Augmented communication: The communicative potential of the internet

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Abstract

Sperber and Wilson's (1995) relevance theory is used as a general communication theoretical framework to describe different media technologies and explain the communication that takes place through them. Nine features are deduced that characterize media as more or less deviant from the prototypical communicative situation: face-to-face interaction. It is foreseen that the media of the future may emulate the features of face-to-face interaction so well that the extra advantages of media technologies outperform face-to-face interaction as a preferred form of communication.

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1 Introduction: Can human communication be augmented?

In 1968, J.C.R. Licklider and Robert W. Taylor predicted that it would be possible 'in a few years' to communicate more efficiently through a machine than face to face (Licklider & Taylor, 1999, p. 97). Has this profecy come true already, or will we have to wait 'a few' years more? It partly depends on what one understands by *communication* and *efficiency*. Licklider and Taylor consider the former to be the kind of cooperative interaction that leads to consensus when working with models and planning (for instance in architecture). The latter is the maximal amount of this kind of interaction for a given amount of resources. From their point of view, the prediction has come true long ago. In many contexts, computer supported cooperative work has reduced business trips to an unnecessary cost or primarily social events.

But from another point of view, communication is more than just business. If communication is seen in a broader perspective as the creation of meaning between people, and efficiency as the amount of new information that is produced for a given cognitive cost, there is probably nothing that has yet surpassed direct, interpersonal face to face communication, i.e. conversation. Dan Sperber and Deirdre Wilsons relevance theory (Sperber & Wilson, 1995) is an attempt at a precise description of how the cognitive system creates meaning and supports communication. Their claim is that meaning emerges as a product of the cognitive deductions of new information that are continuously carried out on the basis of incoming perceptual information and information already present in the focus of attention.

Their theory gives a detailed demonstration of how communication can only take place in a situation where the conversation partners have mutual access to a mass of information, the *mutual cognitive environment*. Such a mass of information is often called a 'shared context', but the notion of a context has a special meaning in Sperber and Wilson's theory, and will be used here in accordance with that. It is precisely the mutual cognitive environment which is the central point. The smaller the mutual cognitive environment is, the more difficult it is to make sense of a message communicated. And in this context a thing like the hypermedium is interesting: What does it do to the mutual cognitive environment and thereby communication?

This and other media can profitably be investigated in terms of relevance theory. In the following, I will show that all media can be described as more or less deviant from face to face communication as a prototypical communicative context, along with the 'pros' and 'cons' that these deviations yield.

Thus, in the following I will analyze the concept of a *medium*, and point out two opposite trends in the evolution of media: one that aims toward better and better simulations of the effortless transfer of meaning of direct face to face interaction, and one that strives to bridge those communicative gaps (in space and time, for instance) that face to face communication cannot fill. These two trends can be characterized as *assimilation* and *dissimilation*, respectively. Assimilation happens through ever higher degrees of multimodality and interactivity in media technologies, while dissimilation shows itself in technological revolutions such as the appearance of permanent media, mass media, and as of late, electronic, network based media.

My conclusion is that the access to the internet will one day lead to easier communication online in virtually augmented reality (and later in 'pure' virtual reality) than face to face in 'real' reality, through internet-mediated extensions of the mutual cognitive environment. A vision that puts Licklider and Taylor's in perspective.

2 Relevance theory

Dan Sperber and Deirdre Wilson's book 'Relevance – Communication and Cognition' (Sperber & Wilson, 1995) contains a theory about how humans derive meaning from each other's communicative actions. This theory will be presented in the following.

Sperber and Wilsons point of departure is linguistic-pragmatic. Relevance theory is primarily a theory about how meaning is derived from linguistic utterances. Language is seen as a highly sophisticated and conventionalized system of communicative actions. However, these actions are not in principle any different from other, less systematic communicative actions. This means that the theory is applicable to other forms of communication, and this will be exploited later in this paper.

2.1 The difference between ostensive-inferential communication and hidden information transfer

Interpersonal communication, or *ostensive-inferential* communication, is defined as follows by Sperber and Wilson. Their example (55) is shown as (1) below:

(1) *Ostensive-inferential communication*: The communicator produces a stimulus which makes it mutually manifest to communicator

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> and audience that the communicator intends, by means of the stimulus, to make manifest or more manifest to the audience a set of assumptions *I*.

Communication is accomplished in that the communicator carries out an *ostensive act*, which creates a change in the physical environment. This change—*the ostensive stimulus*—makes it clear to both parties that the communicator intends to pass certain assumptions along to the recipient, and that he intends to do it by means of precisely that stimulus. Ostensive acts are thus acts which make new information available for the recipient in a communicative situation and at the same time makes it obvious that it was on purpose, or intentional. There is a distinction between 'regular' actions and ostensive acts: regular actions will most likely make new information available for the recipient. Sperber and Wilson mention an example with two friends who sit on a bench in the park (Sperber & Wilson, 1995, p. 48). When one friend leans back this move is available as new perceptual information for the friend. As the friend's vision is now no longer blocked, it is not only the information that 'he just leaned back' that is available, but also other information like which persons are walking further down the path, for instance. But this does not entail that it was the purpose of the leaning-back action that the recipient was supposed to notice it.

