

A NEW FRAMEWORK FOR INTERACTIVITY: MAKING RESEARCH ON INTERACTIVE COMMUNICATION MORE COMPARIBLE

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Abstract

Interactive communication is an interesting topic for various research disciplines. This makes the concept a multidisciplinary concept. The increase in interest can be explained in accordance with the introduction of new media (primarily the internet), because these have changed the communicative environments significantly. However, the concept is also interesting because of the continuous debate about its definition, or lack thereof. This article starts with an explication of a discrepancy in usage of the term interactivity and moves from there to introduce a new framework. This framework can be used to make previous and future research of interactive communication better comparable and puts contemporary conceptualizations and operationalizations in a new perspective. Key in this framework is a 3x3 matrix that distinguishes between moment-specific classification and research perspectives. The framework will make similarities and dissimilarities more explicit. As such, it can help ensure that researchers are talking about the same thing where it concerns interactivity.

Keywords: interactivity, classification, perspective, communication

1. Introduction

Literature on the concept of interactive communication can generally be divided in articles on conceptual constructs or definitions (e.g., Downes and McMillan, 2000; Kiouisis, 2002), changes in communication environments due to technological developments (e.g., Heeter, 1989; Jensen, 1998), and experimental studies on the effects of interactive communication (e.g., Sundar, Kalyanaraman and Brown, 2003; Rafaeli and Sudweeks, 1997). Interactivity has been indicated as a multidimensional concept (e.g., Burgoon et al., 2000; McMillan and Hwang, 2002) and research would benefit from a framework that captures this multidimensionality and allows for multidisciplinary perspectives. This article introduces a first step towards such a framework. First, a divergence in perspectives on the concept must be explicated. To do so, we introduce a 3x3 matrix that provides structure according to which conceptualizations and operationalizations can be characterized according to moment-specific classifications as well as research perspectives. Moment-specific classification allows researchers to distinguish between hypothetical postulations, actual occurrences, and relevant conclusions or interpretations. Recognition of a divergence in research level perspectives, in turn, places these classifications in their relevant contexts. Content within one specific cell is better comparable than content of various cells and the distance between cells, in turn, represents a greater divergence. This new framework can be used to further explicate specific elements of interactive communication, be helpful in the development of a constructive multidisciplinary definition, and make research results better comparable.

2. Different views on one concept

Research on interactive communication is performed in various scientific disciplines and as such builds forth on various research traditions, theories, and models. Even though interactive communication seems to have an intuitive nature (Rafaeli, 1988), it proves difficult to reach consensus on a concept definition or on the question if researchers are actually referring to the same concept (Jensen, 1998). In our field of research (science communication) views on interactive communication seem to stem primarily from communication science and computer science. As such, interactive communication is perceived as a mode of communication that contrasts or criticizes traditional models of communication, especially those on mass communication. Interpersonal communication in a face-to-face setting is frequently used as a blue-print for interactive communication – as well as for computer-mediated communication – and, in this light, face-to-face communication is sometimes suggested to be a superior form of communication (for research on modes of communication, see also Burgoon et al., 2002). Theorists on interactive communication view communication processes as significantly different from the traditional one-way and sender-receiver oriented models or theories (e.g., Lasswell, 1948; Shannon and Weaver, 1949) and distinguish between interactive and non-interactive communication formats. In general, the differences are that the flow of information is no longer one-way

and linear, but can be two-way (or multi-way) and nonlinear; for this to be possible, the roles of sender and receiver must become interchangeable and everybody becomes a participant in the process rather than a role-specific character (e.g., Hoffman and Novak, 1996; Williams, Rice and Rogers, 1988). In this line of thought, all participants can exert control of the communication process (e.g., control over sequence, pacing, content, etc.), have the availability of choice (e.g., choosing a channel on TV or a hyperlink on a website), and communication occurs in an environment that leaves room for timing flexibility (e.g., communication can be both synchronous and asynchronous) (see for examples Ha and James, 1998; Heeter, 1989; Jensen, 1998, see for reviews of the literature Downes and McMillan, 2000; Kioussis, 2002). As noted by Schultz (1999), the concept of interactive communication seems to have its origins in popular beliefs about democracy and equality. At the same time, research on interactive communication is highly interested in communication outcomes and effects, and how these can be influenced to attain specific goals (e.g., in education and persuasion). This type of research postulates that interactive communication is a superior mode of communication because it enhances information processing, attitude development and actual behavior (based on traditional theories and models such as those formulated in social psychology: Eagly and Chaiken, 1994; Petty and Cacioppo, 1986; Ajzen and Fishbein, 1980). In this light, interactive communication seems to lose its democratic character and becomes a tool that might be used to attain specific results. These fundamental differences in views on interactivity lead to a discrepancy that is difficult to bridge.

