Relationships with Artificial Market Actors:
a new perspective of interactive technology

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Abstract

In the marketing literature digital machines (computers and software applications) have been largely considered as tools for the automation of various human directed processes (mechanization) or as a new form of media (interactive) that is manipulated and controlled by humans. Although in human-computer interaction studies the impact on humans is emphasized as a crucial element, the literature tends to neglect that digital machines are increasingly becoming autonomous interactants in the market. Hence, the focus here is on relationships, including digital machines, in an attempt to illustrate their increasing role in shaping the market behavior. This article outlines a context that includes non-human market interactions, critically re-examines the notion of interactive media, introduces the concept artificial market actors (called *artificials* in this article), and provides a framework for the marketers' analysis of artificials. The article concludes with a discussion of the theoretical implications of the findings of the research and suggestions for future research when the presence of artificials is recognized.

Introduction

In the late 1970s, marketing scholars began to use the term relationship marketing (RM) to highlight important phenomena that marketing theorists had previously overlooked. Since then, RM has turned into one of the most frequently used conceptual schemes when the future of marketing knowledge is discussed (Day, 1999; Duncan & Moriarty, 1998; Egan, 2001; Gummesson, Lehtinen & Grönroos, 1997; Healy, Hastings, Brown & Gardiner, 2001).

On the one hand, these discussions are grounded in a re-discovery of since long established marketing practices. Perhaps, the most important contribution from RM is the shift of attention from products and discrete transactions towards continuous relationships. Consequently, questions concerning relations between firms, their customers, competitors, collaborators, and other stakeholders become crucial. With focus on the relationships, the firm, for example, utilizes increased economic value if the stakeholders are loyal (Reichheld, 1996) or has long-term commitments to the firm (Håkansson & Snehota, 1995, p. 382).

However, the increased interest in RM is also motivated by recent changes in the marketing environment. This article is particularly concerned with the kinds of change that are related to advances in computer-based technologies. Previous works have presented different views on these developments, including the emergence of electronic market spaces (Rayport & Sviokla, 1994), Internet as a new medium (Hoffman & Novak, 1996), consumer's use of interactive technology in cybermarketspaces (Venkatesh, 1998), and the increased importance of information (Weiber & Kollman, 1998).

Before the question as to how relationships are affected by these technological developments is further addressed, it is useful to reflect on how our conjecture of future and current marketing environments is informed through literature and everyday reality. Consider first two scenarios that, with slight variations, are increasingly coming to the attention of marketers

Imagine that it is Tuesday morning after breakfast. Weather reports forecast a hot day. As soon as a downtown beverage vending machine realizes that, it raises the price on cold sodas by 5%. At the same time, a milk container in a private apartment begins to feel empty. It quickly begs the intelligent refrigerator to buy some more milk. This first scenario is based on ideas presented by commercial enterprises (Hays, 1999; Kitchengate, 2001; Marconi, 2000). Kelly (1994), however, has portrayed more thought-provoking ideas. He writes, "[retail products with active microchips] can display their own prices, thank you, easily adjusting to sales. They can recalculate their prices...remember if you passed it over even after seeing the sale price....When shelf items acquire awareness of each other and themselves and interact with their consumers, they rapidly erupt into a different economy." (p. 194).

Stories comparable to these tell about a possible future—not current reality. Yet, consider Volvo on Call (Volvocars, 2001) or the OnStar system launched by General Motors in 1996 (Onstar, 2001). OnStar has currently 300,000 users and is predicted to be available in 3 million vehicles by the year 2002 (Stepanek, 2000). In the event of an accident, the car will describe its state and position to the semi-automatic OnStar system. If necessary, OnStar finds the nearest emergency center and directs an ambulance towards the car. In Europe, the USA, and Japan millions of drivers can already ask their cars for directions to the nearest restaurant. The car will tell the driver how to get there based on information from its navigation system. If we stick to more traditional PCs, one of the innovations in the newer Apple Mac's is Sherlock, a search engine system (Apple, 2001). Sherlock aids its users in finding information on the Internet, locating people, comparison-shopping, news gathering, and more.

The introduction of the World Wide Web (Web) has brought with it a new breed of digital machines. Bakos (1998) describes how these machines are implemented in electronic markets as *rule-based systems* and *collaborative filtering systems* that allow the practice of one-to-one marketing between producers and consumers. He also argues that specialized *search engines* and *intelligent agents* lower the cost for buyers to obtain information about price and product features.

Ansari, Essegaier, and Kohli (2000) and Iacobucci, Arabie, and Bodapti (2000) describe agents, search engines, and collaborative filtering as

automated recommendation systems, of which the latter mimics word-of-mouth processes. West et al. (1999) specifically look at how electronic agents may assist people on three fronts. The first is on preference construction and discovery; the second is on finding and organizing relevant information; and the third is on evaluating attractive alternatives and executing decision strategies.

These developments have also made their way into management textbooks. In this respect, Turban, Lee, King, and Chung (2000) outline how *cookie-based* systems are used to manage information about consumers, that consumers use search engines, how retailers can automate selling procedures with collaborative filtering, and the use of software agents.

Thus, we increasingly find digital machines (computers and software applications) that, in various ways, both process market information and act according to that information. The use of digital machines can be studied from many perspectives. In the marketing literature the prevailing view is that digital machines are tools that automate business activities, including information management, decision-making, communication, selling, RM, and consumption (Blattberg & Deighton, 1991; Henderson & Venkatraman, 1994; Li, Kinman, Duan, & Edwards, 1998; Little, 1994; McKenney, 1995; Peppers & Rogers, 1997; Sheth & Sisodia, 2000).

The role of digital machines

In a manner of speaking, the above examples all illustrate how firms and their stakeholders have outsourced part of their information management and decision-making to digital machines. This article is concerned with the theoretical implications of that development. It seems that digital machines are increasingly becoming fully meritable market interactants. Consequently, would it not be viable to consider such machines as artificial market actors—hereafter referred to as “artificials”? Hence, at this point I tentatively define artificials as digital machines that interact in markets. A formal definition will be provided presently. The expression digital machine is alternatively used in this article whenever it might be inappropriate to attribute a digital machine a marketing role.