An extra layer of information like that requires something extra of the situation, namely that it is obvious that the friend would not have leaned back if there had not been a hidden agenda behind the action. Only if he leans back in an awkward or unnatural way—so that it becomes obvious that it was not just to strech his back—is it possible for a recipient to figure out that it might be an action aimed at directing attention to who is approaching further down the path. And as it turns out to be William, a person who both friends think is annoying, it is obvious that the friend's intention was to draw the other's attention to him. To carry out an act of ostension is to produce a 'difference that makes a difference', and a difference which is so big that it becomes clear that precisely that difference is intended as a communicative act.

The intention to get the recipient to understand that one is communicating is a part of every communicative action. It is called the *communicative intention*. The communicative intention in a sense is what makes ostensive communication something more than pure information transfer. Ostension means to make mutually manifest to both parties in the communication that the communicator intends to share a change in their common environment with the recipient.

Of course, the information content itself is also an important part of any communication. The intention to "make a set of assumptions **I** manifest or more manifest for the recipient" is called the *informative intention* in Sperber and Wilson's terminology. The informative intention can become manifest for both communicative parties even when the communicator does not have a communicative intention, whereas the opposite is by definition not possible. It is possible to have an informative intention and an intention to make it manifest to the recipient (and to *make* it manifest for the recipient) without revealing any intention to make it mutually manifest. Sperber and Wilson have an example with a girl who leaves her broken hair dryer on the table, arranged so that it is obvious that she is in the process of trying to repair it, only to make her boyfriend repair it for her. In this way she has made an informative intention manifest, but leaves it to her boyfriend to decide whether he will fulfill her obvious wish for a functioning hairdryer. It is clear for him that she wants the hairdryer repaired, and it is clear for her that it is clear for him. But it is not clear for him that it is clear for her that it is clear for him that she wants the hairdryer repaired, and so on. Thus, it is not *mutually* manifest for them. This lack of mutuality means that Sperber and Wilson talk about "hidden information transfer" in such cases, and not communication. This somewhat confusing example shows that it is possible to intentionally *inform* without openly *communicating*. The following will focus on communication.

2.2 The mutual cognitive environment

As we have seen, it is a defining feature of communication that a set of mutually manifest assumption is available. There has to be some overlap in what Sperber and Wilson call the *cognitive environments* of the communication parties. A person's cognitive environment is the set of (correct or incorrect) assumptions that are manifest to him or her. The technical definition of manifestness is that a person is able to mentally represent a given assumption and assume that it is true (although they do not necessarily have to *be* true). Sperber and Wilson use the the faculty of vision as a metaphor, in that manifestness of assumptions to the conceptual system is said to be analogous to visibility of objects to the visual system (Sperber & Wilson, 1995, p. 39). That something is manifest thus means that it can necessarily be either perceived (for instance with the faculty of vision, or through one of the other perceptual modalities), or derived from knowledge that is stored in

memory. More importantly, this is not only a necessary, but also a sufficient definition of manifestness: it is enough that something *can* be perceived or derived from knowledge, it does not have to actually *be* perceived or derived to be manifest. When assumptions are menifest for two or more persons at the same time, i.e. when their cognitive environments overlap, they share a portion of each other's cognitive environments: they have a *shared* cognitive environment. This does not entail that any of the communication parties are aware of the overlap of cognitive environments, but as soon as this becomes manifest, they no longer merely have a *shared* cognitive environment, but a *mutual* cognitive environment. Assumptions that are *mutually manifest* are thus assumptions in a mutual cognitive environment.

In the communicative situation, the communicator will take the mutual cognitive environment as his or her point of departure and make certain assumptions about the cognitive environment of the recipient. By gauging how accessible the assumptions one wants to evoke in the recipient are, one can tailor one's ostensive stimulus so that the assumption that first comes to the recipient's mind is the right one: the ostensive stimulus can be made *optimally relevant*. And this is a good idea if one wants to get one's message through. On the recipient side, there is one principle which determined how a message makes sense: the principle of relevance.

2.3 The principle of relevance

The principle of relevance is reproduced as (2) from Sperber and Wilson's example (62).

(2) *Principle of relevance*
Every act of ostensive communication communicates a presumption of its own optimal relevance.

Under Sperber and Wilson's definition of ostensive-inferential communication this means that any action that expresses an informative and a communicative intention makes it (more) manifest that this expression (the ostensive stimulus) is optimally relevant. The rationale behind the principle of relevance is that any ostensive act automatically will be seen by the recipient as guaranteeing its own relevance—at least in those cases where the recipient bothers to figure out what it means. It all comes down to the claim that the recipient would not pay any attention to the ostensive stimulus if it did not appear to be worth the cognitive effort. Sperber and Wilson literally see cognitive effort as a commodity with which one pays for the decoding of ostensive stimuli. If what is being offered is not worth it, no attention will be paid.

The communicator of an ostensive stimulus (who by definition wants the recipient to notice *that* he or she is communicating and *what* he or she is communicating) has to intend the ostensive stimulus to be relevant to the recipient. It has to convey the communicator's *presumption of relevance* of the ostensive stimulus.

This presumption of relevance is another central term in Sperber and Wilson's theory. Indeed, someone who wants to communicate efficiently should make sure to convey a *presumption of optimal relevance* of the ostensive stimulus, which means that one should guarantee that the ostensive stimulus is 1) at least worth the cognitive processing effort, and 2) the most relevant stimulus one could have chosen to convey one's message in the given situation (Sperber & Wilson, 1995, p. 270).

