced in individuals reading a vignette about online silence.

6.2.6 Future directions

One obvious extension of this study is to increase the sample size, in a manner that will allow additional manipulations such as investigating more points on the continuum of response latencies, as well as assessing the impact of other intervening factors, such as, for example, a two-week latency accompanied by an apology for the delay. As mentioned in the discussion of study 1, and described in Table 11, such apologies seem to be common in responses beyond 10τ . In addition, it would now be possible to make directional hypotheses based on these initial results, as well as on the results of classical EVT, and use a more sensitive tool such as contrast analysis to measure the significance of the findings.

The success of the vignette methodology in exposing expectations and evaluations related to online communication opens the door to investigating additional nonverbal cues in computer mediated communication, and thus enriching our understanding of the way impressions are formed and interpreted in the online world. Hypotheses that can be examined using this

methodology can, for example, be extracted from the section [2.6 Nonverbal cues in written CMC](#).

An additional interesting direction would be to explore the role of response latencies in other social contexts. It is possible, for example, that a delayed response from a high valence addressee who is being courted by the sender will be interpreted as a positive expectancy violation, possibly even more positive than a quick response.

Additional unobtrusive methods could be applied to exploring expectations about response time. An interesting example might be to collect e-mail “out of office” notices. These are automatic replies which users set up to be sent in response to incoming e-mails, when they are unable to respond to incoming messages themselves (due to business travel, holidays, illness, etc.). These are relevant for understanding expectations about online responsiveness since they are posted when users feel they will not be able to respond to e-mail as quickly as they might be expected. An initial analysis of a collection of such responses shows that these are usually posted when the person is away for a few days, and are never posted when the person is absent for less than a full day. Triangulating the results of a quantitative analysis of such messages, as well as an analysis of the texts of these messages (e.g. Nastri, Pena, & Hancock, 2006) could further our understanding of expectations and responsiveness norms, as well as about issues such as attribution.

6.2.7 Summary of the discussion of study 2

This study confirms that e-mail users are sensitive to response latencies, are aware of response latency norms, have expectations about response latencies, and incorporate response latencies as cues in their assessment of their fellow communicators. These cues affect a broad

range of variables, and can affect impressions, as well as actions such as a recommendation to recruit or not recruit a job candidate.

6.3 Discussion of results of study 3

This study is based on self-reports about cases of online silence. The discussion begins by answering the four research questions of study 3, regarding the causes and consequences of online silence in e-mail. Following that we discuss the additional findings, as well as discuss the limitations of the study, and suggest further research.

6.3.1 RQ³₁ and RQ³₂: causes of online silence

6.3.1.1 RQ³₁: At what stages of the CMC cycle does silence occur?

According to the testimonials of those who created silence, the stages most involved with the creation of online silence are stages 5-8 in Table 9. By stage 5, the recipient has fully read the e-mail message, and by stage 8 the response is completed and ready for sending. During stages 5-8, the recipient assesses whether an answer is expected (stage 5), and takes the decision whether to respond or not (stage 6), and whether the response will be written immediately or not (stage 7). If a response is started, it is still necessary to complete the writing (stage 8). Thus, according to the testimonials of the recipients, a “hotspot” of e-mail silence occurs after a message has already been received and read, and before it is being sent. In addition, it is important to note that silence could also occur in stage 1, when the (intended) recipient never gets to see the original e-mail they should have responded to.

Since one iteration of sending a message and receiving a response to it, covers more than 360 degrees of the [2.8 text-based CMC communication cycle](#), the numbers used here do not

correspond directly to the numbers used in the cycle. Thus, for example stage 10 (“I sent the response, but it was never opened”) maps between stages 1 and stage 2 in the CMC cycle.

Thus, the answer to the research question is that there is a hotspot on the CMC cycle between points 4 and 7.

6.3.1.2 RQ³2: What explanations are suggested as causes for online silence?

Three categories of explanations for online silence were identified in the open text responses:

(A) the intended recipient has not seen the incoming message; (B) the recipient did not intend to respond; and, (C) the recipient intended to respond or even started responding; nevertheless, the recipient did not send a response for a long period of time.

These second and third categories are further divided into three sub-categories each. In category B, recipients do not intend to respond since:

(1) They did not think it is necessary to respond, usually since they assumed that taking the action that was asked for in the e-mail was enough. They did not see a need to send a written response to the sender. It is interesting to note that in some cases, the silence meant, to the silent party, to represent an affirmative answer (for example, not responding to an invitation, assuming that one should respond only if one can't make it to the meeting). In contrast, we will see in the third subset of category A responses, that to others the same silence can mean a negative, rather than affirmative, answer.

(2) They did not want to respond, feeling that responding was not in their interest

(3) They did not respond as a way to say “no”. It is interesting to contrast this with the first subcategory, where silence sometimes meant “yes”.

In category C, recipients intended to respond, but:

(1) Have not yet sent the response since various constraints kept them from starting or completing the response (e.g. time, other commitments, and deliberations over the content of the response).

(2) Have sent the response after a long time, due to similar constraints as in subcategory 1.

(3) Eventually did not send the response since too much time has passed. This also includes cases in which with the passing of time, it seemed like the issue that was raised in the original e-mail was no longer relevant.

The question of explanations can also be examined through the lens of intentionality. When the responses to the intentionality question are examined, a little over 50% of the participants who created silence reported that their silence was intentional, about a third reported that it was unintentional, and the rest reported that they did not know. Much more uncertainty is revealed when those who experience the silence try to answer the question whether intentionality is the explanation for the silence: a quarter of the participants thought the silence was intentional, a third thought it was unintentional, and the rest either responded that they did not know, or left the answer blank.

6.3.2 RQ³ and RQ⁴: consequences of online silence

6.3.2.1 RQ³: What are the consequences of online silence for those who do not receive the response?

The first consequence of online silence that comes to mind, especially in light of the literature on cyberostracism (e.g. Williams et al., 2000), is hurt feelings. What do our data say about the link between online silence and hurt feelings? According to the responses,

almost one half of the participants reported that their feelings were not hurt at all; about one quarter reported that they were slightly hurt, and less than a tenth reported that they were quite hurt. Whether these results are surprising or not will be discussed later. It is also interesting to note a difference between genders in regards to the self-report of hurt feelings. As presented in Table 12, males were less likely to report that they were not hurt at all, and more likely to report that they were slightly or quite hurt.

Table 12: Feelings hurt by online silence, by gender

Answers to the question “Were your feelings hurt by the lack of response?”, by gender

Were your feelings hurt by the lack of response?					
	not hurt at all	slightly hurt	quite hurt	blank	Grand Total
Female	10	3	1	3	17
Male	7	7	2	2	18
blank				3	3
Grand Total	17	10	3	8	38

A second consequence of the silence is a high level of uncertainty. This uncertainty is most apparent in the responses to the multiple choice questions about possible reasons for the silence they experienced. As can be seen in Table 8, more than half of the responses (206/384) were “possibly”. Compared to less than one tenth (21/270) of the responses in the case of those who created the silence, it is obvious that experiencing online silence is fraught with uncertainty. The same high level of uncertainty is expressed in the responses to the question about intentionality, where almost half of the responses were either left blank or the participants reported that they did not know.

A third consequence is further steps taken following the silence. More than half of those who experienced silence chose to take further steps, such as resending the e-mail, trying to use

another medium, and even filing a complaint. Moreover, in many of the cases in which participants reported that they created silence, they became aware of the silence by the sender following up on their message.

6.3.2.2 RQ³4: What are the consequences of online silence for those who do not respond?

Users who created online silence tend to believe that their silence was hurtful: close to half believed their silence was slightly hurtful, and close to a sixth thought it was hurtful or quite hurtful. The rest thought that their silence was not hurtful at all. An interesting gender related bias might have influenced the responses here, since as is apparent from Table 13, males were much more likely not to be able to recount a situation in which they caused online silence, and thus females are overrepresented in the responses that led to the answer to RQ³4.

Table 13: Answers to question on experiencing silence, by gender

Answers to the questions whether the respondent can recall experiencing online silence, by gender and whether they can recall creating online silence, by gender

Can you recall a situation in which you sent an email, expected a response, but never received a response to that email?	Female	Male
no	3	
yes	14	16
no response		1
Grand Total	17	17
Can you recount a situation in which an email was written to you, but despite the fact that the sender expected an answer from you, s/he never received one?	Female	Male
no		9
yes	17	8
no response		
Grand Total	17	17

An additional consequence is that those who do not respond might be chased. 30% of them reported being chased for an answer (reminder e-mail, phone call, etc.), and in at least two of

the cases it is clear that they would not have known about the message they were expected to answer had they not been chased.

6.3.3 Further discussion

6.3.3.1 Online silence is ambiguous

It is interesting to note the finding that silence is at least as ambiguous online as it is in spoken conversation. If we look at the example provided in the literature review (Jensen, 1973) that shows how the same silence can have opposite meanings, we can see the same phenomenon in the reports of the participants in study 3. For example, we can see that silence can be a way to say yes, or to say no; silence can be temporary or permanent; silence can be intentional or unintentional; silence can be a signal of action or of inaction; silence can be a result of the user having seen the message, or of the user not having seen the message. Note that we are not trying to evaluate which type of silence is more ambiguous. This assessment would depend on many factors. Nonetheless, it is clear from the results of study 3 that online silence is highly ambiguous and shrouded in uncertainty.

6.3.3.2 Explanations for online silence, intentions, and hurt feelings

In the questionnaire used in study 3, participants were asked to provide “explanations” as well as “reasons” for the online silence they experienced or caused. McLaughlin, Cody & Read (1992) assert that the study of communicated explanations by different academic disciplines is focused on limited aspects of this phenomenon. Social psychologists research this subject under the theoretical umbrella of attribution theory, as an intrapsychic phenomenon, ignoring the fact that most of these explanations will eventually be

communicated to another person, and that this eventual communication significantly influences the way the explanation is shaped. At the same time, sociologists and communication researchers explore the subject of explanations (“accounts”) focusing on the discourse manifestations of explanations, with little regard to the process of comprehending the event that is being accounted for. We believe that this insight about disciplinarity and the resultant incompatibility of the fruits of research of different disciplines is very relevant to an interdisciplinary study like this one. We attempt to ensure that insights on explanations for online silence should be as cross-disciplinary as possible.

The questionnaire asked the participants to anonymously provide explanations to a researcher. The questions were accompanied by questions about the communication cycle. It is not surprising then, that the explanations were focused on causation and on the sequence of events that lead to the silence, rather than on polite explanations or excuses. Such polite explanations were more likely if the responses were not anonymous, and the participants had reason to believe that their explanations might reach those to whom they did not respond.

In the two main categories of explanations (B and C), it is interesting to note the central role of “intention to respond” as the differentiator between the two categories. This important role of intention is exemplified in the importance of perceived intentionality of hurtful acts on factors such as distancing: Vangelisti & Young (2000) showed that people who felt that they were intentionally hurt reported a stronger distancing from the hurting person, and less satisfaction with the relationship, than those who felt the hurting was unintentional. This same study links such hurtful feelings to online silence by showing a (marginally significant) negative association between perceived disregard and the amount of hurt evoked by hurtful messages.

It is not surprising that no specific relationships between level of hurt and intention were identified in this study. Hurtful feelings are complex and depend on highly variable factors such as the nature of the relationship, the specific context of the event, previous events, and personality (Leary et al., 1998; Pietrzak, Downey, & Ayduk, 2005; Sharkey et al., 2001; Snapp & Leary, 2001; Vangelisti et al., 2005; Vangelisti & Young, 2000). None of these variables were either measured nor controlled for in this study. Intention too is highly dependent on linguistic and cultural factors (Duranti, 2006). The scope of this study, as well as the way it was structured, do not focus on elucidating the intricate effects of various factors that might affect the intensity of hurtful feelings resulting from online silence, but rather simply on illustrating the potential of online silence to cause hurt, and the involvement of intentionality in explaining online silence and the strength of its effect (e.g. McClure, 1992; Sommer et al., 2001).

In answer to RQ³2, we identified three categories of explanations. These categories are in line with findings of other researchers (Dabbish et al., 2005) Is it possible to classify the explanations in a different way? The answer is yes. The classification proposed in this study is a result of many iterations and failed attempts to reach alternative classification. Moreover, the inclusiveness and the non-overlapping of the categories, as well as the two phased discovery process (identifying categories in the explanations provided by those who created silence, and then attempting to apply these categories to explanations provided by those experiencing silence), all strengthen the confidence that these categories reflect a reality that exists in the minds of the participants. Nevertheless, alternative approaches might attempt to analyze the explanations provided by the participants by treating the explanations as discourse that constructs a reality within a given rhetorical-cultural-interpersonal context.

The analysis could try to use these explanations to understand issues such as responsibility and blame, as well as hierarchy and power. For example, it is possible to see that in some of the explanations (e.g. many of the explanations in category B), responsibility is left with the person who created the online silence. In other cases the responsibility is pushed away from the one who created the silence, and is assigned to the sender of the message, to the content of the message, to technology, or to other external factors. Some excellent examples of alternative approaches to analyzing discourse similar to the one analyzed here can be found in chapter 4 of Potter & Wetherell (1987).

Despite all of these limitations, the classifications suggested here are corroborated by findings of researchers who chose to analyze the dynamics of e-mail responses using tools developed for physics (Barabasi, 2005; Kryssanov et al., 2006). These researchers come up with processes and models that are surprisingly compatible with the qualitative results of study 3. In these studies, the researchers came up with a model to explain the mathematical distribution of response latencies of e-mail messages, such as the results reported by us firstly in 2004, and elaborated on in study 1. The models are competing, and the jury is still out as to which model is correct. Nevertheless, both of these models are compatible with our findings in study 3. Barabasi's model suggests that some e-mail messages are responded to immediately, and that some are then queued for a later response, a queue in which the priority of the e-mail competes with other priorities in the recipient's life. This model is compatible with the categories of silence suggested by study 3. Kryssanov et al.'s model suggests two subsystems, A and B, with different dynamics, which together influence 99% of the observed variety in response latencies. One possible interpretation is that one of the systems is a result of the immediate answers produced shortly after receiving and reading the

message (the responses that are complemented by category B silences), and the second system is a result of the delayed answers that the recipients intend to create at a later time. If these responses are not eventually created, category C silences are created. These interesting parallels between our results on silence and the results of these two researches on responsiveness are suggestive.

6.3.3.3 Limitations of study 3

A central methodological limitation of this study is that it is based on self reports. Self reports are a common method of collecting accounts of unpleasant interpersonal situations, including hurt feelings, angering, embarrassment, unwanted courting, and ostracism (Baumeister et al., 1990; Leary et al., 1998; Sharkey et al., 2001; Sinclair & Frieze, 2005; Sommer et al., 2001; Vangelisti et al., 2005; Vangelisti & Young, 2000). In all of these situations there are usually two sides: one side creates (sometimes inadvertently) the unpleasantness and one side experiences it. Online silence fits this general scheme, and thus this method was adopted, providing insights and directions for further research. Nevertheless, personal accounts and self reports are vulnerable to biases and mistakes that result from the limitations of personal memory, from intentional or unintentional attempts to manage images and impressions, or from simple challenges of effective interpersonal communication (A. A. Stone et al., 2000). In addition, the responses might also be influenced by social desirability, and personal variability in related traits such as offence taking (Sigmon & Snyder, 2006). These limitations become even more prominent when questioning participants about sensitive issues (Lee, 1993). The fact that this methodology is based not only on self reports about a sensitive issue, but also on the participants self selecting the cases that they will report on, is an additional source of bias. One consequence of this bias is that the results,

though numeric, should not be treated as quantitatively representative. This is one of the reasons that most of the discussion of the results uses fraction (e.g. “about one half”, “less than a third”), and not precise percentages. Lastly, the fact that the open text sections of the self reports revealed a central role for intentionality, as well as were clearly linked to specific stages in the CMC cycle, might reflect the fact that some of the multiple choice questions in the questionnaire asked about intentionality and the CMC cycle. It is possible that the participants were primed to include these topics in their open text responses. Many of these challenges related to self reports can be circumvented by methodologies that explore the topic of silence indirectly, and without making the participants aware of the research topic, such as the vignette methodology employed in Study 2.

Participants were allowed to define the period of time that constitutes silence. We can see that in some of the cases it is a longer period of time, in some it is shorter, and in some cases (classified in category C) an e-mail has eventually been sent, after a long period of silence. Thus, the study did not distinguish between silence and a long pause. This could be perceived as a limitation of the study. Nevertheless, is it at all possible to make such a distinction? In Study 1 we have shown that e-mail responses can be created even after months of silence. In study 2 we have shown that users’ intuitions about what constitutes too long a pause are in line with the findings of study 1, and that a long pause followed by a response can sometimes be interpreted even more negatively than no response at all. Thus, we believe it was justified not to enforce a quantitative definition of online silence, one that distinguishes between a long pause and “full silence”. Any such delineation would have been artificial, and creating it might have resulted in participants leaving out some interesting examples of what they, subjectively, perceive as online silence.

An inherent limitation of this study is the fact that it investigated online unresponsiveness through responses to an online survey tool. Moreover, the survey was carried out in the context of a geographically distributed organization, where e-mail is a principal communication tool. Taken together this means that the survey is not of a representative sample of the general population, but rather includes only users who are relatively comfortable with e-mail, and for whom online responsiveness is the rule, rather than the exception. For example, in this population we would not expect to find explanations such as “I did not answer her e-mail since if it was really important she would have telephoned me” or “I didn’t open my e-mail application for a whole month so I did not see his e-mail”. Having said that, it is important to note that such explanations would still have been classifiable into the categories identified in the study, category B and category A, respectively. Moreover, some of the participants recalled situations in which they experienced silence by parties outside the company (friends and family, organizations like banks, and customers and suppliers). Consequently, it was possible to learn also about e-mail users outside of this specific organization.

The answer to RQ³1 too is limited by the methodology of asking participants to recall a situation in which they were silent. Since the trigger for the occurrence presented by the participant is self-recall, there are some situations in which the participant might not even be aware of the fact that an answer was expected. We can see two examples in which the silent parties realized they were silent only after the original sender chased them for an answer. Had the sender not chased them, they might not have become aware of the sender’s message at all. Thus, for example, it is not possible to use the numbers of participants who provided a category A explanation as representative of the frequency of this type of reason for silence. It

is interesting to note in this context an intriguing attempt by other researchers to estimate the proportion of e-mails that are “lost in transit”. In their work, Afergan & Beverly (2005) sent hundreds of thousands of e-mails that were intentionally meant to bounce. By analyzing the responses of the servers, the researchers measured e-mail loss rates, latencies and errors in hundreds of e-mail servers. They present evidence that a small but significant percentage of the e-mails were lost, and that in at least some of the cases the loss is “non-deterministic” and bursty in nature. Although the authors are cautious not to calculate an average loss rate, a conservative estimate would probably be that a few e-mails are lost out of every thousand e-mail messages sent. They also show that despite the fact that most of the bounces occurred within a few minutes, the distribution of the response latencies is heavy tailed, with some of the automatic responses taking hours and even days. There is plenty of additional evidence for e-mail being lost without any trace (e.g. Everett-Church, 2004; Herardian, 2000)

6.3.3.4 For future research

This study is the first survey about the reasons and explanations for online silence. As such, it provides an answer to a few questions, and raises many new ones. The study reveals “hot spots” on the communication cycle in which silence seems to be more likely to occur. Follow up studies should look more closely at such hot spots. For example, if we know that a significant percentage of the silences result from a user who wants to respond but never gets to actually write the response, what are the reasons for this failure? An interesting unobtrusive methodology to explore such a question would be through the collection of blog sections in which bloggers and their audience discuss e-mail responsiveness. In a pilot study that we performed, we used specific search queries in order to identify such blog postings. A preliminary and unsystematic exploration of these postings revealed, for example, a

significant sub-section of the blogger population that treated “doing e-mail” as a “chore”, similar to household chores such as washing dishes or to sorting the laundry. Such a perception throws interesting new light on the meaning and perception of online silence. In other sections, bloggers present to their readers their explanations why they have not responded to specific e-mails, as well as try to understand, in collaboration with their readers, the reasons why others have not responded to their own e-mails. The ability to unobtrusively collect discourse about online silence is an interesting opportunity to explore, in more depth, the initial answers revealed through the survey. Other methods that will help gain a better understanding of those hot spots are more obtrusive, such as interviews and in-depth questionnaires focusing on only one of the categories of online silence.

We have already discussed the limitation created by the fact that users were asked to select the cases of online silence that they presented, as well as by the fact that we only see one side of the story (either the side that experiences the silence, or the side that creates it). Future research should also attempt to catch a more representative (and hopefully complete) set of cases, in a way that allows the investigation of both sides of the story. This could be accomplished, for example by identifying all of the unanswered e-mails of a specific user, and by (ethically) contacting the intended recipients.

Lastly, future research could explore the role of “guilt” and its temporal dynamics (Ferguson, Olthof, & Stegge, 1997), as time progresses for users in category C silence. Our initial findings point to the fact that a significant proportion of the online silences fall in this category, and we would expect intentionality and guilt to interact in complex and interesting ways as the response latency increases.

6.4 General discussion

The research question of this dissertation is “**What constitutes silence in text-based CMC, what are the causes of online silence and what are its consequences?**” In this general discussion, we present a preliminary model of online responsiveness and silence that attempts to integrate the findings of the three studies into a single answer to the research question. The presentation of the model is followed by a discussion of the contributions of the findings of this dissertation to theory and practice. The section ends with an exploratory exposition in which the concepts of synchronicity and of synchronicity modulation are discussed in light of the findings of study 1.

6.4.1 A model of online responsiveness and silence

Silence is a subjective experience, which is highly context dependent. This makes defining silence and its causes more challenging. We hereby propose a model that incorporates the context dependency and the subjective nature of online silence through the use of the average response latency τ (tau), the latency that was identified and explored in studies 1 and 2. The model presented here focuses on e-mail, which was the medium that studies 2 and 3 focused on. There is good reason to assume that the model could be extended to additional text-based CMC media.

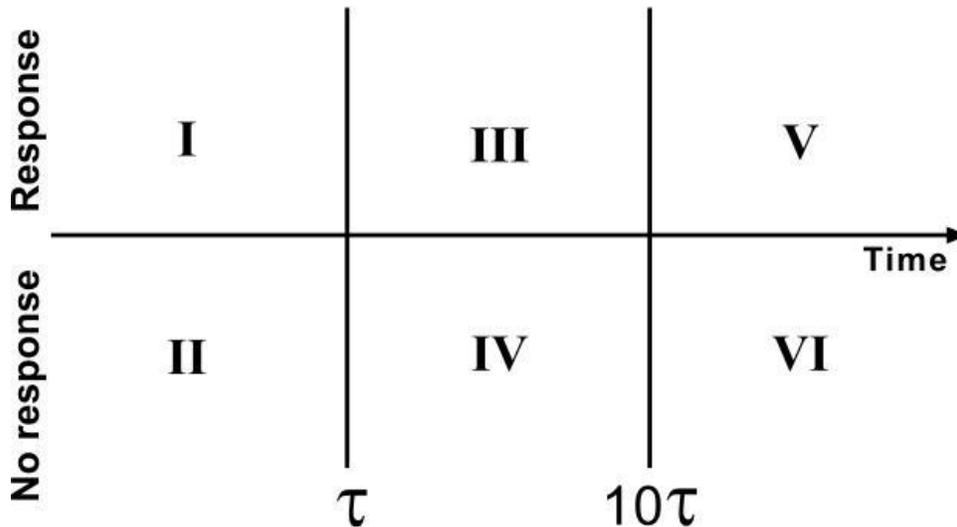
The model is based on combining the three chronemic zones identified in study 1, with the understanding of expectancies about response latencies from study 2, together with the sender and recipient perspectives as well as the three categories of recipient silence explanations identified in study 3.

A key feature of the model is the separation between the perspective of the sender, and that of the recipient. We present a “sender model” and an “intended recipient model”. The perspectives are different not only since the sender and the intended recipient are usually physically separated from each other, and view the communication between them separately, but also since their chronemic zones, as defined by τ , do not necessarily overlap. Both models adopt the term “pause” in its traditional use (Tannen, 1985) of denoting the period of time between the message and its response, and the terms “delay” and “silence” to denote a situation in which a response has not been received. “Expected” is used to denote pauses which are typical and are to be expected in a majority of the cases, and “acceptable” is used to denote pauses and delays which are longer than expected, but still within the normative range.

6.4.1.1 The sender model

The sender model describes six regions that represent a 2x3 table (Figure 9). The x-axis (representing time) is divided into three chronemic zones: below τ , between τ and 10τ , and above 10τ . The y-axis is divided into two sections, one representing receiving a response to the e-mail message, and the other representing receiving no response. The six regions, or rubrics, that are defined by the intersection of the three zones with the response/no response alternatives, are described in Figure 9, and are numbered by roman numerals I-VI.

