Marketing in Hypermedia Computer-Mediated Environments: Conceptual Foundations

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Abstract

This paper addresses the role of marketing in hypermedia computer-mediated environments (CMEs). Our approach considers hypermedia CMEs to be large-scale (i.e. national or global) networked environments, of which the World Wide Web on the Internet is the first and current global implementation. We introduce marketers to this revolutionary new medium, propose a structural model of consumer behavior in a CME that incorporates the notion of flow, and examine the set of consequent testable research propositions and marketing implications that follow from the model.

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1) Introduction

Firms communicate with their customers through various media. Traditionally, these media follow a passive one-to-many communication model whereby a firm reaches many current and potential customers, segmented or not, through marketing efforts that allow only limited forms of feedback on the part of the customer. For several years now, a revolution has been developing that is dramatically altering this traditional view of advertising and communication media. This revolution is the Internet, the massive global network of interconnected packet-switched computer networks, which as a new marketing medium has the potential to radically change the way firms do business with their customers.

The Internet operationalizes a model of distributed computing that facilitates interactive multimedia many-to-many communication. As such, the Internet supports discussion groups (e.g. USENET news and moderated and unmoderated mailing lists), multi-player games and communication systems (e.g. MUDs, irc, chat, MUSEs), file transfer, electronic mail, and global information access and retrieval systems (e.g. archie, gopher, and the World Wide Web)[1]. The business implications of this model "[where] the engine of democratization sitting on so many desktops is already out of control, is already creating new players in a new game" (Carroll 1994), will be played out in as yet unknown ways for many years to come.

This paper is concerned with the marketing implications of commercializing *hypermedia computer-mediated environments* (CMEs), of which the World Wide Web (Berners-Lee et. al. 1992, 1993) on the Internet is the first and current networked global implementation. While we provide a formal definition subsequently, at this point we informally define a hypermedia CME as a distributed computer network used to access and provide hypermedia content (i.e., multimedia content connected across the network with hypertext links). Though other CMEs are relevant to marketers, including private bulletin board systems (Bunch 1994); conferencing systems such as the WELL (Figallo 1993; Rheingold 1992, 1993), ECHO, and the River; and commercial online services such as AOL, CompuServe, and Prodigy, we restrict our current focus to marketing activities in hypermedia CMEs accessible via the "Web" on the Internet.

The Internet is an important focus for marketers for several reasons. First, consumers and firms are conducting business on the Internet in proportions that dwarf the commercial provider base of the other CMEs combined. Though no one yet knows how many users there actually are on the Internet (Hoffman and Novak 1994a, 1994b), the number of computers (hosts) connected to the network topped 4.8 million (Network Wizards 1995) as of January 1995. More importantly, since 1982, this number has been doubling every year (Network Wizards 1995). Note that a single host supports anywhere from a single user to, in some cases, thousands of users. As of July 6, 1995 there were 9009 firms listed in Open Market's (1995) directory of "Commercial Services on the Net," and there were 14,099 entries in the "Business/Corporations"

[1]For a discussion of the technical terms used in this paper, consult one of the many reference books on the Internet (e.g. Hahn and Stout 1994). A comprehensive listing of books about the Internet may be found at http://www.switch.ch/switch/Internet-Books.txt. The http address is a Uniform Resource Locator (URL) which specifies the exact location of a file on the Internet. Note that URL's are used in the Reference list to indicate where online versions of documents may be identified. While these URLs were accurate at the time this paper was written, it is possible that over time, some of these URLs may change names or no longer exist.

directory of the Yahoo Guide to WWW (Yahoo 1995). Further, the number of Web sites is doubling every two months (Semich 1995).

Second, the evidence mounts that the market prefers the decentralized, many-to-many World Wide Web for electronic commerce than the centralized, closed-access environments provided by the online services (Wolf 1994). Significantly, all the major online services now offer Web access to their subscribers, and at least one (Prodigy) has announced plans to allow its members to self-publish their own "home pages" on the Web, as well. Recently, AOL purchased WAIS, Inc., an Internet publishing system developer, and Medior, Inc., a multimedia company specializing in interactive publishing, in an effort to create "AOL-brand Internet services." Additionally, virtually all the major communications conglomerates have Web sites, as they shift their strategic orientations away from so-called "interactive television" applications to Web-based publishing, communication, and multimedia marketing efforts.

Third, and following from the first and second points, the World Wide Web represents the broader context within which other hypermedia CMEs exist. Indeed, much of the foundation we develop in this paper is relevant to online services, particularly as they begin to offer full Internet access. Thus, restricted online services are special cases of the open-access World Wide Web. Open access results in lower entry barriers so that virtually anyone can both access and provide content to the Internet. Both hypermedia CMEs like the Web and proprietary online services are examples of developments in "electronic commerce," and, as Rangaswamy and Wind (1994) have noted, includes such developments as EDI (electronic data interchange), kiosks, electronic classified ads, and online services like Prodigy and Minitel, the French videotex system (Cats-Baril and Jelassi 1994). With the possible exception of EDI, which is moving to the Internet because its "open architecture" system is more inclusive and offers numerous advantages over private networks (e.g. see CommerceNet 1995), none of these mechanisms for facilitating commerce electronically has the far reaching scope and potential for transformation of the marketing function as the World Wide Web on the Internet.

Fourth, the Web offers a versatile laboratory-like environment in which research hypotheses may be developed, explored, tested, and refined. While such hypotheses could also be tested in other CMEs, notably the commercial online services, from an academic perspective there is an important reason for focusing instead upon the Web. The proprietary nature of commercial online services means they are less accessible for academic inquiry than Web-based services, as these proprietary services have made strategic decisions not to release user data (Lohr 1995). On the Web, however, virtually any academic researcher can obtain data. In our experience in these early days of Internet-based commerce, many firms doing business on the Web are eager for collaborative work with academic researchers. In fact, there are literally thousands of commercial sites that can be approached for joint work.

As we shall argue subsequently, the hypermedia CME represented by the World Wide Web on the Internet possesses unique characteristics, including machine-interactivity, telepresence, hypermedia, and network navigation, that distinguish it from traditional media and some interactive multimedia. We shall further argue that because of these unique characteristics, this new media environment requires the rigorous development of a conceptual framework; one that incorporates the notion of "flow" (Csikszentmihalyi 1977; 1990). The central thesis driving this research is that flow characterizes virtually every aspect of the interaction between the consumer and the firm in the hypermedia CME and holds important implications for marketing theory and practice.

The World Wide Web

The World Wide Web, sometimes referred to as WWW, W3, or simply the "Web," is an Internet-based global information initiative begun by Tim Berners-Lee at the European Laboratory for Particle Physics (CERN) in Geneva, Switzerland. First proposed in 1989 and released to the Internet community in 1991, the Web represents the "universe of network-accessible information, an embodiment of human knowledge" in hypertext and multimedia form (Berners-Lee, Cailliau, Groff, and Pollermann 1992; Berners-Lee, Cailliau, Pellow, and Secret 1993). The World Wide Web is the first example of a hypermedia CME with a body of software, and a set of protocols and conventions that make it possible for people on the Internet to search, retrieve, browse, and add information to the environment at will.

The World Wide Web consists of locations or "sites" which providers (e.g. firms) erect on servers and users (e.g. consumers) visit. On the Web, consumer-oriented network navigation consists of visiting a series of "Web Sites" in order to search for information and/or advertising about products, browse content (possibly advertiser supported), or place an order for a product. Sites are accessible through client software called a Web browser (e.g. Kent 1995) available on Macintosh, Windows, and UNIX platforms, and a (preferably) high-speed Internet connection.

Consumers visit a site by entering its Web address directly in the browser or clicking on a hypertext link leading to it from some other site. Once there, consumers navigate through the site using a series of point-and-click motions with a mouse or entering textual information into pop-up windows and "fill-out forms" via keyboard strokes. All sites have what is known as a "Home Page," the virtual front door of a Web site. From there, the user chooses where to go next in the site. Usually, the offerings are presented as a nonlinear graphical menu or "map" of choices to the user. The navigation process continues, terminated only when the user "jumps" to another off-site hypertext link within the Web, or exits the Web navigation experience entirely.

Though traditional marketing approaches can be utilized to get consumers to visit such a site once (the trial problem), virtually nothing is known about how to develop commercial Web sites to maximize profit impact. For example, in an online storefront environment, how does a firm maintain consumer attention, move consumers through the decision process to the "purchase click," and secure repeat visits? While the data to address these issues are readily available (see Section 5 below), there is little in the way of a framework to guide the analysis.

Goals and Organization of the Paper

The increasing popularity of the Web as a business vehicle in general, and an advertising medium in particular, is due to its current size and future growth prospects (Network Wizards 1995; Parekh 1995), its attractive demographics (e.g. Gupta 1995; GVU Center 1995; SRI International 1995; Ogilvy & Mather Direct's 1994 "Techno-Savvy Consumer"), its ability to facilitate the global sharing of information and resources, and its potential to provide an efficient channel for advertising, marketing, and even direct distribution of certain goods and information services. For example, Verity and Hof (1994) have suggested that it may be nearly one fourth less costly to perform direct marketing through the Internet than through conventional channels. Neece (personal communication, 1995) reports that SunSolve Online™ has saved Sun Microsystems over $4 million in "FAQs[2]" alone since they "reengineered information processes

[2]A FAQ is a "frequently asked question" to which standardized replies are both readily available and desirable.

around the WWW." Further, a recent study by IBM Corporation (IBM 1995) suggests that online catalogs on the Internet can save firms up to 25% in processing costs and reduce cycle time by up to 62%. Along with the suspected increases in efficiency, the anecdotal evidence mounts that marketing on the net may also be more *effective* than marketing through traditional media. For example, one vendor estimated that his marketing efforts on the Web resulted in "10 times as many units [sold] with 1/10 the advertising budget" (Potter 1994).

Despite the massive amount of attention given to the Internet in the popular press (see, for example, Markoff (1993a; 1993b) and any of the 3182 references to the Internet in *ABI Inform* through March 1995), and the belief in many business circles that the Web represents a phenomenal marketing opportunity, to date virtually no scholarly effort has been undertaken by marketing academics to understand hypermedia CMEs, both as media for marketing communications *and* as markets in and of themselves.

Yet, without a theoretical framework to examine the issues, we are likely to make little progress in exploiting the potential of this unique environment. At the least, the current void in theory is likely to hamper seriously the efforts of marketers who wish to understand the hypermedia CME, from either the scholarly or practical perspective. Further, if marketers do not understand the medium, they cannot possibly develop and market offerings efficiently and effectively to customers, let alone satisfy customer needs.

Note that in this paper we do not provide an exhaustive review of the extant marketing and consumer behavior literature as it relates to new media environments. Indeed, although there have been recent scholarly efforts detailing the impact of new information technologies on marketing (e.g. Blattberg, Glazer, and Little 1994 and Glazer 1991), there is a dearth of research on the impact that hypermedia CMEs such as the World Wide Web hold for marketing theory and practice. Instead, we draw from the relevant literatures in psychology, communications, organizational behavior, and computer science, with our efforts concentrated on developing a solid conceptual foundation for understanding the role of marketing in hypermedia computer-mediated environments.