The principle of relevance is intended as a description of effortless communication, not a norm to be followed. It is thus possible to 'lie' about the optimal relevance of one's utterances in order to get the recipient's attention, and furthermore, it is possible to communicate without being particularly cooperative in a Gricean sense: one may refrain from being maximally informative, i.e. leave out relevant information, and still communicate a 'presumtion of optimal relevance' (Sperber & Wilson, 1995, p. 162). The principle of relevance is a reflection of the fact that most people usually aim for efficiency when they convey information, for the simple reason that human cognition is attuned to maximizing relevance. Every time one engages in the processing of some assumption, it happens on the basis of an expectation of its relevance. This is what makes it possible to make sense of it.

2.4 Sperber and Wilson's notions of relevance and context

What is relevance? Sperber and Wilson define it as a relation between new information and a context. The technical definition of a *context* is that set of assumptions (i.e. known or *given* information) which is active in the consciousness of the recipient of a certain stimulus at a given time. It is important to note this special use of the word 'context', which otherwise usually denotes a concept which is practically identical to Sperber and Wilson's notion of a mutual cognitive environment. Here, however, the term is used about the assumptions that form the background in an information recipient's consciousness. These assumptions (i.e. the context) can be affected in three ways, all of which render the affecting information relevant. First, the new informa-

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tion together with context information can lead to the deduction of new assumptions, which can then be added to the context. Second, the new information can strengthen an assumption already present in the context, and third, the new information can falsify an assumption in the context. These modifications of the context are called *contextual effects*. Something is more relevant the more contextual effect it produces.

According to Sperber and Wilson, one only engages in the processing of information if it appears to be cognitively profitable. But once the decision has been made, the cognitive system will aim for *maximal* relevance, simply because it is 'tuned' to do so. What this means is that the most relevant interpretation of some stimulus is also the most cognitively *accessible* one, so that the most relevant interpretation will automatically come to mind first. If no interpretation emerges that fulfills the expectation of relevance, this expectation will not be abandoned. On the contrary. The brain will continue its search for an interpretation which matches the principle of relevance by extending the current cognitive context. More manifest assumptions will be added to the context until the stimulus makes sense in accordance with the principle of relevance. This can happen in one of the three following ways:

1. By 'backtracking', i.e. by taking assumptions from earlier contexts into consideration.
2. By supplementing the assumptions in the current context with encyclopaedic knowledge.
3. By adding assumptions from the perceptual domain to the context.

In this way it is the context rather than the stimulus or relevance as such which is the variable factor in the deduction of meaning. Whenever one starts to interpret available stimuli, ostensive or not, it is based on an expectation that it is worth it. The particular context which leads to this or that stimulus making sense is ultimately dependent the cognition of the person on the receiving end.

In principle, even the most absurd stimuli could be assigned a meaningful interpretation. However, the ability to extend a context will always have a natural limit. Popularly speaking, there is only room for a limited amount of assumptions in the brain at any one time. Any communicative recipient in practice only has access to a subset of the assumptions that are mutually manifest at a given time. This subset is what Sperber and Wilson call the *maximal context*. In order to be understood, any message thus has to be relevant within the maximal context of the recipient.

2.5 Summary

Sperber and Wilson's notion of communication is inseparable from the concepts of *relevance*, *context*, and *mutual cognitive environment*. In the following I will clarify the concept of a medium, and then show how media technologies can be characterized in terms of the way in which the affect the mutual cognitive environment—and thereby the technology mediated communication.

3 Media

What is a medium? N. O. Finnemann (1998) mentions four possible definitions, which focus on the use of the medium in society, the medium as a neutral channel, the medium as an external tool, and the function of the medium, respectively. He discusses the latter at length, and defines a 'communication medium' as 'an organized phusical material/substance, which can be utilized for symbolic purposes'. The concept of a communication medium is a subconcept of a broader notion of media, in that Finnemann actually understands the word *medium* as synonymous with the term *tool*. For instance, copying requires the media 'copy machines and printing' (Finnemann, 1998, p. 49). Here the focus is on communication, however, and therefore also on communication media.

Furthermore, it can be useful to differentiate what I would call *signal media*, *communication media*, and what I would call *media technologies*. In a telephone, for instance, the signal media are air and telephone cables, the communication medium is spoken language, and the media technology is the apparatus itself. The notion of a communication medium is thus closely related, but not identical, to the notion of a mode of expression, in that a communication medium as I understand it may comprise one or more modes of expression. These two concepts are sometimes mixed up with the concept of a media technology under the common expression *media*, but in the following, the term will have denote the concept 'media technology for communication media'.

Finnemann's definition of a communication medium includes spoken language. I believe that direct face-to-face communication is a *prototypical mode of communication*, and it includes exactly that: spoken language as a communication medium for symbolic (i.e. linguistic) expressions. Linguistic expressions are the prototype of a symbolically usable difference in the physical environment—an ostensive stimulus in Sperber and Wilson's terms. All media can be characterized in terms of the way in which they affect interpersonal communication by diverg-

ing from direct face-to-face communication in various ways. In the following i will deduce nine mutually independent parameters which correspond to the dimensions in which a given medium can resemble or diverge from the face-to-face situation. These nine parameters can be seen as a synthesis of most of the descriptive models which have been proposed for interactive, hyper-, and multimedia in the newer literature on the subject.