Studies that specifically address direct human interaction with digital machines are by no means new. These studies have typically been framed as Human-Computer Interaction (HCI) or as Computer-Mediated Communication (CMC). HCI studies humans using computers. The focus on humans is reflected in the scientific journal Human-Computer Interaction, a publication that is "Seeking to foster a scientific understanding of the behavior of computer users—programmers and nonprogrammers, experts and novices —with an emphasis on the cognitive aspects…" (Moran, 2001, Editorial scope). CMC examines humans communicating through computers. An author explains the interest in humans, as "Computer-Mediated Communication is a process of human communication via computers, involving people, situated in particular contexts, engaging in processes to shape media for a variety of purposes." (December, 1997, para. 3). When social response is studied in human computer encounters, the response is considered to happen on the human side (Nass, Moon, Morkes, Kim, & Fogg, 1997).

In sum, underlying that research is the human factor-- not the role of digital machines. A major reason to shift the focus on the digital machine itself is that it differs in many aspects from other machines. Most notable is that as a symbol processor (Simon, 1997), it presents such cognition-like capabilities and related actions as communication and decision-making. Hence, it is high time to turn attention to the role of digital machines in markets. When doing so, this article uses good anthropomorphism, as argued by computer scientist McCarthy (1983). Briefly, this idea suggests the use of the language of mind in a metaphorical sense, including psychological words, such as thinking, knowing, and wanting. The reason for doing so is that it helps us to understand what digital machines do, how our actions will affect them, how to compare them with ourselves, and how to design them. Let us now apply this use of language in a marketing context and thereby develop a new perspective of digital machines.

A few questions will indicate the kinds of problem, perhaps unknowingly, that marketers face. What does a car know about restaurants and how does it use that knowledge? What will make a refrigerator switch to a new milk brand? Which methods should an attentive shelf item use to recalculate its price? If Sherlock does the shopping, how does it learn about new products? Particularly important within the scope of this article is the

question of whether firms should also manage their relations with artificials. As will be explicated shortly, theories that take these types of question into account are already needed and will become more urgent if computer-based technology advances in its current directions.

Aim and structure of the article

Is it appropriate, as has frequently been done by scholars, to discuss the automation of marketing activities in media-related terms? Can digital machines be regarded as tools under direct human control? How do such machines communicate and how do they make decisions? These questions lead to digital machine action as an important issue for students in the field of marketing. This quest is in line with Rust (1997), who foresees an era of marketing that acknowledges *computer behavior* and Gatarski and Lundkvist (1998), who suggest the notion of *artificial consumers*. Unfortunately, none of these authors provide sufficient background or any framework to aid theoretical analysis of such developments.

The aim of this article is to explore the role played by digital machines and to suggest a framework that aids further analysis of their interactions in the market. From the above background, the article first describes the methods applied in the current research and interactive communications in a theoretical perspective. The article then outlines the Web as a digital marketing environment that hosts a number of interacting digital machines. Next, the article critically re-examines the idea of interactive media. Following this treatment, the article presents a framework to assist in the analysis of artificials as they increasingly participate in market interactions. Finally, theoretical and managerial implications are discussed and directions for future research are suggested.

Any study of communication assumes two or more participants. In a marketing context these participants include a firm, its suppliers, investors, customers, and other stakeholders. To facilitate the description of important issues the article is written from the perspective of the firm interacting with other market actors on the Web. Web-based marketing is used because it has become an environment well known to marketing scholars. As developed in the concluding section, this approach does not imply that the

issues explored in this article are significant only for firms or exclusive of the Web.

Research method

Given the lack of empirical research concerning digital machines and their role in marketing, an exploratory investigation using a qualitative approach was deemed justifiable (Patton 1990). The empirical data discussed here is extracted from a larger body of data generated from the author's Ph.D. project that was initiated in 1995. My pre-understanding of the field has greatly guided the selection of data sources, the analysis, and concept generation (Gummesson, 1991; Patton, 1990; Yin, 1994). I have more than 20 years of personal experience with computer technology, where I have worked as a programmer, electronics and communications expert, and E-commerce consultant. Great care has been taken to assure that the data generated concern artificials that exist in business practice and are not vaporware (Bayus, Jain & Rao, 2001) or science fiction.

To assure the quality of the current research several sources of empirical data have been used (Patton, 1990; Yin 1994). These sources include: (a) informal conversational interviews with computer scientists, programmers, and business managers; (b) documents, primarily from the Web, and (c) direct and participant observation while attending both computer science and business conferences. I have also personally used different digital machines to observe their interactions. This use includes direct communication with digital machines as well as indirect interactions by connecting them to my academic Web site.

Relationships are formed by interactions

A relationship denotes something between two parties. Two human beings, for example, a sales person in a clothing store and a customer, may have a relationship based on cognitive as well as emotional aspects. Such personal and human-centered relationships in a social context are widely understood as a fundamental model (Egan 2001, p. 30; Gummesson, 1999, p. 5;

Håkansson & Snehota, 1995, p. 10). Also recognized are relationships with non-human parties. These include relationships between organizations (Håkansson & Snehota, 1995; Payne, Christopher, Clark, & Peck, 1995) and between humans and objects (e.g., the customer-brand relationship, Fournier, 1998; Gummesson, 1999, p. 90). Furthermore, market relationships are not found in isolation, but are embedded in a wider network of relationships that extends beyond the firm-customer dyad. Gummesson (1999) outlines 30 relationships between various stakeholders that are more or less connected in different networks.