Figure 9: The six rubrics of the sender model, numbered I-VI



When a sender sends a message and expects an answer from the intended recipient, the chronemic zones identified in study 1 and the results of study 2 suggest that the following six possibilities can occur (RL - Response Latency):

Answer from recipient within τ or less (rubric I): **Expected pause**

No answer from recipient within τ or less (rubric II): **Acceptable delay**

Answer from recipient within $\tau < \text{RL} < 10\tau$ (rubric III): **Acceptable pause**

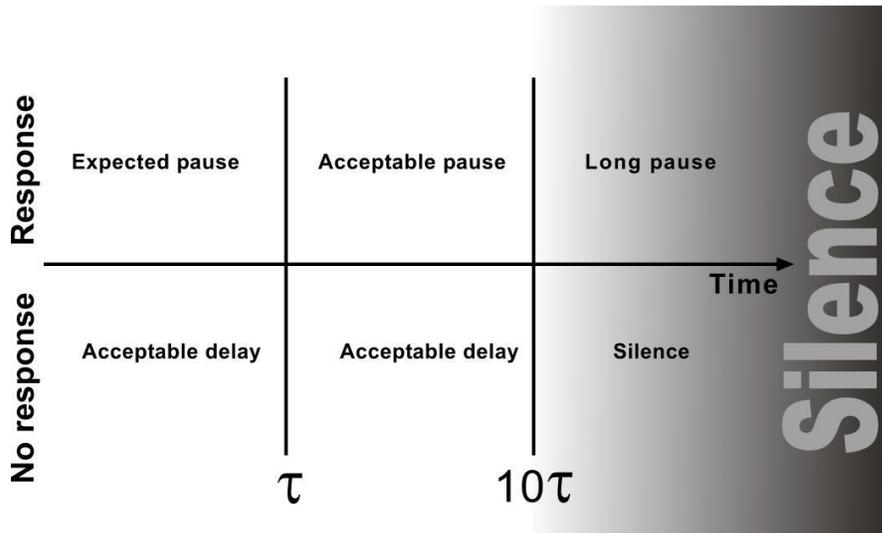
No answer from recipient within $\tau < \text{RL} < 10\tau$ (rubric IV): **Acceptable delay**

Answer from recipient within $\text{RL} > 10\tau$ (rubric V): **Long Pause**

No answer from recipient within $\text{RL} > 10\tau$ (rubric VI): **Silence**

These six regions are summarized in Figure 10

Figure 10: The sender model



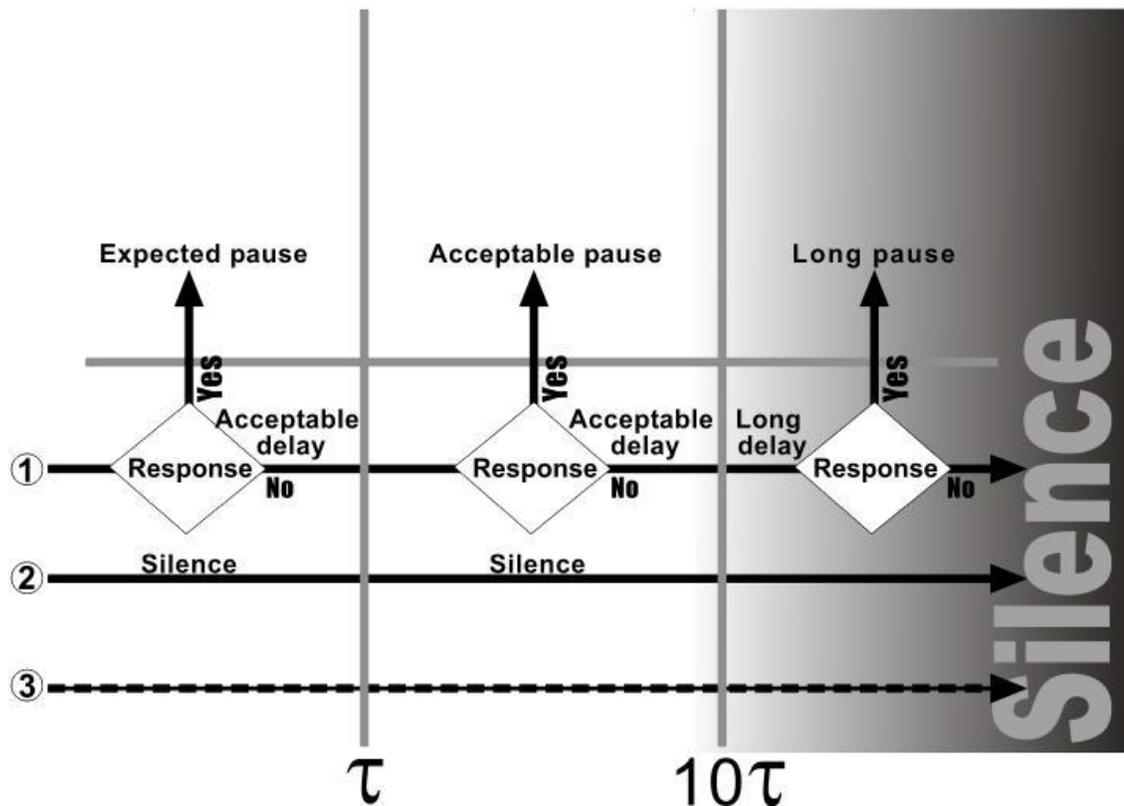
6.4.1.2 The intended recipient model

The intended recipient model is described in Figure 11. Like the sender model, this model too extends along a time continuum defined by τ . In this model there are three possible states, linked to the three scenarios (A-C) identified in study 3.

In the first state described by the top arrow labeled 1, the intended recipient receives the e-mail message and intends to answer it. If the recipient responds immediately, before τ , the response time is perceived as an **expected pause**. If the response is not created immediately, before τ , (scenario C) then an **acceptable delay** is created. Moving along the continuum to the right, the model shows that if an answer is created within a period between τ and 10τ , the result is an **acceptable pause**, and if no response is created within this period of time, the result remains an **acceptable delay**. If, then, a response is finally created after more than 10τ , the result is a **long pause**, and if no response at all is created, despite the intentions of the recipient, then the result is a long delay or **silence**. In the second state, described by the

middle arrow labeled 2, the intended recipient receives the e-mail, but does not intend to answer. This recipient will be creating silence from the first moment. In the third state, described by the bottom (broken) arrow labeled 3, the intended recipient does not even receive the message, and thus will not be aware that he or she is creating silence.

Figure 11: The intended recipient model



For clarification purposes, let's follow the intended recipient model along two hypothetical cases. The τ in both cases is assumed to be 24 hours. In the first case, Alice, the intended recipient, opens an e-mail, reads the content and decides to answer the e-mail at a later time, since creating the response will take at least half an hour of work. The decision to respond to the e-mail places Alice's case along the continuum of arrow 1. If Alice finds the time within a day or so to create the answer, the pause between receiving the e-mail and sending the reply

would be an expected pause. If, on the other hand, a week goes by and no response is sent, the result will be an acceptable delay, and if another week goes by, the delay will already be perceived as silence. Finally, if Alice sends an answer after three weeks of silence, the time between receiving the message and sending the response will be perceived as a long pause. In the second case, Bob sends Carol an e-mail. Carol does not notice the incoming message from Bob. Carol's case is placed along the continuum of arrow 3, in which case Carol is simply not aware of anything. Let's say now that after 3 days Carol learns from a colleague that Bob sent this e-mail that she has not seen. Consequently, Carol searches her inbox and trash/spam folder, and identifies Bob's e-mail message. At this stage, Carol decides whether she intends to respond to the e-mail, in which case she "moves" to arrow 1, or she decides that she does not intend to answer the e-mail, in which case she "moves" to arrow 2, expressing silence. Assuming the former, if she then responds to Bob within a few days, then the response is still within the τ - 10τ region, and the result from Bob's point of view is an acceptable pause.

6.4.1.3 Combining the two models?

Both models are actually two facets of the same phenomenon. An e-mail message can't be sent to an intended recipient without a sender, and vice versa. Moreover, since both models contain an x-axis based on τ , and on a y-axis representing a response or no response, it is tempting to superimpose both of them and unify them into a single graphic. Nevertheless, we suggest keeping both graphics apart until more information on online responsiveness and silence is accumulated. For example, we do not yet know to what extent perceptions of τ differ between people. If the differences are minor, then the scale of the sender's and of the

recipient's x-axis can be superimposed. On the other hand, if for some people five days is already a very long delay ($\tau < 12$ hours), while for others ten days is still an acceptable delay ($\tau > 24$ hours), then superimposing one over the other might lead to the wrong conclusions. Our study 2, which has examined only three chronemic zones, will need to be further refined and carried out at a higher chronemic resolution in order to identify such differences. Meanwhile, since we can't yet unify both parts of the model, we will treat them as two facets of the same model.

6.4.1.4 Exploring the nature of τ

This model combines the results of the three studies. It focuses the attention on the central role of the variable τ : τ is the variable that connects the findings of study 1 with the findings of study 2; τ is also the variable that connects the sender model and the intended recipient's model. At the same time, the model also underlines how many questions are left unaddressed in regards to the nature of τ . For example, is τ situational, dispositional, or both? And, assuming that τ is both situational and dispositional, what are the interactions between the situational and the dispositional? Is τ a cultural construct? Is there a cognitive mechanism that senses the τ of others, and monitors one's own τ ? And, if there is such a mechanism, is there one single mechanism that sensitizes people to τ 's that last fractions of a second, as well as to τ 's that last minutes, hours, days and weeks, or is there more than one such mechanism? And, are these mechanisms sensitized to the value of τ , to the variance in its value, or to another property of this elusive variable? These sociological, physiological and cultural questions all suggest open research questions awaiting careful investigation.

6.4.1.5 Limitations of the model

This is an initial model that attempts to summarize the state of the art regarding online responsiveness and online silence. Most of its limitations stem from the limited knowledge gained so far on this topic. It is a dyadic model, focused on simple e-mail exchanges between a single sender and a single intended recipient. Moreover, it is stronger in *describing* the perception of delays, pauses and silences, and weaker in *explaining* the causes or the results of the delay, of the pause, or of the silence. For example, the model describes how a two-hour response latency is perceived as an expected pause, while a two-week response latency is perceived as a long pause. Nevertheless, one might claim that the length of the latency is not enough of an explanation why these latencies *cause* this perception, nor is “long pause” enough of a description of the *results* of the long silence. It can justly be claimed that the causes might go beyond the length of the latency, and involve, for example, psychological and social mechanisms that are not described by the model. The results might also include more than just a perception of a long pause, and will also include, as already demonstrated in study 3, hurt feelings, and specific actions such as attempting (or a decision not to attempt) repeated contacts. Another limitation is that the model describes only the first order elements of the interaction between sender and recipient. It does not, for example, describe how the recipient might take into account the perception of his or her responsiveness by the sender, when deciding whether and when to respond. Such second order interactions might emerge when the two parts of the model are combined. We believe that these limitations, as well as the limitation described in the previous section titled “[6.4.1.3 Combining the two models?](#)” point researchers towards the next research questions on online responsiveness and online silence.

6.4.2 Contributions to theory and practice

Specific contributions to theory and to practice have been elaborated on in the context of the three individual studies. In this section we recap those contributions, as well as explore additional theories which are enriched or enhanced by our studies. This section touches on many theories, mainly as a result of the interdisciplinary nature of this dissertation, of the pervasiveness of CMC in everyday life, and of the centrality of topics such as time and responsiveness in many theories.

6.4.2.1 Theory

6.4.2.1.1 Theories relating to silence

Silence is a subject of inquiry in many disciplines. Our findings on the nature of pauses and silences in online communication enrich these theories both by strengthening their findings, as well as by opening new directions and suggesting new methodologies to explore the nature of silence. These theories include psychological theories about ostracism and cyberostracism (Williams, 2001; Williams et al., 2002), employee silence in the workplace (Van Dyne et al., 2003), pauses and silences in linguistics (N. S. Baron, in press; Sacks, 1992), and pauses and silences as forms of nonverbal communication (Poyatos, 2002b). Nonetheless, we do not see significant impact of our results on the “spiral of silence” theory.

6.4.2.1.2 Theories relating to time and rhythms

Time is an important variable in several theories. Our findings on the important role of time and chronemics in text-based CMC throw new light on the role of time in various socio-cognitive theories. For example, Afifi & Burgoon (2000) link attributions, uncertainty

reduction and expectancy violations theory (EVT) and show the important relationships between them. Time is an important factor in all three of these theories, as well as in theories of impression formation, perception of self, and presentation of self. Our findings are directly applicable to the respective theories of online social cognition, but since online social cognition is tightly linked to “offline” social cognition, the contribution extends beyond the online world. Time and temporality are also central in theories that look into organizational temporality (Ballard & Seibold, 2004), negotiation (Macduff, 2006), interactivity (Rafaeli & Sudweeks, 1997), and other aspects of online and offline social interaction (Finn, 1999; Julkunen, 1977). Lastly, time is also an important aspect in customer relations management, especially the concept of customer waiting time (Nie, 2000).

6.4.2.1.3 Theories relating to online behavior

The investigation of online silence is an example of researching the online manifestation of a human behavior that has been investigated previously in “traditional” settings, and thus of extending the theories that were developed in traditional settings to a new setting. Our findings strengthen the approach that such research should not position the traditional setting (in our case, face-to-face) as the gold standard that defines the theory, but rather that new settings should be investigated as independent entities, and only then should the results be compared to existing theories. This seemingly subtle modification of research ontology would produce more meaningful results more quickly, and is relevant not only for extending theories from the “real world” to the online world, but also to extending theories from a single culture to additional cultures, from one sector of the economy to another, etc. Some examples from various disciplines have already been mentioned before, and others could include the sociocognitive psychology of CMC (Riva, 2002), the linguistics of e-mail (N. S.

Baron, 1998, 2002), online deception detection (Hancock, Curry, Goorha, & Woodworth, 2005) and theories of media choice and media effectiveness (Walther & Parks, 2002). Lastly, as emphasized by Saville-Troike (1985), a total theory of communication should concern itself with sounds as well as with silences as objects of investigation. Thus, and possibly too obvious to mention in the context of this dissertation, a theory of computer mediated communication will not be whole without a theoretical understanding of online silence.

An additional theoretical implication related to online behavior is presented in Buchanan's "The Social Atom" (2007). This book reviews the emergence of a promising convergence of social science and the physical sciences. This approach has already been proven successful in several instances in which methodologies developed in the physical sciences were applied to analyzing the behavior of individuals and groups, and through that insight was gained into the behavior of large numbers of people. Some of the best examples of this convergence come from the work of researchers in statistical physics, for example in social network analysis. Some of these researchers have recently also started to look at the chronemics of online communication (e.g. Barabasi, 2005; Kryssanov et al., 2006). This type of research requires access to very large datasets representing authentic human behavior. The fact that so much human behavior can now be expressed in digital form means that the availability of such datasets will increase significantly. Our work on online chronemics is an example of the wealth of information that can be achieved by analyzing such datasets.

6.4.2.1.4 Theories in e-mail research

The field of e-mail research is now an established field of inquiry (Ducheneaut & Watts, 2005). As presented by Ducheneaut & Watts, e-mail research focuses on diverse aspects such as human cognition, information organization, systems research, CSCW (computer supported

collaborative work) and other forms of online collaboration, and organizational communication. The proliferation of theories that originate from and relate to e-mail research are a result of its high penetration in the workplace and elsewhere (Lusk, 2006; Pew, 2007). All of these theories need to take into consideration issues of unresponsiveness and silence in e-mail communication.

6.4.2.1.5 Theories relating to distributed teams

CSCW has already been mentioned in respect to e-mail research, but it is only one component of research relating to distributed teams. The importance of silence in theories relating to distributed teams is exemplified by the centrality of silence (or its counterpart, rapid responsiveness) in theories of trust in distributed groups (Jarvenpaa & Leidner, 1999), of effective online leadership (Kayworth & Leidner, 2001), of uncertainty in the context of unfair events online (Tangirala & Alge, 2006), or in the problem of mutual knowledge in distributed teams (Cramton, 2001).

6.4.2.1.6 Theories on power law

The power law distribution has been observed in many fields and in diverse phenomena (Axtell, 2001; Barabasi, 2003; Comellas & Gago, 2005; Gabaix, Gopikrishanan, Pelrou, & Stanley, 2004; Keeling & Grenfell, 1999; Qian, Luscombe, & Gerstein, 2001; Reed, 2001; Zipf, 1949). The finding that online communication pauses also exhibit a power law distribution not only links, as we have noted in study 1, traditional linguistic theories with turn-taking and pausing in online communication, this finding also enriches the spectrum of online and offline phenomena, from diverse academic disciplines, that are described by power law distributions. Our findings also point to additional places to look for power law

distributions (e.g. the power law distribution we report in Hewitt, 2005) The more examples of power law distributions that are identified in nature and in human behavior and artifacts, the better our ability of linking seemingly unrelated theories, and of identifying common underlying mechanisms (e.g. preferential attachment) that lead to this characteristic distribution. The mechanism leading to this distribution in e-mail responsiveness is still under investigation (Kryssanov et al., 2006).

6.4.2.2 Practice

Our findings on online chronemics and silences can and should influence many practices related to the development and usage of online tools. A lot of the practical advice regarding online communication has been developed in the early days of CMC media, when CMC media users were few and inexperienced. As already described in several sections of this dissertation, CMC is now ubiquitous, and is more and more pervasive in the lives of more and more individuals. CMC is no longer the domain of the few and the selected, and with that transition, usage norms have transformed and attitudes have changed. Rules and generalizations that were formed based on researching early adopters of CMC media might no longer be relevant, and conventions that have been accepted by practitioners without question for a long time, might need to be reexamined and refreshed.

6.4.2.2.1 Moderating online forums and other online conversations

Moderators of online forums face a significant challenge. A good illustrative example is online classrooms that take place in an online forum. Although this is a highly effective method of educational delivery, online teachers often run into issues of non-participation and unresponsiveness of the online students (Beaudoin, 2002; Benfield, 2000; J. F. Jones, 1999).

On the other hand, the ability students have to take their time before responding is one of the key advantages of this teaching methodology (Bender, 2003), and silence in the classroom is a complex cultural and pedagogical issue (Benfield, 2000; Jenkins, 2000; Zembylas & Michaelides, 2004; Zembylas & Vrasidas, 2007). The moderators of an online classroom face a chronemic challenge: how should they, on the one hand, allow the online students to enjoy the flexible synchronicity of the medium, while still maintaining a lively conversation which is not punctuated by lengthy silences that “kill” the discussion (Hewitt, 2005). Some attempts to identify rules for such forums clearly point to the importance of quick responses (e.g. Liu & Ginther, 2002; Walther & Bunz, 2005), but our findings suggest a useful tool, the average response latency, τ . Having shown that a majority of the responses arrive within τ , that users are sensitized to the τ of a conversation, and that users perceive a response latency of more than 10τ as a long period of silence, these findings can be utilized by moderators. For example, since most responses are expected within τ , an online discussion in which response latencies are on the order of magnitude of τ is a conversation that is perceived to be flowing. Online instructors can monitor response latencies, and influence τ by personal example (increasing or decreasing their own level of participation in the forum), as well as by setting specific ground rules such as requiring students to login at least x times a week, or requiring initial postings in the online classroom within at most y days from the start of the week. Based on our findings and the author’s extensive personal experience with e-learning, we developed several practical recommendations for moderators of online forums in general, and of online classrooms in particular. Some of the recommendations include:

- Require students to login to class at least every 2τ , and moderators every τ .

- Provide $2-3\tau$ at most per discussion oriented assignment, at the end of which the assignment should be posted into the classroom.
- Encourage early (quality) postings of responses into the forum.
- Explicitly discuss response latencies and τ in the classroom. For example, if a question has been posted and none of the 15 students responded for a full two days ($\sim 2\tau$), point this out and ask students to start posting.
- Do not keep discussion threads open for more than about 10τ .

These recommendations are, of course, somewhat circular, since τ is to some extent recursively defined by the rules themselves. Nevertheless, taking a typical online classroom (like the university forums presented in study 2) where τ is on the order of magnitude of 24 hours, it means that students should be required to login 3-4 times a week, and that instructors should be in class almost on a daily basis; it means that if an instructor wants to develop a discussion thread, then the requirement should be that initial responses to the posted question should be posted within at most 2-3 days; it means that threads should be expected to be focused and effective for one or at most two weeks.

τ should be monitored not only in educational forums, but also in other online forums. The link between lurking and social capital of the individual user has already been demonstrated by Rafaeli, Ravid & Soroka (2004), but the interest in getting participants involved and developing a good discussion is a challenge that will benefit the whole community. Attention to τ is a key tool to increase the sociability (Preece, 2000) of the discussion.

6.4.2.2.2 Developing e-mail applications

E-mail applications, as well as other online communication tools, will improve by incorporating into their design some of the insights of this dissertation about the influence of chronemics on users and on the communication process. By defining the chronemic affordances of e-mail applications [see N. S. Baron's (in press) discussion of linguistic affordances of CMC media, and Brennan & Lockridge's (2006) analysis of the affordances of different media from a cognitive science approach], designers can assist communicators to communicate more effectively, to be more responsive, and to be able to evaluate and act on online silence in an informed manner. A significant amount of work in this direction has already been carried out (e.g. Cech & Condon, 2004; Erickson & Kellogg, 2000; Fisher & Dourish, 2004; Mostow & Aist, 1997), and additional directions have already been mentioned earlier in the discussion of the results of study 1 ([6.1.2.5 Practical Implications](#)) suggesting a tool that allows users to better understand the chronemic behavior of those they are corresponding with, as well as their own. The findings of study 3 suggest additional features, which allow users to mark incoming messages that are not erased, as category C (intention to respond). Once an e-mail message is marked as such, the application can remind the user, based on an analysis of the chronemic profile of the relevant conversation, if and when the user crossed a relevant chronemic threshold (e.g. τ or 10τ). This way, the system can issue relevant and timely reminders that will prevent the user from unintentionally creating silence.

We believe that our findings are also useful for designers of other CMC tools. Many of the insights about e-mail communication, on the nature of synchronicity in online communication, and on nonverbal cues in text based CMC could be relevant for those

designing the affordances and structure of environments such as online forums, social networking websites, or ecommerce sites, as well as stand-alone devices and applications such as cell phones, voice mail systems, and IM.

6.4.2.2.3 *E-mail usage tips*

There are plenty of resources offering tips and suggestions on how to more effectively use e-mail (e.g. Brake, 2006; Shipley & Schwalbe, 2007). Moreover, research has shown that e-mail training makes an impact and improves the quality of communication in the workplace (Burgess, Jackson, & Edwards, 2005; T.W. Jackson, R. Dawson, & D. Wilson, 2003). This need for additional training does not come as a surprise. e-mail is a very new medium for the human species, as are other delayed-return media (Leary & Cottrell, 1999). The same e-mail cues are interpreted differently by different people (Byron & Baldrige, 2007), and at the same time e-mail writers are overly confident of their ability to communicate emotion and other complex messages in e-mail (Kruger, Epley, Parker, & Ng, 2005). Taken together, we have a medium which has penetrated the workplace rapidly, is used extensively, which users are overconfident about their ability to communicate subtle messages with, and which is easily interpreted inconsistently by the recipients. In respect to online silence and to responsiveness, our findings can lead to a few recommendations for those who experience online silence, as well as for those who wish to avoid creating unintentional silence. The latter is relevant not only for individuals, but also for organizations who wish to outwardly exhibit a responsive and caring image.

When experiencing online silence:

- Don't jump into conclusions and don't take it personally. A significant amount of online silence is unintentional, and feeling hurt because of an e-mail that does not receive a response is not rational. A significant portion of the silences are category A and category C, and even some of the category B silences are a result of the recipient not understanding that a response is expected. E-mail users need to remind themselves that they are biologically programmed to react negatively to online silence, and that this gut reaction stems from mechanisms honed over the generations to identify and react to early signs of social ostracism. These mechanisms are not suited for the type of asynchronous communication afforded by e-mail.

- Check your outbox, and reread your e-mail. It is not uncommon to discover that either the e-mail message never left your machine, or that if it has, rereading it might reveal that it might not be obvious to the reader that a response is expected. Ask yourself whether it was absolutely clear from your message that you expect a response? Could it have been missed by someone who read through the e-mail but was interrupted in the middle, or read the e-mail on a small handheld device? Maybe the response requires a lot of time? Maybe in your message you have asked a few questions, some of which might not have been quickly answerable, and the whole e-mail was laid aside? Critically rereading an e-mail a few hours or days after it was composed usually reveals to the original writers that their messages were not as clear as they thought when they composed the e-mail.