Apart from this discrepancy, however, views on interactive communication are tainted by characteristic views of scientific disciplines within which research is performed. In communication science, interactivity generally relates to human-human interaction (interpersonal) whereas, in computer science, interactivity refers to human-system interaction, which, in turn, is not considered to be communication at all in social science (Quiring and Scheiger, 2005). Of course, it must be recognized that the introduction of new media (primarily the internet) has changed our communication environment significantly. A medium now exists that performs both mass communication and interpersonal communication, seemingly at the same time. Small-scale mediated communication quickly became an increasingly important concept (McQuail, 1994). In relation to this development, Rogers (1986) remarked that interactivity was actually the most particular feature of these new media. In contrast, other researchers felt that interactivity was independent of a medium (Rafaeli, 1988). But even when we consider interactivity as independent of a medium, it must be recognized that media are increasingly being indicated as being interactive or not (e.g., television or computer games) (Burgoon et al., 2002). Indeed, in scientific literature, a lot of research on interactive communication is involved with new media and primarily with the internet (e.g., Liu, 2003; Tremayne and Dunwoody, 2001; Sundar et al., 2003). The media richness theory or social presence theory are frequent examples of theories and models that link interactivity and medium specific characteristics (e.g., Burgoon et al., 2002; Morris and Ogan, 1996; Walther, 1992). This type of research has led to the discussion that interactive communication is always mediated (e.g., Jensen, 1998; Steuer, 1992), while others consider face-to-face non-mediated communication as the highest form of interactive communication (e.g., van Woerkum and van der Auweraert, 2000).

These types of differences in opinion, divergence of views, and inconsistencies in conceptualizations are undesirable and lead to confusion in scientific research (Jensen, 1998). Various researchers have already attempted to provide a concept definition (e.g., Downes and McMillan, 2000; Kioussis, 2002), but inconsistencies remain. An early conceptualization that is frequently referred to was explicated by Rafaeli (1988). In short, Rafaeli states that interactive communication is a process where three (or more) messages are exchanged in an interrelated manner. In contemporary research, however, the number of messages exchanged (at least three) is sometimes overstated while the necessary interrelatedness remains underemphasized. Rafaeli illustrated this misconception through the example of "communication with a vending machine", where messages might be exchanged to the third degree, but nonetheless this process should not be considered to be interactive (1988, pp. 120-121). Similar misconceptions arise when interactive communication is perceived solely as a tool: conceptualizations and operationalizations in this type of research (primarily effect studies) approach interactive communication as a means to attain specific results (which is essentially sender-based thinking and a redevelopment of a hypodermic needle or magic bullet). In fact, most effect studies expect a high effectiveness of interactive communication and these hypotheses are supported by traditional theories and models. Proof of this effectiveness, however, remains somewhat ambiguous since various effect studies find conflicting results (e.g., Burgoon et al., 2002; Moreno and Mayer, 2005; Sundar et al., 2003; Vorderer, Knoblock and Schramm, 2001). Interactive communication might only be beneficial when people are willing, prepared and equipped to perform in interactive communication processes (e.g., previous knowledge, experience, and skills to cognitively process information). In this light, there seems to be an optimum level of interactivity in communication processes (Sundar et al., 2003). But how do these studies of effectiveness combine with view of interactive communication as democratic and equal? Is communication interactive even when the roles of sender and receiver are distinct (e.g., because of communication goals) but interchangeable? Or when control is not equally dispersed across participants? In summary, the most important discrepancies can be found in views of interactive communication in the perspective of democracy and equality which seems in contrast to the view of

interactive communication as a useful mode of communication to attain specific goals. But other discrepancies can be explicated (e.g., discussion on the necessity of media, or discussions on actual and perceived interactivity). Clearly, there is a high variety in views on interactive communication which has led to inconsistencies in conceptualizations and operationalizations of this concept. These inconsistencies make comparison of research results difficult (e.g., one researcher examines a communication process that is not considered to be interactive by another researcher). The framework introduced in this article provides a contextual structure within which these differences can be made explicit and at the same time allows for better comparability.

3. A new framework for interactivity

Key in this framework is a 3x3 matrix that contextualizes moment-specific aspects of interactive communication in reference to the level of perspective characteristic for the research approach. These levels are indicated as the micro (individual), meso (group), and macro (society) level perspectives.

3.1 Moment-specific classification

Communication processes (and the research thereof) are sequential and can be described as such. The first step in a contextual framework is therefore a sequential classification of interactive communication. To do so, we distinguish between moment-specific differences in conceptualizations of interactive communication, which we have labeled pre-, per-, and post-process classification (see table 1). Pre-process classifications of research on interactivity are primarily focused on expectations and theoretical postulations on interactivity in communication. This type of classification includes premises about hypothetical occurrences of interactive communication within any specific situation (for example technological features that are suggested to afford interactivity to a mediated communication process), but also any hypothetical outcomes or effects of interactivity (for example the occurrence of central processing of information). In short: in pre-process classifications the elements or characteristics of interactivity are strictly hypothetical and formulated before communication has actually occurred. All communication processes can be objectively observed and measured. Researchers can make interactive communication processes explicit by describing process characteristics objectively – looking solely at what actually happens without expectations or interpretations. This type of classification looks at actual occurrences in stead of expectations or perceptions and interpretations. It is important to notice that even under similar conditions the actual occurrences in communication processes might differ significantly; therefore this type of classification is labeled per-process classification. Per-process classifications can make use of recognized elements, features, actions, etc., as long as these can be objectively established through observation of an ongoing communication process. Bos and Koolstra (in press) have suggested an objective measurement instrument for just this type of classification.

