The Impacts of Involuntary Cues on Media Effects

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Abstract

In studies of media effects, differences in results are predicted based on the rationale that different media have differential ability to transmit nonverbal communication. We suggest that while this rationale has validity, it is not complete, and that several other factors must be present before media effects will be observed. In this article, we argue that the situational characteristics of technology, the voluntariness of communication, sender ability to encode messages, listener ability to decode messages, and the inherent characteristics of technology are relevant to the detection of media effects. More importantly, the penetrating role of involuntary cues in the processes involved is a key concept of this article. Coupling this key concept with the factors outlined, seven propositions are formulated.

1. Introduction

Media studies fall into two major categories -- those of media effects and those relating to media choice. Studies of media effects focus on how task performance may be affected by the communication medium used to perform the task (e.g., Burke and Aytes, 1998; Ocker et al, 1997). We use the term media effects to refer to differences in values of dependent variables of interest (e.g., quality of decision or perception of communicating partner) that are observable under different communication media. In particular, we are interested in differences that surface when interactions occur face-to-face versus through technological media, such as computer conferencing or videoconferencing. Studies of media choice focus on understanding the factors considered by users when deciding which medium of communication to use (e.g., Chidambaram, Moe and Olsen, 1998; Chidambaram, Lim and Chan, 1998). The focus of this paper is on study of media effects.

Media have been characterized by several constructs. Williams (1977) used the concept of social presence; Mehrabian used the concept of immediacy; and Daft, Lengel and Trevino (1987) used the concept of media richness. Each of these concepts reflects an attempt to aggregate the diverse dimensions along which media characteristics can vary. Media effects are hypothesized on the basis of one of these constructs. For instance, media richness proponents argue that leaner media, such as email, computer conferencing and so on, curtail many of the nonverbal cues communicated by richer media, such as face-to-face interactions and videoconferencing, thus leading to media effects. However, such effects have not surfaced consistently leading to many variations of the theories based on these constructs (see e.g., Kinney and Dennis, 1994; Valacich et al, 1994).

In this article, we argue that the mere curtailment of some or all verbal and/or nonverbal cues is not sufficient to result in differences in task performance and other variables using different media, but that other conditions have to be met for media effects to surface. We discuss these additional conditions: situational characteristics of media, the voluntariness of the communication, sender ability to encode signals, listener ability to decode signals, and inherent characteristics of media. Other factors such as gender and culture can be argued to have explanatory roles, but these roles are mediated through either sender or listener characteristics or a combination thereof. Further, we discuss the implications of the fact that...
multiple cues may be involved in the transmission of information about a specific variable of interest. A central concept that appears repeatedly in these discussions has to do with the role of involuntary cues.

2. Conceptual development

The concepts relevant to our arguments are situational characteristics of technology, voluntariness of cues, sender ability to encode cues, listener ability to decode cues and inherent characteristics of technology. Situational characteristics of technology are those over which the designer or the user has control. For instance, the camera angle in a videoconference may affect the cues transmitted or the image projected, but this characteristic is within the control of the user or the technicians. Inherent characteristics are those that represent limitations of the technology and those that cannot be overcome by design improvements. For example, it is not possible to have mutual eye contact in videoconferencing (Gaver, 1992), a limitation that design presumably cannot overcome. We will discuss situational characteristics and inherent characteristics separately.

2.1 Situational characteristics of technology

Other examples of situational characteristics are display resolution and refresh rate in videoconferencing, and font size or font type in computer conferencing. An inadequate display resolution or a slow refresh rate may distort both voluntary or involuntary messages being communicated and thus lead to media effects. A slow refresh rate in videoconferencing leads to jerky display, and is often associated with audio-video asynchrony, i.e., lips don't move in synchrony with the words being spoken. Reeves and Nash (1996) report that speakers are evaluated negatively when audio-video asynchrony exists. The psychological effect of asynchrony is strong, i.e., the effects are observed even when the asynchrony itself is not noticed by the viewers. Reeves and Nash (1996) found 'When the audio preceded video, the speakers in the presentation were evaluated more negatively……this effect held for viewers who could not even identify the problem.' (p. 214).

Distortions of this nature are a result of the quality of the technology being deployed. Such characteristics will affect communication and hence the performance of the task when technology is used.

Proposition 1: Situational characteristics, which distort communication, will lead to media effects1.

