

## NONLINEARITY AND INTERACTIVITY IN COMMUNICATION AND NEW MEDIA APPROACH

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### Nonlinearity and Interactivity

We are now in a period of extremely rapid media evolution as a result of advances in information and communications technologies. The ongoing transformation of the entire range of communications media in the current environment is reflected in both the explosive development of new media technologies and increasing media convergence. As specific technologies evolve, their properties (and therefore their uses and effects) can shift—so, for example, the “interactivity” of interactive media has changed substantially over the past 40 years. Digital convergence creates opportunities for content to be delivered through multiple outlets, making it more difficult to track and assess the effects of any particular medium.<sup>1</sup>

Computer-based multimedia has the potential to allow users to interact with information as they might interact with a human expert. Unfortunately very little existing multimedia comes close to this ideal. Creating systems that afford this high level of interactivity requires first that the information be organized in a non-linear fashion. An interface must then be designed that allows the user to make meaningful choices regarding what he/she wants to do or see next.<sup>2</sup>

Advances in computer technology and resources support an increasing use of multimedia products with high quality delivery systems at reasonable prices. As delivery of multimedia has moved from laser disks to CD-ROM to the World Wide Web our access to multimedia has increased dramatically. Multimedia offers us the potential to find just the information we need, when we need it, and in the form that we need it. Despite this potential, most current multimedia is non-interactive and linear. Not only does current multimedia fail to exploit the potential of the technology, it fails to even achieve the interactivity afforded by a traditional book. The problem is the interface. While more information, delivered faster, in multiple media is good, it is almost useless without a good interface. While good human computer interfaces are important in all software areas, they are essential to allowing the user to interact in any meaningful way with a multimedia environment.<sup>3</sup>

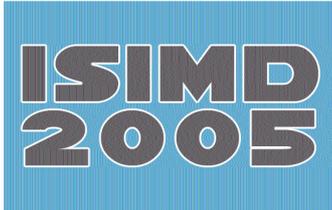
When you need information, where do you go? The optimal choice is usually to find an expert who is willing to sit down and answer all of your questions. This is the most efficient way to get what you need. You ask the questions you need answered. If an answer confuses you, you can ask for clarification.

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<sup>1</sup> O’Keefe, B.J., Zehnder S., Understanding media development: A framework and case study, Applied Developmental Psychology 25 (2004) p.730.

<sup>2</sup> Feifer, R.G., Tazbaz, D., Interface Design Principles For Interactive Multimedia, Telematics and Informatics. Vol. 14, No. I, 51-65. 1991

<sup>3</sup> Feifer, R.G., Tazbaz, D., Interface Design Principles For Interactive Multimedia, Telematics and Informatics. Vol. 14, No. I, 51-65. 1991



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There are, however, two limitations to getting information from an expert:

1. An expert is less optimal if you need to actually see something, or do something in order to understand (i.e., visit Turkey in order to understand the country).
2. It is not always possible to find an expert when needed.

An alternative to the expert is to search for books dealing with the information that you need. In this case, you may need to read one or more books to get what you want. If you are lucky you will recognize the answer you are looking for in a table of contents or index. Often you will have to read the books from beginning to end to find the information that you need, without the guarantee that it is even there. Through multimedia, computers can provide some of the expanded bandwidth of interacting with a real person. Sometimes it can be better than talking to an expert, providing pictures and video of actual phenomena and places. This article is an example of linear communication. We have gone to a lot of trouble to place the information in what we believe is a meaningful sequence. We expect you to read the article from beginning to end. There is no interaction between you and me and communication is the same to every reader because what we say is in no way affected by your background, interests or questions. It is thus likely that we will waste some of your time with answers to questions that you already know, confuse you by assuming that you have background knowledge that you do not have, and bore you with detail that you could care less about. If we could sit down face-to-face to discuss this topic, our conversation would be nonlinear. The conversation would be the unique result of the interaction between you and us. Most of what we say to you would be the result of the questions you ask us. We would try to

discover a little about your background in this topic, and that would shape our answers to you.<sup>4</sup>