Therefore, the goals of this paper are to: 1) introduce marketers to this revolutionary new medium; 2) propose a structural model of consumer behavior in a hypermedia CME and examine the set of consequent testable research propositions that flow from the framework; and 3) outline the key research issues necessary to stimulate critical inquiry in this emerging area.

To that end, the paper is organized as follows. In section two, we discuss three models of communication in the context of several new concepts including computer-mediation, machine-interactivity, telepresence, hypermedia and network navigation. Then we compare media along seven unambiguous objective characteristics which reveal new insight into the distinctions among traditional media and CMEs. In the third section, we introduce a process model of network navigation in CMEs based on an expanded concept of flow (Csikszentmihalyi 1977; 1990). This structural model provides the conceptual foundations for understanding the role of marketing in hypermedia CMEs and introduces the first measurement proposition. Section four presents a series of 14 further research propositions that identify the antecedents and consequences of the flow experience and discusses the marketing implications of the model. The fifth section outlines methodological approaches and data sources that can be used to test the propositions. Finally, in section six, we summarize the paper and offer our conclusions about the importance of this emerging area of inquiry to both marketing scholars and practitioners.

2) Hypermedia Computer-Mediated Environments

We begin by outlining a series of three communication models, which serve to identify several unique characteristics of hypermedia CMEs such as the Web. Concepts that are singularly relevant to hypermedia CMEs, including *machine-interactivity*, *telepresence*, *hypermedia*, and *network navigation*, are introduced. We then describe a new media typology that positions the Web in the broader context of new and traditional media, and discuss the marketing implications of the communication models and typology.

Communication Models

Model 1: Mass Media. Figure 1 presents a simplified model which underlies many models of mass communication (e.g. Lasswell 1948; Katz and Lazarsfeld 1955). The primary feature of Figure 1 is a one-to-many communications process, whereby the firm (F) transmits content through a medium to consumers (C). Depending upon the medium (i.e. broadcast, print,billboards), either static (i.e. text, image and graphics) and/or dynamic (i.e., audio, full-motion video and animation) content (see Bornman and von Solms 1993) can be incorporated. No interaction between consumers and firms is present in this model. Virtually all contemporary models of mass media effects are based on this traditional model of the communication process (e.g., see Kotler 1994, chapter 22).

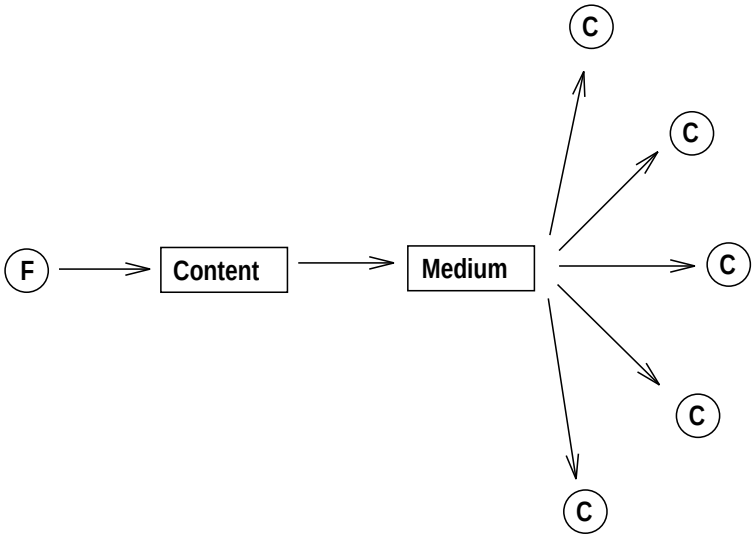


Figure 1 - Traditional One-To-Many Marketing Communications Model for Mass Media

Model 2: Interpersonal and Computer-Mediated Communications. Figure 2, based upon traditional models of communication from sender to receiver, presents a simplified model of interpersonal communication. The solid and dashed lines indicate communication flows through a medium for two distinct individuals. This model incorporates a feedback view of interactivity, consistent with Rafaeli's (1988) definition of interaction 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." While Figure 2 is shown here for one-to-one communication between two consumers, the model can be easily

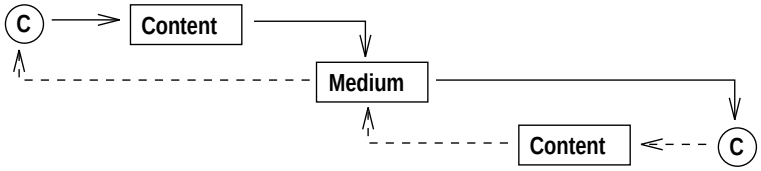


Figure 2 - Model of Marketing Communications for Interpersonal and Computer-Mediated Communication

extended to represent many-to-many interpersonal communication (i.e. teleconference, face- to-face group meetings, or on-line "chat rooms"). Note that unmediated face-to-face interpersonal communication is special case of Figure 2. From a marketing perspective, the model in Figure 2 is implicit in developments of word-of-mouth-communication models (e.g., see Wilson 1991).

Interactivity is the key feature distinguishing Figure 2 from Figure 1. This *"person-interactivity"* is *through* a medium (or unmediated, in the case of face-to-face communication). In this view of interactivity, media are "important only as a conduit, as a means of connecting sender and receiver, and are only interesting to the extent that they contribute to or otherwise interfere with the transmission of messages from sender to receiver" (Steuer 1992). The implicit assumption is that the characteristics of the medium allow only limited aspects of the content to be communicated. For example, non-verbal cues are eliminated in text-based computer conferencing systems, and visual cues are eliminated by the telephone.

Hypermedia CMEs. Nearly fifty years ago, Busch (1945) proposed a hypertext-like system called "Memex," which would consist of "...a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility." Nelson (1967) discussed hypertext in terms of a network of paths and associations, with an emphasis upon approximating the way the human brain connects information. Bornman & von Solms (1993) provide a current definition: "Hypertext suggests the concept of non-sequential writing of information that allows the user to connect information together by means of different paths or links. The information in a hypertext system is in the form of nodes and links."

Multimedia (Hugo 1991; Bornman & von Solms 1993) uses a computer to integrate and provide interactive access to both static (i.e. text, image and graphics) and dynamic (i.e., audio, full-motion video and animation) content. As discussed by Tomek et al. (1991), *hypermedia* combines the node-and-link access of hypertext with multimedia content to create an environment that is at once more than the simple additive combination of the components. Hypermedia thus combines the elements of radio (audio), television (moving images), newspaper and magazines (text), and the computer (video display terminal) with hypertext links to form the basis for a unique computer-mediated environment. Gygi (1990) and Smith and Wilson (1993) provide more extensive discussion of hypertext and hypermedia.

We define a hypermedia CME as: *a dynamic distributed network, potentially global in scope, together with associated hardware and software for accessing the network, which allows consumers and firms to 1) provide and interactively access hypermedia content (i.e. "machine interaction"), and 2) communicate through the medium (i.e. "person interaction").* We further define network navigation as *the process of self-directed movement through a hypermedia CME.* This nonlinear search and retrieval process provides both essentially unlimited freedom of choice and greater control for the consumer, and may be contrasted with the restrictive navigation options available in traditional media such as television or print. Further, network navigation permits much greater freedom of choice than centrally-controlled interactive multimedia systems, such as video-on-demand and home-shopping applications of so-called "Interactive Television," the text-based French Minitel system (Cats-Baril and Jelassi 1994), the menu-based information-acceleration approach of Hauser, Urban & Weinberg (1993), or experimental systems for monitoring information processing such as Mouselab (e.g. Payne, Bettman and Johnson 1993). Network navigation in a hypermedia CME may also be contrasted with hierarchical, "menu-based"

navigation systems such as gopher (Anklesaria, et.al. 1993), which although networked, offer less control to the consumer.

Model 3: A New Model for Hypermedia CMEs. Figure 3 presents a many-to-many communication model for hypermedia CMEs. The content in Figure 3 is hypermedia and the medium is a distributed computer network. Figure 3 differs from Figure 2 in that interactivity can also be *with* the medium (i.e., "machine interactivity") in addition to *through* the medium (i.e., "person interactivity").

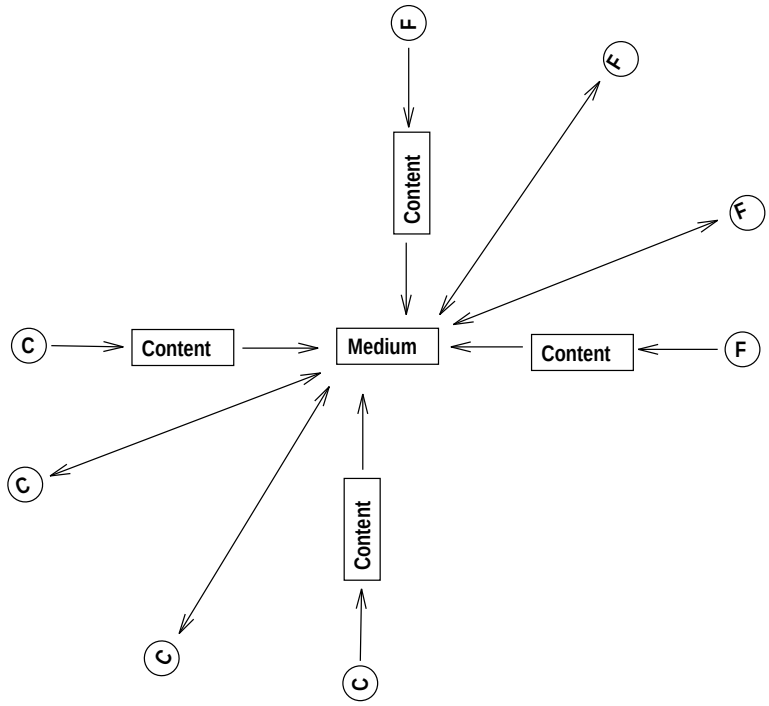
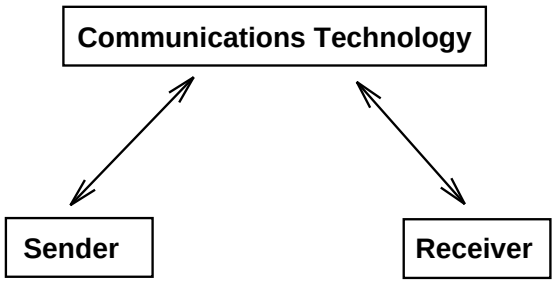


Figure 3 - New Model of Marketing Communications in a Hypermedia Computer-Mediated Environment

Figure 3 is based upon a communication model outlined by Steuer (1992), and shown in Figure 4. The mediated model represented in Figure 4 suggests that the primary relationship is not between the sender and the receiver, but rather with the "mediated environment" with which they interact. Additionally, because of the interaction, the sender is also a receiver. In this view, information or content is not merely transmitted from a sender to a receiver, but rather "mediated environments are created and then experienced." (Steuer 1992). In Steuer's model of mediated communication, interactivity is "...the extent to which users can participate in modifying the form and content of a mediated environment in real time" (see also Laurel 1991; Rheingold 1991). Steuer calls his model a *"telepresence view"* of mediated communication, where *presence* is "the natural perception of an environment" and *telepresence* is "the mediated perception of an environment" (Steuer 1992). Following Steuer, when interacting with a computer-mediated environment, the consumer perceives two environments: 1) the physical environment in which he or she is present, and 2) the environment defined by the hypermedia CME. The *strength* of the experience of telepresence is a function of the extent to which one feels present in the hypermedia CME, rather than in one's immediate physical environment.