It should be also stated that situational characteristics can arise from design-related decisions or implementation-related decisions. For instance, let us consider screen resolution. It could be considered a design decision in that monitors are designed for a particular resolution. It could also be considered an implementation decision in that a user can choose to purchase monitors with high or low resolution. Other situational characteristics are mostly related to implementation, e.g., camera angle when transmitting video images. A frontal image may be transmitted or the image may be shot from the side. The first image will appear as though the sender is communicating with the receiver. The second image will appear as though the sender is addressing someone other than the receiver.

More situational characteristics are discussed by Reeves and Nash (1996) and Gaver (1992). Reeves and Nash (1996) address the effects of characteristics of display in video conferencing, e.g., the size of the display, the fidelity of the display and so on. They also address audio fidelity. Gaver (1992) addresses affordances, i.e., the properties of the environment (in this case, the communication medium) which allow actions. Some of the affordances may be considered situational characteristics, while others are inherent characteristics. For instance, affordances such as field of view, resolution, and monophonic sound are situational and are design or implementation choices. Other affordances, such as mutual eye-contact, limited aspects of three-dimensionality, lack of peripheral vision and so on reflect inherent characteristics of technology.

The characteristics discussed both by Reeves and Nash (1996), and Gaver (1992) are capable of contributing to media effects, but not necessarily through the differential ability to convey nonverbal signals. For instance, Reeves and Nash (1996) point out that while the content communicated may be the same, size of video

1 As the primary interest here has to do with whether media effects would occur under certain conditions, the propositions do not address specific dependent variables, and thus do not concern themselves with the issue of directionality. Directionality is more appropriately addressed at the level of hypothesizing about specific dependent variables.
display may have psychological effects. They report that larger sizes lead to heightened state of arousal and improve memory, i.e., one could infer that the subjects will be more attentive and retain more information.

Situational characteristics are important in experimental studies. It is necessary to maintain these constant across treatments in a study to ensure that variations in situational characteristics are not introducing extraneous effects. It is also important to account for differences in situational characteristics across studies when comparing studies.

We will discuss inherent characteristics of technology later.

### 2.2 The involuntariness of cues

Communication can be divided into two broad categories: verbal and nonverbal. Verbal communication involves the use of words in writing or in speech, while nonverbal communication refers to hand gestures, facial expressions, body movements and so on. Some authors make distinctions between nonverbal behavior, nonverbal communication, paralanguage and so on (e.g., Brown, Warner and Williams, 1985), but for the purposes of our arguments, these distinctions are not significant. Another dimension of classification of communication is voluntary and involuntary communication. Voluntary communication is that which the sender wishes to send. Involuntary communication can fall into one of two categories. First, they may include information which the sender is aware of and does not wish to send. Second, they may include information, usually feelings, which the sender may not be aware of at a conscious level. In both these cases, information transmission is transmitted but not under the volition of the sender. Ekman and Friesen (1969) use the term ‘leakage’ to refer to involuntary communication, but focus mostly on nonverbal leakage.

Involuntary communication may be verbal or nonverbal. An example of involuntary verbal communication would be a ‘slip of the tongue’. An example of involuntary nonverbal communication may be a person drumming the table or fidgeting nervously. It may be appropriate to mention that involuntary communication is more likely to be nonverbal than verbal. In the literature on nonverbal communication, the distinction between voluntary and involuntary communication is not always clearly indicated. For instance, Short et al (1976) in discussing the functions of nonverbal signals, discuss functions that could be performed by involuntary signals and functions that could be performed by voluntary signals. The term nonverbal cues or nonverbal signals has been used to refer to involuntary nonverbal communication, although this has not been explicitly stated. For example, Hall (1985) in discussing the male and female nonverbal behavior includes both voluntary and involuntary behavior as nonverbal behavior.

The channels used for voluntary or intended communication are substitutable to a large extent. An intended message may be communicated orally when the sender and receiver are meeting face-to-face. The same message may be communicated in written format when the two persons are in different locations. It is possible to use a nonverbal channel such as Morse code to send the message. Simple messages may be communicated by hand signals or facial expressions. Different channels may differ in terms of the degree of difficulty in executing the communication or the time it takes to effect the communication, but the message can be communicated.