Finally, research is interested in communication outcomes and effects, which can be measured and interpreted after the communication processes has been completed. In research of interactive communication researchers are typically interested in perceptions of participants on the level of interactivity they have experienced, or changes in attitudes, knowledge or behavior (e.g., Liu and Schrum, 2002; McMillan and Hwang, 2002; Moreno and Mayer, 2005; Sundar et al., 2003; Vorderer et al., 2001). These measurements can only be performed after the process has been completed; therefore we label this type of classification post-process classification. In some instances, measurements are also performed during communication processes (e.g., Vorderer et al., 2001), however, these measurements are not indicative for ongoing aspects, in stead, these represent outcomes and effects after communication at that time – for the purposes of measurement and interpretations this type of data is post-process data. So, what do we gain when making this type of distinction? First of all, it makes the concept of interactive communication more explicit. Second, it demands an explicit description of the various moment-specific aspects of this concept, which is useful in recognizing specific similarities and differences in conceptualizations or operationalizations in various research projects. For example, the internet (or specifically websites) is considered as being interactive, or at least as affording interactive communication. Quite a lot of research on interactive communication is concerned with communication processes that occur on the internet and especially the World Wide Web (e.g., Chung and Zhao, 2004; Liu, 2003; McMillan, 2002; Schultz, 1999; Sundar et al., 2003; Tremayne and Dunwoody, 2001). Indeed, the internet has quickly become a well established medium for various communication purposes, for example entertainment, education and advertisement. However, as a communication environment the internet offers a high variety of features, websites might be supplemented by forums, chat-rooms and e-mail. Some of these features facilitate interactive communication while others do not or at least to a lesser extent. Clearly, websites that allow people to exchange messages in chat rooms create a different communication environment than websites consist of content-static information through which people might maneuver through the usage of hyperlinks. The expectations or hypotheses concerning the extent of interactivity of one such a specific website are highly dependent on the researchers thought of that concept (see also the text on levels of perspective below) and

even under similar conditions different researchers might classify interactive communication differently before actual communication has occurred (pre-process classification). While in experimental conditions all of the website's features might be used because the preset task demands it of a user, in real life many features of a website might go unused. Actual interactive communication need not occur simply because it is made available through technological features or environmental conditions. People might simply scan the homepage without clicking on any hyperlink (even without reading any text), or they might simply retrieve information in much the same way they would from a hardcopy encyclopedia without making use of any of the features that were indicated as making that website interactive. Actual occurrences can be very different from what is expected, but can be objectively established through observation and measurement for any specific process (per-process classification). Tremayne and Dunwoody (2001), for example, made use of observations and think-aloud protocols in their research on how people process information and learn from websites. Many effect studies, logically, make use of questionnaires or interviews to perform measurements on communication outcomes and effects. For example, Sundar et al. (2003) asked people to visit websites that differed in their level of interactivity but were identical in content in an experimental setting and afterwards measured impression formation effects. These post-process classifications can differ significantly from what was expected beforehand.

Distinguishing between pre-, per-, and post-process classifications might provide more insight in the differences between conceptualizations and operationalizations of interactive communication and make comparisons across various research projects more comprehensible. For example, it might illustrate how it is possible that theories or models on communication can suggest a specific communication process to be highly interactive (and therefore attain specific results) (pre-process classification), while researchers find little or no effects at all (e.g., per-process classification showed that the process was not interactive at all, which is confirmed in post-process measurements). This type of classification might also be useful to distinguish between what people perceive as interactive communication (post-process classification) and what scientists would actually label as interactive communication (pre-process classification).

3.2 Levels of perspective

As a multidisciplinary concept, it is of little surprise that interactive communication is approached from varying perspectives. So, apart from a distinction in moment-specific classifications, it might prove useful to distinguish between different levels of perspective. In this framework a distinction is made between micro, meso and macro levels. The labels micro, meso and macro are common in social science (e.g., organizational science) and economics, but are less common in communication science. Nonetheless, we feel that these three levels of perspective provide structure to the different views on interactivity that are existent in contemporary research across the different scientific fields for which the concept is both relevant and interesting. Interactive communication, however, seems to mean something different for processes concerning individuals, groups, or society as a whole. When researchers look at how individuals perform in interactive environments it provides insight in the manner in which people process information, the relevance of previous knowledge and experience, the importance of specific skills, etc. However, when people need to perform in groups (e.g., perform specific tasks, take part in discussions, etc.) the concept of interactive communication takes on a different meaning. In the micro level perspective, for example, researchers might build forth on the idea that interactive communication leads to active participation and active processing of information, which might be beneficial for learning (e.g., Moreno and Mayer, 2005; Sundar et al., 2003; Vorderer et al., 2001). In the meso level perspective, however, researchers are more interested in how people behave within a group, or how the communication environment affects the group communication processes, etc. For meso level perspective research it is necessary to explicitly describe the group characteristics, for example according to age, sex, level of education, etc. Examples of communication processes that are of interest for the meso level perspective, are processes among self-help groups, children with mental handicaps, members of the rotary, or specific communities (e.g., Gordin et al., 1996; Oren, et al., 2000; Rheingold, 1993). The macro level perspective, in turn, is interested in communication processes that concern the general public or society as a whole (e.g., Coleman and Spiller, 2003; Comor, 2001). Generally, this means that macro level perspective research is concerned with mass (mediated) communication, for example health campaigns, political campaigns, etc. Since the new media, however, this type of communication can be performed on a smaller scale than was previously possible (McQuail, 1994). Specific elements that are adhered to interactive communication (e.g., levels of control, availability of choice, etc.) will differ significantly across these three levels of perspective. In a one-to-one communication setting the exchange of roles and control over content is much easier established than in a one-to-many or many-to-many setting.