(after Steuer 1992 and Krueger 1991)

Figure 4 - Mediated Communication

Figure 3 shows the range of communication relationships possible in a hypermedia CME. Consumers can interact with the medium (e.g., "surf the Web" using browsing software) as can firms (e.g. business-to-business marketing as in CommerceNet). In addition, firms can provide content to the medium (e.g., a firm establishes a corporate Web server). Finally - in perhaps the most radical departure from traditional marketing environments - consumers can provide product-related content to the medium. For example, individual consumers have established Web pages for automobiles (e.g. the Ford Probe, Porsche, car audio, and solar cars), toys (e.g. Lego and Barbie Dolls), and television shows (e.g. Jeopardy, The X-Files, Married With Children, and Northern Exposure). Further, note that Figures 1 and 2 are contained within Figure 3. Thus, a hypermedia CME can also used be used for computer-mediated communication among consumers and/or firms (*through* the medium), and also potentially for one-to-many mass communication, although applications of the latter have met with considerable consumer resistance (e.g., Godwin 1994b).

Media Characteristics

Studying media characteristics provides a structured context for comparing different media types, including traditional media and "new media" (Valacich, Paranka, George, and Nunamaker 1993; Rice 1984;Williams, Strover, and Grant 1994). Traditional media include both mass media (e.g. television, radio, newspaper, magazines, and direct mail), and personal communications (e.g. word-of-mouth). New media encompass interactive media like videotex, interactive CD-ROM, online services, and hypermedia CMEs, as well as emerging so-called"interactive multimedia" like pay-per-view (PPV), video-on-demand (VOD), and "interactive TV" (ITV).

Relative to traditional media, new media as a group tend to afford greater consumer control and nonlinear access to more differentiated content (Perse and Courtright 1993; Williams, Rice, and Rogers 1988). The media typologies referenced in Table 1 reveal that media differ along many different dimensions, for example, channel characteristics (Reardon & Rogers 1988; Rogers 1986), social presence (Rice 1992, 1993), and uses and gratifications (Perse and Courtright 1993). However, such typologies render little insight into the nature of hypermedia CMEs because these new environments were not in existence at the time these typologies were constructed. Although the typologies cited include the computer as a communications medium, it is defined narrowly in terms of email, bulletin boards, and computer conferencing.

Further, many of the characteristics listed in Table 1 are either subjective in nature or require the application of valid empirical measurement procedures. Therefore, we propose a new media typology based upon seven unambiguous and objective characteristics. While objective characteristics, of course, do not enable the media to be compared with respect to psychological dimensions such as communication needs, social presence, or control, they do permit a relatively error free classification. Thus, Table 2 characterizes 35 traditional and new media with respect to seven objective characteristics. We have already discussed *person-interaction* and *machine-interaction*, and the distinction between the one-to-many/one-to-few (Figure 1), one-to-one/few to few (Figure 2) and many-to-many (Figure 3) communication models. Content is self-explanatory, and simply identifies whether static (i.e. text or image) or dynamic (i.e. audio, video, or experiential) content can be delivered by the medium. For unmediated interpersonal communication, *experiential* content includes stimuli impacting upon additional sensory modalities, such as tactile, proprioceptive, or olfactory senses.

Table 1 - Review of Media Comparisons

Source:	Communication Media Compared:	Characteristics of Communication Media:
Dennis and Valacich (1994)	face-to-face, phone, memo, voice mail, video conference, email, electronic phone, group support systems	feedback, symbol variety, concurrency, persistence, rehearsability
Perse and Courtright (1993)	TV, VCR, movies, conversation, phone, computer, newspapers, magazines, books, radio	11 communication needs (uses and gratifications), social presence
Reardon and Rogers (1988)	interpersonal communication interactive media mass media	message flow, source knowledge of the audience, segmentation, interactivity, feedback, asychronicity, emotional vs. task-related content, control, privacy
Steuer (1992)	44 new and old media including newspapers, fax, interactive TV, 3-D films, sensorama, and the Star Trek Holodec	subjective classification according to vividness and interactivity
Stewart and Ward (1994)	TV, radio, magazines, newspapers	27 characteristics for "gross media comparisons"
Rice (1992)	email, voice mail, videoconferencing, online databases	social presence, information richness
Rice (1993)	face-to-face, email, meetings, phone, desktop video, text, voice mail	social presence, appropriateness for 10 communication activities
Valacich et al. (1993)	distributed verbal, face-to-face verbal, distributed electronic, face-to-face electronic	communication concurrency
van Dijk (1993)	two-way cable, videotex, data networks, email, videophone, interactive video	kinds of information, mode of communication

The remaining three characteristics may be defined briefly as follows. The *number of linked sources available* specifies how many sources of content are readily accessible or available to the user at any given usage opportunity. *Media feedback symmetry* refers to whether different parties in the communication process employ differing media bandwidths for sending information. For example, in an Interactive CD (CDI), feedback is asymmetric as the CDI sends high bandwidth information, but the consumer sends low bandwidth information. From the consumer's perspective, this facilitates interactivity because a few simple cursor, mouse or joystick movements produce dramatic modifications in the environment. When there is symmetric media feedback, all sources in the communication process employ the same media bandwidth for sending information, for example telephone, mail, and face-to-face communication. *Temporal synchronicity* is a property of interactive media only, does not apply to mass media, and means interaction occurs in real time. Thus, email is temporally asynchronous, but the telephone and computer talk programs are temporally synchronous.

Table 2 - Objective Characteristics of Media

	person-interactive:	# of machine-interactive:	linked sources:	communication model:	content[a]	media feedback symmetry:	temporal synchron-icity
Mass Media:							
billboards	no	no	one	one-to-many	T, I	yes	n/a
newspapers	no	no	one	one-to-many	T, I	yes	n/a
magazines	no	no	one	one-to-many	T, I	yes	n/a
direct mail	no	no	one	one-to-many	T, I	yes	n/a
radio	no	no	few	one-to-many	A	no	n/a
broadcast TV	no	no	few	one-to-many	A, V, (T)	no	n/a
cable TV	no	no	few	one-to-many	A, V, (T)	no	n/a
satellite TV	no	no	many	one-to-many	A, V, (T)	no	n/a
500 channel cable TV	no	no	many	one-to-many	A, V, (T)	no	n/a
Interactive Media:							
local hypertext	no	yes	one	one-to-many	T	yes	yes
local hypermedia	no	yes	one	one-to-many	T, I, A, V	no	yes
dial-up BBS (info only)	no	yes	one	one-to-many	T	yes	yes
CD-Interactive	no	yes	one	one-to-many	T, I, A,V	no	yes
Videotex	no	yes	few	one-to-many	T	yes	yes
Pre-Web Online Services	no	yes	few	one-to-many	T, I	no	yes
Interactive TV	no	yes	few	one-to-many	T, I, A, V	no	yes
World Wide Web	no	yes	many	many-to-many	T, I, A, V	no	yes
Interpersonal Communication:							
mail	yes	no	one	one-to-one	T	yes	no
fax	yes	no	one	one-to-one	T	yes	no
telephone	yes	no	one	one-to-one	A	yes	yes
videophone	yes	no	one	one-to-one	A,V	yes	yes
face-to-face	yes	no	one	one-to-one	A,V, E	yes	yes
face-to-face (group)	yes	no	few	few-to-few	A,V, E	yes	yes
town meeting	yes	no	many	many-to-many	A,V, E	yes	yes
Computer-Mediated Communication:							
email	yes	yes	one	one-to-one	T	yes	no
voice mail	yes	yes	one	one-to-one	A	yes	no
talk program	yes	yes	one	one-to-one	T	yes	yes
email (CC: list)	yes	yes	one	one-to-few	T	yes	no
multi-party chat	yes	yes	few	few-to-few	T	yes	yes
MUDs	yes	yes	few	few-to-few	T	yes	yes
CU SeeMe	yes	yes	few	few-to-few	A, V	yes	yes
mailing lists	yes	yes	many	many-to-many	T	yes	no
Usenet newsgroups	yes	yes	many	many-to-many	T	yes	no
WWW (forms/annotation)	yes	yes	many	many-to-many	T, I	yes	no
Internet Relay Chat (IRC)	yes	yes	many	many-to-many	T	yes	yes

[a]T=text, I=image, A=audio, V=video, E=experiential. Note that (T) indicates there is a minor amount of text content.