- Check how much time has passed. Usually, once τ is over, one feels that too much time has passed. Nevertheless, about a fifth of the responses take place between τ and 10τ . Obviously, τ is context sensitive, and if one is expecting a response from a colleague who sits across the hall, is clearly doing his e-mail, and usually responds within 10 minutes or less, then by all means a silence of a few hours is already beyond 10τ . On the other hand, since usually users

expect responses to be in the order of magnitude of τ , they could experience some level of unjustified anxiety well before 10τ have lapsed.

- Resend you e-mail. Resending the e-mail message solves some of the category A silences (maybe this time the e-mail won't be sucked into cyberspace or lost on the recipient's computer), some of the category B silences (assuming that with the resent message one clearly states the fact that one expects a response), and some of the category C silences (by reminding the recipient that a response is still expected). It helps to resend the e-mail message with a short message pointing out the fact the message is being resent. The tone and content, should, of course, fit the circumstances.

- Finally, try alternative channels. A category A silence might, for example, be a result of the recipient's spam filter unfailingly filtering your messages, or of your using the wrong address or an infrequently checked one. A category B silence might, for example, be a result of the fact that the recipient is uncomfortable discussing this issue by e-mail. And, a category C silence might, for example, be a result of a recipient whose e-mail habits are such that once an e-mail message is out of view, it is never replied to. Moreover, in some organizations and cultures, if something is really important, e-mail is simply not the way to communicate about it, and a telephone call or a face-to-face meeting are called for.

The complement to the above set of recommendations is an answer to the question how to avoid creating online silence. These recommendations target users who wish to project a responsive and caring image, reduce uncertainty, increase reciprocity, and quicken processes. These recommendations should be taken in the context of other considerations such as time availability and priorities, as well as take into account the fact that in some relationships one does not necessarily wish to project responsiveness or to reduce uncertainty. The user that

was on our mind when developing these recommendations is a customer service employee of an organization that wishes to provide effective online customer service. Alternative sets of recommendations could be developed to other circumstances.

- When in doubt, respond. To avoid creating unintentional silence, when in doubt it is better to send a short response or a confirmation. It creates reciprocity, and, if kept short, does not waste the other side's time.

- Acknowledge receipt. If you intend to respond to an e-mail, but can't do so immediately, it is recommended to send a short acknowledgement message to the sender, preferably stating expected response time. Such a response removes the uncertainty of the sender whether the silence is a category A or category B silence, and gives the sender an idea as to when an answer should be expected.

- When unsure, ask for clarifications. If something in the request is not clear, it is better to ask for a clarification rather than simply guess what the sender intended.

- Clearly mark messages awaiting response, and revisit them at least once a fortnight. We have already seen that keeping track of category C messages is not easy. Clearly marking them, and revisiting them every 10 τ or so, will ensure that no messages remain unanswered for an unacceptable length of time.

6.4.2.2.4 Shaping expectations

As already exemplified in some of the previous sections on contributions to practice, the shaping of chronemic expectations is important for effective communication, especially in an organizational context, but also in other contexts. The challenge is somewhat analogous to intercultural communication. The challenge is magnified by the fact that people who share

the same culture in the “real world”, might not share the same online culture, or at least might not share the same online speech community (Patrick, 2004). Thus, if for example a sender expects to receive an answer from a hotel within the same working day, while the same hotel’s policy is to respond to all incoming e-mails within 48 hours, the gap in expectations could lead to significant customer dissatisfaction. A good example of such norms affecting media use is provided by Turner, Grube, Tinsley, Lee, & O’Pell (2006) who show how norms of using IM and e-mail in an organization can affect employee ratings by supervisors, as well as the importance of employee polychronic orientation. Our findings as well as the methodologies presented in this dissertation can assist organizations who wish to measure norms, or to use benchmark norms as guidelines for policies. For example, it makes good corporate sense to send an auto reply to every incoming message that states the organization’s response time policy. Such an auto-reply lowers customer uncertainty as to whether their message arrived, and adjusts expectations about response time. Another example is the need to define a policy on the handling of intra-organizational IM messages when the recipient is busy and unable to take part in a conversation. Leaving the decision to the individual employee is likely to result in misunderstandings and unnecessary conflicts originating from heterogeneous norms and assumptions about responsiveness and about technology.

The last paragraph illustrates the ambiguity of silence in general and of online silence specifically. Online silence is not, *per se*, negative. Online silence harms communication when there is a mismatch between the expectations of the sender and those of the intended recipient. When expectations are adjusted, online silence allows users to take their time before they respond, and even to make a decision not to respond.

6.4.2.2.5 Additional practical applications

Our findings are also relevant for informing visualizations of online behavior (J B Begole et al., 2003; J B Begole et al., 2002; Popolov, Callaghan, & Luker, 2000; Viegas, Donath, Boyd, Nguyen, & Potter, 2004), especially those attempting to visualize time related components. For example, it might be more relevant to visualize the passage of time on a logarithmic, rather than a traditional linear scale.

Survey methodologies, especially those relating to nonresponse (WebSM, 2006), will benefit from our findings about response rates and reasons for nonresponse.

Lastly, chronemic considerations have already been incorporated into the research of interruptions (Burmistrov, 2007; Mark et al., 2005). Nevertheless, our findings on the chronemic behavior of CMC users, and our analysis of the nature of synchronicity in CMC, illuminate the need of employees to self interrupt in a new light. Initiatives such as “Yourtime” (Intel Corporation, 2003) that attempt to lower the impact of interruptions in the workplace by forcing employees to avoid quick e-mail responses, might theoretically be effective, but, in practice, run counter to deeply ingrained needs, such as the need to shorten response latencies and thereby project responsiveness and rapport.

6.4.3 Modulating synchronicity in CMC

This section of the discussion focuses on and develops one of the implications of the findings of study 1. It is presented at the end of the dissertation’s discussion section since it is a speculative theoretical development of the findings, and as such should be presented separately from the discussion of the findings of study 1 .

A key implication of the findings of study 1 is that the traditional division of CMC media into two categories: synchronous media (e.g. instant messaging, chat) and asynchronous media (e.g. e-mail, discussion board) needs to be re-examined. Recent trends, as well as the findings of study 1 about the manner in which users actually utilize CMC technologies, show that communication media are actually used at varying levels of synchronicity, and not at only a single level; that there are intermediary levels of synchronicity ranging from the highly synchronous to the highly asynchronous; and, that the level of synchronicity is not only a function of the medium being used, but also of decisions taken by users. In this exploratory exposition, we describe the trends that have blurred the dichotomy between synchronous and asynchronous communication, and present evidence that conversational synchronicity is modulated by the communicators, to adjust to changing circumstances and constraints. We show that this modulation by the communicators is carried out by employing assorted features of the media at their disposal, and/or by moving a conversation to a medium that has the required features. We speculate about the reasons for the human preference for high synchronicity, and discuss its implications.

6.4.3.1 A history of the concept of medium synchronicity

6.4.3.1.1 The early days

For much of human history, there was a simple distinction between two types of interpersonal communication. The first type was spoken speech: it was delivered in the presence of the recipients of the message; it was instantaneous; it was unmediated; it was ephemeral and left no record; it was natural, the default; and it was the common form of communication. The second type of communication was at a distance, using the written

word, a messenger, or a combination of both: it was slow, mediated, costly, time consuming, it left a record and it was used primarily for formal communication, or when talking was impossible and the message was of importance. Moreover, it was based on the technologies of the day: writing instruments, production of an appropriate substrate such as paper or parchment, and transportation; and, it was prone to interference and interception. (N. S. Baron, 1998; Winston, 1998)

6.4.3.1.2 The emergence of electric communication

The emergence of electric communication in the 1800's started blurring this simple and "natural" division. The telephone and telegraph allowed virtually instantaneous communication at a distance (Marvin, 1990). Later, the phone answering machine and voice mail allowed the delayed delivery of a spoken message at a distance; e-mail allowed a rapid and virtually free delivery of a written message across the globe; bulletin board services (BBS's) allowed groups of people separated by geography and time zones to hold a collaborative conversation, with each member making a contribution to the discussion at his or her convenience. Consequently, a new dichotomist nomenclature was coined: technologies such as the telephone and instant messaging (IM) were classified as synchronous, like face-to-face conversation (Karahalios, 2000). Technologies such as BBS's, e-mail and voice mail were classified as asynchronous. They preserve the message, and allow the recipient to retrieve it at the recipient's convenience (Mitchell, 1996). Communication technologies, and especially computer mediated communication (CMC) technologies, were clearly labeled as either synchronous or asynchronous, and synchronicity became a key parameter in the classification of the technologies and in the choice of the appropriate technology for specific tasks (e.g. Churchill & Bly, 1999; Daft & Lengel, 1986; Finn, 1999; Olson & Olson, 2000).

6.4.3.1.3 *The dichotomy blurs*

In recent years we observe a confluence of four trends that are slowly eroding the dichotomy between synchronous and asynchronous media, these trends being *digitization*, *media convergence*, “*always-on*” and *portability*. Due to the ease and ubiquity of digitization technologies (Negroponte, 1996), more and more communication is digitized, and that includes not only written words, but also pictures, movies, voice and music. The convergence of media (Koskinen, 2000) leverages digitization and blurs the boundaries between the message and the medium used to create the message and to receive it: e-mail is instantly read on the mobile phone, telephone voice mail is forwarded to the e-mail inbox for access at one’s convenience, an SMS can be sent from a desktop computer, and a picture is instantly transferred from a cell phone to an XML enabled blog. “Always-on” (Agre, 2001; Anderson, Gale, Jones, & McWilliam, 2002) is a trend that is driven by the ever increasing popularity of high-bandwidth and of wireless/ubiquitous connections, all of which keep the communication devices “on-line” at all times. In combination with the portability (Huber, Franz, & Vogel, 2002) of communication devices, mainly a result of miniaturization and extended battery life, the message is transmitted to the user wherever the user is, without a need to “connect” to the network and deliberately download the message. The coming together of these four trends, digitization, convergence, “always on” and portability, means that most messages can now be relayed immediately after they are created, can be received almost instantly, and can be stored indefinitely. In other words the co-temporality of message creation, delivery, response, response creation and response delivery is no longer a function of the technology used, but rather a result of user preferences and decisions.

6.4.3.2 Most “asynchronous” communication is rapid

Study 1 sheds light on the temporal and chronemic preferences of users of written CMC. The results of that study show that users of purportedly asynchronous media like e-mail or discussion boards have a strong preference for a rapid response. For example, in the study that looked at the time it takes people to respond to e-mails, more than 16,000 e-mail responses created by Enron employees were analyzed, and the response latencies calculated. The analysis shows that the average e-mail response latency of the employees is about 29 hours, that more than 50% of the responses were created within 2-3 hours, and that more than 85% of the responses were created within the average response latency, i.e. within 29 hours or less. Moreover, only a small fraction, around 3% of the responses, was created after a period of more than ten times that average response latency (more than 12 days). This highly asymmetric distribution of response latencies is hypothesized by us to be a hallmark of human communication in general, as it appears time and again in the response time profiles of various populations, using various communication methods and media, and in various contexts, including not only asynchronous CMC, but also traditional spoken conversation. In all of these settings, where average response times range from almost one second (Jaffe & Feldstein, 1970), to almost 3 days (Hamilton, 2005), at least 70% of the responses are created within the average response time (τ), and not more than 4% of the responses are created after more than 10 times the average response time (10τ).

This strong preference for short response latencies in asynchronous CMC has many explanations, including information overload, as well as the signaling power of a quick response. These were discussed in depth in the section “[6.1 Discussion of results of study 1](#)”. Regardless of the possible explanation, it is clear that quick responses are the norm in

mediated communication, as well as in traditional communication, and that if one does not receive a quick response, chances are quite high that no response at all will be received. For example, as mentioned above, almost 50% of the responses to e-mail messages in the Enron Corpus were created within the first 2-3 hours. Is this surprising? In her in-depth analysis of the linguistic nature of e-mail, N.S. Baron (1998) already noted that despite the fact that e-mail allows for a long delay in response, the use of e-mail is based on an assumption of a rapid response. Furthermore, as mentioned before, this behavior is similar to typical behavior in traditional, spoken, communication. The same asymmetry favoring relatively short response latencies exists in traditional spoken communication. Here too, most inter-speaker turns are taken rapidly, and only a very small minority of inter-speaker pauses are long pauses. Moreover, such long pauses, or hesitations in response, carry a message which is usually interpreted as a negative message, a message of silence (Tannen & Saville-Troike, 1985).

6.4.3.3 The synchronicity continuum

These findings and insights bring into question the traditional dichotomous grouping of communication technologies into synchronous and asynchronous. Can we still call e-mail asynchronous and instant messaging (IM) synchronous, if e-mail is based on the assumption of a rapid response (the vast majority of responses are created within a day or two) and often used for a rapid exchange of messages (Renaud, Ramsay, & Hair, 2006; Tyler & Tang, 2003), and IM is used asynchronously (N. S. Baron, 2005a) while surfing, word processing, holding face-to-face conversations, talking on the phone or simply in parallel with a couple of more IM conversations (N. S. Baron, 2005b)? We suggest that this dichotomy should be replaced by a continuum, and that average response latency, measured in units of time

(seconds, minutes, hours, and days) should be the parameter of essence. Thus, an IM conversation with a few turns a minute will be different in nature from an IM conversation in which 20 or 30 minutes pass before a response is sent, but quite similar to a rapid exchange of e-mails spaced one or two minutes from each other. Similarly, a rapid exchange of a few SMS messages within a period of 10 minutes between two “always on” mobile phone users will be different from an SMS message retrieved at the end of the workday by a user who turns the mobile phone off during office hours. A continuous spectrum of average response latencies is a more useful tool to characterize the nature of the conversation taking place, rather than a reliance on the synchronicity of the specific technology picked for carrying the messages.

6.4.3.4 Synchronicity is a property of the conversation

The same four trends that have led to the blurring of the synchronous/asynchronous dichotomy: digitization, media convergence, “always on” and portability, have also led to the disjoining between the medium and the conversation. For example, Alice reads an incoming e-mail from Bob and might wish to respond to it while she is on the road. Alice tries calling Bob’s office, but getting only voice mail, she might use her cellular and call Bob’s cellular phone. Bob might identify the caller using caller ID, and might not wish to take that call at the moment, diverting it to voice mail. This time, Alice might leave a voice mail on the cellular. Seeing the voice mail notification, Bob might send an SMS to Alice saying that he will get back to her as soon as possible. After listening to the voice mail, he might ring Alice’s cell, and after a brief talk they might decide to continue the talk face-to-face later that day. That face-to-face conversation might be followed up by a few more exchanges of e-mail. In this scenario, which is a likely scenario in the life of a contemporary knowledge

worker, not only have Alice and Bob shifted between various points on the synchronicity continuum, they have also moved the conversation between various media. The smooth transitioning of the *conversation* between the various media, a transitioning that is facilitated by the four trends mentioned above, obliges us to acknowledge the fact that though the synchronicity of the medium is an important constraint (or, to be more precise, the constraint is the range of synchronicities afforded by each medium or mode of communication), the important property to observe is the synchronicity of the conversation, and not the synchronicity of the medium. The decision by Bob to not take Alice's call based on caller ID is clearly a decision to lower the synchronicity of the conversation between them. Maybe even the original decision to send Alice an e-mail and not call her was based on Bob's wish to keep this specific conversation at a low level of synchronicity. We can conclude that given the range of synchronicities offered by many contemporary media, the synchronicity of the medium is not as central a concept as is the concept of the synchronicity of the conversation. An illustrative example of this principle is provided by Brennan & Lockridge (2006) who cite the following New York Times story: "*...the New York Times chronicled a man and his BlackBerry (a portable wireless device for e-mail and instant messaging): 'He once saw a romantic interest walk into a bar and immediately called her on her cell phone. "I saw her look at the phone and put me right to voice mail," he said, still indignant. But then he sent her a BlackBerry message, which made her laugh and prompted her to walk over and find him'.*"

6.4.3.5 Modulating synchronicity

Pointing out that synchronicity is a continuum and that it might be more an attribute not of the medium but rather of the conversation, is not an entirely new idea [e.g. Newhagen &

Rafaeli's concept of the elasticity of synchronicity (1996)] nor does it mean abandoning synchronicity as an important parameter in describing online conversations. Rather, the terminology should now describe increasing, decreasing, or maintaining synchronicity, or, in other words, of *modulating* synchronicity. Communicators constantly take decisions on the level of synchronicity they prefer for each conversational exchange they are involved in. For example, an e-mail exchange with an average response latency of one day is less synchronous than a chat with three turns a minute. A person who notices an SMS message that was sent an hour ago, asking her to ring the sender of the SMS, and who then dials the mobile phone of that person, is attempting to move to a more synchronous mode. But, if she only encounters voice mail and leaves a message, which is not immediately returned, then the average response latency stays long, and the attempt to increase the synchronicity of the conversation has not succeeded. At any rate, if the conversation moves from one technology to another (for example from IM to phone) its level of synchronicity, i.e. average response latency (or number of turns per unit of time), can still be measured, and this measure, the point on the synchronicity continuum that describes the synchronicity of the conversation, is a more useful parameter than the previous dichotomous parameter of media synchronicity.

6.4.3.6 Human preference for high synchronicity

Before we continue to explore the implications of synchronicity modulation, we wish to tackle the question why people tend to use technologies that allow long response latencies, in a highly skewed manner, preferring short response latencies? The answer might be that the preference for short response latencies, for highly synchronous interaction, is an innate human quality, possibly because humans are biologically inclined to prefer highly

synchronous interaction over delayed interaction. In this section we outline a few lines of evidence supporting this suggestion.

In his work on “The Biological Origins of Automated Patterns of Human Interaction”, Cappella (1991) presents convincing evidence for the biological basis of fundamental human communicative interactions such as reciprocity, responsiveness and synchronicity. He shows that failing to respond and reciprocate synchronously leads to negative emotions and failure of relationship building, and he presents evidence for the biological origin of these patterns. The evidence is diverse, and comes from studies of early interactions of infants and even neonates, from ethological studies, from an analysis of the evolutionary adaptiveness of these patterns, and from physiology. If the preference for synchronicity in interpersonal communication has a biological basis, then it is a preference which is inherited, and shaped by natural selection. Technological changes that have taken place in the last few decades could not yet have influenced human biological evolution in any substantial way, and thus it is not unexpected that humans will tend to underutilize features of technology that are opposed to their “natural” tendencies.

Dunbar (2002) presents a good example of how the effects of dozens of generations of biological evolution manifest themselves in current human communication patterns that are not congruent with recent technologically driven changes to the environment. Most human communication is conversational. Dunbar carefully presents evidence that the majority of human conversations take place in dyads, trios, or, at most, groups of four. He also shows that these conversations form the social glue that keeps society functioning, and proposes a mechanism whereby the selective advantage bestowed to those with optimal conversational capabilities has, through the process of evolution, honed the spoken conversational skills of

humans. Lastly, he speculates on how this evolutionary mechanism has caused what he terms “scars of evolution”. In an analogy to the physical “...*hangovers of our evolutionary past... from our useless appendix, to the weak backs we have through standing upright*”, (p. 193). Dunbar explains that our conversational capabilities are still most adapted to the small peasant or nomadic communities in which human beings have lived for millennia. Humans are naturally endowed with capabilities optimized for those environments. When they are faced with modern-day developments such as urbanization and communication technologies like e-mail and videoconferencing, humans are limited in the extent to which they can take advantage of the novel circumstances. Despite the hypothetical ability these modern developments bestow on mankind to be liberated from the traditional constraints of geography by meeting, communicating, and building relationships with ever increasing numbers of people, we see that people are still unable to build a close relationship with more than 150-200 people- the size of typical hunter-gatherer clans or Neolithic villages in Mesopotamia (Dunbar, 1993; Oates, 1977), or hold effective meetings with more than a handful of participants. The human “communicative machinery” is optimized to a different set of circumstances. Recent developments have not yet been around for enough human generations to allow natural selection to influence this machinery or its effective utilization. Similarly, it is possible to speculate that, on an evolutionary timescale, our communicative machinery is most adept at face-to-face conversation, and thus is, by its nature, synchronous. In face-to-face communication, a delay of more than 2-3 seconds in providing a response already creates discomfort. McLaughlin & Cody (1982) coined the term “awkwardness limen” to describe this period of 2-3 seconds. Neurological work corroborates this linguistic limen, and defines a range of 2-3 seconds as a temporal integration time range which is a

general principle of the neurocognitive machinery (Poppel, 2004; Vollarth, Kazenwadel, & Kruger, 1992). This interval of 2-3 seconds defines a “subjective present”. Since this machinery too was influenced by evolution, it is possible to speculate that humans will have a strong inclination to try and minimize this gap, in an effort not to create awkwardness.

The assumption that humans prefer highly synchronous communication is also evident in the “Media Naturalness Principle” developed by Kock (Kock, 2001). In this work Kock looks at the development of various modes of communication during human evolution, and concludes that people will innately be more accepting of media that incorporate all the elements of face-to-face interaction, since these more natural media require less individual cognitive effort. Thus, in our case, the preference for synchronous communication exists since face-to-face communication is highly synchronous, making synchronous communication more “natural” to humans.

The fact that the human mental machinery is optimized to carry on a conversation through rapid turns of input and output, and that a response is ready almost immediately after the turn of the other side is over (Johnson, 2004; Luce, 1991) is an additional “biological” explanation for the preference for a rapid response. Any delay in communicating this response is an inefficient use of our resources, since it loads the memory, or requires repeating the cognitive effort of creating or recalling the response at a later time, before the response is transmitted.

The evidence presented here suggests a plausible explanation for the fact that the use of computer mediated communication by humans will be significantly influenced by “hardwired”, biological capabilities and limitations. It is thus less surprising that some capabilities offered by communication technologies will not be adopted as rapidly as might

be expected. The ability to communicate asynchronously is, in evolutionary terms, a very recent innovation, only freshly introduced to the human environment. When people are exposed to the asynchronous capabilities of these technologies, they are interested in the ways these capabilities can help them to take a few more seconds, or minutes, or even hours to contemplate their response without creating obvious discomfort. On the other hand, their natural inclination, their instinct, is not to stretch this delay too much. What we see in the highly skewed distribution of response latencies in asynchronous CMC is the result of a play of two forces. One force is the permanence of the message, and the social expectation that the response latency will be longer than the traditional 2-3 seconds of spoken conversation. The opposite force is the natural tendency of people to avoid a long delay in their response. The result of this play of forces is an aggregation of most of the response times at or before the socially expected response latency (average response time), and a rapid drop afterwards.

To summarize, our explanation for the phenomenon of a highly skewed distribution of response latencies, and for the relative infrequency of long response latencies in asynchronous CMC is twofold: firstly, with the instantaneous delivery of messages, even latencies of a few minutes, are significantly longer than the traditional latency in spoken conversation, and can be perceived as relatively long and awkward pauses. Secondly, the natural tendency of the human mind is to give a negative interpretation to a long period of silence. Even if on a rational level people know that the technology allows, through message permanence, a long response time, their biologically programmed gut reaction to a delayed response is negative, and results in a feeling of lack of closure (Button, 1987).

One might ask if our explanation is deterministic, and if it precludes a true utilization of the possibilities offered by asynchronous communication. The answer is certainly not. The

interaction between environment and physiology is complex, and people have the ability to expand their skills as the environment changes and offers additional possibilities. We have already presented evidence that people utilize various technologies according to their immediate needs, regardless of how the technology is classified. But, the ability to adopt these technologies will vary between people, and will differ between different communities. In this context it is interesting to see Kock's postulation of the "learned schema diversity principle" (Kock, 2001), that discusses the interplay between the inborn and deterministic naturalness principle, and the learning that takes place while experience with online communication tools embedded in specific social contexts, is gained. Further, the recognition of predispositions and innate preferences for synchronicity is important to support the design and implementation of asynchronous forums, and the training and learning processes required for their diffusion.

6.4.3.7 Media Richness Theory and synchronicity modulation

The perception of synchronicity as a continuous parameter that characterizes the conversation, rather than a dichotomous characteristic of the chosen communicative medium, requires us to reexamine theories in which the dichotomous treatment of medium synchronicity plays an important role. As an example, we will examine one such theory, Media Richness Theory (Daft & Lengel, 1986; Daft et al., 1987). Media Richness Theory (MRT) attempts to explain media choice by users as a match between the task at hand, and the medium's capacity to process rich information. MRT, as well as later theories that attempted to expand the theory (A R Dennis & Valacich, 1999) treat medium synchronicity (immediacy of feedback) as a *fixed* parameter of each medium. For example, the phone is classified as a synchronous medium. Given the four trends of digitization, convergence,

“always on” and portability described above, can the contemporary phone still be classified as a “synchronous” medium? Many phones (including landlines) today have features such as caller ID, voice mail, and even texting tools such as SMS (Kandiyoor, van de Berg, & Blomstergren, 1996). This means that an incoming phone conversation can develop into a highly synchronous conversation if the recipient decides to take the call, or into a low synchronicity conversation if, for example, the recipient chooses to divert the call to voice mail. Moreover, many phone systems allow callers to reach voice mail directly, thus giving callers the power to decide whether they want to initiate a low synchronicity conversation. Under these circumstances, MRT’s traditional classification needs to be re-evaluated, and our proposal is that it be modified so as to assign the synchronicity to the conversation itself.