3.1 Synchronicity, syntopicity, and audience size

Jens F. Jensen writes that 'from a certain angle, media can be seen as aspirations to overcome time and place' (Jensen, 1999, p. 30). According to this view, media can be characterized using spatiotemporal criteria such as *syntopic*[1]/*distributed* and *synchronous*/*asynchronous*, a type of classification that is employed by for instance Judith Jeffcoate. Her classification contains the categories synchronous interaction, e.g. face-to-face meetings; asynchronous (syntopic) interaction, e.g. through work in shifts on the same computer; synchronous, distributed interaction, e.g. telephone conversations; and asynchronous, distributed interaction, e.g. email or conventional mail. The spatiotemporal point of view reappears in Totsuro Tomita's arrangement of ordinary media types in the so-called *Grid* (Jensen, 1999, p. 32). Here, the temporal aspect is expressed as a scalar time delay from low to high asynchronicity. For instance, the signals in a telephone conversation are delayed by less than a second, whereas 'snail mail' letters can be delayed by several hundred thousand seconds, i.e. several days. Instead of a spatial aspect, Tomita uses a scale from few to many recipients of the message. The two dimensions are elegantly plotted as two logarithmic axes in a coordinate system with the amount of recipients on the x-axis, and temporal delay in seconds on the y-axis. The various media types are then plotted in the coordinate system as areas literally 'covering' different areas in this two-dimensional 'media landscape'.

Both distributedness and asynchronicity make the set of mutually manifest assumptions—and thereby the mutual cognitive environment—smaller. For example, because of the distributed nature of telephone conversations it is hard to refer to the choking heat in the room without further explanation. If the feature of synchronicity is eliminated from the definition of a telephone, one has a different medium altogether: an answering machine. Anyone who has tried communicating through each other's answering machines knows that there is a big difference between synchronous, telephone mediated communication and asynchronous, answering machine mediated communication. Even Tomita's amount-of-recipients parameter has communicative consequences. The more recipients share the same stimulus, the smaller the sender and each individual recipient's mutual cognitive environment becomes. This affects communication, presumably in an infavorable way. It becomes harder for the sender to produce ostensive stimuli that obey the presumption of relevance.

Just like media can be seen as aspirations to overcome time and place, i.e. attempts to compensate for asynchronicity and distributedness of the interlocutors, they can also be seen as ways of compensating for constraining features of the prototypical medium, which stand in the way of other forms of communication than the interpersonal one. This is the case for media types that make bigger audiences possible. If the intention is to transmit a message to as many people as possible, and it is not necessary to receive feedback from all of them, then mass media have their justification. And since the mass media dominate so much of our daily lives and play such a massive role in society it is safe to conclude that the divergence from interpersonal communication they require, and which makes the communication *mass* communication, is highly appreciated. In many cases the biggest possible mutual cognitive environment is not strictly necessary for the intended communication to take place. Sometimes it may even be beneficial to hinder communication somewhat. This is a humorous point in a recent Danish TV ad for a teleconferencing service where everyone attending a regular meeting are picking their nose, cutting their toe nails, or worse things. They would be better off with the lack of visual copresense offered by the teleconferencing system. The fact that no media have yet surpassed face-to-face conversation with respect to direct interaction thus does not mean that it is always the most desirable thing to be face to face with the conversation partner.

3.2 Multimodality and non-linearity

Multimodality can be seen as a media feature which directly compensates for distributedness. Everything else being equal, there is no difference between a distributed medium with rich modes of expression and real face-to-face interaction. Jensen

[1] *Syntopy* is a term which is primarily used within biology, meaning "Living together at the same locality" (e.g. http://www.pearlfishpress.com/glossary.html). It literally means 'same place' (*syn* = 'same', *topos* = 'place'). It is introduced here as an antonym of *distributed*. Thus, syntopic media ideally communicate across a distance no farther than two persons conversing face-to-face.

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(1998b) partly defines multimedia as media which include two or more modes of expression (the visual and the auditive modality, for instance). The communicative import of this criterion is that a medium with fewer modes of expression makes fewer assumptions mutually manifest. Communication can be presumed to become less direct the fewer modes of expression the medium comprises. For instance, it is not possible to send someone a telling look over the telephone or to write an email with happy or angry intonation.

Non-linear structure also has considerable communicative import. Jensen writes about hyperstructure: 'While the user of traditional media (books, film, TV, etc.) is offered one linear way in which the product can be read (if it is to make sense), the reader of hypermedia is offered several different options to choose which path should be followed during the reading' (Jensen, 1998b, p. 34). This has the communicative consequence that the sender of a non-linear text dispenses with the ability to assume a particular order of reception of the material. This results in fewer assumptions being mutually manifest, and the sender should therefore preferably make each node in a hypertext equally meaningful in all the contexts it might occur in. For instance, it is not very meaningful to use abbreviations which have been introduced in another node if the sender cannot be sure of the reading order of the nodes.