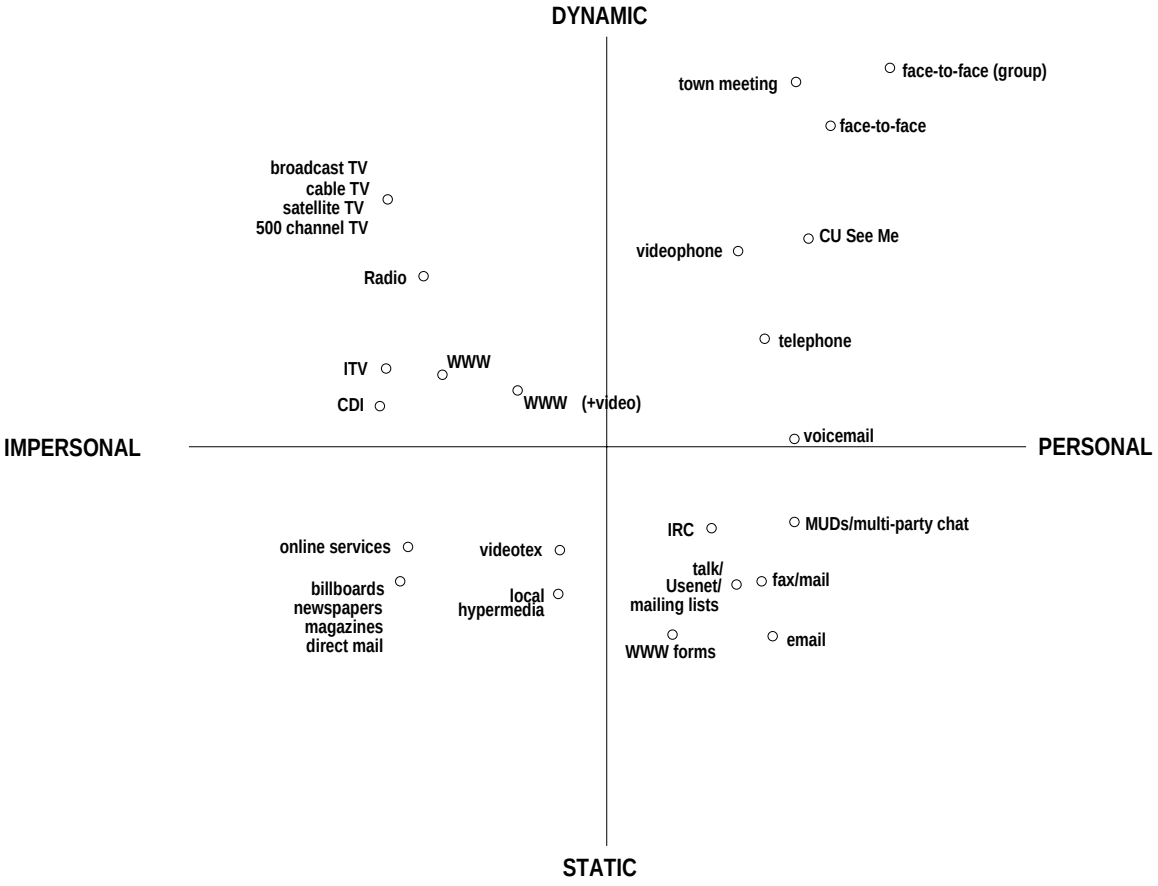


Figure 5 - Media Typology Based Upon Objective Characteristics

Figure 5 presents a perceptual map, produced by plotting object scores for 35 media types resulting from a nonlinear principal components analysis (NPCA) (Gifi 1990) of the data from Table 2. NPCA is equivalent to multiple correspondence analysis (Hoffman and de Leeuw 1992) with ordinal restrictions imposed upon category quantification of variables assumed to have a known underlying ordering of categories[3]. To simplify presentation, only the object scores for the rows of Table 2, and not the category quantifications for the columns of Table 2, are plotted.

Following orthogonal rotation of axes, Figure 5 has a clear interpretation. The horizontal axis differentiates impersonal from personal communication media, while the vertical axis differentiates dynamic (audio, video, experiential) from static (text, image) media. Reardon and Rogers (1988) argued that "new communication technologies are interactive in nature, and thus cannot be easily categorized as either interpersonal or mass media channels." Indeed, Figure 5 shows that traditional mass media channels occupy positions at the upper left (broadcast media) and lower left (print media), while interpersonal media occupy the upper right position, and mail and fax occupy the lower right position. New media occupy largely intermediate positions,

[3] In this case, ordinal restrictions were imposed upon the number of linked sources (one, few, many), and the three-category variable specifying presence of text content. Communication model was also treated as two separate ordinal variables - the number of senders (one, few, many), and the number of receivers (one, few, many). As all other variables were either binary (person-interactive, machine-interactive, audio, video, image, experiential, and media feedback symmetry) or nominal (temporal synchronicity), no other ordinal restrictions were imposed.

in agreement with Reardon and Rogers (1988) who viewed new interactive media as *combining* properties of mass (impersonal) and face-to-face (personal) communication channels.

Figure 5 identifies two points for the Web, one assuming text, image, and audio content (WWW) and one assuming text, image, audio, and video content (WWW+video). The latter is technically feasible over T1 (1.5 million bits per second) or higher speed connections, and developments such as cable modems (10 to 30 million bits per second) will bring video Web capability to the home. It should be noted that WWW with video content occupies a central position in Figure 5, meaning that it is the most "typical" of all communication, sharing characteristics with a wide variety of other media types. The many-to-many communication model underlying the Web largely serves to position the Web closer to the "personal" side of the horizonal axis than traditional mass media. In addition, note that virtually all Web browsers include fillout form capability (WWW forms), and increasingly Web browsers also permit seamless access to email, Usenet newsgroups, and through telnet clients, IRC, multi-party chats, and talk programs. Thus, the complete bundle of WWW services covers a broad range of communication channels, with extensions to desktop videoconferencing capabilities (e.g. CU SeeMe) a logical next step.

The central position of the Web in Figure 5 corresponds to an important strategic interpretation of the Web as a marketing medium, in that the Web combines elements from a variety of traditional media, yet it is more than the sum of the parts. For example, broadcast media in the top left quadrant of Figure 5 provide relatively short-term exposure with low information content, while the print media in the bottom left quadrant provide relatively long-term exposure with high information content. Advertising strategy on the Web must account for both short-term (decision of which link to select next) and long-term (reading detailed information provided at a commercial site) exposure.

We now discuss a structural model of consumer behavior in a hypermedia CME such as the World Wide Web on the Internet.

3) A Process Model of Network Navigation in Hypermedia CMEs

The Flow Construct

Although consumer researchers have explored the role of play in the consumption experience (e.g. Holbrook, Chestnut, Oliva, and Greenleaf 1984**)**, we believe the concept of *flow* in a hypermedia CME holds wider applicability, underlying virtually every aspect of the consumer's interaction with the firm and its offerings. A number of researchers have suggested that flow is a useful construct for describing our interactions with computers (Csikszentmihalyi 1990; Ghani, Supnick and Rooney 1991; Trevino and Webster 1992; Webster, Trevino, and Ryan 1993).

Flow formalizes and extends a sense of playfulness (Csikszentmihalyi 1975; Bowman 1982; Csikszentmihalyi & LeFevre 1989; Day 1981; Ellis 1973; Miller 1973), incorporating the extent to which, in the hypermedia environment, consumers: 1) perceive a sense of *control* over their interactions in the environment, 2) focus their *attention* on the interaction, and 3) find it *cognitively enjoying* (Webster, Trevino, and Ryan 1993). When in the flow state, irrelevant thoughts and perceptions are screened out and the consumer's attention is focused entirely on the interaction. Flow thus involves a merging of actions and awareness, with concentration so

intense there is little attention left over to consider anything else. A consumer's action in the flow state is experienced "as a unified flowing from one moment to the next, in which he is in control of his actions, and in which there is little distinction between self and environment, between stimulus and response, or between past, present, and future" (Csikszentmihalyi 1977, p 36). Self-consciousness disappears, the consumer's sense of time becomes distorted, and the resulting state of mind is extremely gratifying.

Flow has been described as "the process of optimal experience" (Csikszentmihalyi 1977; Csikszentmihalyi & LeFevre 1989) achieved when a sufficiently motivated user perceives a balance between his or her skills and the challenges of the interaction, together with focused attention. Flow activities in the Web, specifically network navigation, facilitate concentration and involvement because they are distinct from the so-called "paramount reality" of everyday existence (Csikszentmihalyi 1990, p. 72). We provide next a formal process model of network navigation in a CME, in which the flow construct plays a central role.

The Process Model

Figure 6 presents a dynamic process model of network navigation in the hypermedia CME. For expository purposes, we diagram only the most important links. The model in Figure 6 does not show the complex set of feedback loops and pathways, nor the fully dynamic nature of the process. It represents a general process model of behavior in this environment. A

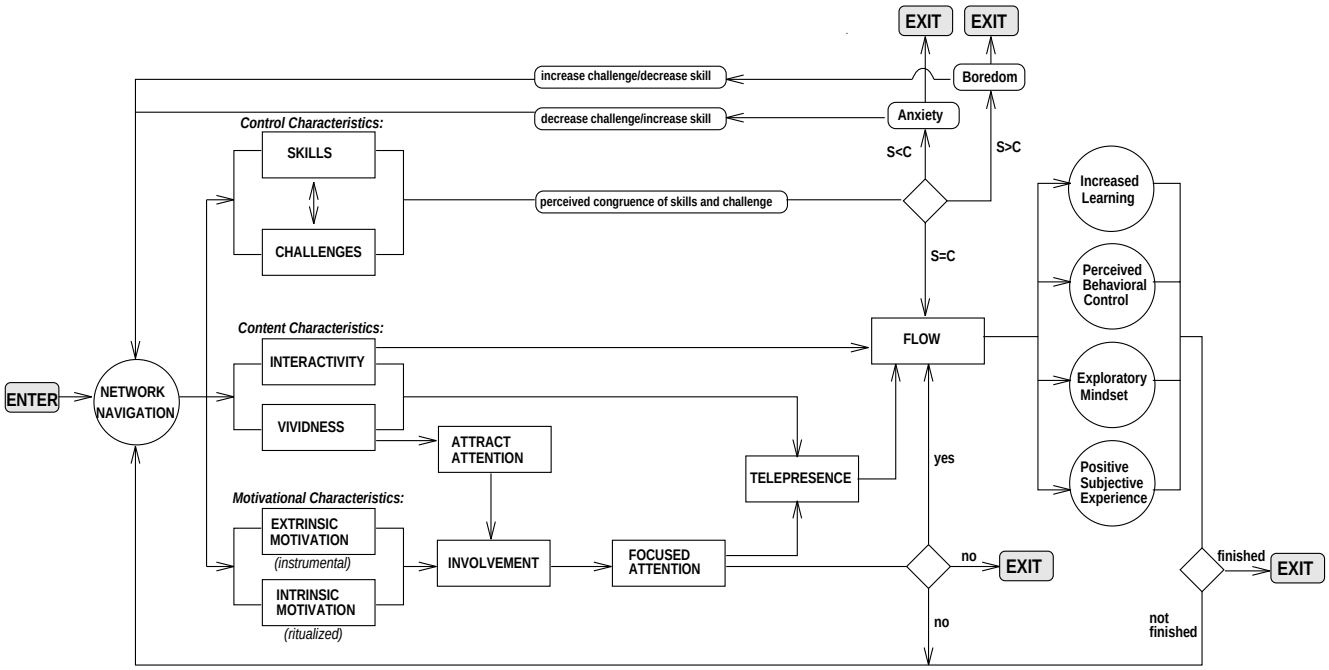


Figure 6 - A Model of Network Navigation in a Hypermedia CME

consumer enters the hypermedia CME and engages in network navigation. There are several points of Exit from the environment, as well as opportunities to continue navigation. In essence,

flow is the "glue" holding the consumer in the hypermedia CME. We now introduce a proposition that outlines how flow can be measured

Flow Measurement

Reliable and valid measurement of flow is necessary for theory testing and development of the process model in Figure 6. Thus, our first proposition states:

P1: Flow in a CME is measurable along a continuum, and can be inferred from its antecedents and consequences.

Numerous researchers (Csikszentmihalyi 1977; Csikszentmihalyi and Csikszentmihalyi 1988; Csikszentmihalyi & LeFevre 1989; Ellis, Voelkl, and Morris 1994; Ghani & Deshpande 1994; Ghani, Supnick & Rooney 1991; Kimiecik & Stein 1992; Mannel, Zuzanek, and Larson 1988; Webster, Trevino & Ryan 1993; Trevino & Webster 1992, Webster 1989) have developed self-report scales to identify the presence of the flow state. While these studies contain some limitations and difficulties, they nevertheless provide a broad basis of prior research which establishes convincingly that flow can be measured. One difficulty with these previous studies is that they do not clearly and consistently distinguish between antecedents of flow, the flow experience, and its consequences. The model in Figure 6 resolves this limitation and thus has both theoretical and practical implications for flow measurement.