Are these observations about the deficiencies of MRT a claim that MRT should be discarded? Certainly not. MRT’s strength is not in this classification or that classification of various media. The strength of the theory is in its observation that communicators constantly make media choices that optimize their communicative efficiency. It is the simple hierarchical classification that we wish to re-evaluate and update, by pointing out that synchronicity can no longer be treated as a dichotomous property of the medium. How then does this optimization by the users take place? The level of conversational synchronicity is influenced by decisions taken by the communicators, or, in other words, the synchronicity is *modulated* by the communicator. For example, a decision not to answer a phone call is in fact a decision to decrease synchronicity. The reasons for this decision can be numerous. Maybe the recipient is engaged in a different conversation; perhaps the recipient looked at the caller ID and decided to let the call reach voice mail; or, possibly, the owner of the phone turned it off. These are all decisions that mean the response to the caller will either take place

at a later time, or not at all. Thus, the telephone, a medium that has in the past been categorized as relatively rich and highly synchronous, can today be used to modulate the synchronicity of a conversation initiated by the caller and intended to be highly synchronous, to a low level of synchronicity. Similarly, when e-mail users go over their inbox, they are constantly deciding which e-mails to respond to immediately, which to leave for later, and which can be discarded or filed away. Every time the user decides to respond to an e-mail message at later time, the result is a decrease in the conversational synchronicity of that specific communicative act. Every time a user decides to immediately respond to an e-mail message that just landed in their inbox, they have increased the synchronicity of a conversation using a medium that has been categorized by MRT as a relatively poor medium. There is plenty of anecdotal evidence that even conversations using the medium classified by MRT as the richest medium, face-to-face meetings, are sometimes victims of their participants' inability to stay off "poor" media such as e-mail and IM (Sandberg, 2006; B. Stone, 2006; Zeldes et al., 2007). We believe that once one opens up to the concept of synchronicity modulation, one sees evidence for it all around.

6.4.3.8 Measuring synchronicity

Synchronicity should be treated as a continuum. It is therefore vital to define measurement units that place every conversational exchange somewhere along the spectrum between highly synchronous communication, and highly asynchronous communication. We propose that these units be frequency, and its complement, cycle time or response latency. These units can be used to measure the frequency of exchanges between the participants in the communication. Thus, for example, based on the results of study 1, an e-mail exchange of one message/day is of average synchronicity, one message/week is low synchronicity, and

one message/hour is a high synchronicity. Frequency and cycle time can be used interchangeably, depending on the context. Usually, if we are reporting on a single exchange (e.g. a response to an online survey), response latency might be a more natural measure, while multiple and ongoing exchanges can be described using average response frequency. The measure of synchronicity can also be applied to the classification of different media. For example, the phone we have already discussed before can be classified as a medium with a synchronicity spectrum ranging between an order of magnitude of ten exchanges a minute, and an order of magnitude of one exchange a week. This is a spectrum of five orders of magnitude. Instant messaging, (text chat), on the other hand, offers a more narrow spectrum, of about three orders of magnitude, mainly since it is not a utility built to save messages over a period of more than a few hours.

6.4.3.9 Synchronicity trade-off principle

Due to physical and cognitive limitations, people are restricted in their ability to pay attention to or participate in a few communication events at the same time. The physical limitations are, for example, those that prevent us from speaking more than one word at a time, or from looking in more than one direction. The cognitive limitations have to do with the limited capacity to simultaneously carry out a few cognitive processes. Information overload is the result of the increase in this cognitive load, as demonstrated in the case of online forums by Q. Jones et al. (2004). Neurocognitive research is still exploring the nature of these cognitive limitations. Significant findings on working memory and on attentional control (Baddeley, 1996, 2003; Engle, 2002; Hopfinger, Buonocore, & Mangun, 2000), in conjunction with the obvious physical limitations, can help explain the trade-off between the levels of

synchronicity of various communicative acts. This trade-off means that an increase in the synchronicity of a specific communicative act, leads to an increase in the load on working memory and on the central executive (Baddeley, 1996), and consequently to a decrease in the attention that can be paid to other tasks. This is not the place to inquire if this is a zero-sum situation, or to what extent attention can be expanded, but the work on workplace interruptions clearly demonstrates that humans are very limited in their ability to cope with the multiplicity of cognitive demands they encounter in today's workplace (Gonzalez & Mark, 2004; T W Jackson et al., 2003; McFarlane, 1999; O'Conaill & Frohlich, 1995). This limitation means that some communicative tasks can't take place simultaneously, and the result is an interruption. Synchronicity modulation, i.e. decreasing the synchronicity of other communicative events in order to increase the synchronicity of a communicative act, is a solution that allows accommodating the additional load. For example, if we are exclusively engaged in a face-to-face conversation and we hear a notification that a new e-mail has reached our inbox, we could choose to either continue the conversation without interruption (maintain the level of synchronicity of the face-to-face conversation), or glance at the screen and see the header and/or the name of the sender, and decide if we want to decrease the synchronicity of the face-to-face conversation and pay additional attention to the e-mail.

6.4.3.10 Directions for research

The trigger to re-evaluate the dichotomous classification of media into synchronous and asynchronous media was the result of robust empirical findings. These showed that a significant proportion of the exchanges taking place using media classified as asynchronous are relatively rapid exchanges. These findings prompted us to examine the history of this dichotomous classification, suggest an alternative classification, and explore the

consequences of this revised classification. Additional research is now required in order to evaluate the relative influence of synchronicity modulation on media choice, in comparison with other considerations that influence media choice such as privacy, cost, ease-of-use or message transience. Moreover, the synchronicity tradeoff principle can be examined and quantified in the context of various task types. Lastly, we hope that the light this paper casts on MRT will bring out the strengths of the theory, and rather than focusing on arguing for and against the hierarchical classification of specific media, the research will focus on improving the predictive, and hence explanatory, power of the theory, and inform theoreticians and practitioners about media choice made by the contemporary user who faces a constantly evolving multitude of communication media, each of which has a host of attributes.

6.4.3.11 Conclusion: synchronicity modulation

Synchronicity is a central concept in mediated communication, and our understanding of this theoretical concept influences and informs our view of mediated communication and of communication in general. The view of synchronicity as a dichotomous feature of the media should be revised in light of the technological changes of the past decade, as well as in light of recent research findings that reveal a strong tendency for rapid exchanges even in conversations taking place using so-called asynchronous media, and evidence for punctuated communication when using so-called synchronous media. These findings are actually in agreement with recent theories on the nature of human communication, and on the interaction between the slow-paced biological evolution and fast-paced evolution of communication technologies.

Viewing synchronicity as a continuous parameter of the communicative exchanges taking place, and measuring the frequencies of these exchanges, opens a new window on communication (mediated as well as unmediated), emphasizes the role of synchronicity modulation, informs existing theories, and reveals new directions for research.

7 Conclusion

In this dissertation we present our exploration of the nature of online silence in text-based CMC. The exploration starts by studying the quantitative properties of response latencies in large and diverse datasets of unobtrusively collected response latencies. We reveal that the distribution of response latencies in text-based CMC is highly asymmetric, with a majority of the responses created relatively quickly, and a minority of the responses displaying a long tail distribution, with ever increasing response latencies. We explore the nature of this long tail, and identify a characteristic power law distribution. Consequently we are able to propose the division of response latencies into three zones, quantitatively defined by the average response latency, τ : a majority of the responses occur within τ or earlier; a minority of the responses occur after more than τ , but less than 10τ ; and, the chance of a response occurring after more than 10τ is very low, well under 5%. We conclude that the duration of a normal response is up to about 10τ , after which the delay is unusually long and can be classified as online silence. The robustness of these zones is strengthened by the fact that these three zones are observed in three different datasets representing tens of thousands of messages sent by users of diverse national and professional backgrounds, using different CMC media, and in diverse contexts. Moreover, the same chronemic zones can be observed in response latencies measured in other forms of online communication such as online surveys, as well as in other forms of human communication such as spoken conversation and letter writing.

Having empirically identified the distribution of response latencies and their mathematical properties, the next question is whether these distributions are reflected in the norms of online communication? Is 10τ only a convenient statistical line separating the more common

response latencies from the uncommonly long ones, or is it also a boundary line separating normative online behavior from the nonnormative? We explore this question using the Expectancy Violation Theory of nonverbal behavior, and discover that under the experimental conditions of the vignette of the study, long response latencies beyond 10τ are less expected, and that respondents whose response latencies are nonnormative (long response latency beyond 10τ , or total silence) could make a less positive impression.

Lastly, we explore the thoughts and beliefs of e-mail users who experienced online silence and who caused online silence, trying to understand the nature of online silence. We identify three main categories, and a total of seven categories and sub-categories of explanations for online silence; we show how, like traditional silence in spoken conversation, online silence too is ambiguous and fraught with uncertainty; we explore the role of hurt feelings in online silence; and, we identify hotspots on the text-based CMC cycle where silence is more likely to occur.

The three studies lead to an initial answer to the research question of the dissertation by offering a practical definition for online silence, by suggesting categories of causes of online silence, and by an exploration of the results of online silence. In addition, these studies enrich our understanding not only of online silence, but also of long and short pauses in online communication. Accordingly, an initial model of online responsiveness and online silence is proposed.

Beyond the answers to the research question, the findings of this dissertation have wider significance in communication research, and beyond. The results of study 1 lead to insights into the role of time in CMC, and suggest a revision of long held conventions about the dichotomous division of CMC media into synchronous and asynchronous media; the results

of study 2 lead to insights about nonverbal cues in text-based CMC, and point to the need to explore the possibility that nonverbal communication has a central role in text-based CMC, a possibility that is at odds with the “common wisdom”, as well as with some central theories in CMC; and, the findings of study 3 link to back to the work of statistical physicists who are attempting to explain the chronemic distributions described in study 1.

Our findings have wide implications for theories in communication, as well as in related disciplines such as information systems and behavioral sciences, and suggest numerous practical applications in applied areas such as online education and online moderation, in the development of CMC tools, and in the development of more effective workplace procedures and processes.

Online silence is suggested to be an important component of CMC theory. Pauses and silences are silent participants in almost every online communicative act. Ignoring their role in online communication will inevitably lead to a more limited understanding of CMC.

Exploring these invisible components of communication is not a simple task, and doing so in the realm of virtual communication poses even further challenges. Nevertheless, we believe that our initial findings and the possible far-reaching theoretical and practical implications of these findings make the effort worthwhile.

8 References

- Afergan, M., & Beverly, R. (2005). The state of the email address. *ACM SIGCOMM Computer Communication Review*, 35(1), 29-36.
- Afifi, W., & Burgoon, J. K. (2000). The impact of violations on uncertainty and the consequences for attractiveness. *Human Communication Research*, 26(2), 203-233.
- Agre, P. E. (2001). Welcome to the always-on world. *Spectrum, IEEE*, 38(1), 10-13.
- Albright, J. M. (2001). *Impression formation and attraction in computer-mediated communication*. University of Southern California <http://www-ref.usc.edu/~albright/dissertation.htm>.
- Alexander, C. S., & Becker, H. J. (1978). The use of vignettes in survey research. *Public Opinion Quarterly*(42), 93-104.
- Alves, W. M., & Rossi, P. H. (1978). Who should get what? Fairness judgments of the distribution of earnings. *The American Journal of Sociology*, 84(3), 541-564.
- Anderson, B., Gale, C., Jones, M. L. R., & McWilliam, A. (2002). Domesticating broadband- what consumers really do with flat-rate, always-on and fast Internet access. *BT Technology Journal*, 20(1), 103-114.
- APA. (2001). *Publication manual of the American psychological association* (Fifth ed.). Washington, DC: American Psychological Association.
- APA. (2007). *Electronic media spelling guide*. Retrieved September 30, 2007, from <http://apastyle.apa.org/spelling.html>
- Aragon, S. R. (2003). Creating social presence in online environments. *New Directions for Adult and Continuing Education*, 2003(100), 57-68.
- Arendt, J., Skene, D. J., Middleton, B., Lockley, S. W., & Deacon, S. (1997). Efficacy of melatonin treatment in jet lag, shift work, and blindness. *Journal of Biological Rhythms*, 12(6), 604.
- Axtell, R. L. (2001). Zipf distribution of U.S. Firm sizes. *Science*, 293(5536), 1818-1820.
- Baddeley, A. (1996). Exploring the central executive. *The Quarterly Journal of Experimental Psychology: Section A*, 49(1), 5-28.
- Baddeley, A. (2003). Working memory: Looking back and looking forward. *Nature Reviews Neuroscience*, 4(October), 829-839.
- Ballard, D. I., & Seibold, D. R. (2004). Organizational members' communication and temporal experience: Scale development and validation. *Communication Research*, 31(2), 135-172.
- Barabasi, A. L. (2003). *Linked: How everything is connected to everything else and what it means for business, science, and everyday life*. New York: Plume.
- Barabasi, A. L. (2005). The origin of bursts and heavy tails in human dynamics. *Nature*, 435(7039), 207-211.
- Baron, N. S. (1998). Letters by phone or speech by other means: The linguistics of email. *Language and Communication*, 18(2), 133-170.
- Baron, N. S. (2002). Who sets e-mail style? Prescriptivism, coping strategies, and democratizing communication access. *Information Society*, 18(5), 403-413.
- Baron, N. S. (2005a, February 17-21). *Instant messaging by American college students: A case study in computer-mediated communication*. Paper presented at the American Association for the Advancement of Science, Washington, DC.

- Baron, N. S. (2005b). The written turn. *English Language and Linguistics*, 9, 359-376.
- Baron, N. S. (in press). Adjusting the volume: The impact of technology and multitasking on discourse control. In J. E. Katz (Ed.), *Mobile communication and social change in a global context*: MIT Press.
- Baron, R., & Byrne, D. (1997). Social perception. In R. Baron & D. Byrne (Eds.), *Social psychology*. Boston, MA: Allyn and Bacon.
- Barron, G., & Yechiam, E. (2002). Private e-mail requests and the diffusion of responsibility. *Computers in Human Behavior*, 18(5), 507-520.
- Baumeister, R. F., Stillwell, A., & Wotman, S. R. (1990). Victim and perpetrator accounts of interpersonal conflict: Autobiographical narratives about anger. *Journal of personality and social psychology*, 59(5), 994-1005.
- Bays, H. (1998). Framing and face in Internet exchanges: A socio-cognitive approach. *Linguistik Online*, 1, 1-11.
- Beardsley, T. (2005). *Phishing detection and prevention*. Retrieved September 30, 2007, from http://www.planb-security.net/wp/503167-001_PhishingDetectionandPrevention.pdf
- Beaudoin, M. F. (2002). Learning or lurking? Tracking the "invisible" online student. *The Internet and Higher Education*, 5(2), 147-155.
- Bechar-Israeli, H. (1995). From <bonehead> to <clonehead>: Nicknames, play, and identity in Internet relay chat. *Journal of Computer-Mediated Communication*, 1(2).
- Begole, J. B., Tang, J. C., & Hill, R. (2003). *Rhythm modeling, visualizations and applications*. Paper presented at the UIST: Proceedings of the Annual ACM Symposium on User Interface Software and Technology.
- Begole, J. B., Tang, J. C., Smith, R. B., & Yankelovich, N. (2002). Work rhythms: Analyzing visualizations of awareness histories of distributed groups. *Proceedings of the ACM Conference on Computer Supported Cooperative Work*, 334-343.
- Bender, T. (2003). *Discussion based online teaching to enhance student teaching*. Sterling, VA: Stylus.
- Benfield, G. (2000). *Teaching on the web - exploring the meanings of silence*. Unpublished manuscript.
- Berger, C. R., & Calabrese, R. J. (1975). Some explorations in initial interaction and beyond: Toward a developmental theory of interpersonal communication. *Human Communication Theory*, 1, 99-112.
- Bergus, G. R., Sinift, S. D., Randall, C. S., & Rosenthal, D. M. (1998). Use of an e-mail curbside consultation service by family physicians. *Journal of Family Practice*, 47(5), 357-360.
- Berman, D. K. (2003, 5 October). Online laundry: Government posts Enron's e-mail --- amid power-market minutiae, many personal items; `about Wednesday... ' *The Wall Street Journal*.
- Bernard, M., Lida, B., Riley, S., Hackler, T., & Janzen, K. (2002). A comparison of popular online fonts: Which size and type is best. *Usability News*, 4(1).
- Biocca, F., Kim, T., & Levy, M. R. (1995). The vision of virtual reality. In F. Biocca & M. R. Levy (Eds.), *Communication in the age of virtual reality* (pp. 3-14). Hillsdale, NJ: Lawrence Erlbaum.
- Bluedorn, A. C. (2002). Convergence. In A. C. Bluedorn (Ed.), *The human organization of time* (pp. 146-180). Stanford, CA: Stanford University Press.

- Boneva, B., Kraut, R., & Frohlich, D. (2001). Using e-mail for personal relationships: The difference gender makes. *American Behavioral Scientist*(3), 530-549.
- Bosnjak, M., Wittmann, W. W., & Tuten, T. L. (2005). Unit (non)response in web-based access panel surveys: An extended planned-behavior approach. *Psychology and Marketing*, 22(6), 489-505.
- Brady, P. T. (1968). A statistical analysis of on-off patterns in 16 conversations. *The Bell Systems Technical Journal*, 47, 73-91.
- Braithwaite, C. A. (1999). Cultural uses and interpretations of silence. In L. K. Guerrero, J. A. DeVito & M. L. Hecht (Eds.), *The nonverbal communication reader* (pp. 163-172). Prospect Heights, IL: Waveland Press.
- Braithwaite, D., Emery, J., de Lusignan, S., & Sutton, S. (2003). Using the Internet to conduct surveys of health professionals: A valid alternative? *Family Practice*, 20(5), 545-551.
- Brake, D. (2006). *Dealing with e-mail*. Retrieved September 30, 2007, from <http://www.well.com/user/derb/dealingwithemail/>
- Brand, S. (1988). *The Media Lab: Inventing the future at M.I.T.* New York, NY: Penguin.
- Brashers, D. E. (2001). Communication and uncertainty management. *Journal of Communication*, 51(3), 477-497.
- Brennan, S. E., & Lockridge, C. B. (2006). Computer-mediated communication: A cognitive science approach. In K. Brown (Ed.), *Encyclopedia of language and linguistics, 2nd edition*. Oxford, UK: Elsevier Ltd.
- Bruneau, T. J. (1973). Communicative silences: Forms and functions. *The Journal of Communication*, 23, 17-46.
- Buchanan, M. (2007). *The social atom: Why the rich get richer, cheaters get caught, and your neighbor usually looks like you*. New York, NY: Bloomsbury, USA.
- Burgess, A., Jackson, T., & Edwards, J. (2005). Email training significantly reduces email defects. *International Journal of Information Management*, 25(1), 71-83.
- Burgoon, J. K., Bonito, J. A., Ramirez Jr, A., Dunbar, N. E., Kam, K., & Fischer, J. (2002). Testing the interactivity principle: Effects of mediation, propinquity, and verbal and nonverbal modalities in interpersonal interaction. *Journal of Communication*, 52(3), 657-677.
- Burgoon, J. K., Buller, D. B., & Woodall, W. G. (1996a). Nonverbal communication. In J. K. Burgoon, D. B. Buller & W. G. Woodall (Eds.), *Nonverbal communication: The unspoken dialogue* (2nd ed.): McGraw-Hill.
- Burgoon, J. K., Buller, D. B., & Woodall, W. G. (1996b). *Nonverbal communication: The unspoken dialogue* (2nd ed.). New York: McGraw-Hill.
- Burgoon, J. K., Burgoon, M., Broneck, K., Alvaro, E., & Nunamaker Jr, J. (2002). *Effects of synchronicity and proximity on group communication*. Paper presented at the National Communication Convention, New Orleans, LA.
- Burgoon, J. K., & Hale, J. L. (1987). Validation and measurement of the fundamental themes of relational communication. *Communication Monographs*, 54(1), 19-41.
- Burgoon, J. K., & Hale, J. L. (1988). Nonverbal expectancy violations: Model elaboration and application to immediacy behaviors. *Communication Monographs*, 55(1), 58-79.
- Burgoon, J. K., & Hoobler, G. D. (2002). Nonverbal signals. In M. Knapp & J. Daly (Eds.), *Handbook of interpersonal communication* (pp. 240-299). Thousand Oaks, CA: Sage.

- Burgoon, J. K., & Koper, R. J. (1984). Nonverbal and relational communication associated with reticence. *Human Communication Research, 10*, 601-626.
- Burgoon, J. K., Manusov, V., Mineo, P., & Hale, J. L. (1985). Effects of gaze on hiring, credibility, attraction and relational message interpretation. *Journal of Nonverbal Behavior, 9*(3), 133-146.
- Burgoon, J. K., Newton, D. A., Walther, J. B., & Baesler, E. J. (1989). Nonverbal expectancy violations and conversational involvement. *Journal of Nonverbal Behavior, 13*(2), 97-119.
- Burgoon, J. K., & Walther, J. B. (1990). Nonverbal expectancies and the evaluative consequences of violations. *Human Communication Research, 17*(2), 232-265.
- Burke, M., Joyce, E., Kim, T., Anand, V., & Kraut, R. (2007). *Introductions and requests: Rhetorical strategies that elicit response in online communities*. Paper presented at the Third International Conference on Communities & Technologies.
- Burmistrov, I. (2007). *Interruptions.Net*. Retrieved September 30, 2007, from <http://interruptions.net/>
- Button, G. (1987). Moving out of closings. In G. Button & J. R. E. Lee (Eds.), *Talk and social organization* (pp. 101-151). Clevedon, UK: Multilingual Matters.
- Byron, K., & Baldrige, D. C. (2007). E-mail recipients' impressions of senders' likability: The interactive effect of nonverbal cues and recipients' personality. *Journal of Business Communication, 44*(2), 137-160.
- Callahan, E. (2005). Cultural similarities and differences in the design of university websites. *Journal of Computer-Mediated Communication, 11*(1).
- Caplan, S. E. (2003). Preference for online social interaction - a theory of problematic Internet use and psychosocial well-being. *Communication Research, 30*(6), 625-648.
- Cappella, J. N. (1979). Talk-silence sequences in informal conversations I. *Human Communication Research, 6*(1), 3-17.
- Cappella, J. N. (1991). The biological origins of automated patterns of human interaction. *Communication Theory, 1*(1), 4-35.
- Cech, C. G., & Condon, S. L. (2004). *Temporal properties of turn-taking and turn-packaging in synchronous computer-mediated communication*. Paper presented at the Proceedings of the Hawaii International Conference on System Sciences.
- Chapanis, A. (1975). Interactive human communication. *Scientific American, 232*, 34-42.
- Chenault, B. G. (1998). *Developing personal and emotional relationships via computer-mediated communication*. Retrieved September 30, 2007, from <http://www.december.com/cmcmag/1998/may/chenault.html>
- Churchill, E. F., & Bly, S. (1999, 14-17 Nov.). *It's all in the words: Supporting work activities with lightweight tools*. Paper presented at the GROUP'99 - International ACM SIGGROUP Conference on Supporting Group Work, Phoenix, AZ.
- Ciarocco, N. J., Baumeister, R. F., & Sommer, K. L. (2001). Ostracism and ego depletion: The strains of silence. *Personality and Social Psychology Bulletin, 27*(9), 1156-1163.
- Clair, R. P. (1998). The first word was silence. In *Organizing silence: A world of possibilities* (pp. 3-45): State University of New York Press.
- Claycomb, C., Martin, C. L., & Porter, S. S. (2000). Riding the wave: Response rates and the effects of time intervals between successive mail survey follow-up efforts. *Journal of Business Research, 48*(2), 157-162.