Duncan and Moriarty (1998) propose a communication-based model for managing relationships as a useful type of direction for firms when they acquire, retain, and develop relationships with important stakeholders in the interactive future. In their exploration of that direction the authors found that the RM literature often fails to include the communication process as a critical dimension in relationship building. They argue that whereas relationships are built on the platform of interactive communication, the RM literature has instead focused on "elements such as trust and commitment, which are *products* of communication" (p. 3).

Hence, it is from theories of communication, beginning with those concerning interactivity, that the current exploration will continue. Let us now examine the interactions between some of the actors on the Web.

The digital marketing environment

This section discusses the assumption that only humans can actively participate in market communications. Schramm (1973) maintains that "the ability to process information and share it with others is *the most human skill* [italics added]" (p. 41) and that "communication must be understood as human behavior" (p. 291). If we assume that only human individuals can communicate, think, have attitudes, compete, consume, etc., then digital machines do not communicate as such but are tools under direct human control. Such reasoning, however, no longer holds, as can be discerned after close examination of the literature and empirical observations.

The Turing test in reverse

In the early days of digital computing Alan Turing asked: "Can machines think" (Turing, 1950, p. 433)?. To guide his discussion about computing machinery and intelligence he described the problem in terms of an imitation game. In this game two players, a human individual and a digital computer, would be interrogated by a human. The setting (communications over a teleprinter) assured that the interrogator would not know which was which. Turing's point of view can be described as if the interrogator could not distinguish the players by questioning, it would be reasonable to call the computer intelligent. Today, this game has been popularized as the Turing test.

The Web is more similar to the setting of Turing's imitation game than to traditional market settings, where the actors meet face-to-face (personal selling), face-to-product (bricks-and-mortar retailing), or face-to-media (advertising, mail-order). The Web, being a digital marketing environment, requires that human communication have a digital form. More important here is that this requirement enables interactions from digital machines. Thus, on the Web the mode of representation is digital for all participants. The main implication analyzed in this context is that this opens the door for machine participation in an unprecedented way. As a result, we find a new type of problem stemming from situations where market actors cannot directly judge each other's state of being. For example, governments, commercial organizations, and others have to confirm the identity of otherwise anonymous Web visitors (Lessig, 1998).

Consider how natural it has been for us humans to realize that we are facing another human, a packaged good, a printed letter or an advertisement. It has been equally natural to assume that goods, letters or ads are not aware of what are facing them. On the Web, these assumptions can be hazardous. The "On the Internet, nobody knows you're a dog" cartoon by Steiner (1993) is often used to illustrate such situations. It turns out that quite often the question about identity on the Web is not *who* the visitors are, but *what* they are? Consider the sentence, "If you are a human being viewing this page..." that was found through a search engine (see Figure 1). Apparently, the message behind the link is primarily intended for something non-human. In some cases humans intentionally address

machines. In other cases the nature of the other party is an open question for both participants.

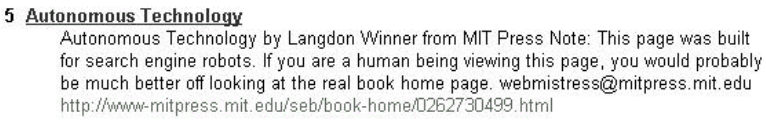
5 **Autonomous Technology**
Autonomous Technology by Langdon Winner from MIT Press Note: This page was built for search engine robots. If you are a human being viewing this page, you would probably be much better off looking at the real book home page. webmistress@mitpress.mit.edu
http://www-mitpress.mit.edu/seb/book-home/0262730499.html

Figure 1 - Search reference produced by www.alltheweb.com

Machines, such as Web servers, have begun to interrogate visitors in an effort to determine whether they are humans or other machines (e.g., software robots). This form of inquiry is the case at Los Alamos National Library's E-print archive, where a mechanism at the site identifies automatic download attempts (Robots beware, 1996). One of the Library's motivations for this procedure reads as follows: "Presumably you neither would be terribly thrilled if every aspiring encyclopedia editor were to send a gang of blind 600 lb. gorillas to your library, armed with a photocopy machine." (para. 4). This digital library apparently wants preferred visitors to be undisturbed. Note that the adjective preferred includes machines in that they are sometimes allowed entrance (ibid).

The Internet community has developed a voluntary scheme to overcome some of the problems that occur when computers behave in a network originally intended for manual browsing (Koster, 1995). Many search engines use this scheme and look for a special file named robots.txt located in the root directory of a Web site. This file contains declarations for computerized visitors about how they may index the site. Another example is found in the cold war between the music industry and providers of illegal music files, often in the MP3 file format. In that struggle robots.txt is purposely ignored. When copyright holders developed software robots that automatically scan the Internet for illegal MP3 files, the criminals were quick to deploy interrogation methods that kept the robots at distance. The issue is illustrated in BMI (1998) and Figure 2.

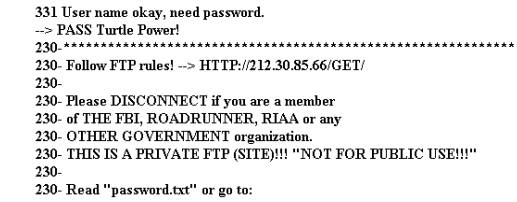

Figure 2 - Message from FTP site containing MP3 files

The realization of one of Turing's predictions helps to further explain the developments within the digital marketing environment. He wrote: "Nevertheless, I believe that at the end of the century the use of words and generally educated opinion will have altered so much that one will be able to speak of machines thinking without expecting to be contradicted" (Turing, 1950, p. 442). In this article, it is understood that Turing's remark on thinking machines has a lot of relevance today and will no doubt be crucial in the future.