In early studies, flow was operationalized simply as individual items assumed to be correlates of flow. Csikszentmihalyi (1977, pp 108-122) describes an exploratory study where subjects were assigned *a priori* into two groups based upon direct observation of whether they typically were involved with dancing, and thereby likely to experience flow. Differences between the flow and non-flow groups were found on congruence of skills and challenges, as well as on seven items dealing with distractions, passage of time, control, and self-consciousness.

Likert scales provide a second approach to measuring flow. Ghani, Supnick & Rooney (1991) and Ghani and Deshpande (1994) operationalized flow as a self-report scale containing items measuring enjoyment and concentration. Perceptions of control, skill, and challenge were found to be significantly related to this flow measure. Trevino & Webster (1992) used four items, adapted from Webster (1989), to measure flow. The four items dealt with components of control, attention focus, curiosity, and intrinsic interest. Webster, Trevino & Ryan (1993) used a 12-item scale expanded from Trevino & Webster to measure flow, again measuring the same four components of flow. While we consider these components to correspond to antecedents of flow, more than to the flow experience, the scales used in these studies were significantly correlated with a variety of consequences of flow, such as enjoyment, positive attitudes, and future usage intentions.

Perhaps the most widely used approach to measuring flow is the Experience Sampling Method (ESM) (Csikszentmihalyi & Csikszentmihalyi 1988; Csikszentmihalyi & LeFevre 1989; Ellis, Voelkl, and Morris 1994; Kimiecik & Stein 1992; Mannell, Zuzanek, and Larson 1988). The ESM involves electronically paging respondents at random intervals throughout the day, at which point they immediately complete a self-report Experiential Sampling Form (ESF) form with open ended items and rating scales. On a typical ESF, respondents are asked to rate, for the experience they are currently engaged in, the challenge of the experience, their own skills

in the experience, a series of items measuring affect and arousal, and items measuring motivation, concentration, and creativity.

The measures described thus far are cognitive measures, which are necessary for theory testing. Cognitive measurement may be contrasted with behavioral measures of flow based upon the specific actions taken by a consumer in a CME such as the Web. Behavioral measures of flow are analogous to process-tracing methods used in the monitoring of information acquisition behavior (e.g. Payne, Bettman & Johnson 1993), such as verbal protocol methods, information display boards, and computer-based information retrieval systems such as Mouselab and Information Acceleration. As we note in Section 5, Web browser and server software provides the capability of creating detailed "access logs" of consumer behavior in a CME.

Behavioral measures of flow will represent either behavioral correlates or consequences of flow, rather than direct measures of flow. We anticipate that behavioral measures will be of considerable practical importance to applied marketers, since they can be collected unobtrusively, and used to infer whether the consumer is in the flow state. One simple behavioral measure is duration time. As we will discuss later, longer duration times are expected to correlate with presence of the flow state. More complex behavioral measures can be used to characterize navigation patterns through a CME. For example, using easily quantifiable basic navigational patterns they termed "paths, rings, loops, and spikes," Canter, Rivers and Storrs (1985) identified five distinct search strategies used in navigating complex data structures.

4) Antecedents and Consequences of the Flow Experience

In the following section, we introduce a series of research propositions derived from the process model in Figure 6 that 1) identify antecedents of flow, 2) define two distinct categories of flow, 3) consider individual differences, and finally 4) identify consequences of flow.

The next two propositions identify the four antecedents of flow. Proposition 2 states that there are two primary antecedents:

P2: There are two primary antecedent conditions that are necessary for the flow state to be experienced: 1) skills and challenges are perceived to be congruent and above a critical threshold, and 2) focused attention must be present.

Perceived Congruence of Skills and Challenges. Consider the first necessary condition (prerequisite) for flow to occur. Only when consumers' perceive that the hypermedia CME contains high enough opportunities for action (or challenges), which are matched with their own capacities for action (or skills), will flow potentially occur. Csikszentmihalyi's original (1977) model specified that flow occurred when a person perceived an equal match between skill and challenge, both when skill and challenge were equally high and when skill and challenge were equally low. More recent reformulations (Csikszentmihalyi and Csikszentmihalyi 1988; Csikszentmihalyi and LeFevre 1989) specify that "flow results from experience contexts characterized by a match between challenge and skills only when both challenges and skills exceed the level that is typical for the day to day experiences of the individual" (Ellis, Voelkl, and Morris 1994). Congruent skills and challenges that lie below the individual's typical level are said to result in the "apathy" state (Csikszentmihalyi and Csikszentmihalyi 1988). Congruent,

above-threshold skills and challenges as a prerequisite for flow is also consistent with theory of optimal stimulation level (e.g. Berlyne 1971; Holbrook and Gardner 1993; Raju 1980; Steenkamp and Baumgartner 1992).

Note however, that considerable disagreement exists over how many "channels," or categories, should be used to represent the various patterns of congruence or incongruence of high and low skills and challenges, and how these channels should be labelled. Ellis, Voelkl, and Morris (1994) note that three channel (Csikszentmihalyi 1977), four channel (Csikszentmihalyi 1988), eight channel (Csikszentmihalyi and Nakamura 1989; Massimini and Carli 1988), and 16 channel (Massimini and Carli 1988) models have all been developed; recently, a nine channel model was proposed by Clarke and Haworth (1994). The labelling of these channels can also be quite inconsistent. For example, while Csikszentmihalyi and Csikszentmihalyi (1988) term low skill and low challenges as "apathy," Clarke and Haworth (1994) term this combination "relaxation."

There has also been some debate about the best way to determine whether skills or challenges exceed this critical threshold or "typical level." Most often, within-subject standardization is used (e.g. Csikszentmihalyi and LeFevre 1989; Csikszentmihalyi and Csikszentmihalyi 1988). However, Ellis, Voelkl and Morris (1994) note that within-subject standardization precludes studying individual differences, which have been found to be an important predictor of flow (look ahead to Proposition 8), and consequently, some researchers (e.g., Clarke and Haworth 1994) do not employ within-subject standardization. While this discussion of critical threshold is important for day-to-day activities, it is not, at this writing, of much practical significance for CMEs. Given the current relative technical complexity of CMEs, it is highly unlikely that an individual with low skills in a CME would simultaneously perceive the CME as a low challenge.

Thus, in identifying ways in which flow might *not* be attained in a CME, we focus upon two ways in which perceptions of skills and challenges may be incongruent (see Figure 6). If network navigation in a CME does not provide for congruence of skills and challenges, then consumers will either become bored (skills exceed challenges) or anxious (challenges exceed skills) and either exit the CME, or select a more or less challenging activity within the CME.

Focused Attention. The presence of focused attention is also necessary to experience flow. Csikszentmihalyi (1977, p 40) characterizes flow as "a centering of attention on a limited stimulus field." Webster, Trevino and Ryan (1993) note that the computer screen functions as the limited stimulus field, and that computer users report being "mesmerized" during their computer interactions (Webster 1989).

Figure 6 indicates the role of the content characteristics of vividness and interactivity in attracting attention. The performance characteristics of ease of use, mapping, speed, and range all combine to increase interactivity. A consumer's evaluation of ease of use and mapping (naturalness of how human actions are connected to actions in the hypermedia CME) are subjective and based on perception. The speed of a CME depends on a number of factors including the type of Internet connection and the user's hardware and software. Typically, the range or number of possibilities for action in a hypermedia CME is high.

Vividness, the "representational richness" of the hypermedia CME (Steuer 1992), may be increased by the structural characteristics of breadth and depth. Breadth refers to the number

of sensory dimensions presented and is closely related to media concurrency (Valacich et. al 1993) and media richness (Daft and Lengel 1986; Daft, Lengel and Trevino 1987; Daft and Wiginton 1979). Depth defines the resolution or the quality of the presentation (Steuer 1992) and is highly correlated with media bandwidth. In the hypermedia CME, both breadth and depth are, in general, high.

Extrinsic and intrinsic motivation (Csikszentmihalyi 1977, chapter 1; Davis, Bagozzi, and Warshaw 1992; Graef, Csikszentmihalyi and Gianinno 1983) are important motivational characteristics which impact focused attention through involvement (Zaichkowsky 1986). Extrinsic motivation creates situational self-relevance (Celsi and Olson 1988; Bloch and Richins 1983), while intrinsic motivation, or "autotelic activities" (Csikszentmihalyi 1977, chapter 2), create intrinsic self-relevance. Davis, Bagozzi and Warshaw (1991), in summarizing the motivational literature, note that extrinsic motivation applies to activities performed because they are *instrumental* to achieving a valued outcome, while intrinsic motivation applies to activities performed "for no apparent reinforcement other than the process of performing the activity." Situational and intrinsic self-relevance combine to form felt involvement which affects attention and comprehension effort (Celsi and Olson 1988). In the context of human-computer interactions, Webster, Trevino and Ryan (1993) found significant positive correlations between factors for intrinsic interest/curiosity and focused attention.

Interactivity and Telepresence. The third proposition identifies two additional antecedents:

P3: Given the presence of focused attention and perceived congruence of skills and challenges, two additional antecedents - interactivity and telepresence - will enhance flow.

The last two determinants - high levels of interactivity and telepresence - are hypothesized to increase the subjective intensity of the consumer's flow state. As noted earlier, telepresence (Steuer 1992) is the mediated perception of an environment, where "presence" is the natural perception of the immediate physical environment. A strong sense of telepresence is induced by vividness and interactivity (Sheridan 1992), as well as focused attention.

Telepresence and interactivity are important because they can increase the flow experience. Alone, however, interactivity and telepresence are not sufficient to produce a flow state. While the user of a hypermedia CME will always experience some level of telepresence and interactivity, higher levels can "boost" flow. However, feedback loops must be considered as well. When telepresence is too high (e.g, when the medium is too "hot"), then challenges may become greater than skills and flow cannot be achieved (Lang 1992; McLuhan 1964; Steuer 1992).

Implications. For marketers, Propositions 2 and 3 suggest that flow is not a constant state. Consumers move in and out of flow, as a function of control, content, and motivational characteristics. To some extent all of these may be influenced by marketing activities. The congruence of skills and challenges is something that can be facilitated by interface design. For example, a user-specified "difficulty level" can be designed to avoid anxiety in novice users and boredom in experienced users. As noted, lack of congruence may lead the consumer to exit the CME. Thus, it is important to provide opportunities for consumers to actively select activities which create congruence. Content characteristics, such as interactivity and vividness, which lead to telepresence, can be directly affected through product design considerations including hardware, software, and hypermedia content. Motivational characteristics, specifically the

distinction between extrinsically and intrinsically motivated consumers, are an important segmentation basis. We explore these at length in the next set of propositions.