- Cobanoglu, C., Warde, B., & Moreo, P. J. (2001). A comparison of mail, fax and web-based survey methods. *International Journal of Market Research*, 43(4), 441-452.
- Comellas, F., & Gago, S. (2005). A star-based model for the eigenvalue power law of internet graphs. *Physica A-Statistical Mechanics and Its Applications*, 351(2-4), 680-686.
- Cook, C., Heath, F., & Thompson, R. L. (2000). A meta-analysis of response rates in web- or internet-based surveys. *Educational and Psychological Measurement*, 60(6), 821-836.
- Couchman, G. R., Forjuoh, S. N., Rascoe, T. G., Reis, M. D., Walsum, K. L. V., & Koehler, B. (2005). E-mail communications in primary care: What are patients' expectations for specific test results? *International Journal of Medical Informatics*, 74(1), 21-30.
- Couper, M. P., Blair, J., & Triplett, T. (1999). A comparison of mail and e-mail for a survey of employees in U.S. Statistical agencies. *Journal of Official Statistics*, 15(1), 39-56.
- Cramton, C. D. (2001). The mutual knowledge problem and its consequences for dispersed collaboration. *Organization Science*, 12(3), 346-371.
- Culnan, M., & Markus, M. (1987). Information technologies. *Handbook of organizational communication: An interdisciplinary perspective*, 420-443.
- Customer Respect Group. (2003). Customer respect online review December 2003. *Customer Respect Online Review*.
- Dabbish, L. A., Kraut, R. E., Fussell, S., & Kiesler, S. (2005). Understanding email use: Predicting action on a message. *Proceedings of the SIGCHI conference on Human factors in computing systems*, 691-700.
- Daft, R. L., & Lengel, R. H. (1986). Organizational information requirements, media richness and structural design. *Management Science*, 32(5), 554-571.
- Daft, R. L., Lengel, R. H., & Trevino, L. K. (1987). Message equivocality, media selection, and manager performance: Implications for information systems. *MIS Quarterly*, 11(3), 355-366.
- Danchak, M. M., Walther, J. B., & Swan, K. P. (2001). *Presence in mediated instruction: Bandwidth, behavior, and expectancy violations*. Paper presented at the annual meeting on Asynchronous Learning Networks, Orlando, FL.
- Danet, B. (2001). *Cyberpl@y: Communicating online*. Oxford: Berg Publishers.
- Davenport, T., & Beck, J. (2001). *The attention economy: Understanding the new currency of business*. Boston: Harvard Business School Press.
- DeJoy, D. M. (1994). Managing safety in the workplace: An attribution theory analysis and model. *Journal of Safety Research*, 25(1), 3-17.
- Denk, C. E., Benson, J. M., Fletcher, J. C., & Reigel, T. M. (1997). How do Americans want to die? A factorial vignette survey of public attitudes about end-of-life medical decision-making. *Social Science Research*, 26(1), 95-120.
- Dennis, A. R., Kinney, S. T., & Hung, Y.-T. C. (1999). Gender differences in the effects of media richness. *Small Group Research*, 30(4), 405-437.
- Dennis, A. R., & Valacich, J. S. (1999). *Rethinking media richness: Towards a theory of media synchronicity*. Paper presented at the Proceedings of the Hawaii International Conference on System Sciences.
- Derks, D., Fischer, A. H., & Bos, A. E. R. (in press). The role of emotion in computer-mediated communication: A review. *Computers in Human Behavior, In Press, Corrected Proof*.

- Devine, P. G., Hamilton, D. L., & Ostrom, T. M. (1994). *Social cognition: Impact on social psychology*. San Diego, CA: Academic Press.
- Dezso, Z., Almaas, E., Lukacs, A., Racz, B., Szakadat, I., & Barabasi, A. L. (2006). Dynamics of information access on the web. *Physical Review E*, 73(6), 66132.
- Diesner, J., Frantz, T., & Carley, K. (2005). Communication networks from the Enron email corpus "it's always about the people. Enron is no different". *Computational & Mathematical Organization Theory*, 11(3), 201-228.
- Doering, N. M., & Poeschl, S. (2007, May 25). *Nonverbal cues in mobile phone text messages: The effects of chronemics and proxemics*. Paper presented at the ICA, San Francisco.
- Donath, J. S. (1998). Identity and deception in the virtual community. In P. Kollock & M. Smith (Eds.), *Communities in cyberspace*. London: Routledge.
- Donath, J. S. (1999). Identity and deception in the virtual community. *Communities in Cyberspace*, 29-59.
- Dredze, M., Blitzer, J., & Pereira, F. (2005). *Reply expectation prediction for email management*. Unpublished manuscript, Philadelphia, PA.
- Ducheneaut, N., & Watts, L. A. (2005). In search of coherence: A review of e-mail research. *Human-Computer Interaction*, 20(1-2), 11-48.
- Dunbar, R. (1993). Coevolution of neocortical size, group size and language in humans. *Behavioral and Brain Sciences*, 16, 681-735.
- Dunbar, R. (2002). *Grooming, gossip, and the evolution of language*: Harvard University Press.
- Duncker, E., Theng, Y., & Mohd-Nasir, N. (2000). Cultural usability in digital libraries. *Bulletin of the American Society for Information Science and Technology*, 26(4), 21-22.
- Duranti, A. (2006). The social ontology of intentions. *Discourse Studies*, 8(1), 31-40.
- Dutton, W. H., & Helsper, E. J. (2007). *The Internet in Britain: 2007*. Oxford, UK: Oxford Internet Institute, Oxford.
- Eckmann, J. P., Moses, E., & Sergi, D. (2004). Entropy of dialogues creates coherent structures in e-mail traffic. *Proceedings of the National Academy of Sciences*, 101(40), 14333-14337.
- Ellison, N., Heino, R., & Gibbs, J. (2006). Managing impressions online: Self-presentation processes in the online dating environment. *Journal of Computer-Mediated Communication*, 11(2).
- El-Shinnawy, M., & Markus, M. L. (1997). The poverty of media richness theory: Explaining people's choice of electronic mail vs. Voice mail. *International Journal of Human-Computer Studies*, 46(4), 443-467.
- Engle, R. W. (2002). Working memory capacity as executive attention. *Current Directions in Psychological Science*, 11(1), 19-23.
- Erickson, T., & Herring, S. C. (2005). *Persistent conversation: A dialog between research and design*. Paper presented at the 38th Hawaii International Conference on System Sciences, Big Island, Hawaii.
- Erickson, T., & Herring, S. C. (2007). *Persistent conversation: Home page*. Retrieved September 30, 2007, from http://www.visi.com/~snowfall/HICSS_PC.html

- Erickson, T., & Kellogg, W. A. (2000). Social translucence: An approach to designing systems that support social processes. *ACM Transactions on Computer-Human Interaction*, 7(1), 59-83.
- Ess, C., & AoIR. (2002). *Ethical decision-making and Internet research*. Retrieved September 30, 2007, from <http://www.aoir.org/reports/ethics.pdf>
- Etzioni, A., & Etzioni, O. (1999). Face-to-face and computer-mediated communities, a comparative analysis. *Information Society*, 15(4), 241-248.
- Everett-Church, R. (2004). *Too many lost emails leave us unconnected*. Retrieved September 30, 2007, from <http://www.esecurityplanet.com/views/article.php/3383001>
- Federal Energy Regulatory Commission. (2003). *Western energy markets - Enron investigation, pa02-2*. Retrieved May 30, 2004, from <http://www.ferc.gov/industries/electric/indus-act/wem/pa02-2/info-release.asp>
- Federal Energy Regulatory Commission. (2004, May 5). *Western energy markets: Enron investigation, pa02-2, data release*. Retrieved May 31, 2004, from <http://www.ferc.gov/industries/electric/indus-act/wem/pa02-2/data-release.asp>
- Federal Energy Regulatory Commission. (2005). *Addressing the 2000–2001 western energy crisis: Information released in Enron investigation*. Retrieved September 30, 2007, from <http://www.ferc.gov/industries/electric/indus-act/wec/enron/info-release.asp>
- Feldman, M. S., & March, J. G. (1981). Information in organizations as signal and symbol. *Administrative Science Quarterly*, 26(2), 171-186.
- Feldstein, S. (1982). Impression formation in dyads: The temporal dimension. In M. Davis (Ed.), *Interaction rhythms* (pp. 207-224). New York, NY: Human Sciences Press Inc.
- Ferguson, T. J., Olthof, T., & Stegge, H. (1997). Temporal dynamics of guilt: Changes in the role of interpersonal and intrapsychic factors. *European Journal of Social Psychology*, 27(6), 659-673.
- Fernando, P. (2002). Silence, stillness and darkness as the communicative nonactivities opposed to sound, movement and light. In *Nonverbal communication across disciplines* (Vol. 2, pp. 281-323). Amsterdam: John Benjamins Publishing Company.
- Finch, J. (1987). The vignette technique in survey research. *Sociology*, 21(1), 105-114.
- Finn, T. A. (1999). The role of temporality in mediated communication and technology convergence. *Information, Communication & Society*, 2(2), 174-200.
- Fisher, D., & Dourish, P. (2004). *Social and temporal structures in everyday collaboration*. Paper presented at the CHI 2004, Vienna, Austria.
- Fiske, S. T. (1993). Social cognition and social-perception. *Annual Review of Psychology*, 44, 155-194.
- Fiske, S. T., & Taylor, S. E. (1991). *Social cognition* (2nd ed.). New York: McGraw-Hill, Inc.
- FOLDOC. (1996). *ASCII art*. Retrieved September 30, 2007, from <http://foldoc.org/index.cgi?ASCII+art>
- FOLDOC. (2001). *Signature*. Retrieved September 30, 2007, from <http://foldoc.org/?signature>
- Fraze, S., Hardin, K., Brashears, T., Haygood, J., & Smith, J. H. (2003). The effects of delivery mode upon survey response rate and perceived attitudes of Texas agriculture teachers. *Journal of Agricultural Education*, 44(2), 27-37.
- Friedman, T. (2005). *The world is flat: A brief history of the twenty-first century*. New York, NY: Farrar, Straus and Giroux.

- Fulk, J., Schmitz, J., & Steinfield, C. W. (1990). A social influence model of technology use. In J. Fulk & C. W. Steinfield (Eds.), *Organizations and communications technology*. Newbury Park, CA: Sage.
- Gabaix, X., Gopikrishnan, P., Pelrou, V., & Stanley, H. E. (2004). A theory of power-law distributions in financial market fluctuations. *Nature*, 423, 267 - 270.
- Ganong, L., & Coleman, M. (2005). Measuring intergenerational obligations. *Journal of Marriage and Family*, 67(4), 1003-1011.
- Garcia, A., & Jacobs, J. (1999). The eyes of the beholder: Understanding the turn-taking system in quasi-synchronous computer-mediated communication. *Research on Language and Social Interaction*, 32(4), 337-367.
- Gilbert, D., & Malone, P. (1995). The correspondence bias. *Psychological Bulletin*, 117(1), 21-38.
- Golder, S., Wilkinson, D. M., & Huberman, B. A. (2006). *Rhythms of social interaction: Messaging within a massive online network*. Retrieved September 30, 2007, from <http://arxiv.org/abs/cs.CY/0611137>
- Goldsmith, D. (2001). A normative approach to the study of uncertainty and communication. *Journal of Communication*, 51(3), 514-533.
- Gonzalez, V., & Mark, G. (2004). Constant, constant, multi-tasking craziness: Managing multiple working spheres. *Proceedings of the 2004 conference on Human factors in computing systems*, 113-120.
- Goodwin, C. (2002). Time in action. *Current Anthropology*, 43(Supplement, August-October), S19-S35.
- Greenspan, R. (2004). *Feedback, e-mail response improvements underway*. Retrieved September 30, 2007, from <http://www.clickz.com/stats/sectors/retailing/article.php/3390571>
- Griffin, E. A. (2003). *A first look at communication theory* (5th ed.). Boston: McGraw-Hill.
- Guadagno, R. E., & Cialdini, R. B. (2002). Online persuasion: An examination of gender differences in computer-mediated interpersonal influence. *Group Dynamics*, 6(1), 38-51.
- Gueguen, N. (2002). Foot-in-the-door technique and computer-mediated communication. *Computers in Human Behavior*, 18(1), 11-15.
- Guerrero, L. K., DeVito, J. A., & Hecht, M. L. (1995). Contemporary nonverbal theories of message exchange. In L. Guerrero, J. DeVito & M. Hecht (Eds.), *The nonverbal communication reader: Classic and contemporary readings* (pp. 423-471): Cambridge University Press.
- Guerrero, L. K., & Floyd, K. (2006). Introduction. In L. K. Guerrero & K. Floyd (Eds.), *Nonverbal communication in close relationships* (pp. 1-16): Lawrence Erlbaum Associates.
- Haberle-Delmonico, D. (2003). *Lessons from the fortune 500*. Retrieved September 30, 2007, from http://www.theemergingenterprise.com/marketingresources/lessons_fortune500.html
- Hall, E. T. (2000). Monochronic and polychronic time. In L. A. Samovar & R. E. Porter (Eds.), *Intercultural communication* (pp. 280-286). Belmont, CA: Wadsworth.
- Hamilton, M. B. (2005). *Online survey response rates and times*. Lake Oswego, OR: Tercent, Inc.

- Hancock, J. T., Curry, L., Goorha, S., & Woodworth, M. (2005). *Automated linguistic analysis of deceptive and truthful synchronous computer-mediated communication*. Paper presented at the Proceedings of the Annual Hawaii International Conference on System Sciences.
- Hayslett, M. M., & Wildemuth, B. M. (2004). Pixels or pencils? The relative effectiveness of web-based versus paper surveys. *Library and Information Science Research*, 26(1), 73-93.
- Hecht, M., DeVito, J., & Guerrero, L. (1995). Perspectives on nonverbal communication. In L. Guerrero, J. DeVito & M. Hecht (Eds.), *The nonverbal communication reader: Classic and contemporary readings* (pp. 3-18): Cambridge University Press.
- Heider, F. (1958). *The psychology of interpersonal relations*. New York: John Wiley & Sons.
- Heisler, J., & Crabill, S. (2006). Who are "stinkybug" and "packerfan4"? Email pseudonyms and participants' perceptions of demography, productivity, and personality. *Journal of Computer-Mediated Communication*, 12(1), 114-135.
- Herardian, R. (2000). Is there hope for lost email? *DominoPower Magazine*(May).
- Herring, S. C. (1999). Interactional coherence in CMC. *Journal of Computer-Mediated Communication*, 4(4).
- Herring, S. C. (2003). Gender and power in online communication. *The Handbook of Language and Gender*. Oxford: Blackwell.
- Hewitt, J. (2005). Toward an understanding of how threads die in asynchronous computer conferences. *Journal of the Learning Sciences*, 14(4), 567-589.
- Hirsh, L. (2002). *E-tail customer service: Finally working?* Retrieved September 30, 2007, from <http://www.technewsworld.com/story/19353.html>
- Hitsch, G., Hortacsu, A., & Ariely, D. (2005). *What makes you click: An empirical analysis of online dating*.
- Honeycutt, C. (2005). Hazing as a process of boundary maintenance in an online community. *Journal of Computer-Mediated Communication*, 10(2).
- Hopfinger, J. B., Buonocore, M. H., & Mangun, G. R. (2000). The neural mechanisms of top-down attentional control. 3(3), 284-291.
- Huber, M., Franz, A., & Vogel, S. (2002). *Implications of digitizing, miniaturization and convergence in media and entertainment*. Norderstedt, Germany: BOD GmbH DE.
- Huffaker, D., & Calvert, S. (2005). Gender, identity, and language use in teenage blogs. *Journal of Computer-Mediated Communication*, 10(2).
- Hughes, R., & Huby, M. (2002). The application of vignettes in social and nursing research. *Journal of Advanced Nursing*, 37(4), 382-386.
- iConect. (2003). *Iconect 24/7*. Retrieved September 30, 2007, from <http://fercic.aspensys.com/iconect247/iconect247.exe>
- ICQ. (2007). *What is a status?* Retrieved September 30, 2007, from http://www.icq.com/help/view_faq.php?faq_id=4324
- Intel Corporation. (2003). *Yourtime email effectiveness program*. Retrieved September 30, 2007, from https://www.itsharenet.org/kshowcase/view/view_item?item_key=49909e9b26ee08341685fd7f4fb5e9888d59254b
- International Telecommunication Union. (2007). *World information society report 2007*. Geneva, Switzerland: International Telecommunication Union.

- Jackson, T. W., Dawson, R., & Wilson, D. (2001). The cost of email interruption. *Journal of Systems and Information Technology*, 5(1), 81-92.
- Jackson, T. W., Dawson, R., & Wilson, D. (2003). Reducing the effect of email interruptions on employees. *International Journal of Information Management*, 23(1), 55-65.
- Jackson, T. W., Dawson, R., & Wilson, D. (2003). Understanding email interaction increases organizational productivity. *Communications of the ACM*, 46(8), 80-84.
- Jaffe, J., & Feldstein, S. (1970). *Rhythms of dialogue*. New York: Academic Press.
- Jarvenpaa, S., & Leidner, D. (1999). Communication and trust in global virtual teams. *Organization Science*, 10(6), 791-815.
- Jaworski, A. (1997). *Silence: Interdisciplinary perspectives*. Berlin: Mouton de Gruyter.
- Jaworski, A. (1999). The power of silence in communication. In L. K. Guerrero, J. A. DeVito & M. L. Hecht (Eds.), *The nonverbal communication reader* (pp. 156-162). Prospect Heights, IL: Waveland Press.
- Jenkins, S. (2000). Cultural and linguistic miscues: A case study of international teaching assistant and academic faculty miscommunication. *International Journal of Intercultural Relations*, 24(4), 477-501.
- Jensen, J. V. (1973). Communicative functions of silence. *Review of General Semantics*(30), 249-267.
- Jick, T. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative Science Quarterly*, 24(4), 602-611.
- Johnson, M. (2004). Timepieces: Components of survey question response latencies. *Political Psychology*, 25(5), 679-702.
- Jones, J. F. (1999). From silence to talk: Cross-cultural ideas on students' participation in academic group discussion. *English for Specific Purposes*, 18(3), 243-259.
- Jones, Q. (1997). Virtual-communities, virtual settlements & cyber-archaeology: A theoretical outline. *Journal of Computer-Mediated Communication*, 3(3).
- Jones, Q., Ravid, G., & Rafaeli, S. (2004). Information overload and the message dynamics of online interaction spaces: A theoretical model and empirical exploration. *Information Systems Research*, 15(2), 194-211.
- Jones, S. E. (2002). Research on the relationship between verbal and nonverbal communication: Emerging integrations. *Journal of Communication*, 52(3), 499-521.
- Joyce, E., & Kraut, R. (2006). Predicting continued participation in newsgroups. *Journal of Computer-Mediated Communication*, 11(3), 723-747.
- Julkunen, R. (1977). A contribution to the categories of social time and the economy of time. *Acta Sociologica*, 20(1), 5-24.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263-291.
- Kandiyoor, S., van de Berg, P., & Blomstergren, S. (1996). DECT: Meeting needs and creating opportunities for public network operators. *Personal Wireless Communications, 1996., IEEE International Conference on*, 28-32.
- Karahalios, K. (2000). *Synchronous and asynchronous conversation*. Retrieved September 30, 2007, from http://web.media.mit.edu/~kkarahal/generals/communication/sync_async.html
- Katz, J. (2003). *Luring the lurkers*. Retrieved September 30, 2007, from <http://slashdot.org/features/98/12/28/1745252.shtml>

- Kayworth, T., & Leidner, D. (2001). Leadership effectiveness in global virtual teams. *Journal of Management Information Systems*, 18(3), 7-40.
- Keaten, J., & Kelly, L. (2000). Reticence: An affirmation and revision. *Communication Education*, 49(2), 165-177.
- Keeling, M., & Grenfell, B. (1999). Stochastic dynamics and a power law for measles variability. *Philosophical transactions of the royal society of London series b-biological sciences*, 354(1384), 769-776.
- Keizer, G. (2003). *Report says companies ignore customers' queries*. Retrieved September 30, 2007, from <http://www.informationweek.com/story/IWK20030220S0013>
- Kelley, H., & Michela, J. (1980). Attribution theory and research. *Annual Review of Psychology*, 31(1), 457-501.
- Kelly, L., Duran, R. L., & Zolten, J. J. (2001). The effect of reticence on college students' use of electronic mail to communicate with faculty. *Communication Education*, 50(2), 170-176.
- Key, M. R. (1980). *The relationship of verbal and nonverbal communication*. Berlin: Walter de Gruyter.
- Klimt, B., & Yang, Y. (2004). The Enron corpus: A new dataset for email classification research. In *Lecture notes in computer science* (pp. 217-226): Springer Berlin / Heidelberg.
- Knapp, M. L., & Hall, J. A. (2002). Nonverbal communication: Basic perspectives. In M. L. Knapp & J. A. Hall (Eds.), *Nonverbal communication in human interaction* (pp. 3-106): Thomson Learning.
- Kock, N. (2001). The ape that used e-mail: Understanding e-communication behavior through evolution theory. *Communications of the Association for Information Systems*, 5(3).
- Kosic, A., Mannetti, L., & Lackland Sam, D. (2005). The role of majority attitudes towards out-group in the perception of the acculturation strategies of immigrants. *International Journal of Intercultural Relations*, 29(3), 273-288.
- Koskinen, T. (2000). Mobile asynchronous communication: Exploring the potential for converged applications. *Personal Technologies*, 4(2 - 3), 113-122.
- Kraut, R., Olson, J., Couper, M., Banaji, M., Bruckman, A., & Cohen, J. (2004). Psychological research online: Report of board of scientific affairs' advisory group on the conduct of research on the Internet. *American Psychologist*, 59(2), 105-117.
- Kraut, R., Patterson, M., Lundmark, V., Kiesler, S., Mukopadhyay, T., & Scherlis, W. (1998). Internet paradox - a social technology that reduces social involvement and psychological well-being? *American Psychologist*, 53(9), 1017-1031.
- Krikorian, D., Lee, J., Chock, T., & Harms, C. (2000). Isn't that spatial? Distance and communication in a 2-d virtual environment. *Journal of Computer-Mediated Communication*, 5(4).
- Kruger, J., Epley, N., Parker, J., & Ng, Z.-W. (2005). Egocentrism over e-mail: Can we communicate as well as we think? *Journal of Personality and Social Psychology*, 89(6), 925-936.
- Kryssanov, V. V., Rinaldo, F. J., Kuleshov, E. L., & Ogawa, H. (2006). *Modeling the dynamics of social networks*, from <http://arxiv.org/abs/cs/0605101>
- Kunda, Z. (1999). *Social cognition: Making sense of people*. Cambridge, MA: The MIT Press.

- Kypri, K., Gallagher, S. J., & Cashell-Smith, M. L. (2004). An Internet-based survey method for college student drinking research. *Drug and Alcohol Dependence*, 76(1), 45-53.
- Lane, D. R. (n.d.). *Function and impact of nonverbal communication in a computer mediated communication context: An investigation of defining issues*. Retrieved September 30, 2007, from <http://www.uky.edu/~drlane/techno/nvcmc.htm>
- Lantz, A. (2001). Meetings in a distributed group of experts: Comparing face-to-face, chat and collaborative virtual environments. *Behaviour & Information Technology*, 20(2), 111-117.
- Lantz, A. (2003). Does the use of e-mail change over time? *International Journal of Human-Computer Interaction*, 15(3), 419-431.
- Larson, K., & Picard, R. (2005). *The aesthetics of reading*. Paper presented at the Human-Computer Interaction Consortium Conference, Snow Mountain Ranch, Fraser, Colorado.
- Laurel, B. (1993). *Computers as theatre*. Reading, MA: Addison-Wesley.
- Lea, M., & Spears, R. (1992). Paralanguage and social perception in computer-mediated communication. *Journal of Organizational Computing*, 2, 321-341.
- Leary, M. R., & Cottrell, C. A. (1999). Evolution of the self, the need to belong, and life in a delayed-return environment. *Psychological Inquiry*, 10(3), 229-232.
- Leary, M. R., Negel, L., Ansell, E., Evans, K., & Springer, C. (1998). The causes, phenomenology, and consequences of hurt feelings. *Journal of Personality and Social Psychology*, 74(5), 1225-1237.
- Lee, R. M. (1993). *Doing research on sensitive topics*. London, UK: Sage Publications.
- Lee, R. M. (2000a). Unobtrusive methods and the Internet. In R. M. Lee (Ed.), *Unobtrusive methods in social research* (pp. 115-138). Buckingham: Open University Press.
- Lee, R. M. (2000b). *Unobtrusive methods in social research*. Buckingham: Open University Press.
- Leuenberger, R., Schegg, R., & Murphy, J. (2003). E-mail customer service by upscale international hotels. *Information and communication technologies in tourism*, 20-28.
- Levine, J. M., & Resnick, L. B. (1993). Social foundations of cognition. *Annual Review of Psychology*, 44, 585-612.
- Lewis, C. E., Thompson, L. F., Wuensch, K. L., Grossnickle, W. F., & Cope, J. G. (2004). The impact of recipient list size and priority signs on electronic helping behavior. *Computers in Human Behavior*, 20(5), 633-644.
- Lipnack, J., & Stamps, J. (2000). *Virtual teams*. New York: John Wiley & Sons.
- Liu, Y., & Ginther, D. (2002). Instructional strategies for achieving a positive impression in computer mediated communication (CMC) distance education courses. *Proceedings of Teaching, Learning, & Technology Conference, Middle Tennessee State University*.
- Liu, Y., Ginther, D., & Zelhart, P. (2001). How do frequency and duration of messaging affect impression development in computer-mediated communication? *Journal of Universal Computer Science*, 7(10), 893-914.
- Lockerd, A. L. (2002). *Understanding implicit social context in electronic communication*. Massachusetts Institute of Technology.
- Lockerd, A. L., & Selker, T. (2003, September 1-5). *Driftcatcher: The implicit social context of email*. Paper presented at the Ninth IFIP TC13 International Conference, Zurich, Switzerland.