In cooperative task-oriented situations, the communication that takes place is largely voluntary and intended. Media capabilities may be limited and may place hurdles in the communication process. But so long as the participants are motivated, and sufficient time and other resources are available, it is possible to overcome the hurdles in the communication process and perform the task. Thus there should be no difference in performance in the face-to-face mode versus performance using other media, if the researchers are focusing on variables measuring the outcome of the task, such as the quality of the deliverable.

Involuntary communication is that which occurs in spite of the sender's best efforts to suppress such communication (conscious attempt to suppress), or communication that occurs without the sender's knowledge (leakage of subconscious information). The two forms of involuntary communication, failed suppression attempts or leakages of subconscious feelings, are relevant in different contexts. In the business or interpersonal context, conscious attempts to suppress or withhold information are relevant. In the context of psychotherapy or psychoanalysis, the surfacing of subconscious processes may be more relevant. The discussions which follow are generally applicable to both forms of involuntary communication. However, the examples and literature cited in this article are restricted mostly to the business context.
Involuntary communication will be present in the face-to-face mode. However, since technology may limit the transmission of some cues, and the sender cannot compensate for involuntary communication, the involuntary cues will be lost in technology-mediated communication. Thus there is likely to be a difference in the performance in the face-to-face mode and the performance in the technology-mediated mode, assuming that the involuntary communication is relevant to the message.

**Proposition 2:** Media effects are more likely to be observed when involuntary communication is relevant to the message.

**Task Type**

Some authors (e.g., Valacich et al, 1994) have attempted to predict or explain media effects on the basis of task type. In our approach, task type is subsumed by the nature of the communication, i.e., the voluntariness of the communication. Some tasks involve more involuntary communication than others. For instance, negotiation may require greater attention to communication leakages (i.e., involuntary communication) than cooperative problem solving. Media effects are more likely to be observed in tasks where involuntary communication is significant than in tasks where involuntary communication is less significant.

**2.3 Sender encoding ability**

Involuntary communication (i.e., leakage) can occur, as stated earlier, through verbal and / or nonverbal channels. Most human beings are aware that such leakage can occur and may sometimes attempt to consciously control the leakage. The extent to which such control can be exercised is affected by two factors: the particular channel that is being controlled and the ability of the person to exercise such control. Zuckerman and Driver (1985) argue that “not all nonverbal channels are alike and some may be more controllable than others” (p.129), i.e., some channels are leakier than others.

It should be added that leakage in one channel is not independent of leakage in other channels. If a person is attempting to consciously suppress leakage in one channel, it is possible, or even likely, that leakage occurs or increases in another channel. This is reflected best in Freud's oft-quoted statement, “...if his lips are silent, he chatters with his fingertips; betrayal oozes out of him at every pore” (Freud, 1959, p. 94).

The ability to control the possible sources of involuntary communication is not uniform in all human beings. Some persons may be able to exercise a greater degree of control over verbal or nonverbal leakage, others less so. This is discussed at length in deception literature (see Hall, 1985), where the encoding skills of senders are studied. Encoding skills refer to both the attempts to suppress the relevant nonverbal skills and the generation of deliberate false cues.

When the sender is able to control leakage, involuntary cues are not being transmitted in the face-to-face mode or the technology-mediated modes. Thus there is no difference in the communication in both cases, and no media effect will be observed. However, if the sender is not able to control leakage, then involuntary cues are being transmitted in the face-to-face mode, but technology curtails the same signals in the technology-mediated modes. So, media effects will be observed.

**Proposition 3:** Media effects are more likely to be observed when the sender lacks encoding skills than when the sender possesses encoding skills.

**2.4 Listener decoding ability**

In informal conversations on using technology for communication, (based on personal experiences of one of the authors in classroom discussions and in post-study debriefings), respondents place a great deal of emphasis on the need for face-to-face interaction to observe nonverbal cues. However, studies have shown that the human ability to interpret the nonverbal cues is not high. Studies in deception show that subject ability to detect deception is in the range of 45 to 60%, on average slightly better than chance (Zuckerman and Driver, 1985). Further, it has been shown that the ability to decode nonverbal signals is not uniform across individuals (Hall, 1985).

Thus if the listener is able to observe and interpret the involuntary signals, it will be possible to do so in the face-to-face mode. In the technology-mediated mode, the involuntary signals will be curtailed. Hence, media effects will be observed. However, if the listener lacks the ability to observe or interpret involuntary signals in the face-to-face mode, the curtailment of such signals in technology-mediated communication will not produce any media effect.
**Proposition 4:** Media effects are more likely to be observed when the receiver possesses decoding skills than when the receiver lacks decoding skills.