Two Categories of Flow

Our next set of propositions identify and characterize two distinct categories of flow, which we call "Goal-Directed" and "Experiential" flow. Both categories involve congruent, above threshold, skills and challenges. In the next series of propositions, we discuss how the categories differ in terms of consumer orientation, involvement, motivation, search, and benefits. Then, we examine the impact of search motives, external memory, decision making, and adoption patterns on the two types of flow.

We have previously distinguished between extrinsic and intrinsic motivation, which is one dimension differentiating Goal-Directed (extrinsic) and Experiential (intrinsic) flow. Following the characterization of flow as an intrinsic reward for participation in an activity (Csikszentmihalyi 1977; Deci and Ryan 1985), Graef, Csikszentmihalyi and Giannino (1983) found greater positive experiences for intrinsically motivated activities than for extrinsically motivated experiences. However, Mannell, Zuzanek and Larson (1988) found exactly the opposite results, with extrinsically motivated experiences producing greater positive affect and congruence of skills and challenges than intrinsically motivated experiences. We propose that there are two major categories of flow, and develop this distinction and its implications in the following set of propositions.

Dimensions characterizing flow states. Our fourth proposition specifies five dimensions along which the Goal-Directed and Experiential flow states can be differentiated:

P4: There are two major types of flow: Goal-Directed Flow and Experiential Flow, characterized by:

Goal-Directed Flow		*Experiential Flow*	
instrumental	*vs.*	*ritualistic*	*orientation*
situational	*vs.*	*enduring*	*involvement*
extrinsic	*vs.*	*intrinsic*	*motivation*
directed	*vs.*	*non-directed*	*search*
utilitarian	*vs.*	*hedonic*	*benefits*

In the communications literature, a distinction has been made between instrumental and ritualistic orientations to media (Rubin 1984; Rubin and Perse 1987). Ritualized orientations focus "more on the medium, rather than on particular content," are "associated with diffuse motives (e.g., pass time, habit, relaxation)," and are a "less intentional and nonselective orientation, a time-filling activity" (Rubin and Perse 1987). In contrast, instrumental orientations are "more intentional and selective," reflecting "purposive exposure to specific content." The distinction between instrumental and ritualized orientations bears considerable resemblance to the classification of expected benefits in the marketing literature into utilitarian and hedonic/experiential benefits (e.g., Havlena and Holbrook 1986; Srinivasan 1987), which as we noted earlier are, respectively, extrinsically and intrinsically motivated.

We can also differentiate flow states on the basis of involvement and search behavior. Currently, most commercial Web sites provide information rather than offering an opportunity to purchase a product. Using a typology of commercial Web sites proposed by Hoffman and Novak (1995), Kaul (personal email communication April 27, 1995), found that only 18% of a random sample of 290 Web sites served as "online storefronts." The remaining 82% were informational or image-based "Internet presence" sites, or directories of other commercial sites. Given this distribution, much of consumer search activities are likely to involve what has been termed "ongoing search" rather than "prepurchase search" (Bloch, Sherrell, and Ridgway 1986). Similarly, Biehal and Chakravarti (1982, 1983) distinguish between directed and non-directed learning. Bloch, Sherrell & Ridgway (1986) note that ongoing search will be a function of enduring involvement with the product (or with the CME), while prepurchase search will be a function of situational involvement with the purchase.

Thus, Goal-Directed flow activities in a CME are instrumental and utilitarian in nature, extrinsically motivated, characterized by situational involvement, and result in directed search and learning. In contrast, Experiential flow activities are ritualistic and hedonic, intrinsically motivated, characterized by enduring involvement, and result in nondirected search and learning. For example, the corporate buyer using CommerceNet to close a deal for computer components will experience a high-challenge, extrinsically motivated instrumental Goal-Directed flow state. On the other hand, "netsurfers" exploring the Web in their daily quest for the latest interesting sites will experience a low-challenge, intrinsically motivated ritualized Experiential flow state. It is important to recognize that consumers will engage in both Goal-Directed and Experiential flow activities, and that the optimal design of a CME site differs for each type of flow.

Search motives. The fifth proposition recognizes that distinct search motives can be linked to the type of flow and the object of involvement. The search motives of Goal-Directed and Experiential flow are quite distinct.

P5: Goal-Directed vs. Experiential Flow activities depend on distinct search motives combined with the object of involvement:

Search Motive:	*Involvement:*	*Flow:*
task completion	*situational involvement with **goal** -->*	*Goal-Directed*
prepurchase deliberation	*situational involvement with **product** -->*	*Goal-Directed*
build information bank	*enduring involvement with **product** -->*	*Experiential*
opinion leadership	*enduring involvement with **product** -->*	*Experiential*
recreation	*enduring involvement with **process** -->*	*Experiential*

Proposition five specifies a variety of motivations consumers may have for searching in a CME, and expands upon Proposition four. First consider Goal-Directed flow, characterized by situational involvement and directed search. In general, a CME user is involved with a specific task completion goal. Marketers are particularly concerned with understanding the prepurchase deliberations for product purchase goals. However, search motives in Experiential flow are more varied. First consider the situation where the consumer exhibits enduring involvement with a product or product category. Bloch, Sherrell and Ridgway (1986), Biehal and Chakravarti (1982, 1983) and Bettman (1979) indicate that consumers may search to build an information bank or knowledge base in memory, for potential future use. Another motivation for information acquisition and search is opinion leadership. Richins and Root-Shaffer (1988)

found that enduring involvement (occurring in Experiential flow) led to opinion leadership, while situational involvement did not. Thus, an opinion leader may be motivated to search and engage in Experiential flow activities in order to disseminate product news, advice, and personal experience via word-of-mouth. Now consider that consumers may be involved with the CME itself. Bloch (personal email communication, April 12, 1995) suggests that there will likely be two segments of consumers who navigate a CME - 1) those who exhibit enduring involvement with an interest area, and 2) those who are navigating because they exhibit enduring involvement with computers. We propose the latter segment is engaged in nondirected search for recreational purposes (Bloch, Sherrell and Ridgway 1986; Csikszentmihalyi 1983; Miller 1973).

Thus, Experiential flow is relevant for 1) word-of-mouth strategies based upon influencing opinion leaders, 2) providing entertainment and recreation, and 3) enhancing consumers' product knowledge, while Goal-Directed flow is relevant for task-specific use of a CME such as prepurchase deliberation. This distinction is critical, suggesting that marketers should take care to focus not only on Goal-Directed flow activities (e.g. product purchase), but also on nondirected Experiential flow activities (e.g. net surfing) which are strategically important, as well.

External memory. Proposition six notes that a CME can provide devices for "external memory," such as bookmark files or "hotlists" that hold custom lists of consumers' favorite Web sites, as well as comparative information about brands (e.g. in the form of product reviews), directly retrievable through an online storefront.

P6: Although information gained from Goal-Directed flow search activity is more accessible in memory than that from Experiential search activity, CMEs provide devices for "external memory" which negate this advantage.

Biehal and Chakravarti (1983) found that information retrieved from directed search (Goal-Directed flow) had greater memory accessibility than information retrieved from nondirected search (Experiential flow). Further, the likelihood of choosing a brand for which information was acquired during directed search was not significantly different than the likelihood of choosing a brand when information about the brand was externally available; in both situations the choice likelihood was greater than when brand information was acquired through nondirected search. However, the external memory devices present in CMEs imply that information retrieved from non-directed search should have a greater impact on subsequent consumer choice behavior than in traditional environments, to the extent that the external memory devices are used by the consumer.

Decision making. We also distinguish Goal-Directed and Experiential flow on the basis of consumer decision and choice processes. Most consumer choice and decision making research in marketing deals with activities directly involving or motivated by product purchase (e.g. Payne, Bettman and Johnson 1993). While theories of problem solving behavior have been developed for extensive, limited and routine problem solving scenarios (e.g. Howard 1989), all three scenarios are typically motivated by a purchase outcome. In a CME, however, the process of network navigation continually confronts the consumer with an ongoing series of decisions, which are potentially, but not necessarily, related to a purchase outcome or other task completion.

In the case of Experiential flow, "activities are not guided by goals or outcomes, but by the process itself" (Bloch, Sherrell and Ridgway 1986). Similarly, Deci and Ryan (1985, pp. 155) note that for intrinsically motivated individuals engaged in flow, choice is "intuitive and spontaneous," and does not involve conscious, deliberate decisions. Consumer choice in Goal-Directed flow will be based upon a clearly definable goal hierarchy, and movement through this goal hierarchy will involve choices among products/services, information sources, and navigational alternatives. Consumer choice in Experiential flow will be dominated by choices among navigational alternatives, and correspond to a relatively unstructured, and continually changing, goal hierarchy.

P7: While existing models of adaptive decision making can explain much of Goal-Directed choice in a CME, they will hold relatively lesser applicability to choice in Experiential flow. In addition, CMEs provide devices which augment the individual decision processes with input from communal or machine agents.

Choice in Experiential flow primarily involves an ongoing series of decisions of "what to do next." This is a highly unstructured activity, and as noted in Proposition 4, corresponds to an intrinsically motivated, ritualistic, hedonic use of the CME. Nonetheless, a key assumption of the sort of adaptive decision behavior expected in Goal-Directed flow - "that people are motivated to use as little effort as necessary to solve a problem" (Payne, Bettman and Johnson 1993, p. 13) - would realistically hold in nondirected Experiential flow as well. Thus, in deciding among navigational alternatives, heuristics and noncompensatory decision rules would most likely be applied in Experiential flow activities. However, relatively little research exists dealing with choice behavior during Experiential activities, so one must be cautious and not overly depend upon Goal-Directed decision strategies to provide explanations of consumer choice. We liken Experiential flow activities to navigating through an amusement park where the visitor is presented with a wide array of ride choices in a nonlinear fashion.

It may well be that for Experiential flow activities, outcome variables which are broader in scope than choice should be investigated. For example, Holbrook and Gardner (1993) have argued that *duration time* is a critical outcome measure of consumption experiences, and Olney, Holbrook and Batra (1991) have used viewing time as a dependent variable in a model of advertising effects. Indeed, duration times are a useful behavioral indicator of Experiential vs. Goal-Directed orientations. For example, 43 percent of all calls to the French Minitel system are for the electronic telephone directory (a Goal-Directed activity), but account for only 21 percent of total connect time. On the other hand, while only 6 percent of all calls to Minitel are for the "chat" services (an Experiential activity), they account for 15 percent of total connect time (Cats-Baril and Jelassi 1994).

In structured decision environments such as an online storefront offering a variety of goods, the strategies typically applied by consumers in traditional environments (e.g., Payne, Bettman and Johnson 1993, chapter 2), are likely to be used. However, these strategies will be augmented by powerful decision aids (e.g. Payne, Bettman and Johnson 1993, chapter 7) that are feasible only in a CME. At the most basic level, these decision aids involve information displays that increase the consumer's processing capacity, while more sophisticated approaches use decision support systems to assist the decision maker. Both of these categories of decision aids

are local rather than network-based, in that they involve only information presented at a given location in a CME.