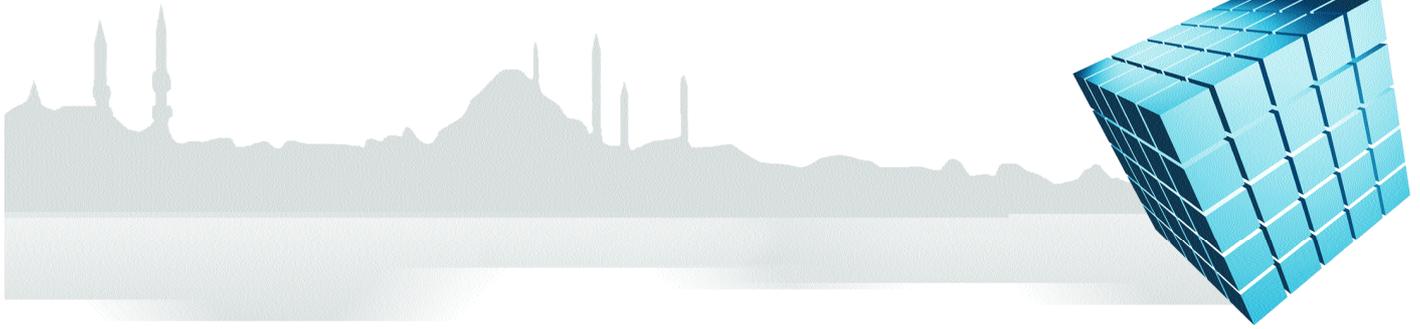
The Internet features a network of linked contents (Hoffman and Novak 1996), which is a parallel, nonlinear structure. In controlling such a nonlinear structure, users are able to customize the information flow and jump from one location in the network to another. In contrast, the linearity of a medium such as television makes it possible for a person to watch television without taking any action except to switch channels once in a while. Although he or she still has some control, the control is not absolutely necessary and does not effectively change his or her viewing experience. The control an Internet user exerts is voluntary. While surfing the Internet, the user acts according to his or her own goals and wills. This is best illustrated by looking at banner advertising versus advertising on television. Because television commercials forcibly interrupt viewing, viewers must involuntarily switch channels to avoid commercials. Even for magazine advertising, where readers have more control over whether they read an ad or not, most times readers still must turn an ad page to go to the content they want to read. This behavior is totally different from banner advertising. Because banner ads are put on the same page, Web surfers do not need to do anything to avoid advertising. If surfers are interested in an ad, they can click on the ad to obtain more information. If not, they can simply ignore the ad without doing anything special. Therefore, Web surfers control their experience on the basis of their own preferences and volition.<sup>5</sup>

Our understanding of the impact of interactivity and related attributes is still quite limited. While discussed during the past two decades, both as a function of computer activities, especially games, and enhanced forms of television. Originating as feedback in

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<sup>4</sup> Feifer, R.G., Tazbaz, D., Interface Design Principles For Interactive Multimedia, Telematics and Informatics. Vol. 14, No. 1, 51-65. 1991

<sup>5</sup> Liu, Yuping, L. J. Shrum, What Is Interactivity and Is It Always Such a Good Thing? Implications of Definition, Person, and Situation for the Influence of Interactivity on Advertising Effectiveness, Journal of Advertising; Winter 2002; 31, 4; ABI/INFORM Global, p. 53



Wiener's Cybernetics around 1950, it received little attention until the 1980s, when Rogers (1986) and his coworkers identified it as a key function of new media. However, interactivity is not a simple, one-dimensional concept. Fortin (1997) cited close to 20 researchers who have identified underlying dimensions of interactivity. He concluded that interactivity implies the shift from one-way communication prevalent in traditional media to interchangeable roles of senders and receivers (which can be human or machines). The end-user has a high level of control over access, timing and sequencing of information, entertainment, or services. Interactive communication may be either synchronous or asynchronous. Interactivity is often confounded with related concepts, such as in Goertz' criteria for interactivity (translated in Vorderer, 2000):<sup>6</sup>

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1. Degree of selectivity
2. Degree to which a given content may be modified by the viewer
3. Quantity of different content that can be selected and modified
4. Degree of linearity/nonlinearity
5. Number of different senses that are activated while using the media.