Communication processes are social processes that happen in specific social contexts. In interactive communication processes these social conditions can be expected to be highly influential. For example, group discussions are dependent on the persons taking part in that process (e.g., dominant personality vs. weak personality) and the subject of discussion (e.g., a highly polarized subject vs. a non-controversial subject). In research projects

moving from a micro level perspective it might be possible to correct for these things through experimental conditions, however, this is much harder in meso and macro level perspective research. In fact, the social context might very well be what the researcher in these levels of perspective is interested in (e.g., comparisons between environmentalists and biotechnology professionals). Recognition of the three levels of perspective allows us to differentiate between different types of research, but also to look at sequential consequences of interactive communication moving from performances or effects on the individual, to a specific group, to society in general. This might prove illustrative for research on how people make sense of a scientific principle, not solely as an individual, but in a social context as well. Similarly, this might be useful when researching various campaigns that consist of various separate communication processes of which some are mass mediated while others are highly interactive. A student, for example, might be making a homework assignment on biotechnology. To complete that task the student will perform various communication that can be researched separately (micro level perspective), but a researcher might also be interested in group performances (how do students in that same class communicate among each other – meso level perspective), or perhaps this student is (by chance) involved in societal measurements of the public understanding of biotechnology (e.g., through the Euro barometer – macro level perspective). In any case, the student will have received information at school (education), might search for relevant information on the internet, discuss the assignment with other students, discuss the topic more generally with friends, or respond to an article that appeared in a newspaper or magazine, etc.

A previously indicated, the manner in which communication processes are labeled interactive or not is, at this time, rather subjective and case specific. Due to a lack of consensus about a concept definition, this will remain the case for some time to come. For example, should a television program, such as Big Brother, be considered as an interactive communication process? In pre-process classification the program has specific features that might be indicative for interactivity (e.g., availability of choice, a certain degree of control through voting, etc.). However, many people will actually view the program without active participation, just like most traditional (non-interactive) TV programs. In per-process classification, these instances would not be indicated as interactive processes at all. Unsurprisingly, conclusions about whether or not such a program is interactive (or to what degree) remain a point of discussion (post-process classification). At the same time, researchers might be interested in how people (individually) enjoy the possibility to interact, how groups are formed (e.g., fan clubs), or whether or not this type of programs are of influence on society as a whole (e.g., in the Netherlands the example of voting in specific TV programs (and the enthusiasm with which Dutch people participate) is currently used in a campaign to get people to vote in political context).

3.3 Freedoms and restrictions

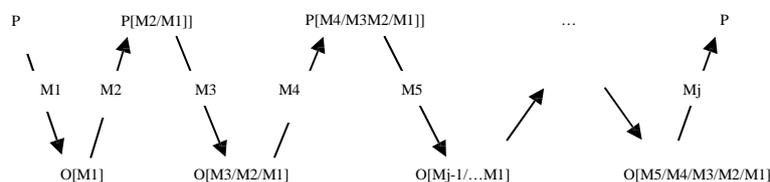
In interactive communication, as in any communication process, there are specific types of freedom and restrictions that determine to a large extent how the process progresses. Some of these conditions can be easily made explicit, for example mediated communication processes know specific restrictions that are inherent to the medium used in any specific situation. However, communication processes can also be influenced by aspects that might seem irrelevant to that particular situation or process but are still influential. Reading across the literature it becomes apparent that interactive communication necessitates a certain degree of freedom for the participants within that communication process. On some aspects of that process they might actively exert influence (e.g., choice of medium, affording a certain degree of control, etc.), on other aspects, however, they cannot. Contemporary research has primarily focused on those aspects of interactive communication that can be made explicit. Participants can exert active control over various aspects of the process or the medium used in communication (e.g., Jensen, 1998; Williams et al., 1988), they are afforded the availability of choice (e.g., Ha and James, 1998), and they exchange roles as sender and receiver (e.g., Rice, 1984). Kioussis (2002), for example, summarizes findings of these aspects in the development of a concept definition of interactive communication. Most effect studies, similarly, operationalize interactivity according to these aspects, for example by providing subjects the availability of choice or control over sequence (e.g., Moreno and Mayer, 2005; Sundar et al., 2003; Vorderer et al., 2001). However, these aspects are not necessarily interdependent in interactive communication – research on interactive communication can investigate the concept as strictly control over sequence without the aspects of control over content, for example. It might prove useful, however, to investigate the interrelations of these various aspects in context rather than separately. Freedoms and restrictions are present in any and all communication processes and might prove the link between the separately identified aspects of contemporary research. Much like the concept of third-order dependency (Kioussis, 2002; Rafaeli, 1988), the concept of degrees of freedom might prove indicative for the degree of interactivity within any communication process.