- Lombard, M., & Ditton, T. (1997). At the heart of it all: The concept of presence. *Journal of Computer-Mediated Communication*, 3(2), <http://www.ascusc.org/jcmc/vol3/issue2/lombard.html>.
- Luce, R. D. (1991). *Response times - their role in inferring elementary mental organization*. Oxford: Oxford University Press.
- Lusk, E. (2006). Email: Its decision support systems inroads - an update. *Decision Support Systems*, 42(1), 328-332.
- Macduff, I. (2006). Your pace or mine? Culture, time, and negotiation. *Negotiation Journal*, 22(1), 31-46.
- Malle, B., & Knobe, J. (1997). The folk concept of intentionality. *Journal of Experimental Social Psychology*, 33(2), 101-121.
- Malle, B., & Pearce, G. (2001). Attention to behavioral events during interaction: Two actor-observer gaps and three attempts to close them. *J Pers Soc Psychol*, 81(2), 278-294.
- Maltz, D. (1985). Joyful noise and reverent silence: The significance of noise in Pentecostal worship. In D. Tannen & M. Saviile-Troike (Eds.), *Perspectives on silence* (pp. 113-137).
- Manusov, V., Floyd, K., & Kerksen-Griep, J. (1997). Yours, mine, and ours: Mutual attributions for nonverbal behaviors in couples' interactions. *Communication Research*, 24(3), 234-260.
- Mark, G., Gonzalez, V. M., & Harris, J. (2005). *No task left behind? Examining the nature of fragmented work*. Paper presented at the CHI 2005: Technology, Safety, Community: Conference Proceedings - Conference on Human Factors in Computing Systems.
- Markey, P. M. (2000). Bystander intervention in computer-mediated communication. *Computers in Human Behavior*, 16(2), 183-188.
- Martin, J. (2002). *Check your email*. Retrieved September 30, 2007, from <http://www.alief.com/jmartin/email.asp>
- Marvin, C. (1990). *When old technologies were new: Thinking about electric communication in the late nineteenth century*. New York, NY: Oxford University Press.
- Mason, B. (1999). *Issues in virtual ethnography*. Paper presented at the Proceedings of Esprit i3 Workshop on Ethnographic Studies, Edinburgh.
- Masterson, J. (1996). *Nonverbal communication in text based virtual realities*. University of Montana.
- Mattila, A. S., & Mount, D. J. (2003). The impact of selected customer characteristics and response time on e-complaint satisfaction and return intent. *International Journal of Hospitality Management*, 22(2), 135-145.
- Matzler, K., Pechlaner, H., Abfalter, D., & Wolf, M. (2005). Determinants of response to customer e-mail enquiries to hotels: Evidence from Austria. *Tourism Management*, 26(2), 249-259.
- McClure, J. (1992). An economy of explanations. In M. L. McLaughlin, M. J. Cody & S. J. Read (Eds.), *Explaining one's self to others: Reason-giving in a social context* (pp. 61-82). Hillsdale, NJ: Lawrence Erlbaum Associates.
- McCroskey, J. C., & McCain, T. A. (1974). The measurement of interpersonal attraction. *Speech Monographs*(41), 261-266.
- McCroskey, J. C., & Young, T. J. (1981). Ethos and credibility: The construct and its measurement after three decades. *Central States Speech Journal*, 32, 24-34.

- McDevitt, M., Kiouisis, S., & Wahl-Jorgensen, K. (2003). Spiral of moderation: Opinion expression in computer-mediated discussion. *International Journal of Public Opinion Research*, 15(4), 454-470.
- McFarlane, D. (1999). Coordinating the interruption of people in human-computer interaction. *Human-Computer Interaction-INTERACT*, 99, 295-303.
- McGuire, W. J. (1981). Theoretical foundations of campaigns. In R. E. Rice & W. J. Paisley (Eds.), *Public communication campaigns* (pp. 41-70). Beverly Hills, Ca: Sage.
- McLaughlin, M. L., & Cody, M. J. (1982). Awkward silences: Behavioral antecedents and consequences of the conversational lapse. *Human Communication Research*, 8(1), 299-316.
- McLaughlin, M. L., Cody, M. J., & Read, S. J. (1992). Introduction. In M. L. McLaughlin, M. J. Cody & R. S. J. (Eds.), *Explaining one's self to others: Reason-giving in a social context* (pp. xv-xxii). Hillsdale, NJ: Lawrence Erlbaum Associates.
- McMahon, S. R., Iwamoto, M., Massoudi, M. S., Yusuf, H. R., Stevenson, J. M., David, F., et al. (2003). Comparison of e-mail, fax, and postal surveys of pediatricians. *Pediatrics*, e299-e303.
- Meier, R. (1963). Communications overload: Proposals from the study of a university library. *Administrative Science Quarterly*, 7(4), 521-544.
- Miller, A., Velleman, R., Bennett, G., Orford, J., Rigby, K., & Tod, A. (1997). The use of vignettes in the analysis of interview data: Relatives of people with drug problems. *Doing Qualitative Analysis in Psychology*, 201-225.
- Milliken, F. J., & Wolfe, M. E. (2003). Shades of silence: Emerging themes and future directions for research on silence in organizations. *Journal of Management Studies*, 40(6), 1563-1568.
- Mitchell, W. J. (1996). Electronic agoras. In *City of bits. Space, place, and the infobahn*. Boston, MA: Massachusetts Institute of Technology.
- Morahan-Martin, J., & Schumacher, P. (2000). Incidence and correlates of pathological Internet use among college students. *Computers in Human Behavior*, 16(1), 13-29.
- Morgan, M., & Coombes, L. (2001). Subjectivities and silences, mother and woman: Theorizing an experience of silence as a speaking subject. *Feminism & Psychology*, 11(3), 361-375.
- Morris, M., & Ogan, C. (1996). The internet as mass medium. *Journal of Computer-Mediated Communication*, 1(4), <http://www.ascusc.org/jcmc/vol1/issue4/morris.html>.
- Mostow, J., & Aist, G. (1997). *Sounds of silence: Towards automated evaluation of student learning in a reading tutor that listens*. Paper presented at the Proceedings of the National Conference on Artificial Intelligence.
- Murphy, J., & Gomes, L. (2003). E-mail customer service by Australian educational institutions. *Australasian Marketing Journal*, 11(2), 56-69.
- Murphy, J., & Tan, I. (2003). Journey to nowhere? E-mail customer service by travel agents in singapore. *Tourism Management*, 24(5), 543-550.
- Nakane, I. (2003). *Silence in Japanese-Australian classroom interaction: Perceptions and performance*. University of Sydney, Department of Linguistics.
- Nastri, J., Pena, J., & Hancock, J. T. (2006). The construction of away messages: A speech act analysis. *Journal of Computer-Mediated Communication*, 11(4), 1025-1045.
- Negroponte, N. (1994). Talking with computers. *Wired*, 2(3), <http://www.wired.com/wired/archive/2.03/negroponte.html>.

- Negroponte, N. (1996). *Being digital*. New York, NY: Random House Inc.
- Nestruck, J. K. (2003). Voyeur's paradise: Web site airs dirty laundry of Enron staff. *National Post*.
- Neuwirth, K., Frederick, E., & Mayo, C. (2007). The spiral of silence and fear of isolation. *Journal of Communication*, 57(3), 450-468.
- Newhagen, J. E., & Rafaeli, S. (1996). Why communication researchers should study the Internet: A dialogue. *Journal of Communication*, 46(1), 4-13.
- Newman, M. E. J. (2005). Power laws, Pareto distributions and Zipf's law. *Contemporary Physics*, 46(5), 323-351.
- Nie, W. (2000). Waiting: Integrating social and psychological perspectives in operations management. *Omega*, 28(6), 611-629.
- Niqqud. (2007). *Niqqud*. Retrieved September 30, 2007, from <http://en.wikipedia.org/w/index.php?title=Niqqud&oldid=143863591>
- Noelle-Neumann, E. (1991). The theory of public opinion: The concept of the spiral of silence. In J. A. Anderson (Ed.), *Communication yearbook 14* (pp. 256-287). Newbury Park, CA: Sage.
- Nonnecke, B., Andrews, D., & Preece, J. (2006). Non-public and public online community participation: Needs, attitudes and behavior. *Electronic Commerce Research*, 6(1), 7-20.
- Nonnecke, B., & Preece, J. (2000). *Lurker demographics*. Paper presented at the Proceedings of CHI 2000, The Hague, Netherlands.
- Nowotny, H. (1997). *Time* (N. Plaice, Trans.). Cambridge, UK: Polity Press.
- NTL: Telewest. (2006). *Digital etiquette*. Retrieved September 30, 2007, from http://www.ntltelewestbusiness.co.uk/news_events/research_findings/digital_etiquette.aspx
- Oates, J. (1977). Mesopotamian social organisation: Archaeological and philological evidence. In J. Friedman & M.J. Rowlands (Eds.), *The evolution of social systems*. London: Duckworth.
- O'Connell, B., & Frohlich, D. (1995). Timespace in the workplace: Dealing with interruptions. *Conference on Human Factors in Computing Systems*, 262-263.
- Oliveira, J. G., & Barabasi, A. L. (2005). Human dynamics: Darwin and Einstein correspondence patterns. *Nature*, 437(7063), 1251.
- Olson, G. M., & Olson, J. S. (2000). Distance matters. *Human-Computer Interaction*, 15(2-3), 139-178.
- Ong, W. J. (1988). Orality and literacy. In *The technologizing of the word*. New York, NY: Methuen.
- Oxford English Dictionary. (1989). "*silence, n*". Retrieved September 30, 2007, from <http://dictionary.oed.com/cgi/entry/50224754>
- Pagnucci, G. S., & Mauriello, N. (1999). The masquerade: Gender, identity, and writing for the web. *Computers and Composition*, 16(1), 141-151.
- PalmOne. (2004). *New palmone research shows 'bad attitude' is slowing down business in europe*. Retrieved September 27, 2004, from <http://palm.rever.fr/docs/pr.html?docid=j71ojwrg&lang=en&bpage=Download>
- PalmOne, & Collett, P. (2005). *Smart steps to help you beat the seven deadly email sins*. Retrieved September 30, 2007, from http://www.top-consultant.com/UK/Editorial/Article_display.asp?ID=1125

- Panteli, N. (2002). Richness, power cues and email text. *Information and Management*, 40(2), 75-86.
- Panteli, N. (2004). Discursive articulations of presence in virtual organizing. *Information and Organization*, 14(1), 59-81.
- Panteli, N., & Fineman, S. (2005). The sound of silence: The case of virtual team organising. *Behaviour & Information Technology*, 24(5), 347-352.
- Park, J.-R. (2007). Interpersonal and affective communication in synchronous online discourse. *Library Quarterly*, 77(2), 133-155.
- Patrick, P. L. (2004). The speech community. In b. J. K. Chambers, P. Trudgill & N. Schilling-Estes (Eds.), *The handbook of language variation and change (Blackwell handbooks in linguistics)*. Oxford: Blackwell.
- Peris, R., Gimeno, M. A., Pinazo, D., Ortet, G., Carrero, V., Sanchiz, M., et al. (2002). Online chat rooms: Virtual spaces of interaction for socially oriented people. *Cyberpsychology & Behavior*, 5(1), 43-51.
- Pew. (2007). *Internet activities*. Retrieved September 30, 2007, from http://www.pewinternet.org/trends/Internet_Activities_6.15.07.htm
- Pietrzak, j., Downey, G., & Ayduk, O. (2005). Rejection sensitivity as an interpersonal vulnerability. In M. W. Baldwin (Ed.), *Interpersonal cognition* (pp. 62-84). New York, NY: The Guilford Press.
- Pitkin, R. M., & Burmeister, L. F. (2002). Prodding tardy reviewers: A randomized comparison of telephone, fax, and e-mail. *Journal of the American Medical Association*, 287(21), 2794-2795.
- Pool, I. D. S. (1983). *Forecasting the telephone: A retrospective technology assessment of the telephone*. Norwood, NJ: Ablex Publishing.
- Popolov, D., Callaghan, M., & Luker, P. (2000). Conversation space: Visualizing multi-threaded conversation. *Proceedings of the Workshop on Advanced Visual Interfaces*, 246-249.
- Poppel, E. (2004). Lost in time: A historical frame, elementary processing units and the 3-second window. *Acta Neurobiologiae Experimentalis*, 64, 295-301.
- Porter, S. R., & Whitcomb, M. E. (2005). E-mail subject lines and their effect on web survey viewing and response. *Social Science Computer Review*, 23(3), 380-387.
- Postman, N. (1992). *Technopoly: The surrender of culture to technology*. New York: Knopf.
- Potter, J., & Wetherell, M. (1987). *Discourse and social psychology: Beyond attitudes and behaviour*. London, UK: Sage.
- Poyatos, F. (1983a). Interactive and noninteractive verbal and nonverbal behaviors: Categories, forms, and functions. In F. Poyatos (Ed.), *New perspectives in nonverbal communication* (pp. 94-174): Pergamon Press.
- Poyatos, F. (1983b). *New perspectives in nonverbal communication: Studies in cultural anthropology, social psychology, linguistics, literature and semiotics*: Pergamon.
- Poyatos, F. (2002a). *Nonverbal communication across disciplines: Narrative literature, theater, cinema, translation* (Vol. 3). Amsterdam: John Benjamins Publishing Company.
- Poyatos, F. (2002b). Silence, stillness and darkness as the communicative nonactivities opposed to sound, movement and light. In *Nonverbal communication across disciplines* (Vol. 2, pp. 281-323). Amsterdam: John Benjamins Publishing Company.

- Preece, J. (2000). *Online communities: Designing usability and supporting sociability*. New York, NY: John Wiley & Sons, Inc.
- Provine, R. R., Spencer, R. J., & Mandell, D. L. (2007). Emotional expression online: Emoticons punctuate website text messages. *Journal of Language and Social Psychology, 26*(3), 299-307.
- Qian, J., Luscombe, N., & Gerstein, M. (2001). Protein family and fold occurrence in genomes: Power-law behaviour and evolutionary model. *Journal of Molecular Biology, 313*(4), 673-681.
- Quinney, R. (1988). Beyond the interpretive: The way of awareness. *Sociological Inquiry, 58*(1), 101-116.
- Raban, D. R., & Rafaeli, S. (2006). The effect of source nature and status on the subjective value of information. *Journal of the American Society for Information Science and Technology, 57*(3), 321-329.
- Rafaeli, S. (1984). *If the computer is the medium, what is the message?* Paper presented at the Annual Conference of the International Communication Association, Honolulu, Hawaii.
- Rafaeli, S. (1988). Interactivity: From new media to communication. In *Sage annual review of communication research: Advancing communication science* (Vol. 16, pp. 110-134). Beverly Hills, CA: Sage.
- Rafaeli, S., & Ariel, Y. (2007). Assessing interactivity in computer-mediated research. In A. N. Joinson, K. Y. A. McKenna, T. Postmes & U. D. Reips (Eds.), *The oxford handbook of Internet psychology* (pp. 71-88). Oxford, UK: Oxford University Press.
- Rafaeli, S., Raban, D. R., & Ravid, G. (2005). *Social and economic incentives in google answers*. Paper presented at the ACM Group 2005 conference, Sanibel Island, Florida.
- Rafaeli, S., Ravid, G., & Soroka, V. (2004). *De-lurking in virtual communities: A social communication network approach to measuring the effects of social and cultural capital*. Paper presented at the Proceedings of the 2004 Hawaii International Conference on System Sciences (HICSS 37), Big Island, Hawaii.
- Rafaeli, S., & Sudweeks, F. (1997). Networked interactivity. *Journal of Computer-Mediated Communication, 2*(4).
- Rains, S., & Young, A. (2006). A sign of the times: An analysis of organizational members' email signatures. *Journal of Computer Mediated Communication, 11*(4), 1046-1061.
- Ramirez Jr, A., Walther, J. B., Burgoon, J. K., & Sunnafrank, M. (2002). Information-seeking strategies, uncertainty, and computer-mediated communication toward a conceptual model. *Human Communication Research, 28*(2), 213-228.
- Ravid, G., & Rafaeli, S. (2004). A-synchronous discussion groups as small world and scale free networks. *First Monday, 9*(9).
- Raziano, D. B., Jayadevappa, R., Valenzuela, D., Weiner, M., & Lavizzo-Mourey, R. (2001). E-mail versus conventional postal mail survey of geriatric chiefs. *Gerontologist, 41*(6), 799-804.
- Reddy, A., Field, M., Maywood, E., & Hastings, M. (2002). Differential resynchronisation of circadian clock gene expression within the suprachiasmatic nuclei of mice subjected to experimental jet lag. *Journal of Neuroscience, 22*, 7326-7330
- Reed, W. J. (2001). The Pareto, Zipf and other power laws. *Economics Letters, 74*(1), 15-19.

- Reeves, B., & Nass, C. (2000). Perceptual bandwidth. *Communications of the ACM*, 43(3), 65-70.
- Renaud, K., Ramsay, J., & Hair, M. (2006). "you've got e-mail!" ... Shall I deal with it now? Electronic mail from the recipient's perspective. *International Journal of Human-Computer Interaction*, 21(3), 313-332.
- Rheingold, H. (1993). *The virtual community: Homesteading on the electronic frontier*. Reading, MA: Addison-Wesley.
- Rice-Lively, M. (1994). Wired warp and woof: An ethnographic study of a networking class. *Internet Research: Electronic Networking Applications and Policy*, 4(4), 20-35.
- Rintel, E. S., & Pittam, J. (1997). Strangers in a strange land: Interaction management on Internet relay chat. *Human communication research*, 23(4), 507-534.
- Rintel, E. S., Pittam, J., & Mulholland, J. (2003). Time will tell: Ambiguous nonresponses on Internet relay chat. *Electronic Journal of Communication*, 13(1).
- Riva, G. (2002). The sociocognitive psychology of computer-mediated communication: The present and future of technology-based interactions. *CyberPsychology & Behavior*, 5(6), 581-598.
- RoCRM. (2003). *CRM 101: How to better manage e-mail*. Retrieved September 21, 2003, from www.allbusiness.com/periodicals/article/445170-1.html
- Rouse, S. V., & Haas, H. A. (2003). Exploring the accuracies and inaccuracies of personality perception following Internet-mediated communication. *Journal of Research in Personality*, 37(5), 446-467.
- Rubinstein, A. (2004). *Instinctive and cognitive reasoning: Response times study*. Retrieved September 30, 2007, from <http://arielrubinstein.tau.ac.il/papers/Response.pdf>
- Russell, E., Purvis, L., & Banks, A. (2007). Describing the strategies used for dealing with email interruptions according to different situational parameters. *Computers in Human Behavior*, 23(4), 1820-1837.
- Sacks, H. (1992). *Lectures on conversation, vol. 1*: Oxford: Blackwell.
- Sacks, H., Schegloff, E. A., & Jefferson, G. (1978). A simplest systematics for the organization of turn taking for conversation. In J. Schenkein (Ed.), *Studies in the organization of conversational interaction* (pp. 7-55). New York: Academic Press.
- Sandberg, J. (2006, September 12). Yes, sell all my stocks. No, the 3:15 from JFK. And get me Mr. Sister. *Wall Street Journal*, p. B1.
- Savicki, V., Kelley, M., & Oesterreich, E. (1999). Judgments of gender in computer-mediated communication. *Computers in Human Behavior*, 15(2), 185-194.
- Saville-Troike, M. (1985). The place of silence in an integrated theory of communication. In M. Saville-Troike & D. Tannen (Eds.), *Perspectives on silence* (pp. 3-18): Ablex Pub. Corp.
- Schaefer, D. R., & Dillman, D. A. (1998). Development of a standard e-mail methodology: Results of an experiment. *Public Opinion Quarterly*, 62(3), 378-397.
- Schefflen, A. E. (1982). Preface. In M. Davis (Ed.), *Interaction rhythms* (pp. 13-22). New York, NY: Human Sciences Press Inc.
- Scott, R. L. (1993). Dialectical tensions of speaking and silence. *Quarterly Journal of Speech*, 79(1), 1-18.
- Shaikh, A. D., Fox, D., & Chaparro, B. S. (2007). The effect of typeface on the perception of email. *Usability News*, 9(1).

- Sharkey, W. F., Kim, M.-S., & Diggs, R. C. (2001). Intentional embarrassment: A look at embarrassors' and targets' perspectives. *Personality and Individual Differences, 31*(8), 1261-1272.
- Sheehan, K. B., & Hoy, M. G. (1999). Using e-mail to survey internet users in the United States: Methodology and assessment. *Journal of Computer-Mediated Communication, 4*(3).
- Sheehan, K. B., & McMillan, S. J. (1999). Response variation in e-mail surveys: An exploration. *Journal of Advertising Research, 39*(4), 45-54.
- Shenk, D. (1999). *The end of patience: Cautionary notes on the information revolution*. Bloomington, IN: Indiana University Press.
- Shipley, D., & Schwalbe, W. (2007). *Send: The essential guide to email for office and home*. New York, NY: Knopf.
- Shneiderman, B. (1998). *Designing the user interface: Strategies for effective human-computer interaction* (3rd ed.). Boston, MA: Addison-Wesley.
- Short, J., E., W., & Christie, B. (1976). *The social psychology of telecommunications*. London: Wiley.
- Sifianou, M. (1997). Silence and politeness. In A. Jaworski (Ed.), *Silence: Interdisciplinary perspectives* (pp. 63-84). Berlin: Walter de Gruyter & Co.
- Sigmon, D. R., & Snyder, C. R. (2006). Offense-taking: Development and validation of a trait self-report measure. *Cognitive Therapy and Research, 30*(4), 445-456.
- Sinclair, H. C., & Frieze, I. H. (2005). When courtship persistence becomes intrusive pursuit: Comparing rejecter and pursuer perspectives of unrequited attraction. *Sex Roles, 52*(11-12), 839-852.
- Smith, A., & Williams, K. D. (2004). R u there? Ostracism by cell phone text messages. *Group Dynamics, 8*(4), 291-301.
- Snapp, C. M., & Leary, M. R. (2001). Hurt feelings among new acquaintances: Moderating effects of interpersonal familiarity. *Journal of Social and Personal Relationships, 18*(3), 315-326.
- Sommer, K. L., Williams, K. D., Ciarocco, N. J., & Baumeister, R. F. (2001). When silence speaks louder than words: Explorations into the intrapsychic and interpersonal consequences of social ostracism. *Basic and Applied Social Psychology, 23*(4), 225-243.
- Soroka, V., Jacovi, M., & Ur, S. (2003). We can see you: A study of communities' invisible people through reachout. *Communities and Technologies, 65-79*.
- Spagnolli, A., & Gamberini, L. (2007). Interacting via SMS: Practices of social closeness and reciprocation. *British Journal of Social Psychology, 46*, 343-364.
- Spears, R., & Lea, M. (1994). Panacea or panopticon? The hidden power in computer-mediated communication. *Communication Research, 21*, 427-459.
- Spears, R., Postmes, T., Lea, M., & Wolbert, A. (2002). When are net effects gross products? The power of influence and the influence of power in computer-mediated communication. *Journal of Social Issues, 58*(1), 91-107.
- Spears, R., Russell, L., & Lee, S. (1990). De-individuation and group polarization in computer-mediated communication. *British Journal of Social Psychology*(29), 121-134.
- Sproull, L., & Kiesler, S. (1986). Reducing social context cues: Electronic mail in organizational communication. *Management Science, 32*(11), 1492-1512.