Intelligent interface agents (e.g., Maes 1994) provide a network-based decision aid, particularly useful for vastly enhancing the consumers' ability to perform search activities by reducing information overload. An example of a rudimentary agent present on the World Wide Web is the Lycos search engine (1995)**,** a robot program that automatically traverses the World Wide Web in search of hypermedia documents, and stores and categorizes them in an extensive and rapidly growing data base. The Lycos data base contains over 4 million documents, as of June 1, 1995, four times as many as six months previous.

While agents have been portrayed in the popular media as engaging in semi-autonomous, high-level, human-like interactions, "the most successful interface agents are those that do not prohibit the user from taking actions and fulfilling tasks personally" (Maes 1994). Thus, agents can serve as effective decision aids in an information intensive environment. One promising approach in a networked environment like a CME are collaborative interface agents (Lashkari, Metral, and Maes 1994; Hill, Stead, Rosenstein and Furnas 1994; Shardanand 1994) which combine decision aids *across* a segment of similar consumers, rather than relying upon a single consumer's input.

Developmental patterns of flow states. Our eighth proposition has important implications for the adoption of CMEs:

P8: Experiential flow activities will dominate a user's early interactions in a CME; over time this will evolve to also include Goal-Directed flow activities.

We anticipate that early interactions in the hypermedia CME are characterized by a non-directed, "time-passing," ritualistic quality. Over time, ritualistic use evolves into instrumental use as consumers accumulate experience navigating within the medium. A greater degree of technical skill is required to successfully perform Goal-Directed activities than Experiential activities. Experiential activities, where the consumer experiments and becomes familiar with the CME, will be accompanied by an increase in skills that the consumer develops to meet the challenges presented by the environment. In other words, learning occurs and consumers begin to seek higher challenges. Thus, an instrumentalized orientation is likely to dominate a consumer's later interactions in the environment, although both orientations may be present at different points in time, depending on consumer characteristics.

This discussion has important implications for the adoption of CMEs, particularly for those seeking the "killer application." Proposition 5 suggests that Goal-Directed flow activities, such home shopping and home banking, are not likely to be attractive to new users of a CME. On the other hand, Experiential flow activities, such as browsing online magazines, simple chat rooms, and exploration of a Web corporate home page for a topic with which the consumer exhibits enduring involvement, would be attractive to new users and will stimulate adoption.

Individual Differences

Our next set of two propositions deal with individual differences in the flow experience in CMEs. A fundamental assumption dealing with consumer heterogeneity is introduced first:

P9: Consumers are heterogeneous in their ability to experience flow in a CME.

Csikszentmihalyi (1977, p. 21-22; 1990 p. 83-90) has described the "autotelic personality," noting that flow experiences tend to occur more frequently for people who are responsive to intrinsic rewards, and later suggests (Csikszentmihalyi 1988) that the ability to experience flow may be learned in the family, developed through practice, or may even have a neurological component. Whatever the underlying explanation for the individual differences, Ellis, Voelkl, and Morris (1994) found that considerable variation in subjective experience was explained by variables which indicated the autotelic nature of the person, over and above the variance explained by the perceived congruence of skills and challenges. For marketers, the crucial implication is that the relative likelihood that an individual will experience flow is an important segmentation basis in a CME.

We also anticipate that individuals possessing the autotelic personality trait will have a higher optimal stimulation level (OSL). The fundamental idea of OSL theories (e.g. Zuckerman 1979) is that an intermediate level of stimulation corresponds to the most favorable affective reaction. Further, there are individual differences in the OSL, with individuals having a higher OSL exhibiting increased curiosity-motivated behavior, variety seeking, and risk taking (Steenkamp and Baumgartner 1992) and exploratory behavior (Raju 1981; Raju and Venkatesan 1980; Zuckerman 1979). Holbrook and Gardner (1993) found the duration time of consumption of an experiential good to be related to an optimal arousal level, which has clear implications for consumer behavior in a CME.

As flow in a CME requires the congruence of above-threshold skills and challenges, those individuals with low optimal stimulation levels will be more likely to experience anxiety in their initial interactions with a CME, as they will be overwhelmed by the wide variety of options available to them, and perceive their skills to be well below the challenges of the task. Further, individuals with low OSLs who have mastered the basics of network navigation will also be more likely to later become bored with a CME, as they will relatively less likely to seek out sufficiently high challenges to maintain congruence with their increasing skills. Thus:

P10: Individuals more likely to experience flow in a CME will have a higher optimal stimulation level than those who are less likely.

Consequences of Flow

The final set of propositions address consequences of flow. We propose that there will be a number of positive consequences of flow in a CME. Specifically, consumers who experience the flow state in a hypermedia CME will achieve increased learning, increased perceived behavioral control, increased exploratory and participatory behavior, and positive subjective experiences. Support for these positive consequences are detailed below. We conclude this section with a brief discussion of potentially negative consequences of flow.

Propositions 11 through 15, seen in the context of the network navigation model in Figure 6, contrast consumers who experience the flow state vs. those who do not. These propositions apply both to 1) heterogeneity *across* consumers according to their ability to experience flow, as in Proposition 9, and 2) heterogeneity *within* consumers according to whether flow is experienced, following the antecedents described in Propositions 2 and 3. Thus flow is viewed as both a trait and a state, much as Webster and Martocchio (1992) viewed playfulness as both a trait and a state. Note that other researchers have viewed positive mood as both a trait and a state (e.g. George 1989; 1991).

Increased learning. Playfulness (Webster & Martocchio 1992; Miller 1973) and flow (Webster, Trevino and Ryan 1993) have been found to relate to learning. In addition, as noted before, early ritualized use of a CME, (i.e. "scanning," "exploring," and "wandering" Canter, Rivers, and Storrs 1985) will facilitate learning needed to progress to instrumental usage involving "browsing," and "searching" (i.e., purposive search behavior to identify on-line vendors selling products or services desired by the consumer). Flow is positively correlated with perceived communication quantity and effectiveness. Webster, Trevino, and Ryan (1993) suggest that since consumers develop and apply their abilities through exploratory behaviors that characterize flow interactions, learning is a reasonable outcome of the flow state.

P11 : Consumers who experience the flow state will be more likely to retain more of what they perceive than consumers who do not.

In addition to the five dimensions specified in Proposition 4, the distinction between directed and nondirected learning (Biehal & Chakravarti 1982, 1983; Bettman 1979) further differentiates Goal-Directed and Experiential flow. In Experiential flow, ongoing, nondirected search produces latent learning (Hilgard & Bower 1966, pp. 199-200), in which the consumer learns about the environment, "even if the specific knowledge gained has no direct relevance to current purchases (Bettman 1979, p. 88)". In Goal-Directed flow a product choice decision or specific task completion is the primary goal for learning. Proposition 9 implies that Goal-Directed flow would lead to more informed decisions, while Experiential flow would lead to greater recall and word-of-mouth activities.

Increased perceived behavioral control. Perceived behavioral control (PBC) is a component of Azjen's theory of planned behavior (Azjen 1988; 1991; Ajzen and Driver 1992; Doll and Ajzen 1992; Madden, Ellen and Azjen 1992), and provides an extension of the well-known theory of reasoned action (Azjen and Fishbein 1980; Fishbein and Azjen 1975). The extended theory of planned behavior is useful for predicting behaviors which are not under complete volitional control. Similar to the original expectancy-value model, the theory of planned behavior posits that the conceptually independent determinants of attitudes toward the behavior, subjective norms with respect to the behavior, and a new component, *perceived control over the behavior*, affects behavioral intentions, as well as directly affecting behavior. In other words, in this extended formulation, usage of a hypermedia CME (for those individuals with the prerequisite technology), depends jointly on motivation (intentions) and ability (behavioral control).

PBC (cf. Bandura's 1977; 1982 earlier notion of "perceived self-efficacy") can also be interpreted as a confidence construct, and is an important determinant of CME usage because such behavior is strongly influenced by consumers' confidence in their ability to perform it.

Note, however, that opportunities and resources available represent consumers' *real* control over CME usage; given the required opportunities and resources, along with intentions, we expect consumers to realize this usage. Yet, theoretically, and not surprisingly, a consumer's *perception* of behavioral control over CME use and its impact on intentions and actions is more important than real control (Azjen 1988).

Flow has been found to significantly correlate with perceived control (Ghani, Supnick and Rooney 1991). Webster, Trevino and Ryan (1993) defined control as one of four dimensions of flow, and found it significantly correlated with two of the other three dimensions (curiosity and intrinsic interest, but not attention focus).Webster and Martocchio (1992) found a significant correlation between microcomputer playfulness and self-rated computer competence.

P12: Consumers who experience the flow state in a hypermedia CME will have greater perceived behavioral control than those who do not.

Because the hypermedia CME is, first and foremost, an interactive environment, it affords the foundation for consumer control that is impossible in traditional, passive media. This sense of control manifests itself through interactivity, as the consumer perceives the ability to adjust the CME and observe the results of those adjustments based on his or her input. Control comes from both the consumer's perception of their ability to adjust the CME, plus their perception of how the CME responds to their input. This adjustment takes the form of network navigation. The consumer has the ability to navigate anywhere within the medium that is the CME network. Further, another aspect of consumer control in a hypermedia CME such as the Web, is that consumers can directly and actively add content to the medium. Again distinguishing Goal-Directed and Experiential flow state, Proposition 12 implies that Experiential flow will result in increased PBC over network navigation, while Goal-Directed flow will result in increased PBC over task completion. As the former is a prerequisite for the latter, Experiential flow facilitates the learning necessary, according to Proposition Five, to "move up" to Goal-Directed flow activities.

Increased exploratory behavior. Webster, Trevino, and Ryan (1993) showed that flow is correlated positively with perceptions of software flexibility and modifiability, and experimentation. Other researchers have found that higher levels of playfulness or flow in human-computer interactions correlated with higher experimentation (Katz 1987; Ghani, Supnick and Rooney 1991; Ghani and Deshpande 1994). This argues for a flexible hypermedia environment that encourages exploratory behavior on the part of consumers. Since flow is also positively correlated with expectations of future computer interactions and the actual use of technology, CMEs that facilitate flow are likely to reap the rewards of increased repeat visits and longer times at each visit.

A "playful" hypermedia CME makes it more likely that consumers will be more exploratory. In general, then, we propose that:

P13: Consumers who experience the flow state in a hypermedia CME will exhibit more exploratory behaviors than those who do not.

Implications of increased exploratory behaviors are increased risk taking in Goal-Directed flow (Steenkamp and Baumgartner 1992, Raju 1980) and broader exposure to content in Experiential flow. Further, increased exploratory use has been found to lead to greater extent of use (Ghani and Deshpande 1994).