Cable or satellite television, in combination with the VCR, in their current form primarily provides increased selectivity, not true interactivity. The tremendous success of home video and multichannel cable in the 1980s clearly indicates that viewers like to expand their viewing choices, although much of the interest is in early availability of blockbuster material. Recent developments in digital cable and satellite have mainly catered to this trend: more channels are available; starting times vary; and

viewers have more immediate control through on-screen program/recording features.

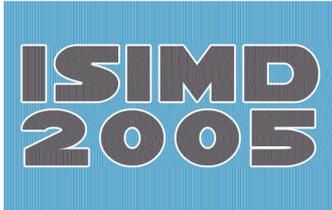
Video games respond to more of Goertz' criteria. For example, content can be modified (e.g., the player can take on the identity of different participants in a race; different levels of difficulty can be selected). Some games also provide tactile feedback in addition to the traditional video and audio. The X-box being developed by Microsoft will play movies and games on DVD, and it will interface with the Internet. Finally, computer and, in particular, Internet-based technologies tend to maximize selectivity, nonlinearity, and available modification. However, one might argue that much Internet activity is based on an extremely high level of selectivity, while true modification of original content or true interaction is limited. A notable exception is e-mail, which is low on appeal to different senses but has generated a new wave of social and parasocial interactions. McKenna and Bargh (1999) pointed out that interpersonal communication is the number one use of the Internet at home. In addition to conventional e-mail, they point to chat rooms, bulletin boards, and electronic "communities". Their research correlates personality traits and individual differences with preference for the Internet as a social vehicle, particularly stigmatized and constrained identities and/or social anxiety, loneliness, hectic lifestyle, and safety issues. Nie and others (see Streitfeld, 2000) claim that the Internet contributes to social isolation among heavy Internet users, while it also leads to an increased blending of home and work life. By contrast, McKenna and Bargh applied a more rigorous methodology and discovered largely beneficial effects resulting from interpersonal Internet use: increased self-disclosure, decreased feelings of estrangement and isolation, decreased depression,

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<sup>6</sup> Mundorf N., Bryant, J., Realizing the social and commercial potential of interactive technologies. *Journal of Business Research* 55 (2002) p.666.

<sup>7</sup> Fortina, D.R., Dholakia, R.R., Interactivity and vividness effects on social presence and involvement with a web-based advertisement, *Journal of Business Research* 58 (2005), p.388.

<sup>8</sup> Liu, Yuping, L. J. Shrum, What Is Interactivity and Is It Always Such a Good Thing? Implications of Definition, Person, and Situation for the Influence of Interactivity on Advertising Effectiveness, *Journal of Advertising*; Winter 2002; 31, 4; ABI/INFORM Global, p. 53



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greater liking and acceptance by others, as well as a widening social circle. Even though convergence is technically feasible, it has been limited due to lifestyle preferences and other factors. Age and other sociodemographic differences in adoption of new technology are well established. While many in the older demographic groups seem to prefer passive consumption of media entertainment, Rockwell and Bryant (1999) found that children enjoyed entertainment programs more when more interactivity was afforded. Vorderer (2000) and his coworkers found support for greater enjoyment of suspense presented in an interactive mode for those who are more intellectually active (as indicated by response time to on-screen questions) and those with a higher level of education.<sup>9</sup>

## New Media Approach

Stipp (1998) pointed out that most people still look to the television for relaxation and entertainment, whereas the PC is a source of information (and, increasingly, service). It appears that most PC users have not significantly reduced their TV viewing. Recent adopters tend to use the PC less than early adopters. Differentials during daytime could be due to employment patterns. He stresses that the market for television and PC consumption is highly segmented and heterogeneous. Convergence takes place in certain populations and at certain times, but it is far from becoming a population-wide phenomenon. For some demographic and psychographic segment, "Surfing the Web" may be more absorbing than watching TV, and help take their mind off the stress of work and personal life.<sup>10</sup>