Communication processes can be afforded freedom or become inhibited through specific restrictions. These restrictions can be placed upon communication by specific persons (e.g., a manager discussing with his team), a medium (e.g., hardcopy newspapers vs. online newspapers), or case specific conditions (e.g., time, financial aspects,

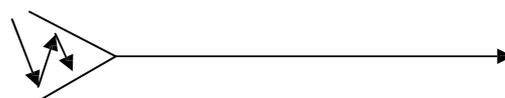
organizations structure, etc). The important thing to note, however, is that these restrictions (or freedoms) are not necessarily recognized or made explicit in research of interactive communication. In our view, a communication process without restrictions (a maximum degree of freedom) would allow for the highest level of interactivity. Similarly, the more restrictions placed upon a process, the harder it will be to establish interactive communication or high levels thereof. For example, think about the discussion on the importance of medium specific characteristics on interactive communication: a rich medium is generally considered more capable of facilitating interactive communication than a lean medium. Interactive communication as a tool is somewhat sender-oriented, in which case one participant has specific ideas on how that particular process is to develop which might be quite different from the ideas of other participants. By placing specific restrictions on the communication environment, however, one participant might steer the process but communication might be interactive nonetheless. Burgoon et al. (2002) indicated that human communication processes and outcomes will vary according to the degree of interactivity that is afforded or experienced (p. 659). In our view, the degrees of freedom determine, to a large part, the level of interactivity that is afforded within specific communication settings and predetermination of specific goals and other conditions, in turn, determine the degrees of freedom. Depending on reason for participation, people will beset specific restrictions on a communication process. As a participant, an initiator of a process will have a different mindset (e.g., different goals and expectancies) than other participants. Even though the effectiveness of interactive communication remains a point of discussion, the degrees of freedom seems indicative for the extent to which interactivity is afforded within any specific condition (see figure 1). The concept of degrees of freedom additionally provides insight in the divergence of interactive communication as an ideal (adhering ideas of democracy and equality) contrasting views of interactive communication as a tool (as previously described).

The concept is best illustrated in figures depicting the development process of ongoing communication process (see figure 1). Figure 1 shows four representations of communication processes that differ in their degrees of freedom and as such evolve differently. To emphasize the necessity of third-order dependency for interactive communication, we have included Rafaeli's (1988) figure as well (figure 1a). Regardless of this third-order dependency, however, communication processes that are interactive will proceed quite differently (note: the various figures (1b through 1c) do not represent the effectiveness of the various communication processes). Communication settings with limited degrees of freedom (or many restrictions) are less likely to attain high level and durable interactivity than situations with fewer restrictions. Figure 1b represents a communication process with many restrictions. When one participant (the initiator of the communication process for example) is highly dominant or the communication process severely restricted (for example because of time limits) there is less room for people to interact. Examples of this type of communication processes are decision making processes (where the process is highly dependent on time aspects or financial aspects for example) or structured interviews (where the interaction is restricted by the predetermined necessary outcomes). When a process is afforded a higher degree of freedom (or fewer restrictions) that process is more likely to become interactive and durable. Figure 1c depicts the progress of such communication processes. All participant can make use of the afforded freedoms and are comfortable working according to the process specific restrictions and as such are co-creating the content (and outcome) of the messages exchanged. A typical example of one such process would be an open discussion where people are expressing various opinions on a specific subject and search for a well balanced consensus. When there are no restrictions a communication process can become too interactive. In these instances people might become lost in the interactive environment and loose track of the initial intentions.

Figure 1: Communication processes according to their degrees of freedom. In figures 1b through 1d the interconnected arrows are an abbreviation of the depiction of interactive communication as depicted in



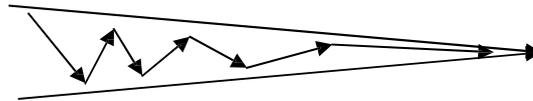
1a. Rafaeli's depiction of interactive communication (1988, p. 120).



1b. A highly restrictive communication process in which only low level interactivity can occur.



1c. A communication process with no restrictions (high degree of freedom). Although the level of interactivity within this process may be high, the process is not sufficient for all purposes.



1d. A communication process with an optimum balance between the degrees of freedom and the necessary restrictions to attain specific goals.