- Standage, T. (1998). *The Victorian Internet: The remarkable story of the telegraph and the nineteenth century's on-line pioneers*. New York: Walker & Co.
- Stellin, S. (2001, April 30). Does it take a clock or calendar to gauge e-mail responses? *New York Times*, p. 4.
- Stellin, S. (2003, June 30). Most wanted: Drilling down/company web sites; customer care, online. *The New York Times*, p. 8.
- Stone, A. A., Turkkan, J., Bachrach, C., Jobe, J., Kurtzman, H., & Cain, V. (2000). *The science of self-report: Implications for research and practice*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Stone, A. R. (1991). Will the real body please stand up? Boundary stories about virtual cultures. In M. Benedikt (Ed.), *Cyberspace: First steps*. Cambridge, MA: The MIT Press.
- Stone, B. (2006). *Live talk: Can the Blackberry stay on top?* Retrieved September 30, 2007, from <http://www.msnbc.msn.com/id/9377027/site/newsweek/>
- Strate, L. (1995). Experiencing cybertime: Computing as activity and event. *Interpersonal Computing and Technology*, 3(2), 78-91.
- Strauss, J., & Hill, D. J. (2001). Consumer complaints by e-mail: An exploratory investigation of corporate responses and customer reactions. *Journal of Interactive Marketing*, 15(1), 63-73.
- Tangirala, S., & Alge, B. (2006). Reactions to unfair events in computer-mediated groups: A test of uncertainty management theory. *Organizational behavior and human decision processes*, 100(1), 1-20.
- Tanis, M., & Postmes, T. (2003). Social cues and impression formation in CMC. *Journal of Communication*, 53(4), 676-693.
- Tannen, D. (1985). Silence: Anything but. In *Perspectives on silence* (pp. 93-111). Westport, Connecticut: Greenwood Publishing Group.
- Tannen, D., & Saville-Troike, M. (1985). *Perspectives on silence*. Westport, Connecticut: Greenwood Publishing Group.
- Ter Bush, R. (2006). Silence, attribution accuracy and virtual environments: Implications for developers and facilitators. *Proceedings of the 39th Annual Hawaii International Conference on System Sciences*.
- Ter Bush, R., & Mittleman, D. (2005). Determinants of mutual knowledge on virtual teams with recommendations to virtual environment designers. *EDRA conference proceedings, Vancouver, BC*.
- Thaler, R. H. (1980). Toward a positive theory of consumer choice. *Journal of Economic Behavior and Organization*, 1(1), 39-60.
- Thomson, R. (2006). The effect of topic of discussion on gendered language in computer-mediated communication discussion. *Journal of Language and Social Psychology*, 25(2), 167-178.
- Tidwell, L. C., & Walther, J. B. (2002). Computer-mediated communication effects on disclosure, impressions, and interpersonal evaluations: Getting to know one another a bit at a time. *Human Communication Research*, 28(3), 317-348.
- Tse, A. C. B. (1998). Comparing the response rate, response speed and response quality of two methods of sending questionnaires: E-mail vs. Mail. *International Journal of Market Research*, 40(4), 353-361.
- Turkle, S. (1980). Computers as Rorschach. *Society*, 17(2), 15-24.

- Turkle, S. (1984). *The second self: Computers and the human spirit*. New York: Simon & Schuster.
- Turkle, S. (1997). *Life on the screen: Identity in the age of the Internet*. Carmichael, CA: Touchstone Books.
- Turner, J., Grube, J., Tinsley, C., Lee, C., & O'Pell, C. (2006). Exploring the dominant media: How does media use reflect organizational norms and affect performance? *Journal of Business Communication*, 43(3), 220-250.
- Twenge, J. M., Catanese, K. R., & Baumeister, R. F. (2003). Social exclusion and the deconstructed state: Time perception, meaninglessness, lethargy, lack of emotion, and self-awareness. *Journal of Personality and Social Psychology*, 85(3), 409-423.
- Tyler, J. R., & Tang, J. C. (2003). *When can I expect an email response? A study of rhythms in email usage*. Paper presented at the ECSCW 2003.
- Van Der Meij, H., & Boersma, K. (2002). Email use in elementary school: An analysis of exchange patterns and content. *British Journal of Educational Technology*, 33(2), 189-200.
- Van Der Meij, H., De Vries, B., Pieters, J., Boersma, K., & Wegerif, R. (2005). An examination of interactional coherence in email use in elementary school. *Computers in Human Behavior*, 21(3), 417-439.
- Van Dyne, L., Ang, S., & Botero, I. (2003). Conceptualizing employee silence and employee voice as multidimensional constructs. *Journal of Management Studies*, 40(6), 1359-1392.
- Vangelisti, A. L., Young, S., Carpenter-Theune, K., & Alexander, A. (2005). Why does it hurt?: The perceived causes of hurt feelings. *Communication Research*, 32(4), 443-477.
- Vangelisti, A. L., & Young, S. L. (2000). When words hurt: The effects of perceived intentionality on interpersonal relationships. *Journal of Social and Personal Relationships*, 17(3), 393-424.
- Vargas, M. F. (1986). Nonverbal communication - an introduction. In M. F. Vargas (Ed.), *Louder than words* (pp. 9-17): Iowa State University Press.
- Viegas, F. B., Donath, J. S., Boyd, D., Nguyen, D. H., & Potter, J. (2004). *Digital artifacts for remembering and storytelling: Posthistory and social network fragments*. Paper presented at the Proceedings of the Hawaii International Conference on System Sciences.
- Vollarth, M., Kazenwadel, J., & Kruger, H. P. (1992). A universal constant in temporal segmentation of human speech. *Naturwissenschaften*, 79(10), 479-480.
- Voss, C. (2000). Developing an eservice strategy. *Business Strategy Review*, 11(1), 21-34.
- Wallace, P. (1999). *The psychology of the Internet*. New York, NY: Cambridge University Press.
- Walther, J. B. (1992). Interpersonal effects in computer-mediated interaction - a relational perspective. *Communication Research*, 19(1), 52-90.
- Walther, J. B. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication Research*, 23(1), 3-43.
- Walther, J. B. (2002). Research ethics in Internet-enabled research: Human subjects issues and methodological myopia. *Ethics and Information Technology*, 4, 205-216.

- Walther, J. B., Anderson, J. F., & Park, D. W. (1994). Interpersonal effects in computer-mediated interaction: A meta-analysis of social and anti-social communication. *Communication Research*, 21(4), 460-487.
- Walther, J. B., & Bazarova, N. N. (2007). Misattribution in virtual groups: The effects of member distribution on self-serving bias and partner blame. *Human Communication Research*, 33(1), 1-26.
- Walther, J. B., & Bunz, U. (2005). The rules of virtual groups: Trust, liking, and performance in computer-mediated communication. *Journal of Communication*, 55(4), 828-846.
- Walther, J. B., & Burgoon, J. K. (1992). Relational communication in computer-mediated interaction. *Human Communication Research*, 19(1), 50-88.
- Walther, J. B., & D'Addario, K. P. (2001). The impacts of emoticons on message interpretation in computer-mediated communication. *Social Science Computer Review*, 19(3), 324-347.
- Walther, J. B., & Parks, M. R. (2002). Cues filtered out, cues filtered in. In M. Knapp & J. Daly (Eds.), *Handbook of interpersonal communication* (pp. 529-563). Thousand Oaks, CA: Sage.
- Walther, J. B., Slovacek, C. L., & Tidwell, L. C. (2001). Is a picture worth a thousand words?: Photographic images in long-term and short-term computer-mediated communication. *Communication Research*, 28(1), 105-134.
- Walther, J. B., & Tidwell, L. C. (1995). Nonverbal cues in computer-mediated communication, and the effect of chronemics on relational communication. *Journal of Organizational Computing*, 5, 355-378.
- Webb, E. J., Campbell, D. T., Schwartz, R. D., & Sechrest, L. (1966). *Unobtrusive methods: Nonreactive research in the social sciences*. Chicago: Rand McNally.
- Webb, E. J., Campbell, D. T., Schwartz, R. D., & Sechrest, L. (2000). *Unobtrusive measures* (revised ed.). New York: Sage Classics.
- WebSM. (2006). *Nonresponse*. Retrieved September 30, 2007, from <http://websm.org/index.php?fl=0&p1=&p2=&p3=&id=126>
- Wellman, B., & Gulia, M. (1999). Net surfers don't ride alone: Virtual communities as communities. In B. Wellman (Ed.), *Networks in the global village: Life in contemporary communities* (pp. 331-366). Boulder, Co: Westview.
- Wellman, B., & Haythornwaite, C. (Eds.). (2002). *The Internet in everyday life*. Malden, MA: Blackwell Publishers Ltd.
- Whittaker, S., & Sidner, C. (1996). *Email overload: Exploring personal information management of email*. Paper presented at the Conference on Human Factors in Computing Systems - Proceedings.
- Whittaker, S., Terveen, L., Hill, W., & Cherny, L. (1998). *The dynamics of mass interaction*. Paper presented at the Proceedings of CSCW 98, Seattle, WA.
- Wilder, C. (1978). From the interactional view - a conversation with Paul Watzlawick. *Journal of Communication*, 28(4), 35-45.
- Williams, K. D. (2001). *Ostracism: The power of silence*. New York: The Guilford Press.
- Williams, K. D. (2005). Ostracism: The indiscriminate early detection system. In K. D. Williams, J. P. Forgas & W. v. Hippel (Eds.), *The social outcast: Ostracism, social exclusion, rejection, and bullying*. New York: The Psychology Press.

- Williams, K. D., Cheung, C. K. T., & Choi, W. (2000). Cyberostracism: Effects of being ignored over the internet. *Journal of Personality and Social Psychology*, 79(5), 748-762.
- Williams, K. D., Govan, C. L., Croker, V., Tynan, D., Cruickshank, M., & Lam, A. (2002). Investigations into differences between social- and cyberostracism. *Group Dynamics*, 6(1), 65-77.
- Winston, B. (1998). *Media technology and society. A history: From the telegraph to the Internet*. London: Routledge.
- Wolf, A. (2000). Emotional expression online: Gender differences in emoticon use. *CyberPsychology & Behavior*, 3(5), 827-833.
- Wolfe, J. L. (1999). Why do women feel ignored? Gender differences in computer-mediated classroom interactions. *Computers and Composition*, 16(1), 153-166.
- Wurtz, E. (2005). A cross-cultural analysis of websites from high-context cultures and low-context cultures. *Journal of Computer-Mediated Communication*, 11(1).
- Yechiam, E., & Barron, G. (2003). Learning to ignore online help requests. *Computational & Mathematical Organization Theory*, 9(4), 327-339.
- Yun, G. W., & Trumbg, C. W. (2000). Comparative response to a survey executed by post, e-mail, & web form. *Journal of Computer-Mediated Communication*, 6(1).
- Zadro, L., Richardson, R., & Williams, K. D. (2004). How low can you go? Ostracism by a computer is sufficient to lower self-reported levels of belonging, control, self-esteem, and meaningful existence. *Journal of Experimental Social Psychology*, 40(4), 560-567.
- Zeldes, N., Sward, D., & Louchheim, S. (2007). Infomania: Why we can't afford to ignore it any longer. *First Monday*, 12(8).
- Zembylas, M., & Michaelides, P. (2004). The sound of silence in pedagogy. *Educational Theory*, 54(2), 193-210.
- Zembylas, M., & Vrasidas, C. (2007). Listening for silence in text-based, online encounters. *Distance Education*, 28(1), 5-24.
- Zhang, J., & Ackerman, M. (2005). *Searching for expertise in social networks: A simulation of potential strategies*. Paper presented at the Proceedings of the 2005 international ACM SIGGROUP conference on Supporting group work, Sanibel Island, Fl.
- Zipf, G. K. (1949). *Human behaviour and the principle of least-effort*. Cambridge, MA: Addison-Wesley.
- Zviran, M., Te'eni, D., & Gross, Y. (2006). Does color in email make a difference? *Communications of the ACM*, 49(4), 94-99.
- Zweig, D., & Webster, J. (2002). Where is the line between benign and invasive? An examination of psychological barriers to the acceptance of awareness monitoring systems. *Journal of Organizational Behavior*, 23(5), 605-633.

9 Appendixes

9.1 Appendix A: the vignette of study 2

Below is a detailed description of the vignettes of study 2. The translation from Hebrew is a free translation, and some of the sentences might sound awkward in English. The texts used here were piloted on several native Hebrew speakers, and reflect a typical “business casual” linguistic style. A sample original of version 1 (positive valence, one day latency) in Hebrew appears below the English translation.

The e-mail texts were presented in a different font type, and within a thin frame that delineated the text.

The vignette described to the participants a sequence of events in which:

The participants are asked to assess a candidate whose name is Rafi (a typical male Israeli name) for the position of sales team leader.

The candidate sent an application e-mail. The text of the e-mail was presented verbatim:

Hello,

I wish to apply for the advertised position of sales manager. I have over 6 years of sales experience, and believe that my qualifications meet the advertised requirements.

Then the participants were told that the candidate was subsequently interviewed by them at the company’s offices. “Rafi is a 29 old salesperson. You were very [un]impressed by his presentation and his professionalism. It seems to you that his sales experience is exactly that

[not the experience] required for the job. Personally, you felt very [un]comfortable with him.” Square brackets describe the low valence version of the vignette.

Following that, the participants were informed that they realized that their interview notes contained something unclear. Consequently they sent Rafi the following e-mail (provided verbatim):

Hello Rafi.

Thanks for your visit at our offices. I reviewed my interview notes and realized that something is not clear to me. Was your 2002-2004 position purely a sales position, or did you also have some managerial responsibility?

A month has passed, and you received no response from Rafi (never latency)/After one day/two weeks you received the following response:

Hello,

it was a pleasure meeting you. I certainly hope to come and work in your organization! I was very impressed by the positive atmosphere in the office, and feel that I will be able to easily fit in.

As for your question, my role in 2002-2004 was pivotal to the company, and required a high level of responsibility, but it was purely a sales position, with no managerial responsibility.

Following this part, the participants were asked to respond to the questions. Participants were allowed to review the story as they responded.

ראשית, תודה

שלום ותודה על נכונותך להשתתף בשאלון זה. השאלון הוא חלק מעבודת מחקר המתבצעת באוניברסיטת חיפה. השאלון דורש ריכוז למשך של כ-12 דקות, ותשומת לבך חיונית להצלחת המחקר. אם אינך מעוניין/מעוניינת למלא את השאלון עכשיו או בכל שלב בהמשך, ניתן להחזירו ולרשום עליו "לא מעוניין/לא מעוניינת".

מה יש לנו כאן?

בעמודים הבאים תתבקש/י לספק חוות דעת מפורטת אודות מועמד לקבלה לעבודה. שמו של המועמד הוא רפי, ובשאלון זה את/ה מתבקש/ת לדמות לעצמך שחוות הדעת שלך תקבע אם רפי יתקבל לתפקיד או לא. לאחר תיאור קצר של המגעים שהיו לך עם רפי (ראיון אישי, והתכתבויות בדואר אלקטרוני), תתבקשי לענות על כ-30 שאלות שמטרתן למדוד את התרשמותך מרפי. חשוב לענות על כל השאלות, כמיטב יכולתך, ובהתבסס על כל המידע שניתן לך אודות רפי.

חשוב!

השאלון מנסה להבין את התרשמותך מרפי על סמך התנהגותו בראיון והתנהגותו בהתכתבות בדואר אלקטרוני. לכן, נסה/נסי לשים לב לדמות המצטיירת בעיניך תוך כדי קריאת סיפור המקרה.

בתודה,

צוות המחקר

סיפור המקרה

רפי הגיש מועמדות לתפקיד של ראש צוות מכירות (מנהל של צוות קטן של אנשי מכירות). להלן תוכן הדואר האלקטרוני הראשון שהתקבל מרפי:

שלום רב,

ברצוני להגיש מועמדות לתפקיד ראש צוות המכירות שפורסם. יש לי מעל 6 שנות ניסיון במכירות, ואני מעריך שכישורי עומדים בדרישות שצוינו במודעה.

בעקבות כך, ראינת את רפי במשרדי החברה. רפי הוא איש מכירות בן 29. אתה מאד התרשמת מההופעה שלו, ומהמקצועיות שלו. נראה שהניסיון שלו במכירות הוא בדיוק הניסיון הנדרש. אישית, הרגשת מאד נוח איתו.

לאחר הראיון, גילית ברשימות שרשמת בזמן הראיון פריט מידע שאיננו ברור. בעקבות כך, את/ה שולח/ת לו את הדואר האלקטרוני הבא:

רפי שלום,

תודה לך על הביקור במשרדנו. אני עברתי על הרשימות מהראיון וגיליתי שמשהו לא ברור לי. האם העבודה שלך בשנים 2002-2004 הייתה רק במכירות, או האם הייתה לך גם אחריות ניהולית?

לאחר יום אחד קיבלת את התשובה הבאה:

שלום רב,

היה נעים מאד לפגוש אותך. אני מאד מקווה שאגיע לעבוד בארגוןך! אני מאד התרשמתי מהאווירה החיובית במשרד, ומרגיש שאשתלב היטב בארגון.

לשאלתך, התפקיד שלי בשנים 2002-2004 היה תפקיד מרכזי בחברה, עם רמת אחריות רבה, אך זה היה תפקיד מכירתי בלבד, ללא אחריות ניהולית.

עד כאן סיפור המקרה. כעת, אנא ענה/עני על השאלות בעמודים הבאים. ניתן לחזור לסיפור המקרה בזמן המענה על השאלות.

9.2 Appendix B: the questionnaire of study 3

Below is the text of the key parts of the questionnaire. The sequence of the first and second sections was randomized, so that half of the respondents first recounted a situation in which they experienced online silence, and later recounted a case when they caused online silence, while the second half first recounted creating online silence, and then recounted causing online silence.

“...By filling out this survey you will contribute to the academic research on "online silence". Specifically, this survey will assist us in understanding situations of online silence in email: situations in which a person sends an email, expects to receive a response, but then does not receive a response.

First section

Can you recall a situation in which you sent an email, expected a response, but never received a response to that email? (A negative response moved the responder to the second section)

In the following questions we will ask you about this case of unanswered email. If you can think of a few cases, please choose one typical case on which you can provide specific details.

Approximately when was this email sent?

- Within the last four weeks
- More than four weeks ago
- I am not sure

Please tell us in detail about this email by describing the purpose of the email, whom it was sent to, and the type of relationship between you and that person or persons. For privacy reasons, please do not use names of people. (Open text)

Below is a list of possible explanations for your not getting the response to the email. Does each of these explanations apply to the case you just described? (Options provided: Yes, this is certainly the explanation; This is possible, but I am not sure; No, this can't be the explanation)

- I wrote the email but actually did not send it to the recipient
- I sent the email but it never arrived in the recipient's account
- The email arrived, but was never opened
- The email was opened but not read
- The email was read, but not fully
- The email was fully read, but the recipient did not understand that I am expecting a response
- The recipient understood that I am expecting an answer, but decided not to respond
- The recipient intended to write a response, but did not
- The recipient started writing a response, but did not finish it
- The recipient wrote a response, but never sent it
- The recipient sent the response, but I did not receive it
- I received the response, but did not see it

Would you say that it was the recipient's intention not to respond to you, or was this unintentional?

- I think it was unintentional
- I think it was intentional
- I do not know

Please try to explain the reasons for your answer to the previous question (open text)

Have you taken any further steps to try and receive an answer to the email? If so, what were they? (Open text)

Were your feelings hurt by the lack of response?

- not hurt at all
- slightly hurt
- hurt
- quite hurt
- extremely hurt

Please try to summarize in one sentence the key reason or reasons you did not receive a response to your email. (Open text)

Second section:

Can you recount a situation in which an email was written to you, but despite the fact that the sender expected an answer from you, s/he never received one? Cases of spam (unsolicited mass mailings) are not relevant for this research.

In the following questions we will ask you about this case of unanswered email. If you can think of a few cases, please choose one typical case on which you can provide specific details.

Approximately when did this happen?

- Within the last four weeks]
- More than four weeks ago
- I am not sure

Please tell us in detail about this email by describing the purpose of the email, whom it was sent from, and the type of relationship between you and that person. For privacy reasons, please do not use names of people. (Open text)

Below is a list of possible explanations for your not sending the response to the email. Do these explanations apply to the case you just described? (Options provided: Yes, this is certainly the explanation; This is possible, but I am not sure; No, this can't be the explanation)

- I never received the email
- I received the email, but never opened it
- I opened the email but never read it
- I read the email, but not fully
- I fully read the email, but did not understand that I am expected to respond
- I understood that I am expected to respond, but decided not to respond
- I intended to write a response, but did not
- I started writing a response, but did not finish it
- I wrote a response, but never sent it
- I sent the response, but it was never opened

Would you say that it was your intention not to respond to the email, or was this

unintentional? (open text)

- I think it was unintentional
- I think it was intentional
- I do not know

Please try to explain the reasons for your answer to the previous question. (Open text)

Has the sender of the email taken any further steps to try and receive an answer to the email?

If so, what were they? (Open text)

Do you think the sender's feelings were hurt by the lack of response?

- not hurt at all
- slightly hurt
- hurt
- quite hurt
- extremely hurt

Please try to summarize in one sentence the key reason or reasons the sender did not receive a response to his or her email (Open text).”

Hebrew Abstract

שתיקה מקוונת: הרכיב הסמוי בתקשורת מתווכת מחשב כתובה

יורם מ. קלמן

תקציר

שתיקה היא מרכיב חשוב ומעניין של סוגים שונים של תקשורת. בעבודת מחקר זו נבדק האופן שבו שתיקה באה לידי ביטוי, נחוות, ומפורשת בתקשורת מתווכת מחשב כתובה. העבודה מורכבת משלושה מחקרים נפרדים, הבודקים אספקטים שונים של השאלה תוך בדיקת אוכלוסיות שונות, ותוך נקיטה בשיטות מחקר מגוונות. להלן הצגה תמציתית של חלקי עבודת המחקר ותוכנם.

בפרק המבוא מוצגים שלושת המחקרים שעליהם מושתתת העבודה:

מחקר 1 בוחן את זמני התגובה בתקשורת מתווכת מחשב (CMC – Computer Mediated Communication) כתובה על ידי אנליזה של שלושה מאגרי נתונים המכילים זמני תגובות של למעלה מ-170 אלף תגובות שנכתבו בדואר אלקטרוני, בכיתות מקוונות ובשוק אלקטרוני מקוון. ממצאי מחקר זה מובילים, בין השאר, להגדרה של משכי זמן תגובה נורמטיביים המגדירים מענה מהיר ושתיקה.

מחקר 2 בוחן את הנורמות שנחשפו במחקר 1, ובודק את התגובות להפרות של הנורמות האלו. המחקר מיישם את תיאורית הפרת הציפיות (EVT–Expectancy Violations Theory) שפותחה כדי להסביר הפרת ציפיות ונורמות בתקשורת לא מילולית, ומשתמש בסיפור מקרה (vignette) על מועמד לקבלה לעבודה, כדי לבחון את תפיסת הנורמות האלו על ידי משתמשי דואר אלקטרוני מנוסים. ממצאי המחקר מאששים את ההשערה שמענה תוך פרק זמן נורמטיבי הוא צפוי יותר, ומוביל להערכה גבוהה יותר מאשר זמני מענה לא נורמטיביים כמו שתיקה. ממצאים אלו גם מחזקים את חשיבות זמן המענה כסוג של מסר לא מילולי בתקשורת מתווכת מחשב כתובה.

מחקר 3 מתבסס על סקר שבו עובדי ידע בחברת שירותים מקוונים התבקשו לשחזר מקרים שבהם הם גרמו לשתיקה מקוונת או חוו שתיקה מקוונת, בדואר אלקטרוני. השאלון בוחן פנים שונות של חווית השתיקה המקוונת,

ומאפשר בחינה של נושאים שונים הקשורים לשתיקה מקוונת, כמו לדוגמה אי-ודאות, פגיעה ברגשות, וסיבות לשתיקה. המחקר מזהה אזורים במחזור תקשורת שמועדים יותר לשתיקה. המחקר מציע שלוש קטגוריות ראשיות של הסברים לשתיקה מקוונת, וכן מספר תת-קטגוריות.

פרק סקירת הספרות נפתח בהצגה של החשיבות הגוברת של התקשורת מתווכת המחשב, הבאה לידי ביטוי בצמיחה בשימוש של אמצעי תקשורת מתווכת מחשב הן במדינות מפותחות, והן במדינות מתפתחות. בד בבד עם העלייה בשימוש באמצעי CMC והתועלות המשמעותיות המוענקות על ידי אמצעים אלו ברמת הפרט והקהילה, וברמה הארגונית, אנו עדים לאתגרים חדשים כמו התמודדות עם עומס הולך וגובר של מידע, ועם הפרעות בלתי פוסקות. כמו עומס מידע והפרעות, תחומים שזכו לתשומת לב מחקרית ניכרת, גם תופעת השתיקה המקוונת הסתמנה כשאלה מעניינת מבחינה תיאורטית ומעשית. הפרק ממשיך בסקירה של המחקר האקדמי של נושא השתיקה: הגדרות של שתיקה, השתיקה כנושא מחקר רב תחומי, ודוגמאות של חשיבות השתיקה בתחומי מחקר מגוונים כמו תקשורת, מערכות מידע ומדעי ההתנהגות, כמו גם בתחומים יישומיים רבים. אחד מהתחומים שבהם יש לשתיקה חשיבות תיאורטית ומעשית רבה הוא התחום של תקשורת לא מילולית. הפרק סוקר סוגים שונים של מסרים לא מילוליים, כולל התחום החשוב למחקרנו של כרונמיקה (chronemics): מסרים (לא מילוליים) תלויי זמן. הפוגות בדיבור, כמו גם שתיקות, קצרות וארוכות, מסווגים כמסרים כרונמיים. לסיכום הסעיף העוסק בתקשורת לא מילולית, תקשורת שהיא תלויה הקשר ומבוססת על מוסכמות תרבותיות ולשוניות, מוצגת תיאורית הפרת הציפיות הבוחנת את האופן שבו אנשים מגיבים כאשר מוסכמות של תקשורת לא מילולית לא נשמרות וציפיותיהם מופרות.