**Gender**

It may be appropriate to mention the role of gender at this point in time. Hall (1985) has reviewed literature that suggests females are more aware of nonverbal signals and tend to interpret them more correctly than males. Thus one could argue that media affects are more likely to be observed when female subjects are used than when male subjects are used. A separate proposition is not offered for the gender effect, because the effect is likely to be subsumed by decoding skills in general. If decoding skills are measured in a study, then the effect of gender will be accounted for.

**Culture**

Some nonverbal cues may be the same across cultures, while others may be unique to particular cultures. The uniqueness of some nonverbal cues may make it difficult for an individual of one culture to correctly interpret the nonverbal cues of another culture. In cross-cultural communication, nonverbal cues are apt to be missed or misinterpreted in the face-to-face mode, so the loss of nonverbal cues because of technology will not lead to any differences. In communications between individuals of the same culture, the nonverbal signals are likely to be correctly interpreted in the face-to-face mode, but will be curtailed in the technology-mediated mode; hence media effects are more likely to be observed.

**Proposition 5:** Media effects are less likely to be observed in cross-cultural interactions than in same-culture interactions.

Halberstadt (1985) has reviewed the effects of race and socioeconomic status on detecting deception, and reports that these factors do make a difference. Other cultural surrogates such as nationality may be relevant. Newer operationalizations of culture are also being examined. For instance, Shakun (1997) suggests that there is such a thing as ‘situational culture’. Situational culture refers to a set of norms that arise among a group of people. For instance, individuals working in the discipline information systems (IS) may all adopt a common set of behavioral norms in the workplace, irrespective of their national origin or ethnicity. Such norms may deviate from behavioral norms adopted by professionals in non-IS disciplines.

### 2.5 Inherent technological characteristics

Earlier, we mentioned that technological characteristics may be classified into situational characteristics and inherent characteristics. The possible role of situational characteristics has been discussed. Now we discuss the role of inherent media characteristics, i.e., inherent technological characteristics. Inherent media characteristics reflect limitations of the technology. We provide some examples to illustrate our point. Traditional text-based computer conferencing cannot transmit audio and video cues. Similarly, audio conferencing cannot communicate cues associated with written communication or with visual communication. In video conferencing, mutual eye-contact is not possible. When the cues that are not transmissible are relevant to communication, then media effects are likely to be observed. Thus,

**Proposition 6:** Media effects are more likely to be observed when inherent technological characteristics limit cues relevant to communication.

The simplest classification to characterize technology is based on the extent to which technology limits nonverbal cues, i.e., whether the technology used is videoconferencing, audio conferencing or computer conferencing, or any combination thereof. Based on this simple classification, videoconferencing can permit all or most nonverbal signals, audio conferencing can permit only audio nonverbal signals, and computer conferencing can only permit structural nonverbal signals. The term structural nonverbal signals is used to refer to the cues present in structure of the presentation.

Media richness (Daft, Lengel and Trevino, 1987), immediacy (Mehrabian, 1972) and social presence (Williams, 1977) are all constructs proposed to characterize communication technologies. They are partly based on the extent to which nonverbal cues can be transmitted by the media. For instance, Short, Williams and Christie (1976) state "the capacity to transmit information about facial expression, direction of looking, posture, dress and nonverbal cues, all contribute to the social presence of a communication medium" (p.65). Aggregated concepts such as media richness, social presence and immediacy are convenient to develop measures of the overall ability to communicate nonverbal signals.
However, in some instances, it is not the overall ability to communicate nonverbal signals that is relevant, but the ability of the technology to limit the specific cues that are related to the dependent variable of interest. For instance, computer conferencing may not carry many of the visual and aural cues associated with deceptive behavior, but can carry the structural cues associated with deceptive behavior. So, the likelihood of being able to detect deception in written communication is statistically not different from the likelihood of detecting deception in other modes of communication (Zuckerman and Driver, 1985). Hence, we believe that the aggregated concepts are not adequate for predictions of media effects. Instead, it is necessary to examine the transparency of the medium to the specific cues relevant to the dependent variable of interest.