Figure 1d depicts communication processes that know no restrictions and are perhaps “too interactive” (if there is such a thing?). In these conditions people are not likely to reach a consensus or attain a specific result because each individual continuously makes maximum use of his or her freedom and refuses to bend to the restrictions beset by others. Of course there are situations where there is no need to be concerned with attaining specific results, coming to agreement or searching for consensus (e.g., communication between two friends). The degrees of freedom within communication processes might prove indicative for the level of interactivity afforded in communication processes and might differentiate between interactivity as an ideal (focusing on democracy and equality) and interactivity as a tool (focusing on its effectiveness).

3.4 Visualizing the new framework

All in all, the new framework consists of a 3x3 matrix that captures the multidimensional and multidisciplinary character of interactive communication (see table 1). Each cell within this matrix represents a well defined area of research where conceptualizations and operationalizations of interactivity can be expected to be most similar and best comparable. In turn, the more distant projects are, the more different they will be. As such, this framework offers a tool to ensure better descriptive comparability of conceptualizations and operationalizations which enables researchers to put varying definitions of interactive communication into perspective. The framework offers a structure for comparisons of research on interactive communication from various disciplines and perspectives. Making use of this framework will allow researchers to make a more definite distinction between prerequisites (that can be used to distinguish between interactive and non-interactive communication processes), such as the necessity for third-order dependency (Kioussis, 2002; Rafaeli, 1988), and process specific elements (that can be used to perform measurements on various aspects of interactive communication, such as determining specific levels of interactivity). Distinguishing between different levels of interactivity, and comparing these across research projects using varying levels of perspective, might be useful for future research on the effects of interactivity on communication processes, participants, and outcomes.

Table 1: 3x3 matrix of interactive communication

<i>Perspectives</i>	Micro level (individual)	Meso level (groups)	Macro level (society)
Pre-process (expectations)	General expectations concerning interactive communication at the individual level (generally based on communication models or psychology theories) e.g., interactive communication leads to central processing of information	General expectations concerning interactivity in groups e.g., when groups need to perform a specific task, communication modes that afford higher levels of interactivity will stimulate results	Expectations concerning interactive communication that include society as a whole rather than separate individuals or specified groups e.g., expected effectiveness of interactive communication to inform society on scientific developments (for example in museums)
Per-process (factual occurrences)	Aspects of communication processes that can be objectively established, measured and described (generally considered elements of interactivity, primarily focused on individual actions or technological features) e.g., one-way vs. two-way communication, stimulation of particular senses, number of participants, etc.	Objectively established, measured and described actions that occur within specified groups e.g., young students take different actions in their information retrieval behavior than elderly people in identical environments, for example a specific website	Objectively established, measured and described actions of interactive communication in societal settings e.g., public events, political or health campaigns, etc.
Post-process (conclusion and interpretations)	General conclusions or interpretations from research of interactive communication processes (both conceptual and	General conclusions that can be drawn from research on group performances in communication processes	General conclusions that can be drawn on research on interactive communication in a societal setting

	experimental) e.g., a person appreciates interactive communication more than non-interactive communication	e.g., groups efforts in task performance (e.g., finding consensus through discussion) benefit from interactive communication formats	e.g., measurements on scientific literacy or longitudinal effects of health campaigns for society's health costs
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Table 1 shows the framework and division of some example studies within type specific cells.

4. Discussion

At this time the discrepancy in concept definitions might actually be increasing rather than diminishing, simply because of the increase in interest in this concept across various research disciplines. Effect studies and communication practitioners seem to be using the term in an ever increasingly broad context. Future research is thus in need of a more stable conceptualization of interactivity and clearer definitions of its parameters (Heeter, 2000). This article introduced a framework for this purpose. The framework consists of a classification of moment-specific characteristics of interactive communication, as well as a distinction between levels of perspective on this concept. By restructuring previous and future research of interactive communication according to the suggested 3x3 matrix research becomes better comparable. The framework aids in describing conceptualizations and operationalizations of interactivity relatively precisely and in line with previous projects. It distinguishes differences and similarities in the categorized dimensions. Within academic research it is important to know relatively precisely what we are talking about and where overlap or differences might be apparent (Jensen, 1998), this framework can be used as a tool to recognize the proposed overlap as well as the differences. The framework recognizes the concept's multidisciplinary and multidimensional characteristics (McMillan and Hwang, 2002) and aims to include rather than exclude the various views on interactive communication. We recognize that it will not immediately put an end to the discussion (or search for) a concept definition, but it might provide a useful structure and helpful guidelines.

A better comparability is also useful in interpreting the results of the multitude of effect studies. At this time effect studies are characterized by a lack of consistency and comparability (Liu, 2003) that makes the proposed proof of effectiveness ambiguous at best. Research within the same cells of the suggested matrix is better comparable because they approach the concept from the same perspective. The pre-, per-, and post-process classification also makes case-specific characteristics better comparable. For example, two studies can perform research according to the micro level perspective. In their descriptions the pre-process classification of interactivity might be very similar. However, if the research consists of an experiment the per-process classifications can differ significantly. For example, research might be interested in varying aspects of interactivity as formulated in pre-process classifications, for example a summary of characteristics such as summarized by Downes and McMillan (2000) of Kiouisis (2002). Two research projects might be interested in the effects of different aspects of interactive communication on processing of information in otherwise identical conditions (e.g., effects of timing flexibility and the availability to change content) and perform experimental measurements accordingly. While the research results might not be directly comparable in the sense that they will provide information on different variables, the research approach and perspectives on the concept of interactive communication will be comparable. As such, placement of research within the matrix will uncover similarities as well as important differences, which will provide insight into the different values of varying aspects recognized within the pre-process classification.