פרק סקירת הספרות ממשיך בסקירת נושאים רלבנטיים מתחום הקוגניציה החברתית. הסקירה מתחילה בהצגת התחום ובסקירת נושאים קלאסיים בקוגניציה חברתית הרלבנטיים לחקר השתיקה, נושאים כמו שיוך וכמו הפחתת אי-ודאות. בהמשך, מתמקדת הסקירה בקוגניציה חברתית בעולם המקוון. סקירה זו כוללת נושאים כמו יצירת רושם בתקשורת מקוונת, תפיסת העצמי, קבוצות מקוונות, ונוכחות חברתית במדיום המקוון.

לאחר הצגת נושא האינטראקטיביות, ממשיך הפרק לסקירה של נושא המסרים הלא מילוליים בתקשורת מתווכת מחשב כתובה. מוצעת הגדרה ראשונית למסר לא מילולי בתקשורת מתווכת מחשב, ומוצגות עדויות מהספרות

לחשיבותם של מסרים אלו. לאחר התמקדות בנושא של מסרים לא מילוליים כרונמיים בתקשורת מקוונת, ממשיך הפרק לסקירה מעמיקה של הספרות העוסקת באופן זה או אחר בשתיקה מקוונת. התחומים שנסקרים הם: מענה ואי מענה לסקרים מקוונים; מענה ואי מענה בשירות לקוחות מקוון; היענות ושתיקה מקוונת בתקשורת ארגונית; שתיקה בהוראה מקוונת; נידוי מקוון; אי השתתפות בקבוצות מקוונות; ספיראלת השתיקה בתקשורת מקוונת, ואי מענה בתקשורת צ'ט. נושא השתיקה המקוונת מסתיים בדיון בהפוגות בתקשורת מקוונת, ובשאלה מתי הפוגה ארוכה בתקשורת המקוונת הופכת לשתיקה.

פרק סקירת הספרות מסתיים בהצגה של מודל סכמטי של מחזור תקשורת מתווכת מחשב כתובה. מודל מעגלי זה מסכם את סקירת הספרות על ידי הצגת שלבים טיפוסיים בתקשורת מתווכת מחשב כתובה, וציון של הנקודות שבהן יכול להיווצר נתק במעגל שיוביל לשתיקה.

העבודה מציינת שאת ארבעת הפרקים הבאים של העבודה (שאלת המחקר, שיטות, תוצאות ודיון) ניתן לקרוא או באופן רציף, או על פי הסדר הפנימי של שלושת המחקרים (שאלת המחקר של הפרק הראשון, השיטות שלו, התוצאות והדיון בהן, ואז שאלת המחקר של הפרק השני, השיטות שלו, וכך הלאה).

פרק שאלת המחקר מציין את הרקע לשאלת המחקר, והוא השנים הראשונות של המאה ה-21, שנים שבהן תקשורת מתווכת מחשב הופכת לחלק בלתי נפרד מהחיים האישיים והמקצועיים של יותר ויותר אנשים בעולם. המרכזיות של מושג השתיקה בתקשורת, מעלה את הצורך לבצע עבודת מחקר שיטתית שתניח תשתית תיאורטית ומתודולוגית לחקר השתיקה בתקשורת המקוונת. כצעד ראשון לקראת יעד זה הוגדרה שאלת המחקר של עבודה זו, והיא השאלה: "כיצד באה לידי ביטוי, כיצד נחוות, וכיצד מתפרשת שתיקה בתקשורת מתווכת מחשב כתובה?" כדי לענות על שאלה זו יש צורך להגדיר מהי שתיקה מקוונת, לזהות את הגורמים לשתיקה, ואת תוצאותיה. לאחר תיאור של החשיבות התיאורטית והיישומית של שאלת המחקר, מפורטות שאלות המחקר וההיפותזות של כל אחד משלושת המחקרים הנפרדים שעליהם מתבססת עבודת המחקר.

שאלות המחקר של **המחקר הראשון** נגזרו מהזיהוי של קווי דמיון בין ההתפלגויות של זמני התגובה באמצעי תקשורת מתווכת מחשב שונים. דיווחים המתוארים בפרק סקירת הספרות מצביעים על כך שרוב זמני התגובה הם מהירים יחסית, ורק מיעוט קטן מזמני התגובה הם ארוכים יחסית. דיווחים אלו הם ברובם בעלי אופי אנקדוטי,

כיוון שנושא המחקרים לא היה בדיקת ההתפלגות. הפרק מתאר כיצד ממצאים אלו הובילו לשאלת המחקר הראשונה, והיא: "מהם המאפיינים המשותפים להתפלגויות של זמני התגובה למסרים המוחלפים באמצעות אמצעי תקשורת מתווכת מחשב כתובה?" בהמשך, מתואר איך הובילה ההתעניינות בהתפלגות זמני התגובה הארוכים לשאלת המחקר השנייה והיא: "האם ישנם מאפיינים של ההתפלגות של זמני התגובה הארוכים בתקשורת מתווכת מחשב כתובה היכולים לשמש כדי לאפיין שתיקה מקוונת, ואם יש כאלו, כיצד ניתן באמצעותם להגדיר שתיקה מקוונת?"

שאלות המחקר וההיפותזות של **המחקר השני** נגזרו מממצאי המחקר הראשון. הפרק מתאר את הממצאים אודות תחומים המגדירים נורמות של התנהגות כרונמית מקוונת, ומתאר את ההיפותזות ושאלות המחקר שבאו לבדוק האם נורמות אלו, שהוקשו ממדידות אמפיריות של התפלגות זמני תגובה, הן נורמות המשתקפות גם בציפיות של משתמשים בדואר אלקטרוני. הציפייה היא שמשמשי דוא"ל ותיקים יתפסו זמן תגובה נורמטיבי כצפוי יותר מזמן תגובה לא נורמטיבי, ולכן ההיפותזה הראשונה הייתה: "זמן תגובה נורמטיבי של יום אחד יהיה צפוי יותר מזמני תגובה לא נורמטיביים של שבועיים, ושל שתיקה בת חודש". הפרק ממשיך ומציג היפותזות הנגזרות מממצאי תיאורית הפרת הציפיות, היפותזות שעל פיהן ההערכה (על פי שבעה פרמטרים שונים) שלה יזכו משתמשים המגיבים תוך פרק זמן נורמטיבי (יום אחד) תהייה גבוהה מההערכה לה יזכו משתמשים שזמן התגובה שלהם אינו נורמטיבי (שבועיים ושתיקה בת חודש). הכלי שבאמצעותו נבדקו ההיפותזות היה שאלון שבו התבקשו המשתתפים לחוות את דעתם על מועמד לעבודה, כאשר משתתפים שונים קיבלו תיאורים זהים כמעל לחלוטין של המועמד, תיאורים שנבדלו זה מזה אך ורק לגבי זמן תגובה לדוא"ל, ולגבי הערך (valence) של המועמד. הסיבה לשילוב המשתנה "ערך" המועמד היא תיאורית הפרת הציפיות, שמצאה שהערך היא גורם שנמצא באינטראקציה עם המסר הלא מילולי (התרגום של valence לעברית הוא בעייתי, כיוון שהן התרגום "ערך" והן "ערכיות" יש להם פירושים נוספים בעברית. בתקשיר זה נשתמש במושג "ערך"). ההיפותזה השלישית היא שסיכויי הקבלה לעבודה של מועמד לעבודה שזמן התגובה שלו נורמטיבי גבוהים יותר משל מועמד שזמן התגובה שלו אינו נורמטיבי (שבועיים או שתיקה בת חודש). ההיפותזה הרביעית היא שהאפקט הראשי של זמן התגובה על שבעת הפרמטרים המתוארים בהיפותזה השנייה יעבור אינטראקציה עם הערך של המועמד, והיפותזה זו מובילה לשאלת

מחקר נוספת והיא שאם ההיפותזה הרביעית מתבררת כנכונה, אז כיצד משפיע הערך על האפקט הראשי של זמן התגובה. בפרק מפורטות ההיפותזות ותת ההיפותזות, ושאלת המחקר, כמו גם המחקרים והתיאוריות שהובילו אליהן.

שאלות המחקר של **המחקר השלישי** מתמקדות בהבנת הסיבות והתוצאות של שתיקה בדואר אלקטרוני, הן מצד השולח שאינו מקבל מענה, והן מצד הנמען שאינו עונה. שתי שאלות המחקר הנוגעות לסיבות לשתיקה המקוונת הן: "באילו שלבים של מחזור התקשורת נוצרת השתיקה?" ו-"אילו הסברים משמשים כדי להסביר את הסיבות לשתיקה?" שתי שאלות המחקר הנוגעות לתוצאות השתיקה הן: "מהן התוצאות של השתיקה עבור השולחים שאינם מקבלים מענה?", ו-"מהן התוצאות של השתיקה עבור הנמענים שאינם עונים?"

פרק השיטות מתאר את מגוון השיטות (מתערבות ובלתי מתערבות, כמותיות ואיכותניות) שננקטו כדי לענות על שאלות המחקר של כל אחד מהמחקרים, וכיצד ההצלבה בין התוצאות המושגות בשיטות מגוונות, מובילה לתמונה מלאה יותר של מושא המחקר. **המחקר הראשון** התבסס על ניתוח של שלושה מאגרי נתונים. אחד מהמאגרים של זמני התגובה של משתמשי דואר אלקטרוני הוא מאגר שהפקנו במיוחד לצורך המחקר, על ידי עיבוד של בסיס הנתונים של תכתובות הדוא"ל של עובדי חברת אנרון האמריקאית. הפרק מתאר את הפקת המאגר ומאפייניו. לאחר מכן מתוארים שני המאגרים הנוספים, שהופקו על ידי עמיתים לצורך מחקרים אחרים: מאגר אחד של זמני תגובה בכיתות מקוונות של אוניברסיטה ישראלית גדולה, ומאגר שני של זמני תגובה באתר Google Answers. לאחר הצגת מושג ה"מדידה הבלתי מתערבת", המתודולוגיה העומדת בבסיס המחקר של זמני התגובה, מתאר הפרק את הניתוחים הסטטיסטיים שביצענו על מאגר הנתונים של אנרון, ובעקבות כך, על שלושת מאגרי הנתונים. **המחקר השני** התבסס על וינייטים (vignettes), סיפורי מקרה קצרים המוצגים לנשאלים, ושאהריהם מתבקשים הנשאלים לענות על מספר שאלות הנוגעות לסיפור המקרה. במקרה של המחקר השני, נשאלים שונים קיבלו גרסאות כמעט זהות של אותו סיפור מקרה, כאשר הסיפורים נבדלו האחד מהשני אך ורק במשתנים הבלתי תלויים. הפרק מציג את יתרונות שיטת מחקר זו כדי לחקור נורמות, אמונות ודעות, וכיצד מהווה השיטה אלטרנטיבה לניסויים ולתצפיות. לאחר הצגת מחקרים דומים שבהם שימשה שיטת מחקר זו, מוצגים פרטי המחקר: אוכלוסיית המחקר (סטודנטים בתוכנית MBA ישראלית), סיפורי המקרה שהופצו בשש גרסאות, והשאלון הזהה

שבדק את המשתנים התלויים. סיפור המקרה מתאר מועמד לעבודה שעליו התבקשו הנשאלים לחוות את דעתם. שש (2x3) הגרסאות של סיפור המקרה נבדלו זו מזו בערך של המועמד (ערך גבוה: מועמד מתאים, ערך נמוך: מועמד לא מתאים), ובזמן התגובה של המועמד לדוא"ל שנשלח אליו (תגובה מהירה תוך יום, תגובה איטית אחרי שבועיים, ושתיקה – אי מענה אפילו לאחר חודש). שמונת המשתנים התלויים נבדקו על ידי שאלון שעובד משאלונים דומים באנגלית, ושעסקו בהתרשמויות הקשורות להפרות ציפיות בתקשורת פנים אל פנים "רגילה". המשתנים התלויים כוללים את המידה שבה ההתנהגות המתוארת בסיפור המקרה תואמת את הציפיות, באיזו מידה ההתנהגות זוכה להערכה, עד כמה ההתנהגות המתוארת היא מושכת (חברתית ומשימתית), באיזו מידה היא גורמת לתחושות שונות של קרבה ואינטימיות, ובאיזו מידה היא מעוררת אמינות. שאלה נוספת בדקה באיזו מידה הנשאל היה ממליץ על גיוס המועמד לעבודה. הפרק מציג את המדדים השונים ומקורם. **המחקר השלישי** התבסס על שאלון שבדק סיבות לשתיקה מקוונת בדואר אלקטרוני, ותוצאות של השתיקה. מתוארת אוכלוסיית המחקר של עובדי מידע בחברה אירופית, כמו גם השאלות הפתוחות והסגורות של השאלון שבאמצעותם תיארו הנשאלים מקרה אחד שבו הם חוו שתיקה מקוונת בדוא"ל, ומקרה אחד שבו הם גרמו לשתיקה על ידי אי מענה לדוא"ל. הפרק מסתיים בתיאור של הניתוח של השאלות הסגורות, וניתוח התוכן של השאלות הפתוחות.

פרק התוצאות פורס את התוצאות של כל אחד משלושת המחקרים. **במחקר הראשון** אנו מציגים בפרוטרוט ממצאים אודות ההתפלגות של זמני התגובה בתכתובות אנרון. הממצא הבולט ביותר הוא העוצמה של האסימטריות של ההתפלגות: רוב זמני המענה הם קצרים יחסית, מיעוטם בינוניים, ורק אחוזים בודדים מזמני המענה הם ארוכים. ההתאמה המרבית שמצאנו בשלב הראשון היא להתפלגות גאמא. בהמשך, מתוארים ממצאי הניתוח המשותף של זמני התגובה בשלושת מאגרי הנתונים: על אף השוני הגדול בין מאגרי הנתונים, שלושתם מראים התפלגות מסוג power law. כמו כן, מוצגים זמני המענה הממוצעים (ט-טאו) של כל אחד מהממוצעים, ומוצגת טבלה המראה שלפחות 80% מהמענים נשלחו תוך ט, ושכלל היותר 3% מהמענים עדיין לא נשלחו לאחר 10ט. לבסוף, מוצגות תוצאות בדיקת האחוזונים של זמני מענה אצל משתמשים בודדים, תוצאות המראות שברוב המקרים משתמשים יוצרים לפחות 70% מהתגובות תוך ט, ושכלל היותר 4% מהמענים עדיין לא נשלחו לאחר 10ט. **במחקר השני** מתוארות תוצאות מבחני המניפולציה, ערכי ה-F של ההשפעה של כל אחד מהמשתנים הבלתי

תלויים על כל אחד מהמשתנים התלויים, האינטראקציה של שני המשתנים הבלתי תלויים, והערכים הממוצעים וסטיות התקן של כל המשתנים התלויים, בחתכים שונים. הבדלים מובהקים בין זמני תגובה נורמטיביים לזמני תגובה לא נורמטיביים מצוינים. לאחר מכן מפורטות כל ההיפותזות, ומצוין בפירוט אילו היפותזות נתמכות ואילו נדחות. בסיום, מוצגים הממצאים הנוגעים לשאלת המחקר הנגזרת מההיפותזה הרביעית. **במחקר השלישי** מתוארות ראשית תוצאות השאלות הרב ברירתיות אודות אי קבלת המענה, לאחר מכן תוצאות השאלות הרב ברירתיות אודות אי משלוח מענה, ולבסוף תוצאות ניתוח התוכן של הסברים לשתיקה. תוצאות ניתוח התוכן מלוות בציטוטים המדגימים שלוש קטגוריות של הסברים, כמו גם כל אחת מתת-קטגוריות.

פרק הדיון מחולק לארבעה חלקים. בשלושת החלקים הראשונים נדונות התוצאות של כל אחד מהמחקרים בנפרד, ובחלק הרביעי מוצג דיון אינטגרטיבי יותר. הדיון בתוצאות **המחקר הראשון** מתחיל בדיון בתוצאות של מחקר אנרון, ומתרחב לדיון בכלל התוצאות. המחקר מזהה שלושה תחומים כרוניים של זמני מענה. נדונה היכולת להכליל תחומים אלו על סוגים אחרים של תקשורת, ונבדקים מספר הסברים אפשריים לתוצאות, ובעיקר לממצא שרוב המענים נוצרים תוך זמן קצר מאד יחסית, גם במקרים שבהם הטכנולוגיה מאפשרת השהייה של התגובה. הדיון מסתיים בהצעה להגדרה של שתיקה מקוונת ("אי מענה לאחר תקופה של פי עשר מזמן התגובה הממוצע"), בדיון בהשלכות המתודולוגיות והמעשיות של הממצאים, ובהצעה של כיוונים להמשך המחקר. האחידות המתמטית שזיהינו בזמני המענה באמצעות אמצעי תקשורת מקוונים שונים חשובה להבנת הבסיס המשותף לשיחה האנושית באשר היא, ללא תלות באמצעי התקשורת המשמש לשיחה. הדיון **במחקר השני** נפתח במסקנה שזמן מענה הוא סוג של מסר לא מילולי בתקשורת מקוונת. בהמשך הדיון מסוכמות ההיפותזות ושאלת המחקר אודות ההיפותזה הרביעית, על ידי בדיקת ההשפעה של זמן המענה על המשתנים התלויים השונים והבנת האופן שבו זמן מענה לא נורמטיבי משפיע על ההתרשמות. באופן הכללי ביותר המסקנה היא שזמן מענה ארוך מהמקובל, כמו גם שתיקה, פגעו בהתרשמות החיובית מהמועמד לעבודה, ושהפגיעה היא משמעותית בעיקר במקרים שבהם ההתרשמות הבסיסית הייתה חיובית (מועמד עם ערך חיובי). לסיום, מוצגות השלכות של הממצאים על תיאורית הפרת הציפיות, ועל המחקר של מסרים לא מילוליים בתקשורת מקוונת כתובה, כמו גם מגבלות המחקר וכיווני מחקר העתידיים. בדיון **במחקר השלישי** מוצגים השלבים במחזור התקשורת בהם השתיקה נוצרת, מוצגות שלוש

קטגוריות של הסברים לשתיקה מקוונת (אי ראיית המסר הנכנס, כוונה לא לענות, וכוונה לענות בזמן מאוחר יותר) וכן תת קטגוריות. בנוסף, מוצגות תוצאות השתיקה הן לצד השותק והן לצד שאינו זוכה למענה, תוך דגש על מידת הפגיעה ברגשות, תחושת חוסר הוודאות, וניסיונות נוספים להשיג מענה כמו משלוח חוזר או פנייה דרך ערוצים אחרים. התשובות לשאלות המחקר נדונות, מגבלות המחקר מוצגות, ומוצעות הצעות להמשך מחקר. לאחר הדיון במחקר השלישי, מתבצע דיון כללי בתוצאות **שלושת המחקרים**. הדיון מתחיל בהצגה של מודל של מענה ושתיקה מקוונת, מודל המשלב את תוצאות שלושת המחקרים. המודל משתמש בזמן התגובה הממוצע (τ) שזוהה במחקר הראשון, בתוצאות של עמידה בציפיות הכרונומיות ולהפרתן שנמדדו במחקר השני, ובקטגוריות של סיבות לשתיקה שזוהו במחקר השלישי. המודל מורכב משני רכיבים: רכיב השולח ורכיב הנמען, ומתארת את התפיסה של הזמן העובר ממשלוח הודעת הדוא"ל והפרשנות של אותו זמן: האם זו הפוגה צפויה, עיכוב סביר, שתיקה, וכך הלאה. הדיון במודל עוסק באפשרות השילוב של שני רכיבי המודל, במגבלות המודל, ובמשמעות העולה מהמודל למשתנה τ . הדיון הכללי ממשיך על ידי סיכום תרומות נוספות של עבודת המחקר לתיאוריה ולעולם המעשה, תרומות שלא נזכרו בדיונים במחקרים הספציפיים. אלו כוללים תרומות לתיאוריות על שתיקה, על זמן ומקצבים, על התנהגות מקוונת, תיאוריות הנוגעות למחקרי דוא"ל, תיאוריות העוסקות בקבוצות מבוזרות, ותיאוריות הבודקות את התפלגות ה-power law בדיסציפלינות שונות, ולתחומים מעשיים כמו הנחיית פורומים מקוונים, פיתוח יישומי דוא"ל, עצות מעשיות למשתמש בדוא"ל, ועוד. בסיום הדיון הכללי אנו מבצעים ניתוח של מושג הסינכרוניות בתקשורת מתווכת מחשב, בעיקר לאור תוצאות המחקר הראשון. בהתבסס על הניתוח אנו מציעים לעבור מהתייחסות דיכוטומית לנושא הסינכרוניות (סינכרוני-אסינכרוני) ולהתייחס אל סינכרוניות כמשתנה רציף; להתייחס לסינכרוניות כתכונה של השיחה ולא, כמקובל עד היום, כתכונה של המדיום; אנו מציעים את מושג ה-synchronicity modulation; אנו דנים בהשלכות של ההצעות לגבי תיאוריות מרכזיות בתקשורת; ואנו דנים בפרוטרוט בסיבות אפשריות להעדפה האנושית לרמת סינכרוניות גבוהה.

בפרק הסיכום מוצג בתמצות מהלך המחקר מהמחקר הראשון שחשף את חשיבות המשתנה τ והוביל להצעה להגדרה של שתיקה מקוונת, דרך המחקר השני שאישש את ממצאי המחקר הראשון וביסס את חשיבות זמן המענה כמסר כרוני בתקשורת לא מילולית, ועד למחקר השלישי בו נבדקו תפיסות לגבי סיבות ותוצאות של שתיקה

מקוונת. מעבר לתשובות לשאלת המחקר של עבודת המחקר, הובילו תוצאות המחקרים לבדיקה מחדש של מושג הסינכרוניות בתקשורת מתווכת מחשב ושל נושא המסרים הלא מילוליים בתקשורת מתווכת מחשב כתובה, ולכיווני מחקר חדשים עבור פיזיקאים סטטיסטיים המחפשים את המנגנונים המובילים להתפלגות ה- power law. לממצאים אלו השלכות נרחבות הן על תיאוריות אקדמיות שונות, והן על תחומים יישומיים.

מן העבודה עולה שהפוגות ושתיקות מקוונות הן נושא בעל חשיבות מרכזית בתקשורת מתווכת מחשב. שתיקות והפוגות הן חלק סמוי מכל מהלך תקשורת, ועל אף הקושי לחקור מושאי מחקר סמויים, בעיקר בתוך וירטואלי, התרומה התיאורטית והמעשית מצדיקה את המאמץ. במחקר רב-תחומי שולבו ממצאים שנאספו באמצעים מתערבים ובאמצעים בלתי מתערבים, ממאות רבות של משתמשים בסוגים שונים של תקשורת מתווכת מחשב ברחבי העולם. הממצאים נותחו במגוון שיטות כמותיות ואיכותניות, והתוצאות הוצלבו זו עם זו כדי להגיע, לראשונה, הן להגדרה אופרטיבית של שתיקה מקוונת, והן לתיאור סיסטמטי של סיבות לשתיקה מקוונת ותוצאות של השתיקה. ממצאים אלו מובילים לא רק למודל ראשוני של שתיקה מקוונת, אלא גם משליכים על מושגי יסוד בתקשורת בכלל, ובתקשורת מתווכת מחשב בפרט.

שתיקה מקוונת: הרכיב הסמוי בתקשורת מתווכת מחשב כתובה

מאת: יורם מ. קלמן

בהדרכת: פרופסור שיזף רפאלי

חיבור לשם קבלת התואר "דוקטור לפילוסופיה"

אוניברסיטת חיפה

הרשות ללימודים מתקדמים

הועדה הכלל אוניברסיטאית לתלמידי מחקר

אוקטובר, 2007

שתיקה מקוונת: הרכיב הסמוי בתקשורת מתווכת מחשב כתובה

יורם מ. קלמן

חיבור לשם קבלת התואר "דוקטור לפילוסופיה"

אוניברסיטת חיפה

הרשות ללימודים מתקדמים

הועדה הכלל אוניברסיטאית לתלמידי מחקר

אוקטובר, 2007