Increased positive subjective experiences. Webster, Trevino and Ryan (1993) note that research has suggested that "higher playfulness results in immediate subjective experiences such as positive mood and satisfaction" (Csikszentmihalyi 1977; Levy 1983; McGrath & Kelly 1986; Sandelands, Ashford and Dutton 1983). Previous research on human-computer interactions (Sandelands and Buckner 1989; Starbuck and Webster 1991; Webster and Martocchio 1992) has shown that higher degrees of pleasure and involvement during computer interactions lead to concurrent subjective perceptions of positive affect and mood. A study conducted by Gardner, Dukes and Discenza (1993) showed that the more people use computers, the more their self-confidence with respect to computers increases. This in turn causes more favorable attitudes toward computers. Csikszentmihalyi (1977 p. 36) notes that "people seek flow primarily for itself;" thus flow itself serves as a positive reinforcer which increases the probability of future usage of a hypermedia CME.

P14: Consumers who experience the flow state in a hypermedia CME will exhibit more positive subjective experiences than those who do not.

Together, positive subjective experiences and the increased perceived behavioral control resulting from flow will feed back into the planned behavior model discussed earlier, increasing the probability that the CME will be used in the future. Webster, Trevino and Ryan (1993) found flow to be positively correlated with expectations of future voluntary computer interactions. Thus, we anticipate that the positive affect generated by flow will translate into longer duration time spent visiting a CME, and increased repeat visits.

The positive subjective experience of flow has also been linked to a distortion in time perception (Csikszentmihalyi 1977), where the consumer is unaware of the passage of time. Hauser, Urban Weinberg (1993) provide a model of how in the presence of time pressure, the allocation of search time to negative information sources increases, while in the absence of time pressure, the allocation of search time to positive information sources increases (see also Svenson and Edland 1987; Wright 1974; Kanouse and Hanson 1972). Thus,

P15: To the extent that the flow state reduces time pressure and increases time spent at the site, it will contribute to relatively greater time allocation to searching positive information sources.

Given the tendency of computer-mediated environments to encourage negative word-of-mouth, actions that marketers can take to facilitate positive search behavior become particularly important.

Negative consequences of flow

There are some potentially negative consequences of flow that must be considered. Since flow can be its own reward, consumers may explore a CME for its own sake, rather than purposively search for specific information. Thus, too much flow may distract the consumer from purchase-related activities. As noted by Webster, Trevino and Ryan (1993), playfulness may produce longer time to task completion (Bateson 1955; Miller 1973; Sandelands 1988); at an extreme, "playful computer systems may be so enjoyable that employees neglect other tasks." However, if one marketing objective of a hypermedia CME is to encourage the consumer to spend time at the site, examining product-related information for example, then this is not necessarily a problem. Flow has also been linked to over-involvement (Csikszentmihalyi 1977), leading to mental and physical fatigue. A related source of cognitive fatigue stems from the overwhelming complexity inherent in global hypermedia content (Gygi 1990).

5) Methodologies and Data Sources

Having outlined a conceptual framework and a series of propositions, the next stage is a program of research to test these propositions. The Web offers a versatile, open-access laboratory environment that academic researchers can use to test these and other propositions about marketing in CMEs. In this section, we outline methodological approaches and data sources that can be used to test the series of propositions. The methodologies fall under three categories: 1) observational data, 2) experiments, and 3) quantitative and qualitative survey research.

Observational Data

Each Web server provides a detailed "access log," containing complete information on which "pages" on the server's host computer were visited, when they were visited, the duration time of visits, and the address of the user's computer. Recently released Web servers also provide information on which Web site the user previously visited, along with the user's browser software. Increasingly, commercial Web sites require "authentication" or registration in which the user must "sign in" with an ID to enter the site or "sign out" with an ID in order to purchase from a site. Thus, in some cases, the Web server log can also track a particular customer's behavior over time.

Such access logs bear direct similarities to scanner data, although server access logs provide much richer detail of information on consumers' search processes. In cases where a purchase outcome variable is present, the longitudinal data contained in the access log is well suited to standard techniques applied to consumer transaction data bases, such as logit, probit, hazard, and diffusion models (e.g. Little 1994). When purchase information is not present, the transitions among documents can be modelled with techniques similar to those applied to brand switching matrices (e.g. Novak 1993; Grover & Srinivasan 1987; Kannan and Sanchez 1994) or more general network models (e.g. Canter, Rivers and Storrs 1985).

While server access logs provide complete detail on a particular Web site, for all consumers who have visited the site, access logs do not provide complete detail, for a sample of consumers, on all Web sites they have visited. To provide this detail, browsers can be developed which measure the individual "clickstreams" (Mandese 1995) of a panel of consumers

and forward this information to the researcher on an ongoing basis. Such browsers would be similar to "people meters," in that a panel of consumers would use browsing software which kept track of all activities engaged in by the users.

Experiments

Online experiments conducted over the Web can be used to test many of these propositions. Note that there is an important distinction with previous experimental approaches. Some computer-based experiments (e.g. Burke et al. 1992, Hauser, Urban and Weinberg 1993) are used to simulate "real world" behavior," while others, such as Mouselab and information display boards (e.g. Payne, Bettman and Johnson 1993) provide a controlled laboratory environment. Experiments performed in a CME actually take place in the "natural environment," so that generalizability is easier to achieve.

The statistics provided by server access logs will be of some use in data collection for online experiments. However, due to differences in access speeds and the inherent variability in document transfer times, it would be desirable to increase experimental control by copying the contents of a site to a local server. In addition, "experimental" Web browsers (e.g. Hill, Rosenstein and Stead 1994) can be written which either capture or present additional information to the user.

The increasing sophistication of Web browsers will facilitate the development of online experiments. Sun Microsystems recently released its "HotJava" Web browser (Sun Microsystems 1995), which can execute "applets," interactive applications written in the Java programming language, which "migrate transparently over the Internet accessible by anyone using the HotJava browser." Methodologies such as Csikszentmihalyi's Experience Sampling Method, for example, can be readily implemented with applets that prompt users participating in a study at random intervals and present a series of questions to be answered. In addition, a number of browsers based upon VRML - Virtual Reality Markup Language - are also in development (e.g. Eubanks, Moreland and Nadeau 1995). VRML is a developing standard for describing interactive three-dimensional scenes delivered over the Internet. Clearly, VRML has the potential to dramatically increase telepresence and perceptions of flow.

Quantitative and Qualitative Survey Research

Fill-out forms, or online surveys, have been in use for some time on the Web as a way of collecting consumer survey data (e.g. GVU Center 1995; SRI International 1995). Fill-out forms present a neatly formatted survey on the consumer's browser, and the consumer uses his or her mouse to click off answers and submit the survey to the host server. Online surveys can be readily used in conjunction with observational and experimental data to collect rating scale data. In addition, qualitative research can also be conducted in a CME. Researchers (Chakravarti et. al 1995) have explored the use of electronic focus groups to gather information.

6) Discussion and Conclusion

In this paper, we introduced marketers to the revolutionary new medium defined by hypermedia computer-mediated environments, of which the World Wide Web on the Internet is the current networked global example. We argued that hypermedia CMEs provide greater

consumer control and are more accessible, flexible, and sense stimulating than either traditional media or interactive multimedia, owing to the synergistic effects of their unique characteristics, including machine-interactivity, telepresence, hypermedia, and network navigation. We further proposed that by its nature, the Web requires the development and application of a new conceptual foundation for understanding the role of marketing in this new medium.

To that end, we developed a new process model of network navigation within the medium, built upon an extended concept of flow. From this model, we derived a series of fifteen testable propositions that specify expected relationships and conceptual links among important marketing variables, and may form the basis of a rich and detailed research program.

We have argued that the hypermedia CME represents a fundamentally different environment for marketing activities compared to traditional media and interactive multimedia. The many-to-many communication model turns traditional principles of mass media advertising (based on the one-to-many model of Figure 1) inside out, rendering blind application of marketing and advertising approaches which assume a passive, captive consumer impossible. Thus, marketers must consider carefully the ways in which advertising and communication models may be adapted and reconstructed for the interactive, many-to-many medium depicted in Figure 3. In that new communication model, consumers actively choose whether or not to approach firms through their Web sites, and exercise unprecedented control over the management of the content they interact with.

The opportunity for customer interaction in the hypermedia CME is also unprecedented. This can be utilized in numerous ways, including 1) the design of new products; 2) the development of product and marketing strategy, and 3) the innovation of content. The evolution of content in a hypermedia CME is dependent upon not only the evolution of existing metaphors and communication codes from traditional media, but also new techniques and conventions inherent in the possibilities of the medium itself (Biocca 1992). One implication of this is that the content that will make hypermedia CMEs commercially successful has likely not been invented yet, and may require more than a simple continuous innovation of existing content (Grossman 1994).

As evidence that a discontinuous evolution in content will be required to fuel the growth of hypermedia CMEs, witness the difficulties experienced in applying traditional content to alternative new interactive multimedia, such as pay-per-view, video-on-demand, and interactive TV. Few applications have yet to meet with consumer acceptance in test markets, and even fewer have come online in any significant way (Schwartz 1994; Markoff 1994). To generate and evaluate "future content," the consumer must somehow be placed in a future frame-of-reference. Promising product development techniques include Information Acceleration (Urban, Weinberg & Hauser 1994; Hauser, Urban and Weinberg 1993), and virtual reality and role-playing "informances" approaches being developed at firms such as Interval Research Corporation (Kirkpatrick 1994).

We have proposed that flow will lead to increased quality time in the hypermedia CME. Thus, content developers should seek to facilitate the flow experience, as it has numerous positive consequences. One important consideration is whether and at what point in the process consumers are likely to become bored (e.g. when network navigation is not sufficiently challenging) or anxious (e.g. when network navigation is too difficult), increasingly the likelihood of "site jumping."

Note that because consumers vary in their ability to achieve flow, new bases for market segmentation will be needed for marketing in hypermedia CMEs. Scholars must determine the variables that relate to a consumer's propensity to enter the flow state. Such information can be used to develop marketing efforts designed to maximize the chances of the consumer entering the flow state. Since we believe that repeat purchasing behavior, that is, repeat visits to a hypermedia CME, will be increased if the environment facilitates the flow state, the marketing objective at trial will be to provide for these flow opportunities.

Pricing strategy is relevant here. Commercial online service pricing models are largely based upon connect time and usage charges. Such schemes have the effect of discouraging usage and, increasingly, consumers are demanding flat-rate pricing schemes. In the short run, flat-rate systems encourage consumer experimentation and system use (National Academy of Sciences 1994, Chapter 5). Continued use feeds demand because, as the anecdotal record shows, usage tends to be "addicting." This suggests that pricing algorithms that encourage browsing in a hypermedia CME will encourage usage (Hawkins 1994). In the long-run, usage-based pricing may be more appropriate as the hypermedia CME matures as a medium, becoming as ubiquitous as the telephone (National Academy of Sciences 1994, Chapter 5).

In sum, the new medium-as-market represented by the hypermedia CME, of which the World Wide Web on the Internet currently stands as the preeminent prototype, offers a working example of a many-to-many communication model where the consumer is an active participant in an interactive exercise of multiple feedback loops and highly synchronous communication. As such, it offers dynamic potential for growth, development, and indeed, a virtual revolution (e.g., see Godwin 1994a) in both the way marketing academics and practitioners alike approach the problem of effective, consumer-oriented marketing in emerging media environments.

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