As indicated before, there is still no consensus about the concept's definition (e.g., Heeter, 2000; Kiouisis, 2002; McMillan, 2000). The multidisciplinary character of interactivity makes it hard to develop a definition for the concept that suits any and all scientific disciplines that make use of the term. Interactivity and interactive communication has a different meaning (and research focus) in communication science than in computer science, for example. Nonetheless, both disciplines make frequent use of premises, suggestions, data, and insights on the concept of interactive communication as is apparent from discipline specific literature. As such, it might be concluded that the term may not mean exactly the same across varying disciplines but is simply closely related. Elements that are emphasized by one author (e.g., media specific characteristics) are negated or trivialized by others (e.g. focusing on message specific characteristics in stead). Not all aspects of interactivity recognized in multidisciplinary research are equally relevant for discipline specific conceptualizations or operationalizations of interactive communication. Continued usage of the term interactive communication in unstructured and individualized ways generates an increased risk of confusion and a general divergence of concept definitions. Already some authors feel the term has become diluted (e.g., Jensen, 1998; Heeter, 2000; Kiouisis, 2002). By categorizing conceptualizations and operationalizations of interactive communication, research can be made better comparable. At the same time, differences can be more easily explained according to variations in research disciplines, traditions, and perspectives. More consistency in labeling and better descriptions of the characteristics of specific cases is necessary to provide a singular basis of concept and better comparability of research results. In our view this framework can be useful in the necessary distinction between interactive and non-interactive communication, as well as insight in different levels of interactivity across varying communication processes.

To make a distinction between interactive and non-interactive communication it is useful to describe prerequisites. The best example of one such prerequisite is that of Rafaeli (1988). Recognition of a degree of interrelatedness between messages that are exchanged (at least to the third degree) makes it possible to distinguish between various processes where this does, or does not, occur. However, Rafaeli (1988) also indicated that there are examples of communication processes that seem indicative of third-order dependency (Kiousis, 2002), but should not be labeled as interactive (Rafaeli provided the example of a vending machine which was previously discussed in the above text). Additional prerequisites are necessary to minimize the grey areas between interactive and non-interactive communication processes. The example of a vending machine is characteristic of communication processes dependent on automated responses. Although the messages that are exchanged might be interrelated and interdependent, the sequence of those messages, as well as the extent of their interdependency, will remain identical across various communication processes because of this automation. More specifically, even though a person might purchase different types of products from a vending machine, the sequence of actions and message exchange will be similar, or even identical, in each separate process. Here we would like to suggest the introduction of another prerequisite to distinguish between communication processes that do reflect message interrelatedness to (at least) the third degree. Is it possible (or useful) to introduce the prerequisite of "intelligence"? The concept of intelligent communication seems highly interrelated to the discussion of interactive communication. For example, computer games with better (or higher) artificial intelligence (AI) are generally considered to be more interactive than games with no or low AI. Similarly, experiments indicate that people with better skills to cognitively process information, a higher education, and previous experience with interactive media or environments, are better capable to perform or participate in interactive communication processes (e.g. Moreno and Mayer, 2005; Vorderer et al., 2001). So, perhaps interactive communication is communication where three or more messages are interrelated and interdependent and the message exchange is, to some extent, intelligent. Of course, this brings forth the problem of establishing whether or not communication is "intelligent" or not and how the level of intelligence should be measured to make such a prerequisite useful in future research. At this time we have no easy solution for this problem and recognizing the usability of "intelligence" as a prerequisite in research of interactive communication is, therefore, beyond the scope of this particular article.

We have introduced and discussed the concept of degrees of freedom as an explanation for the dissimilarities that are found within and across concept definitions. Similar differences can be found across the cells of our 3x3 matrix. It is obvious that degrees of freedom will differ across different levels of perspective in research of interactive communication processes. Restrictions might be obvious in micro level perspective research (e.g., because of experimental conditions), however, in macro level perspective research the degrees of freedom might be more difficult to establish (e.g. indirect influences on communication processes such as time restrictions or financial aspects of decisions that are under discussion). In fact, it might be hard to prove that specific effects in society (the macro level perspective) are the result of interactive communication efforts at all. Still, the degrees of freedom might be indicative for the level of interactivity that is attainable in any specific condition. There are examples of research projects that indicate its usefulness and importance. The research of Moreno and Mayer (2005), for example, indicated that (educational) communication processes might benefit from structural guidance. However, structural guidance, in our view, refers to restrictions to the degree of freedom afforded within that specific process. As such, structural guidance might seem somewhat sender-oriented and receiver-restrictive (and as such less interactive), the actual communication process might still be interactive (e.g., two-way communication, interrelated message exchange, control over content, etc.). In a sense, inhibiting the degrees of freedom might be beneficial for both sender and receiver because people (receivers) won't get lost and are ensured to receive the (sender) relevant information. Perhaps the highest level of interactivity in communication is an unwanted commodity because it might make communication processes unnecessarily complex and durational (e.g., discussing for the sake of discussion).

