



Chapter I

A Semiotic Model of Multimedia: Theory and Evaluation

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Models of multimedia communication are attempts to classify the numerous types of media objects available, and to provide a basis for the use of unambiguous terminology in a new and expanding field. Many of these models are products of theory, rather than practical investigation, and few have been empirically studied to assess their suitability. This chapter firstly presents a novel multimedia model (called TOMUS) which is based on a common classification of semiotic representational systems, and uses three dimensions of sign, syntax and modality. By separating the classification of the nature of the text to be communicated from the nature of the technology or interaction, the model provides a focussed terminology for consistent and appropriate discussion about multimedia texts. The chapter also reports on an experiment which investigated the understandability of the dimensions comprising TOMUS. The experiment entailed subjects classifying various media objects according to the TOMUS model. Error and perceived difficulty data were collected; analysis of this data revealed which of the categories are the most difficult to comprehend. Suggestions are made as to the causes of these difficulties, and recommendations as to how the model might be correspondingly altered are proposed.

INTRODUCTION

The concept of 'multimedia' suffers from inadequate standardisation of terminology, and the lack of commonly agreed definitions results in much ambiguity both within and between articles written on the topic. While most people might be satisfied with "a mix of [voice, text and graphics]" (Barfield, 1993), they might be unwilling to place a live lecture on a titled work of art in the category of multimedia presentations.

On the other hand, many definitions focus entirely on technology: "Multimedia seems to be defined by the hardware required... rather than by the user's experience" (Shneiderman, 1992). For example, despite the statement that "...any computer application that employs a video disk, images from a CD-ROM, uses high quality sound or uses high quality video

images on a screen may be termed a multimedia application” (Preece, 1994), it is unlikely that anyone would place a computer application that merely plays a piece of music within the realm of multimedia.

Related Work

Recognising the lack of consistency in the definition of multimedia, many authors have provided classifications, definitions and models, attempting to create a theoretical basis for the study of multimedia communication.

The fine-grained model proposed by Arens et al. (1993) is based on the characteristics of perceiver, producer, information and media, and has a set of rules associated with it which determine matchings between information and media. The taxonomy used by Heller and Martin (1995) is based around common (potentially ambiguous) terms *text*, *graphics*, *sound* and *motion*. Its aim is to enhance students’ understanding of the range of possible media types in their production and evaluation of multimedia software. Vetere’s model (Vetere et al., 1997) includes the notion of interaction, relating to the goals of the user and the goals of the system, and uses 3D vectors to represent complex media types. Bernsen’s input and output modalities (Bernsen, 1995) define 48 low-level “unimodalities” in a hierarchical model. The only experimental model has been developed by Lohse et al. (1994), who categorised visual objects into 11 distinct categories (e.g., *graphs*, *structure diagrams*, *icons*), based on an empirical study. These categories tend to be defined in terms of the nature of the information contained within the visual item, rather than with respect to the representational system used in its creation (e.g., *time charts*, *process diagrams*).

A Difference of Perspective

All these classifications are driven in some manner by knowledge of currently existing media types. The broader method of addressing the classification of representational systems presented in this chapter defines underlying characteristics over any number of appropriate dimensions, and then identifies those existing representational systems which relate to each cell in the model produced. Working from the dimensions suggested by theoretical semiotic characteristics of representational systems to the practical instantiations of the media thus defined, allows for a broader spectrum of media to be considered. This ensures that the taxonomy is complete and that representational systems that may not have a given, defining name in the common parlance of multimedia studies still form part of the taxonomy.

The model proposed and investigated here (called TOMUS) is unlike these other multimedia taxonomies, in that no initial practical assumptions are made as to the media types that will be classified. The categorisation is based on an extension to a common classification of semiotic representational system, and has been created from a semiotic theoretical point of view.

A three-dimensional model is proposed, along the dimensions of *sign*, *syntax* and *modality*. The 36 cells defined in this three-dimensional model are related to existing media types, some of which have no defining term in the current common language of multimedia studies. The model is also extended to include network structures, and makes clear the difference between multimedia and hypermedia communication.

By separating the classification of the nature of the text to be communicated from the nature of the technology or interaction, the model provides a focussed terminology for consistent and appropriate discussion about multimedia texts. In addition, this approach

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