Today, thinking computers are considered reasonable (McCarthy, 1983), are needed (Things That Think, 2001), and are available (Port, 2000). In several experiments, Nass et al. (1997) have shown that people repeatedly treat computers as social actors. According to Turkle (1995), "[the computer] is a mind that is yet not a mind. It is inanimate yet interactive. It does not think, yet neither is it external to thought. It is an object, ultimately a mechanism, but it behaves, interacts and seems in a certain sense to know." (p. 22). She argues that many children (harbingers of future cultural mindsets) believe that computers do indeed think (p. 81). In the context of adults (current mindsets), she presents many cases where people believed they were communicating with humans when the other party in fact was a software program. This is one of the effects from programs required to "populate the growing number of computer microworlds" (p. 96).

In sum, the present contention is that a kind of reversed Turing test has become necessary. The test is reversed in the sense that the interrogation is made by a machine, which decides whether there is a human or another machine at the other end. Although this interrogation is not about intelligence, it is about features that characterize the other participant as human or not. In other words, machines often do not assume what faces

them; rather, they check it through communication. With this in mind, the next step is to discuss these findings within the interactivity concept.

Interactivity reviewed

The concern of this section is to clarify how market interactions in a digital environment involve humans as well as interconnected digital machines. The latter are increasingly used for the purpose of communication. As a result, the expression "interactive media" has become common in everyday language, business press, and academic literature. For example, Rogers (1986) submits that new media are interactive (p. 196), Peterson, Balasubramanian, and Bronnenberg (1997) assumes that the Internet is "a flexible, interactive and efficient medium" (p. 334), and Day and Montgomery (1999) consider the Internet as a "uniquely responsive and interactive medium" (p. 9).

The present standpoint is that the expression "interactive media" is an oxymoron that attempts to combine two incongruous terms: an inconsistency that may have diverted our attention away from the option of seeing digital machines as full-deserving communication participants.

The term interactivity is used loosely, referring to different things in different contexts (Bezjian-Avery, Calder, & Iacobucci, 1998; Boyarski, 1997; Deighton, 1996; Haeckel, 1998; Parsons, Zeisser, & Waitman, 1998; Steuer, 1992). The bulk of the literature about interaction in human communications is grounded in a sociological tradition and reflects an uncertainty about the characteristics of interactivity and how it may be defined (Downes & McMillan, 2000). On this point, it is useful to comment upon a few of the most commonly used terms when interactivity is discussed, namely, media, participants, and responsiveness.

Rogers (1999) shows that studies on human communication have been divided into two subdisciplines: interpersonal and mass communications research. The latter encompasses media, a channel of communication in which a machine (to duplicate and distribute information signs) and a communication organization (e.g., the staff of a newspaper or broadcasting station) have been interposed (Schramm, 1973, p. 115). Media include books, magazines, television, newspapers, radio, outdoor, and recorded

music. (McQuail, 1994). The same split is found in marketing communications. For example, Rothschild (1987) categorizes the sales force and word of mouth as personal promotion. Advertising, sales promotion devices, packaging, brand name, point of purchase, publicity, and endorsements are all forms of mass promotion. Rothschild specifically notes that mass media advertising or "salesmanship in print" (p. 8) is characterized by its lack of support for two-way interactions between seller and buyer.

Williams, Rice, and Rogers (1988, p. 10) use interactivity to denote the degree to which communication participants have control over and can exchange roles in a mutual discourse. The authors emphasize that the word participant encompasses the co-equal role as source and receiver in a communication process. Rafaeli (1988, p. 119) states, "interactivity is not a medium characteristic...media and channels may set upper bounds." Rafaeli and Sudweeks (1997) repeat, "Interactivity is not a characteristic of the medium. It is a process-related construct about communication." (Interactivity section, para. 2).

Rafaeli (1988) defines interactivity as "an expression of the extent that in a given series of communication exchanges, any third (or later) transmission (or message) is related to the degree to which previous exchanges referred to even earlier transmissions." (p. 111). Later, Rafaeli and Sudweeks (1997) underline the reasoning that interactivity varies along a continuum. One end of this continuum is no interaction or declarative (one-way) communication. Some interaction occurs in reactive (two-way) communication when one side responds to the other. Fully interactive communication enables *responsiveness*. It requires that later messages in any sequence take into account not only the messages that preceded them, but also the manner in which previous messages were reactive.

In summary, we find that communication theorists have applied the terminology in diverse ways. The present conclusion is that the medium, regardless of which technique is used for information conduit (air, telephone wires, printed paper, broadcast, Web, etc.), should be understood as a non-interactive facilitator of any communication. Interactivity is a setting requiring both a medium that supports interactivity and two or more interacting participants.

Facing machine participants

Apparently, the nature of digital machines differs from other tools. It might well be that social scientists have confused medium with participant in discussions of digital technology. This confusion can be made free from confusion or ambiguity by recognizing digital machines as interactive participants rather than as a new type of medium.

Type of interactive setting	*Participant 1*	*Participant 2*	*Context*	*Examples*
HwH	Human	Human	Physical	Sales human meets customer human
			Mediated, phone	Human customer calls human seller
			Mediated, Web	Human chats with other human
AwH	Artificial	Human	Physical	Car tells driver where to eat
			Mediated, MUD	Software robot chats with human
			Mediated, Web	Personalized Web store sells to Human
AwA	Artificial	Artificial	Web	Search engine visits a Web site
			Web	Electronic news robot reads an online paper
			E-market	Electronic agents negotiate price

Table 1 - Three basic types of interactive setting, of which two acknowledge artificials as participants.

Table 1 lists three basic types of interactive setting in different contexts, where both humans and artificials are acknowledged as communication participants. The exchangeable role as sender or receiver is stressed here by using the expression *with* each other (instead of to). This reasoning

implies that either part in the communication can initiate as well as terminate the exchange. To further underline the new role of digital machines, the artificials are exemplified in Table 1 as being the more active participant (e.g., initiating or dominating the interaction).

When mediated, Human with Human interaction (HwH) is comparable to Ball-Rokeach and Reardon's (1988) *telelogic communication*, Hoffman and Novak's (1996) *through technology*, and Rafaeli and Sudweek's (1997) *computer-mediated communication*. Examples are two persons meeting face-to-face, calling each other on the phone or chatting on the Web. When digital tools are used for this type of interactive setting, they mediate without being interactive. Human participants in these settings have been widely studied and are not the concern of this study. Instead, the current focus is on settings that include one or more interacting artificials.