Much easier to establish than a process' degrees of freedom or if it meets the prerequisites, is the recognition of specific elements of aspects that are either present or not during communication. In fact, many authors have already provided lists of such elements that are frequently used as indicatives of interactivity. For example, level of control, timing flexibility, direction of communication, number of participants, etc. (e.g., Heeter, 1989; McMillan, 2000). A combination of pre-, per-, and post-process classifications can make use of these elements in the development of various measurements instruments. Some examples: conceptual definitions as pre-process classification (e.g., Kiousis, 2002), objective measurement instruments as per-process classification (e.g., Bos and Koolstra, in press), and interpretative measurements or subject measurements (perceived interactivity) as post-process classification (e.g., Liu and Shrum, 2003). By performing such threefold measurement, combining the expectations, observations, and interpretations of various research projects, and discussing these results in a perspective relevant context, research is made comparable in its differences and similarities. Future research, making use of this framework, will continuously fill the matrix with various examples of research of interactive communication. Through these examples many of the uncertainties can be made more explicit and specific characteristics better explicated. For example, the number of participants is an element that can be described in each cell of our matrix individually or in an interrelated manner. Schultz (2000) already raised the paradox that a greater

number of participants might result in more interactions between participants (e.g., adding and changing content, multi-way communication, interchangeability or roles as sender and receiver, etc.), but this greater number also results in less time to listen to each other. Again, the various dimensions of interactivity seem to be highly interrelated, since the relation between the level of interactivity on the number of participants is interrelated and interdependent on other elements such as time (e.g., timing flexibility, pacing) and control (e.g., control over content).

In our view, the concept of content-static information deserves additional attention in the research of interactive communication. Websites, for example, are generally considered to be interactive, but we feel that content-static websites are a grey area that is between interactive and non-interactive communication. If a website is nothing more than static information that can be accessed through the internet and only allows control over sequence but offers no other facilities to a user, this website should not be considered to be interactive (e.g., Downes and McMillan's (2000) example of a comparison of online vs. hardcopy brochures). People will "communicate" (or utilize) this type of website in much the same manner they would an encyclopedia or dictionary – looking through various pages until they find the information they require. Structuring this information differently (as, for example, in the research of Sundar et al. (2003), by using different layers and hyperlinks) might require more effort from a website visitor (because he or she has to "click" more often and thus exchanges more messages) but afford the visitor no degree of actual control or interaction with the person that provided the information. A website that also makes use of facilities such as e-mail, forums, chat rooms, etc., allows a visitor to actually initiate communication with other participants in stead of solely retrieving information without any capability to communicate in an interrelated manner. On the other hand, other researchers feel that "clicking" is similar to sending an interrelated message, since it is in response to a previous message and requests interrelated additional information (e.g., Sundar et al., 2003) – hence our indication of a grey area. Perhaps this type of content-static information can be considered as interactive according to Rafaeli's (1988) prerequisite of message interrelatedness. At the same time, this type of communication seems highly automated and requires little "intelligence" (at least from one participant in the process) and can perhaps be compared to Rafaeli's (1988) example of a vending machine. Does communication remain interactive when during that process it no longer meets a prerequisite, such as message interrelatedness? If so, can people become "lost" when maneuvering in an interactive environment (for example a website) when the messages exchanged remain interrelated and interdependent? And if this is the case, what role does a person's intelligence play when participating in an interactive communication process? Do people lose their orientation because of the complexity of the content, the process, or because the message exchange loses its interrelatedness and interdependency?

We concur with Burgoon et al., (2002, p. 660): interactivity in itself is neither inherently positive nor negative. Ambiguous results from various effect studies indicate that the usability of interactive communication is case specific, depending on person specific characteristics (e.g., number of participants, educational levels, etc.), and process specific conditions (e.g., proximity, mediated or not, time passage, etc.). Additionally, the content of messages is of influence on the level of interactivity that can be attained within any specific process. Content-static message exchange (e.g., certain websites) seems indicative for low level interactivity, whereas content-variable message exchange (e.g., discussions) seems to afford higher levels of interactivity. In such cases the initial communication goals are especially important (see also the discussion on degrees of freedom and figure 1). Desirability of interactive communication is another matter entirely. Being a passive consumer of information might be something people actually enjoy or desire (Schultz, 1999; referring also to Schönbach, 1997; Vorderer et al., 1996). Approaching interactive communication as a method to attain specific results (e.g., in advertisement) refers to an undesired activation and seems sender-based-thinking rather interactive-based-thinking.

5. References

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