Some of the new media, being based upon telecommunications systems, allow for new forms of person-to-person (or people-to-people) interactions as well as human-machine interaction. Electronic text

and voice messaging systems allow for asynchronous communication and rapid delivery of text, freeing users from some of the limitations of traditional media. There may be scope for one-to-many and many-to-many communication in addition to the traditional one-to-one format. And some electronic media allow for anonymous contact to take place in 'cyberspace', by virtue of the fact that individuals happen to be accessing the same service, rather than because one has deliberately called the other. On CB radio, bulletin boards and chat lines, individuals may adopt pseudonyms and even role-play new identities; and in some MUDS (multi-user role-playing games and the meeting environments that have been inspired by these), many users both explore an electronic landscape and interrelate with each other, thus combining human and IT interactivity.<sup>11</sup>

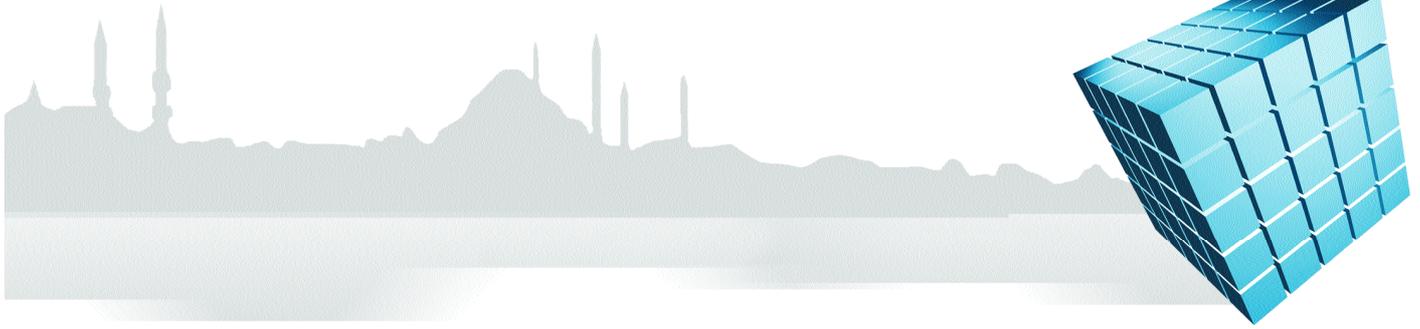
Entertainment services to an increasingly segmented audience may justify implementation of interactive systems (Dholakia et al., 1996; Martin, 1999). However, the combination with business and work applications has greater revenue potential. Interactive applications such as telework, telebanking, teleshopping, telemedicine, and distance learning generate considerable revenue from sources other than the limited household entertainment budget. Employers will finance part or all of the expenses needed to connect teleworkers to the corporate office or the customer. Private households may be able to reallocate part of their transportation budget to telework. Companies pay for some of the transaction costs of teleshopping. Home banking, telemedicine, distance learning, etc., can lead to additional savings and convenience, which permit reallocation of resources (Martin, 1999). Social benefits are realized, as well, through improved access to education, health care, and

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<sup>9</sup> Mundorf N., Bryant, J., Realizing the social and commercial potential of interactive technologies. *Journal of Business Research* 55 (2002) p.668.

<sup>10</sup> Mundorf N., Bryant, J., Realizing the social and commercial potential of interactive technologies. *Journal of Business Research* 55 (2002) p.667.

<sup>11</sup> Miles, I., Cyberspace as a Product Space, *Interactive learning about interactive media, Futures*, Vol. 29. No. 9, pp. 769-789, 1997.



employment opportunities for the physically challenged or those living in remote locations.<sup>12</sup>

To advance our understanding of the new media and how marketing communications should evolve in the new environment, a clarification of the construct and formal programmatic research on its influence is needed.<sup>13</sup>

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The complete and successful interactive systems can be created as prototypes, but to be useful as communication media they must be institutionalized to the point that they can be taken for granted. The process of institutionalization often takes decades—

for example, many electronic technologies that are now in common use (e.g., radio, telephone, and television) were first prototyped in the second half of the 19th century, but only became sufficiently institutionalized to deliver content to audiences some decades later.<sup>15</sup>