Artificial with Human (AwH) interaction is comparable to Steuer's (1992) notion of human individuals interacting with a *mediated environment* and Hoffman and Novak's (1996) and Haeckel's (1998) *with technology*. In the present context, mediated environment and technology are reinterpreted as artificials. Examples are when the car tells the driver where to eat, when a software robot chats with a person in a Multi User Dungeon (MUD), and when a personalized electronic storefront sells to a person on the Web. In all of these settings the communication is interactive, that is, the communication is largely dependent on previous message exchanges between the participants. Note that this type of setting differs substantially from those with machines that do not interact, such as a traditional vending machine (Rafaeli, 1988, p. 121). In studies of AwH settings the human participant has been analyzed. The machine has been regarded as a tool–not as an entity studied per se. For example, Rafaeli (1988, 122 ff) discuss the effects (on persons) from interactivity; Williams, Rice, and Rogers (1988, p. 169) discuss people's involvement; Steuer (1992) discusses the individual's sense of telepresence; Hoffman and Novak (1996) explore the issue in terms of experience of flow; Fortin (1997) explores the issue in terms of arousal; and West et al. (1999) examine the issue in terms of human support, satisfaction, and trust.

Finally, to my knowledge, Artificial with Artificial interaction (AwA) has not been discussed by social scientists. Examples include a search engine that repeatedly visits and scans a Web site, an electronic news robot that reads

a personalized online newspaper on the Web, and two electronic agents negotiating prices in an electronic market. Although this type of setting has been recognized in the literature, it has only been regarded as a background to human communication and decision-making. This is evident when, for example, West et al. (1999) focus on the roles of software agents in what the authors refer to as computer mediated environments.

The tree types of setting described in Table 1 are by no means exhaustive. One might easily imagine settings that involve an artificial interacting with another artificial that, in turn, interacts with a human; an artificial that interacts with two or more participants that can be human or artificial; and so forth.

To sum up, market actors (humans as well as artificials) must always question the assumption that they are only interacting with humans. For instance, a firm that establishes itself on the Web must consider how it communicates with artificials, such as search engines, mail filters, recommendation systems, and price spiders. The next section introduces a framework that supports the analysis of how such interactions between firms and artificials are formed.

Interacting with artificial market actors

In this paper it has been argued that artificials are interactive participants in communications settings. In this light, how useful is the paradigm shift (from a functional, mechanistic model to a more humanistic, interpretative model) in communication studies that Duncan and Moriarty (1998) underline? Clearly, this shift is motivated by an increased awareness of the complexity of human nature in communication processes.

Schramm (1973) states that we must distrust the idea of a human as a passive receiver. He continues: “the message does not enter automatically into his decision-making apparatus” (p. 301). A similar argument is presented when Fiske (1993) uses Gerbner’s model to describe the selective perception of a complex, external reality. According to this model, the selections made by a machine (such as a camera or a microphone) are determined by its engineering. However, human selection is considered more complex. “Human perception is not a simple process of stimuli, but a

process of interaction or negotiation" (p. 25). Therefore, Fiske affirms that it is not sufficient with models from the *process school* that are concerned with transmission of messages, media choice, efficiency, accuracy, etc. Consequently, the author includes models from the *semiotic school* that are concerned with how texts interact with people in order to produce and exchange meanings.

Rogers (1986) adds to this position by specifically asserting that the interactivity of new communication technologies drives an epistemological revolution in communication science. As a theoretical implication, he suggests that convergence models of communication should guide further investigations of human communication. In such a model communication is always a joint occurrence: a mutual process of information sharing between two or more persons (p. 199). This process is also influenced by the fact that human participants have a past that determines their cognitive needs, resources, communication skills, etc. (Rogers, 1986; Schramm, 1973). Although the minimal unit of analysis for communication research is the dyad between two human participants, their personal network may also be relevant (Rogers, 1986, p. 201).

Now, consider a firm that designs a Web page to communicate with its stakeholders. Assuming that one of the stakeholders is a potential human customer, the Web page may, within the process school, be considered to contain a message that efficiently should be received by this customer. Within the semiotic school, the same Web page may be regarded as a sign with which the customer negotiates. What we have to think about is that Web pages also communicate with artificials.

Analyzing artificials

It is plausible that because humans design and use all artificials, the latter are simple objects whose interactions are ideally analyzed within the process school, which after all has its roots in electrical engineering and uses mechanical metaphors. Consequently, an artificial perception of a message in digital form would simply be determined by its engineering. Knowing that an artificial can only perceive messages in text form, a firm may avoid using images to serve artificials. Alternatively, (as in the MP3

war) a firm may use images to close artificials out, assuming that they cannot perceive messages in such form.

Nevertheless, can we assume that the firm always has information about how an interacting artificial is engineered? Even if the firm has such knowledge, the results produced by digital computers often surprise their programmers (Minsky, 1990, p. 216). Furthermore, what can the firm really know about how the artificial is used?

As depicted in Figure 3, empirical observations from the current research regarding these questions can be summarized along two dimensions. The result is a framework useful to describe how the nature of artificials influences their interactions. The *system visibility* dimension reflects that the artificial's system (e.g., programs, data bases, and connections to the environment) ranges from observable to hidden. The *control* dimension reflects that the interactions from artificials range from being autonomous to being controlled by human users.

To illustrate the complexity of artificials this framework will first be used to describe an empirical case that concerns search engines. This is followed by a more detailed description of the dimensions and the other cases outlined in Figure 3. In reality, Web-based communication is extremely multifaceted, including network handshaking according to the TCP/IP protocol and automated customization of server generated Web pages. In the present paper this complexity is reduced to an abstraction that allows us to identify issues important within the scope of the current article.