On the other hand, non-linearity can be seen as a feature which compensates for the lack of interactivity in asynchronous media. The user in a sense gets to 'ask the text what it means', i.e. the option to decide for himself which assumptions should be made available for necessary context elaborations. Hyperstructore lies on a continuum of interactivity, a notoriously difficult concept which I will clarify in the following section.

3.3 Interactivity

The concept of interactivity is discussed in (Jensen, 1998b), and more thoroughly in (Jensen, 1998a). According to Jensen, interactive media are characterized by the following three criteria (Jensen, 1998b, p. 36).

1. They enable the user to provide input.
2. This input must have consequences for the expression side of the message.
3. Changes on the expression side must have consequences for the content side.

Interactivity as such is defined as 'a measure of the potential of the medium to let the user influence the content and/or form of the mediated communication' (Jensen, 1998a, p. 232). This definition is developed in three different dimensions based on four types of communicative pattern, viz. *transmission*, *conversation*, *consultation*, and *registration*, which Jensen has inherited from Jan L. Bordewijk and Ben van Kaam. These four patterns represent four different types of power structure, originally in the information flow in tele-information systems, and in Jensen's writings in internet communication generally. Transmission is defined as a pattern where a central information provider (the *center*) controls both the information content and the distribution of the content. Conversation is when the user of a medium controls both. Consultation means that the center controls the content, while the user controls the distribution, and finally registration means that the user decides the content, while the distribution is controlled by the center. These four power configurations are arranged in a 2×2 table like the following (with my additions in sharp parentheses).

	Information produced by center	Information produced by user
Distribution controlled by center	**Transmission** [User is passive recipient]	**Registration** [User is passive sender]
Distribution controlled by user	**Consultation** [User is active recipient]	**Conversation** [User is active sender]

Table 1: Patterns of information flow. Replicated from Jensen (1998a), p. 202, with my additions in sharp parentheses.

At first glance, this table seems to be symmetrical, but this is not the case. One cannot conclude, as the table might suggest, that conversation gives the media user as much power as transmission gives the center. Transmission gives the user a passive recipient role, which corresponds to being in the audience of a lecture. In conversation on the other hand, the user has an active sender role and has as much influence on the communicative content as the interlocutor, who is free to assume this role in turns, as in a normal conversation where information is exchanged on an equal footing. This is where the assymetrical nature of the table reveals itself, in that conversational communication is not characterized by an information center now being the passive recipient, but by both parties in the interaction having the same degree of authority. Consultation puts the user in an active recipient role, which corresponds to asking an expert in some area for advice. The one that has the desired informa-

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tion (i.e. the center) has the most power in the situation, and the contributions of the user are limited to appropriate requests. In registrative communication, the user is a passive sender, which corresponds to the accused in an interrogation situation: an authority poses the questions, and the user has only has the response options that the center has defined. Jensen's favored example of the registrative information flow on the internet, namely *cookies*, shows exactly these characteristics. Most web browsers are set to automatically accept cookies, i.e. in the present terminology to indescriminately answer with a 'yes' when asked: 'Is it correct that you have bought four books at this site today?', put to the browser as 'do you want to be associated with a variable with name=NumberBooksBoughtToday and value=4?', and thus provide information about the user's commercial habits. The analogy of an interrogation is even more befitting when the user has set his or her browser to ask whether each cookie should be accepted or not. In this situation, there is also the option of saying 'no'.

But what do the information traffic patterns have to do with interactivity? Jensen uses them to build his 'cube of interactivity', a three-dimensional model with the dimensions of *conversationality*, *choice* (which goes from *no choice* to *transmission* to *consultation*) and *registration*. However, based on the above description of the role of the user in the different communication patterns, I believe that it would be more appropriate to arrange the different categories of interactivity as a continuum in one dimension from a skewed to a balanced (and back) distribution of power, i.e. indeed 'a measure of the potential of the medium to let the user influence the content and/or form of the mediated communication'. This can be illustrated as in figure 1.

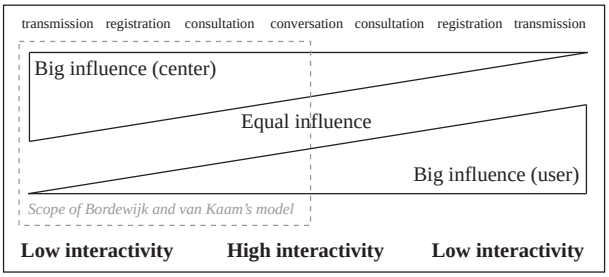

Figure 1: Jensen's user influence criterion for interactivity arranged as a continuum corresponding to Bordewijk and van Kaam's four categories of information flow.

This scale is what Jensen would call a one-dimensional continuum definition of interactivity, and indeed resembles the examples of such continua in (Jensen, 1998a). These continua according to Jensen have the weakness of placing several types of interactivity, which are not comparable, on the same scale. The four types of information flow in his view are mutually incompatible with respect to interactivity. I believe that this is not entirely correct. Interactivity can fruitfully be characterized as a continuum of the above type, in that the demonstration of the power relations in the four patterns clarifies precisely '... the potential of the medium to let the user influence the content etc.'. The figure shows that the user gains ever more influence along with the change from a transmissive, to a registrative, to a consultative, to a conversative information flow—and that this trend continues through to the transmittative endpoint of the scale. In this way, the user finally gains a level of influence which in the original model by Bordewijk and van Kaam was only available to the center. Their table only covers the left half of figure 1 (shown as a dashed line). This makes sense as far as tele-information systems go: it is hard to imagine a tele-information system with the user as the transmitting part. When it comes to media for interpersonal communication, however, the full spectrum of information flows is only to be expected, even within the same conversation. It is not hard to conceive of two persons having a conversation, each an expert or authority in their own field. They might move from ordinary conversation to consulting each other in turn about matters within each other's respective areas of expertise, and the consultative pattern may well turn transmittative in case one of them (the expert) gets carried away, or back to the conversative pattern when they turn to discuss more everyday matters.