2.6 Multiplicity of correlates to behavior of interest

There are multiple correlates to any dependent variable of interest. If one were to look at verbal and nonverbal correlates of expression of happiness, a happy person may smile broadly, pump his or her fist, say ‘Awwright’ or do all of the above. The point to note is that not all the correlates need to be detected by the receiver to realize that the sender is happy. Any one of these signals or a small subset of signals may be adequate to detect the presence of the variable of interest. A question of empirical interest that could be raised is -- is detection accuracy higher when more cues are present? If that is so, then one could expect some media effects; if not, then there will be no media effect.

The existence of multiple cues affecting a behavioral variable of interest is best illustrated in the integration of studies on deception (Zuckerman and Driver, 1985). A meta-analysis identified fourteen significant verbal and nonverbal correlates to deception (see Table 1).

The interesting point to note is that both verbal and nonverbal channels are leaky, i.e., subjects are revealing information involuntarily both in the verbal and nonverbal channels. For instance, in detecting deception, a written statement may not have nonverbal cues, but inconsistencies in a written narration will reveal deception. So, in predicting media effects, both verbal and nonverbal correlates to the dependent variable need to be examined.

A further point to note is that at least a subset of cues can be transmitted by each of the major categories of media. Thus if the sender does transmit the cues, and the listener is capable of detecting those cues, then the likelihood of media effects is low. Admittedly, the number of cues in the video mode is much higher than the number of cues in the written mode.

Judging from studies which report that deception is detectable in written messages at a rate comparable to the detection in other modes (Zuckerman and Driver, 1985), one could argue that just a few of the cues are adequate to detect deception. This leads to

Proposition 7: Media effects are likely to be observed only if all the verbal and nonverbal correlates to the variable of interest are blocked by the medium of interest.

The sum of our argument is that in looking for media effects, one must examine the extent to which all the verbal and nonverbal correlates of the dependent variable are transmissible via the medium under study.

2.7 Summary

Figure 1 summarizes the conditions under which media effects may be observed. The propositions offered so far are at a high level. Empirical testing is necessary to verify them. Studies are being currently designed.

3. Concluding remarks

The factors relevant to the surfacing of media effects have been discussed. Figure 1 shows two instances when media effects may surface. The first instance is when the design or the implementation of the technology distorts communication. In such an instance, there will be differences between face-to-face communication and technology-mediated communication. The second instance is when the surfacing of media effects requires a combination of circumstances. The nature of the cue(s) involved in predicting media effects has(have) to be involuntary. The sender is either not aware that he or she is transmitting such cues or unable to suppress the cues. In most cases, several cues are correlated to one variable of interest. One or a small subset of these cues is often adequate to receive the information. The medium under study must therefore curtail all cues related to the variable of interest. Finally, the listener must be capable of interpreting such cues correctly. Only if all these conditions are present is one likely to observe media effects.
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<tr>
<th>Behavior</th>
<th>Video</th>
<th>Audio</th>
<th>Written Modes</th>
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<td><strong>Blinking</strong></td>
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<td>Smiling</td>
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<td><strong>Facial Segmentation</strong></td>
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<td>Head Movements</td>
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<td><strong>Adaptors</strong></td>
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<td>Foot and leg movements</td>
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**Table 1. Detectability of Verbal and Nonverbal Correlates of Deception**

Notes:
1. Verbal and nonverbal behaviors in bold characters have been determined to be significantly related to deception. Other behaviors listed in the table have not been shown to be correlated to deception.
2. The list of behaviors is from Table 5.2 in Zuckerman and Driver (1985).
Fig. 1. Factors affecting the likelihood of Media Effects

Note: Arrows in this figure reflect sequentiality of arguments, not causality.
The propositions offered in this article need to be qualified with the statement that they are the first-attempt to articulate our formulation of an explanation of media effects. Thus several issues, which may be relevant have not been addressed. First, we have not undertaken to differentiate our position explicitly from other theoretical arguments (e.g., cues-filtered out, see Culnan and Markus, 1987), or take into account relational development (e.g., see Chidambaram, 1996) or temporal aspects of media use (e.g., see Walther, 1996). We plan to address these issues as we continue to develop our thinking.

Second, the analysis presented may be further complicated by the presence of interaction effects. For instance, a sender may be able to suppress visual cues, but may not be adept at suppressing structural cues in writing. Similarly, a receiver may be able to interpret visual cues correctly but fail to observe cues embedded in the nuances of writing.

In summary, the article points out that aggregated characterizations of media technology are not always adequate to predict media effects. Further, it develops a set of conditions which must be prevalent before media effects will be observed.

4. REFERENCES