Designers and scholars of new media have treated Face-to-Face (FtF) interaction as the benchmark for assessing computer-mediated communication (CMC). FtF provides individuals with a full array of verbal and nonverbal cues that create social presence and visceral immersion in the interaction, supply important social and contextual information, permit nuanced and coordinated interaction, and add redundancy. Understandably, then, designers and practitioners alike assume that FtF interaction is the superior form of communication (see, e.g., Nohria & Eccles, 1992; O'Hara-Devereaux & Johansen, 1994). Research and theories examining the effectiveness of such technologies, however, have yielded conflicting conclusions and advice. For instance, early media richness theories generally, and social presence theory specifically, proposed that new communication technologies filter out important contextual and social cues, information typically supplied through nonverbal cues (e.g., Culnan & Markus, 1987; Krauss & Fussell, 1990; Rutter, 1987; Short, Williams, & Christie, 1976). The resultant impoverished communication environment was thought to eliminate social presence, degrade the quality of communication, impair working relationships, and undermine task performance compared to FtF interaction unless communicators are able to compensate for such losses. Such views catalyzed substantial engineering efforts to produce

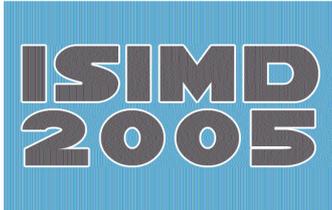
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<sup>12</sup> Mundorf N., Bryant, J., Realizing the social and commercial potential of interactive technologies. *Journal of Business Research* 55 (2002) p.668.

<sup>13</sup> Liu, Yuping, L. J. Shrum, What Is Interactivity and Is It Always Such a Good Thing? Implications of Definition, Person, and Situation for the Influence of Interactivity on Advertising Effectiveness, *Journal of Advertising*; Winter 2002; 31, 4; ABI/INFORM Global, p. 53

<sup>14</sup> Miles, I., Cyberspace as a Product Space, *Interactive learning about interactive media*, *Futures*, Vol. 29. No. 9, pp. 769-789, 1997.

<sup>15</sup> O'Keefe, B.J., Zehnder S., Understanding media development: A framework and case study, *Applied Developmental Psychology* 25 (2004) p.731.



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richer mediated forms of communication that can simulate the nonverbal contextual information of FtF interaction.<sup>16,17</sup>

## Conclusion

The shape taken by a communications technology will reflect the confluence of a set of enabling technologies (a medium), the imagined uses of the medium, policies governing access and use, diffusion and adoption of the medium within a particular community, and a set of user roles and competencies developed around use of the medium for a community's purposes. As such systems stabilize, they move from demo to infrastructure, from the awkward and unstable prototype to a "communication channel" that comes "ready to hand" and is taken for granted by a community of users.<sup>18</sup>

Cellular telephones, Digital TVs and xDSL (Broadband access to the Internet) are "ready to hand" examples. Today, we record and send video portions to our friends by cellular phones. We can vote the best player of the football match we are watching on TV. Finally, we can utilize video on demand features by using broadband access to the internet.

Many existing communications systems create needs for establishing regulating institutions such as ICANN, RTUK (Radio Television Supreme Council) and laws like Broadcast Law. Existing systems have been destabilized by developments in digital technology, due to changes in needs, behaviors or attitudes of individuals or enterprises or changes in policies and regulations governing these new media.

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<sup>16</sup> Burgoon, J.K.; et.al., Testing the Interactivity Principle: Effects of Mediation, Proximity, and Verbal and Nonverbal Modalities in Interpersonal Interaction, *Journal of Communication*, September 2002. p.658.

<sup>17</sup> Wilson, S.M., Peterson, L.C., The anthropology of online communities, *Annual Review of Anthropology*; 2002; 31, Academic Research Library, p.449.

<sup>18</sup> O'Keefe, B.J., Zehnder S., Understanding media development: A framework and case study, *Applied Developmental Psychology* 25 (2004) p.732.