The point of all this is that a maximally interactive medium, e.g. speech, supports all the four patterns of information flow of Bordewijk and van Kaam. Typically, the communication will be in the conversative mode, sometimes in the consultative mode, and less frequently in the registrative and transmissive modes. Generally, if a medium supports one of the four patterns, then it will also support the patterns farther away from the center of the scale. In this way, interactivity is a measure of the equality of the communication partners in terms of power, rather than of one party's total influence.

It is obvious that interactivity affects communication. But how exactly? An interactive medium supports all information patterns. This is beneficial for straightforward interpersonal communication in that it makes it possible to directly negotiate meaning that might otherwise be unclear. A transmission of some message, say, a prolonged monolog in a conversation, in a sense indicates that that the

speaker assumes that the listener understands him perfectly. Such a transmission develops registrative traits as soon as the speaker starts assuring himself of the understanding of the listener through feedback eliciting elements such as *right? you know what I mean?* or the like. The communication becomes consultative if the listener understands so little he or she has to ask the speaker direct questions about what he means. The conversative pattern is represented by mutual negotiation of meaning by the two parties. In Sperber and Wilson's terms, the increasing user influence results in an increasing ability to make assumptions manifest to oneself. The likelihood of making assumptions mutually manifest increases with the likelihood of verifying that the listener has perceived one's ostensive stimuli, and thus it will generally be the most interactive media that make possible the most effortless interpersonal communication.

Walter J. Ong writes that Platon described text as second-rate relative to speech because a text cannot be asked what it means. A text cannot defend itself (Ong, 1982, p. 79). But this argument may become ever more irrelevant as media such as the hypermedium become more interactive and electronic texts engage in 'dialog' with their readers to an increasing extent. One could say that increasing interactivity of a medium leads to increasing compensation for asynchronicity and distributedness. This makes interactivity an important parameter in the characterization of media.

3.4 Permanence

Differences in the physical expression which makes up the 'organized physical material/substance that can be used for symbolic purposes' also play a role in the characterization of media. Sound waves do not propagate well through paper or computer monitors, but certain linguistic interpretations of them do. Interpretations better known as writing. Writing often, but not necessarily, deviates from speech in the synchronicity dimension, as exemplified by chat systems. Usually, writing is distributed (sender and recipient are far apart), but primarily, writing differs from the face-to-face situation in *permanence*. The written word is there before as well as after it has been read. This means that it is possible to return to a text or another stimulus after it has been received, and this in a sense gives the sender a greater responsibility to make him- or herself clear. It has been shown that the introduction of writing has changed communication in the alphabetized cultures for good (Ong, 1982, ch. 4), and this is presumably to no small degree caused by the permanence of writing. Permanence is one of the few factors that expands the mutual cognitive environment relative to what is achievable in unaltered face-to-face interaction. A text enables the reader to go back and look things up in order to make later statements make sense. In relevance theory terms, this can be seen as an external means of backtracking to earlier contexts, and to a certain extent it makes up for for the lack of the possibility to directly ask the author what he or she means. Permanence can be seen as a way of compensating for the limited human cognitive capacity, and this deviation from the prototypical circumstances of communication has proven so beneficial that all media have been made permanent if the current technology allowed it.

3.5 Portability

A further media property that has become increasingly important is portability. A medium is portable if you can take it with you. There are degrees of portability, of course: even a fax machine can be moved with some effort. Here, however, the term portability will be used about media that can be carried around easily, in a pocket or the like.

The obvious communicative consequence of portability results from the fact that senders cannot be sure where recipients are located[2]. This is demonstrated by the common occurrence of questions such as 'where are you?' in the opening phase of cell phone conversations. The lack of location information amounts to a reduction of the mutual cognitive environment, because assumptions about location are not mutually manifest, as they are in face-to-face interaction, where the interlocutors know where each other are. This is even the case for most non-portable media. When calling from one classic stationary telephone to another, for instance, one typically knows the location of the interlocutor.

Portability constitutes yet another way in which most media drift away from prototypical face-to-face interaction. All media but inherently stationary ones such as message boards or the like are being implemented on handheld platforms (e.g. cell phones/PDAs). Portability provides flexibility in time and space. Where interactivity and multimodality can be said to compensate for asynchronicity and distributedness on the recipient's end (people are free to receive a message at any point in time and space), portability lets people communicate *from* any point in time and space. While portability seems to be a tremendously popular media feature,

[2]— as of yet at the time or writing. This is likely to change when mobile phones and PDAs equipped with GPS navigation gain popularity.

the location of interlocutors is apparently so important that this information is quickly established in the mutual cognitive environment when lacking.