Search engine technology

Since their emergence in the early 1990s, search engines and Web directories have become important factors in Web-based communication. Market actors on the Web use these artificials to find Web sites, which are regarded by firms as traffic drivers. Unfortunately, the present author is unaware of academic marketing research that specifically describes such interactions. Instead, drawing from interviews with practitioners, personal observations, and studies of published documents, the following paragraphs briefly describe how firms interact with search engines.

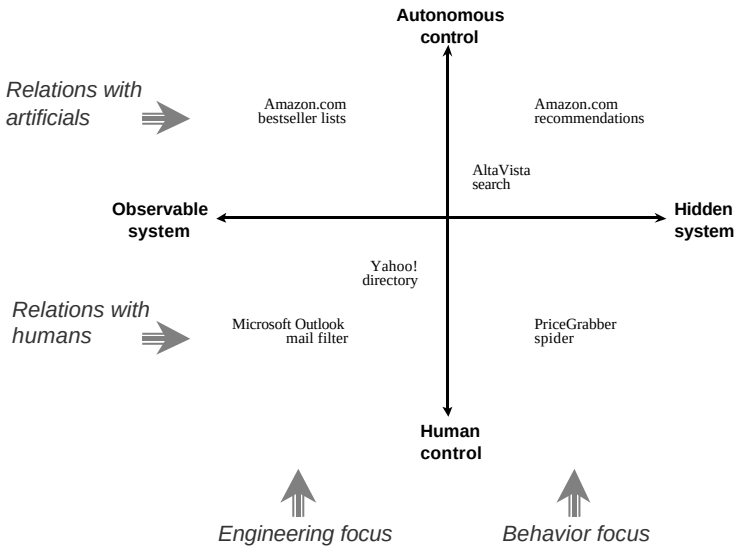

Figure 3 – A framework that aids the marketer's analysis of artificials. The framework is based on two dimensions describing how the artificials' interactions are formed

At the same time, we are also approaching the questions from the Introduction section: more specifically, how an artificial (such as the search engine system Sherlock) might learn about new products.

The nomenclature used in this section is taken from SearchEngineWatch, a Web site that is informed by "the help pages of each search engine, along with knowledge gained from articles, reviews, books, independent research, tips from others and additional *information received directly from the various search engines* [italics added]" (Sullivan, 2001, para. 11).

A search engine, such as the one provided by AltaVista, can be described as an entity that continuously monitors information on the Internet. This highly complex process is called crawling. Search engines crawl the Internet and index Web pages (build their listings) automatically, that is, without direct human intervention. In theory, the search engine will eventually find a page on the Web. Firms may also submit addresses (URLs) to the search engine and thereby suggest that it should index a specific site. Because the Internet is a complex and dynamic environment in

the sense that Web pages appear, disappear, and change, the internal state of the search engine is continuously altered. Some search engines also adopt their behavior to the environment. For example, they direct the monitoring towards those sites that are frequently updated or monitor the robot.txt file (see above) to see if there is something new to index.

Thus, in a communication sense the search engine is partly an active receiver that selectively perceives the Internet. Furthermore, a search engine also functions as an active sender of messages, that is, the responses are automatically produced when a user looks for certain key words. Put differently, the interactions of a search engine are controlled internally. This process is ultimately determined by the search engine's system, a system designed by humans. It is possible to obtain some, but not all, details about how a specific search engine works (e.g., crawls, matches keywords with listings, and presents hits). As an illustration, AltaVista declares, "due to the rapid growth of the Web, our crawlers may not visit pages several levels down in your site hierarchy" (Frequent questions from Webmasters, 2001, Question 3) and FAST Web writes, "We will not fetch a document more often than once each 60 seconds. However, this limit is enforced by each crawler node separately"(Fast Web Crawler FAQs, 2001, How often do you fetch from a web site question). Otherwise stated, detailed and reliable descriptions of a search engine's complete system, including its contents, are typically not available.

In contrast, the listings contained in Web directories, such as the one provided by Yahoo!, are manually built by humans. This means that the firm must submit the URL and a description of the particular Web page to human editors at the directory. The editors then decide on where in the directory the firm's Web URL will be listed. The way Web directories are designed (i.e. indexed) is relatively simple and well documented. For example, a directory search looks for matches only in the descriptions submitted, so changing the firm's web pages has no effect on the directory's listing.

By comparing the difference between these two artificials, it is possible to position them in our framework. Both AltaVista and Yahoo! are systems designed by human beings, but they differ in the way their interactions are controlled. AltaVista is therefore described in this paper as more autonomous than Yahoo! They also differ in the way their system can be examined. Hence, AltaVista can be described as having a more hidden

system than Yahoo! Let us now examine how firms attempt to influence the interactions from search engines, a kind of artificials that are relatively autonomous and have a comparatively hidden system.

Case: Search engines as market actors

Use-IT Information AB (www.use-it.se) is a Swedish service provider that helps firms enhance their Web presence. Use-IT stresses that there will be less traffic if search engines contain obsolete or missing URLs and are unaware of the customer's site. Use-IT helps firms correct these problems in a number of ways. One is to announce the presence of the customer's site by submitting correct URLs to appropriate search engines. When or how the search engine processes these submissions depends on its design and current state. Use-IT also offers a more sophisticated approach called the Traffic Management System (TMS). This growing set of proprietary developed software includes an application that automatically queries search engines for Web pages that link to a customer's site. These links are then automatically checked for validity and errors.

The autonomous character of search engines implies that firms cannot contact the human programmers behind the search engines in an attempt to get a favorable listing. Furthermore, although a firm may have some access to the information about how a search engine is designed, its actual behavior and content (internal state) is unknown beforehand. Just as a human being has a past, every single interaction from a search engine is influenced by its past, which is informed by its previous crawling, received submissions, etc.

