Modulating Synchronicity in Computer Mediated Communication

Abstract

Computer Mediated Communication (CMC) researchers often cite a dichotomy that distinguishes synchronous and asynchronous media. We examine the historical development of this bifurcated classification, as well as present evidence about the manner CMC media is actually used in the field. We speculate about the evolutionary and biological basis for this behavior. We suggest that synchronicity should not be treated as a dichotomy, but rather as a continuum ranging from the highly synchronous, to the highly asynchronous. In addition, we propose that the traditional treatment of synchronicity as an attribute of the medium should be reevaluated. We should treat synchronicity as an attribute of the conversation, not of the medium. These claims have implications on theories in which medium synchronicity plays an important role, and the Media Richness Theory is examined as a test case. Moreover, given that synchronicity is a continuous parameter modulated through decisions of communicators, we examine the way these decisions on synchronicity are taken, propose a theory of synchronicity modulation, and discuss the synchronicity trade-off principle.

Computer Mediated Communication (CMC) media is traditionally divided into two categories: synchronous media (e.g. instant messaging, chat) and asynchronous media (e.g. email, discussion board). Recent trends, as well as findings 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 one 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 paper, 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, and that this modulation 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.

A history of the concept of medium synchronicity

The early days

For much of human history, there was a simple distinction between two types of inter-personal communication. The first type was spoken speech: it was delivered in the presence of the recepients 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; transportation; and, it was prone to interference and interception. (Baron, 1998; Winston, 1998)

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. Later, the phone answering machine and voice mail allowed the delayed delivery of a spoken message at a distance; email 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 (ftf) conversation (Karahalios, 2000). Technologies such as BBS's, email 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 (Churchill & Bly, 1999; Daft & Lengel, 1986; Finn, 1999; Olson & Olson, 2000).

The dichotomy blurs

In recent years we see 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: email is instantly read on the mobile phone, telephone voice mail is forwarded to the email 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. This 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.

Most "asynchronous" communication is rapid

Recent research (Kalman, Ravid, Raban, & Rafaeli, 2006b) sheds light on temporal and chronemic revealed preferences of users of CMC. The research shows that users of purportedly asynchronous media like email or bulletin boards have a strong preference for a rapid response. For example, in a study that looked at the time it takes people to respond to emails, more than 16,000 email responses created by employees of a large corporation were analyzed, and the response latencies calculated (Kalman & Rafaeli, 2005). The analysis showed that the average email response latency of the employees was 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 skewed distribution is hypothesized by Kalman, Ravid, Raban & Rafaeli (2006a) 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. 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 emails 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 email, Baron (1998) already noted that despite the fact that email allows for a long delay in response, the use of email 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 skew 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).

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 email asynchronous and instant messaging (IM) synchronous, if email 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 emails (Tyler & Tang, 2003), and IM is used asynchronously (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 (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 emails 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.

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, Jane reads an incoming email from John and might wish to respond to it while she is on the road. Jane tries calling John's office, but getting only voice mail, she might use her cellular and call John's cellular phone. John 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, Jane might leave a voice mail on the cellular. Seeing the voice mail notification, John might send an SMS to Jane saying that he will get back to her as soon as possible. After listening to the voice mail, he might ring Jane'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 email. In this scenario, which is certainly a likely scenario in the life of a contemporary knowledge worker, not only have Jane and John 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 offered 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 John to not take Jane'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 Jane an email and not call her was based on John'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.

Modulating synchronicity

Pointing out that synchronicity is a continuum and that it might be 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 be of increasing, decreasing, or maintaining synchronicity, or, in other words, of modulating synchronicity. Communicators constantly take decision on the level of synchronicity they prefer for each conversational exchange they are involved in. For example, an email 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.

Human preference for high synchronicity

Before we continue to explore the implications of synchronicity modulation, we wish to answer 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 for this innate preference.

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 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 has carefully presented evidence that the majority of human conversations take place in dyads, trios, or, at most, groups of four (Dunbar, 2002). He has also shown that these conversations form the social glue that keeps society functioning, and proposed 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", 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 email and videoconferencing, humans are limited in the extent to which they can take advantage of the novel arrangements. Despite the theoretical 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). 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 right 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, awkward and "limenous" pauses. Secondly, the natural tendency of the human mind is to give a negative interpretation to a long period of silence. Even if rationally 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 arenas and the training and learning processes required for their diffusion.

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, Lengel, & Trevino, 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 (e.g. 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 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 the recipient chooses to divert the call to voice mail. Moreover, many phone systems allow callers to reach voice mail directly, thus giving the caller the power to decide if she wants 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 email users go over their inbox, they are constantly deciding which emails 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 email later, the result is a decrease in the conversational synchronicity of that specific communicative act. Every time a user decides to immediately respond to an email 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 email and IM (Sandberg, 2006; Stone, 2006). We believe that once one opens up to the concept of synchronicity modulation, one sees evidence for it all around.

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 Kalman et al. (2006a) an email 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 from an order of magnitude of 10 exchanges a minute, up till the 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.

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 Jones, Ravid & Rafaeli (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; Jackson, Dawson, & Wilson, 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 email 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 email.

Directions for research

This paper is speculative in its nature. 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 quite 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, many of which are continuous and can thus not be easily classified.

Conclusion

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, as well as 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, open a new window on communication (mediated as well as unmediated), emphasize the role of synchronicity modulation, inform existing theories, and reveal new directions for research.

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