3.6 WWW access

Many media have been implemented as communication software which runs on personal computers and transmits information over the internet. The very characteristic of being computer implemented is a feature that will be adressed here. The fact that a medium is 'integrated in and controlled by a computer or a digital environment', as it is formulated in Jensen's definition of multimedia (Jensen, 1998b, p. 22), is repeatedly mentioned by various authors as a useful criterion for distinguishing the 'new media' and the 'old' or conventional media. However, Jensen himself in a later article argues that classification based on technological criteria continuously becomes less distinctive (more and more media become digital (Jensen, 1999, p. 35), and I completely agree. If the medium for television programs is a tv set or a computer only affects the communication to the extent that the sender and the reciptient are aware of any difference, and such awareness can be assumed to be decreasing, considering the ongoing media convergence. In any case, it is not an enduring criterion.

However, what can be expected to affect the communication of the future is whether the medium is connected to the internet—with direct access to the World Wide Web—or not. If one compares, for instance, interactive texts in books (e.g. cross-referenced lexica), with interactive texts on the web (hypertexts), the principal difference lies in the medium. A text on the web differs from a text in a book exactly by giving the reader easy access to a huge encyclopedia (the content of the WWW) from his or her computer, whereas the book only provides direct access to its own content. WWW can be seen as an enormous, cognitively external, encyclopedic resource, in Sperber and Wilson's terms a 'set of assumptions' which, when available in a communicative situation, constitutes a fourth way for the recipient of extending the current context. The way this is done in practice is manually through typing, mouse clicks, or even direct spoken commands, rather than automatically in the cognitive system. How does the ability to instantaneously extend one's cognitive environment with encyclopedic knowledge affect communication? Does everything become relevant because the literally unlimited amounts of information on the web are now available? Of course not. I would argue that Sperber and Wilson's first and second principle of relevance is perfectly suited to shed light on this new, fourth way of extending the context. The human brain is tuned to maximizing relevance, and will therefore only start processing stimuli if they seem relevant. And the processing cost grows each time the context is extended with more assumption until the mind is literally filled up. I believe that this can be used as a metaphor for this new way of extending the context. There are limits as to how much one is willing and able to to search the web for information in order to understand an otherwise not very meaningful stimulus (or text). But if the information is relevant enough to be worth the effort, there is no problem. For instance, it would be possible for two persons communicating via an internet mediated, and thereby WWW connected, video phone (i.e. a webcam), to hint at assumptions that the interlocutor—mutually manifestly—had access to over the web, e.g. a street map, if that was easier than explaining the location of some place of interest.

This media feature provides an entirely new way of affecting communication in a positive direction, again (like permanence) by making more rather than fewer assumptions manifest in the mutual cognitive environment. It has been noted that access to the internet will most likely have an effect on the very way we think, just like the introduction of the book did. But precisely how is still hard to predict. In the last section, I will suggest a way in which this media feature will be able to affect communication, but how it will affect our thinking I will not address here.

3.7 Summary

As I mentioned in the beginning of this section, I hold face-to-face communication to be the prototypical communicative situation. After the presentation of the above media characteristics, face-to-face conversation can now be described as follows, with the most important features on top:

1. Multimodal: yes.
2. Interactive: yes.
3. Non-linear: yes?
4. Internet connected: no.
5. Permanent: no.
6. Portable: no.
7. One-to-many/many-to-many: no.
8. Synchronous: yes.
9. Syntopic: yes.

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Face-to-face interaction is both maximally multimodal and maximally interactive (and therefore arguably also maximally non-linear), which is a direct consequence of being synchronous and syntopic. The reason why these features are listed as the most important ones is that they compensate for distributedness and asynchronicity and are thereby well suited to 'overcome time and space'. The properties of being internet enabled, permanent, portable, and allowing very large audiences all add new aspects to communication as such, and thus do not apply to face-to-face interaction. But they have all proven so useful that many media do not even compensate for distributedness and asynchronicity. These features all—*ceteris paribus*—potentially ease human communication. I will claim that all man made media find their functional niche between the highest possible assimilation to the multimodality and interactivity of face-to-face interaction and the satisfaction of communicative needs which have a dissimilating effect on the design of the medium.

All media can be characterized in terms of these eight features. In the following I will restrict myself to a short characterization of the computer as a medium. The computer has been described by N.O. Finnemann, among others, as the ultimate meta-medium, since it can represent or simulate any of the media types that currently exist. As discussed above, this property is not communicatively interesting in itself. What makes the computer intersting as a meta-medium for communication media is its internet access and thereby access to the WWW. In the following, I will suggest how the media which the internet-connected can represent will affect human communication in a not too distant future.

4 Augmented communication: the next media revolution

"In a few years, men will be able to communication more effectively through a machine than face to face." (Licklider & Taylor 1999 [1968], p. 97)

This is how the article *The computer as a communication device* by J.C.R. Licklider and Robert W. Taylor begins. The article was first published in 1968. Although what we today know as the internet was still only on the drawing board as plans for the future, military ARPA-net, the only over-optimistic part of this statement in my view are the "few years" that would allegedly pass before the computer will exceed face-to-face interaction as the context for the most efficient communication. But if one is willing to regard forty years as "a few years", then the prophecy has almost been fulfilled. In the follwing, I will give a brief sketch of exactly how the internet enabled computer makes possible the impending revolution of human communication, as seen from the perspective of relevance theory.