Use-IT, Dowell Internet Services (www.dowell.com), and many other companies provide a service typically called *search engine positioning*. These products are based on studies of the methods the search engines use to index sites. Search engine positioners make doorway pages hosted on their servers. These pages are customized for some of the major search engines. Thus, when a user searches with keywords, the search engine will match these with data from the doorway page, not the pages at the customers Web site. A possible goal could be to have the customers Web site cover page indexed in the first 20 hits of each of these search engines.

At this time, three important points must be emphasized. First, firms depend on knowledge of both how a search engine is engineered and how it behaves. Second, using this knowledge, firms interact directly with the search engine. This interactive character includes the sending of messages designed specifically for search engines (URL submissions, doorway pages), as well as the reception of messages about their content (TMS looks for links, queries to check that the customer's Web site is positioned within the first 20 hits). Third, firms choose to interact in this fashion with a selection (not all) of the existing search engines (above referred to as the appropriate search engines and some major search engines).

The case can be summarized with the following statement from another company engaged in search engine positioning: "no one can guarantee top search engine placement because there is a 3rd party who has all the control: the search engines." (Grantastic Design, 2001, A note about guarantees section, para. 1). Thus, it seems that at least search engines are comparable to Schramm's (1973) notion of the black box within which human information processing takes place.

So far, we have seen that firms cannot always obtain sufficient information about the system constituting an artificial. It was also demonstrated that humans do not always directly control artificials. To this we can add that users of artificials are embedded in a network that, in addition to humans, also includes other artificials. Consequently, artificials may exhibit a level of complexity that bears a resemblance to the one that has been a driving force behind the semiotic school of human communication. However, before we can draw any general conclusions from evidence regarding search engines and Web directories, it is important to further explicate how the nature of artificials varies along the dimensions exhibited in Figure 3.

The artificial's system's visibility

Some digital machines can be analyzed through an examination of their system (e.g., programs and memory structure/content) and how they are connected to their environment. For example, the filter mechanism in Microsoft Outlook's e-mail application is both well documented and easily

understood. The same holds for some of the automatically generated bestseller lists, such as those at Amazon.com.

In addition, there are artificials whose system is hidden or exhibits an extremely complex, hence incomprehensible, design. Examples include price information spiders such as the ones used by PriceGrabber.com and collaborative filters such as the one used in the recommendation system of Amazon.com. The systems complexity is also influenced by the artificials general interaction with their environment.

Rust (1997) discusses if actions from digital machines could be analyzed based on how their programs are constructed. He found this to be problematic because of the proprietary character of many software programs. During the current research, frequent attempts to ask makers of artificials about how these have been designed have largely been fruitless. A possible explanation is that firms do not want to disclose that kind of information because it is a company secret, a core asset, etc., or they cannot reveal such facts because the system has become so complex that the designers have lost the broader structure or organization of the design: at best they can provide only piecemeal information.

In summary, the inside of the artificial's system is, to varying degrees, hidden to outsiders, including its own human designers. When the whole or important parts of the artificial's system are observable, marketers may employ an *engineering focus*. That is, to describe, analyze, and predict the artificial's interaction based on how it is engineered. If the system is hidden, marketers are forced to a *behavioral focus*. That is, to form an understanding of the artificial's interaction based on how it behaves. Or, as Rust (1997) puts it: "[such situations] will make a behavioral study of search engines and agents increasingly attractive." (p. 32).

The control of artificials

Many artificials act under the direct control of others. For example, a mail filter rule in Microsoft Outlook Express is not altered until its human user specifically changes that rule. If a firm would like to have the firm's mail filtered to a special folder, the human users must be convinced to carry out that procedure. In a similar fashion, software robots (spiders) that search for

price information commonly only visit sites specified by its human programmers (for illustrations see www.shoppingagenter.com and www.shoppingagents.com). Thus, if new merchants want to be included in the price survey, they must contact the humans controlling the spider.

Then again, market participants also value highly autonomous artificials. This was evident from user reactions when Amazon, Inc. put products from paying advertisers on top of the supposedly automatically (as described on their site) generated recommendations. One way to influence the list, identified by publishers and book authors, is to buy huge amounts of books from Amazon.com. Amazon also has a recommendation system based on collaborative filtering (Iacobucci et al., 2000). To understand the influence of this system is a more difficult task because of the opacity of that technology (i.e., Amazon, Inc. does not reveal the technology it uses).

Most scholars consider autonomy (Franklin & Graesser, 1996) or semi-autonomy (Maes, Guttman & Moukas, 1999) as a defining and essential characteristic of software agents. Franklin and Graesser survey agent definitions and find that there is no clear-cut definition of what agents really are or how they differ from other software applications. The authors propose the following definition: "An *autonomous agent* is a system situated within and a part of an environment that senses that environment and acts on it, over time, in pursuit of its own agenda and so as to effect what it senses in the future." (The essence of agency section, para. 7).

The current research has investigated many artificials labeled agents that are not even close to the above definition. Even so, an increasing number of artificials pursue agendas out of direct control from humans. Whether this autonomy is applied with simple rules, collaborative filtering (Ansari et al., 2000), or belief-desire-intention models (Georgeff, Pell, Pollack, Tambe, & Wooldridge, 1999), one consequence is that firms are forced to communicate with, and thus influence, the artificial.

In summary, the interactions from artificials are controlled either by its human users or autonomously from within. A firm interested in predicting or influencing the interactions of an artificial that is controlled by humans might find it useful to identify and manage its relationships with those humans. However, if the artificial is autonomously controlled, the firm is forced to manage its relationships with the artificial. Knowing this, we can conclude the article by identifying important theoretical implications.

Conclusions and future research

An increasing number of digital machines are automating commercial activities. This article has suggested that such machines should also be understood as artificials and not only as passive tools or as a new form of medium.

Defining artificials and their role in marketing

Based on the literature review, theoretical discussion and empirical analysis of the present study, a more elaborate definition of artificials is suggested as follows.