4.1 What's so special about the internet enabled computer?

The first big revolution in the history of communication was the introduction of the first permanent mass-medium: the printed book. This revolution was primarily cognitive, however, in that it simply made people think in a new way. As this external means of storing knowledge became common, human memory was freed up, and this provided the cognitive overhead required for rational, analytic thinking. A common assumption is that the written revolution more or less directly led to the emergence of the modern self (Ong, 1982). Permanence yields substantial communicative advantages, as discussed above, and it is probably this feature that made the book so popular, along with the quality of bringing larger audiences within reach (relative to hand-written books and letters). A new form of communication began to form in parallel with interpersonal communication, namely mass communication. This form of communication had both text and images as communication media from the outset. The next steps in the history of media was the addition of 'live' sound and images via telephone, radio, and records, later audio tapes and CDs, and simultaneously film and later video, laser discs, and DVDs. The different modalities were quickly combined into audiovisual media. Still, there was no medium which could compete with face-to-face interation as a context for interpersonal communication, but the media made it possible to an ever larger extent to compensate for the situations in which it was not possible to meet face to face, while the media for mass communication were able to simulate interpersonal communication to an ever higher degree.

Evidently, the media for interpersonal and mass communication have moved toward the prototypical medium from different directions in overcoming the obstacles that prevent anyone to communicate with anyone as effortlessly as in a face-to-face situation: time, distance, and the number of communicators. The new network based media are a current culmination of this development, and they are often described as a hybrid of mass media and interpersonal media, for instance by Jensen, who calls them 'a kind of *interpersonal mass media*' (Jensen, 1998a, p. 203).

If for practical/financial reasons communication cannot take place at the same time and place and/or

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with a manageable number of participants, then the medium must compensate by being multimodal, interactive, internet connected, portable, or permanent, and preferably all of the above. Where ordinary letters and books are permanent, movies both multimodal and permanent, hypermedia like CD-rom lexica are multimodal, interactive, and permanent, and web sites on the WWW are both multimodal, interactive, permanent, and directly connected to the internet. And even though the WWW is in a sense a one-to-many medium, like TV, anyone can publish on the web, which in practice makes it a many-to-many medium. Seen as a 'way to overcome time and space' (plus the problem of reaching large audiences), the hypermedium is thus the supreme medium of our time, which combines the best features from two developmental trends.

4.2 Augmenting communication

But it can become even better—maybe one day to the point where face-to-face interaction becomes a necessary alternative to the situations where the new media are temporarily not available. To return to Licklider and Taylor's vision: What will it take for making technology mediated communication more efficient than face-to-face interaction? Licklider and Taylor's prediction bears on the future success of what is today known as computer supported cooperative work-systems (CSCW systems). However, I believe that the vision does not have to be limited to that form of communication, but that it is in fact becoming the reality for human communication as such, even though the CSCW systems will no doubt—or rather, are—the first manifestation of it. The answer to the above question is best formulated in terms of Sperber and Wilson's relevance theory. Technology mediated communication becomes more efficient than face-to-face interaction as soon as the medium makes possible a larger mutually cognitive environment than face-to-face interaction. The following thought experiment illustrates the perspectives.

If the feature of synchronicity is added to the hypermedium the result is something like a 3-dimensional digital world—and a communicative situation with a quite rich mutual cognitive environment. If multimodality is then enhanced to the point of rendering distributedness irrelevant a virtual reality is created which is hard to distinguish from the 'real world'. A medium like that would come very close to carrying human communication as effortlessly as face-to-face interaction. The further addition of access to the immense encyclopedia which is the WWW—which tremendously expands the set of available assumptions—produces a medium which actually surpasses direct interaction. In order to surpass face-to-face interaction, such a medium would have to support mutual access to the web, as when several people are gathered around the same computer screen, to make the WWW available for the interlocutors' respective Sperber and Wilsonian cognitive contexts. But this is by no means unthinkable: Already, the utility of CSCW systems rests on the fact that two interlocutors are able to see what each other are doing, just as in Licklider and Taylor's early descriptions.

A medium like the one sketched above resembles the *cyber punk* conception of 'cyberspace', and may not be forthcoming for another while. On the other hand, media types are already in the pipeline which will have similar consequences for human communication—consequences that may potentially reach gigantic dimensions. The media types I am referring to are the so-called *augmented reality* media. Augmented reality is 'reality and then some', and is created through the establishment of an extra information flow from a wearable computer, for instance through eyeglasses with integrated video projectors and ear phones (Bass, 1998). If mutual access to the WWW can be established through such a medium, then one has a semi-cyberspace which sets the stage for what could be called *augmented communication*: An augmented form of human communication. The extended immediateness of this medium will only be surpassed when or if 'pure' cyberspace becomes capable of perfect renditions of this extended form of face-to-face interaction—and in that case only because one will be able to get in virtual touch with anyone regardless of location. But before this happens, the advantages of overcoming time and place through less science fiction-like media will no doubt be so big that these media types will dominate for many years to come.

To answer the question in the introduction, I in fact do believe that human communication can and will be augmented. Like the book and later permanent media technologies have altered human cognition, so the internet connected wearable computer will alter and augment human communication.

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