> Artificials are digital machines that interact in markets. An observer's understanding of the interactions of an artificial depends on how it is controlled (humans vs. autonomously) and how its system is designed (visible vs. hidden).

The word artificial is purposely selected to denote that the digital machines are non-human devices that are created by humans. Digital machines are understood as computer-based tools, including hardware and software elements. According to this definition, artificials have an (inter)active role in markets, a status that was previously held sovereign by humans. This leads to a number of important implications, a few of which are delineated in the next section.

Theoretical implications

The current discussion that leads to the recognition of digital machines as interactive communication participants has been held in a marketing communications context. It seems that communication scholars have not explored this possibility when they discuss the same phenomena. However, they do provide some directions that, if followed, could be useful for marketing. Rafaeli (1998) suggests, "that the interactivity concept offers a

way out of the media/channel/source embroilment. A focus on what goes on, rather than whose to gain or blame, could be refreshing." (p. 130). Rogers (1999, p. 627) avows that because the communication technologies of the 1990s are interactive, they force a closer integration of interpersonal/mass subdisciplines or perhaps a formation of a third subdiscipline. It is suggested that further research of artificials communication could constitute a new subdiscipline and thus explore what is going on between the participants (e.g., meaning production) as well as in terms of technological evolution (e.g., increased autonomy).

The complex nature of some artificials, particularly those that are highly autonomous and simultaneously exhibit a hidden design, suggests that we need a new theory that parallels the semiotic school of human communication. Although some artificials are modeled after our understanding of humans, such as belief-desire-intention models, they are not human. Consequently, the differences as well as similarities may guide future research that gives essence to such theory development.

Because marketing theories belong to the social sciences, it has been natural to use insights from the sciences that study human beings and their actions (e.g., philosophy, economics, sociology, and psychology).. When marketing scholars recognize artificials as full deserving actors, it becomes equally natural to use insights from computer science. This would be particularly useful when the artificial's system is visible, hence making it accessible for an engineering focus.

Another theoretical implication is the possibility to compare artificials with corresponding human actors in marketing theory. Advocates of RM stress the importance of long-term relationships, networks, and interactions (Gummesson, 1999). Figure 3 illustrates that marketers have to manage relations with artificials if they are autonomous. How this type of relation differs from relations with humans is an important subject for future research.

If interactive communication builds relationships, it would be logical to assume that some kinds of relationship are formed when such interactions involve artificial participants. In my view, it would be unwise, given the current state of technological development, to compare the result of an artificial-with-human interaction or an artificial-with-artificial-interaction with the kind of emotional relationship that results from human interaction. As the

literature shows, however, other types of relationship may be formed. Egan (2001), for instance, notes that the "sharing of meaningful and timely information is likely to build up both trust and commitment" (p.95). Therefore, it might be useful to say that an artificial trusts a firm's Web site to share timely information or to be committed to re-visit the site to learn about its development.

Consider also the purpose of marketing: "…to create exchanges that satisfy *individual* and *organizational* [italics added] objectives" (Bennet, 1995, Definition of marketing section). From now on, marketing should perhaps satisfy the goals of individuals, organizations, and artificials. If so, future research has to discuss the goals of artificials, as well as how these goals relate to human individual and organizational goals.

Above all, I am convinced that from an economical perspective firms would find it highly useful to generally recognize artificials as stakeholders with which relationships should be managed just as with other stakeholders. There is most likely a difference in cost between not recognizing that search engines are stakeholders, trying to communicate with them all, and managing their relationships with the most important ones. Such management may be supported by results from future research that investigates the importance of different artificial stakeholders and the types of relationship involved.

Limitations of the present research

The present discussion is based on data generated with a qualitative approach. Furthermore, because of the limited space in this article, only a few empirical cases have been described. I have analytically generalized (Yin, 1990, p. 30) the findings from these cases as a first step towards a theory that describes the role of digital machines as market actors. Although such generalizations are not contingent on the number of cases or the amount of evidence (Gummesson, 1991, p. 78 ff), great care must be taken to ensure that such a theory would be valid (e.g., by adding different cases and further comparisons with rival theories).

Another limitation with the current research is that it makes no assessments of the usefulness or importance of the notion of artificials. In

the present study it is merely suggested that this notion and the proposed framework are useful and important for both theory development and practical use. Further research should address these limitations.

Implications for practitioners

Despite the theoretical nature of this article, a few practical implications can be outlined. Generally, it is my belief (to some extent supported by comments from interviewees) that practitioners would find the concept of artificials and the related framework useful when they continue to identify and address the problems described here.

Perhaps the most obvious implication is that firms know relatively well how to communicate or interact with humans. Accordingly, a creative director at an advertising agency is skilled in message design for a human audience. Alternatively, the staff at a firm's customer support department knows how to deal with humans. Clearly, new skills in message design for artificials and how to deal with artificials are required.

A final implication is motivated by the increased awareness that the value of a firm is influenced by its brand equity, i.e. a set of assets, such as name awareness, loyalty, perceived quality, and associations (Aaker, 1996). Currently, it is true that this definition of brand equity does now acknowledge the awareness, loyalty, quality perceptions, and associations held by artificials. Firms that currently spend resources to build that type of equity (because they find it important to run their daily business) might find it useful to have that reflected in their brand equity model.

Future artificials

By their nature, contemporary artificials are typically confined to digital marketspaces. Future artificials, based on envisioned ubiquitous computers (Weiser, 1991) or information appliances (Norman, 1999), perhaps with emotional intelligence (Picard, 1997), implies the invasion of artificials in the physical marketplace. Such developments, labeled ubiquitous marketing by

Press (1999), provide yet other challenges in addition to formidable opportunities for both marketing scholars and practitioners.

Therefore, research is also needed to identify and categorize other factors that characterize artificials. Some possible factors might include hardware features (e.g., boundary definitions, sensory system, connectedness, and mobility) and soft features (e.g., intelligence, time-constraints, monetary budgets, liability, and general trustworthiness).

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