

SUMMARY

1 INTRODUCTION

1 DEFINING PHANTASMS

The concept of phantasmal media is the central topic of this book. Phantasms are combinations of mental imagery and ideology constructed by embodied, distributed, and situated cognitive processes. The concept of the phantasm captures the insight that many of the constructs people see as socially real are in fact rooted in processes of imaginative cognition. Phantasmal media is a term to describe media systems that prompt phantasms—with a focus on computing systems (computational media).

Key design concept: The idea of the phantasm provides an orienting perspective for developers focused on issues of content and imagination in the design of computing systems.

2 IMAGINING AND COMPUTING PHANTASMS

This book focuses on understanding and designing computer systems that prompt phantasms. I explore how computers prompt phantasms through an articulation of how computers can be used for the subjective, cultural, and critical aims of understanding, and improving, the human condition.

Key design concept: The ideas of subjective, cultural, and critical computing can guide development of new types of computing systems.

II SUBJECTIVE COMPUTING

The computer is usually seen as an objective machine, yet it can be used for subjective aims such as expression. A key aspect of using the computer for subjective aims (subjective computing) is understanding its ability to represent imaginative worlds, ideas, and worldviews through data structures (expressive epistemologies). Furthermore, computing systems can express values (such as preferences of designers, norms of societies, or traditions of civilizations). Another key aspect of subjective computing is precisely describing some of the ways that values can be embedded in the structures of computing systems. We can also account for how computing systems express different meanings and values through different structures (polymorphic poetics).

3 EXPRESSIVE EPISTEMOLOGIES

The computer can be used to construct imaginative worlds and prompt forms of imagination called poetic phantasms (meaningful mental imagery and ideas involving metaphor, narrative, categorization, etc.). Imaginative worlds and poetic phantasms are results of subjective forms of computational expression (subjective computing systems). "Expressive epistemologies" is the name I give to data structures based on subjective human worldviews that are useful for implementing computer-based imaginative worlds and prompting poetic phantasms.

Key design concept: The idea of expressive ontologies can guide development of knowledge representations used for subjective purposes.

4 POLYMORPHIC POETICS

The mathematician and computer scientist Joseph Goguen developed a theory called algebraic semiotics that is useful for precisely describing the structures of systems that convey meaning such as languages, graphic designs, and user interfaces. A key aspect of this theory is the concept of a mapping from one sign structure to another. In computing system design such mappings are often from an abstract idea of a system to a specification for a system's implementation. At the same time as reflecting a philosophical commitment to acknowledging the limitations of highly structured mathematical approaches, algebraic semiotics utilizes highly mathematical formalisms (from the areas of universal algebra and category theory). *Morphic semiotics* is a formulation of algebraic semiotics that is intended to be more generally accessible to non-mathematicians. *Polymorphic poetics* is an approach developed to use morphic

semiotics concepts to aid in understanding and designing expressive computing systems by considering how different structures might encode different meanings and values.

Key design concept: The idea of polymorphic poetics involves using a precise language to design systems to reflect users' values. Morphic semiotics is the precise descriptive language used.

III CULTURAL COMPUTING

After having observed that computers can be used for subjective purposes such as prompting phantasms, it is important to consider that the very foundations of computing depend on cultural phantasms shared among people. All technical systems are cultural systems. However, computing systems are based on cultural assumptions that are usually left implicit. For example, hardware and software development are influenced by historically and culturally specific ways of talking and writing about systems. Technologies are produced in historical-cultural contexts and are informed by underlying philosophical perspectives. Computers play a role in shaping culture through facilitating the construction of shared knowledge, shared beliefs, and shared representations (cultural phantasms). More explicit accounts of how computing systems are grounded in culture can help us better understand the limitations of systems and design a greater diversity of systems. Furthermore, computing systems can be designed based on particular cultural models (comprising *integrative cultural systems*). This diversity in design approaches may yield new innovations based in cultures that are not currently privileged in computer science.

5 CULTURAL PHANTASMS

Computing systems, whether used for expression or more utilitarian aims such as commerce, play a role in shaping culture. However, culture is a challenging concept to pin down. There are many definitions from fields such as anthropology, sociology, literature, and more. After integrating aspects of definitions of culture from different fields, the idea of a *cultural phantasm* is introduced to describe one particular way that computers can affect and shape culture at large. Cultural phantasms are socially entrenched phantasms that not all members of a society are equally aware of. In this last regard, we can say that cultural phantasms are only semi-visible. Computing systems can be designed to entrench cultural phantasms within a society—for example,

by influencing unaware users to come to consensus. Computing systems can also be designed to reveal cultural phantasms by enabling users to take perspectives outside of their own experiences.

Key design concept: The idea of the cultural phantasm can help guide development of systems that play roles in shaping shared user knowledge, beliefs, and representations.

6 INTEGRATIVE CULTURAL SYSTEMS

A *cultural system* is a model providing an abstraction from the complex milieu of everyday life in a given society. Cultural systems are useful for informing the creation of material or conceptual artifacts that express features of a culture. *Integrative cultural systems* are cultural systems that are transmitted through, and enacted within, media. However, the relationship between cultures and systems is complex. It is not the case that different cultures, or people of specific cultures, have certain essential characteristics that can then be found in media systems produced in those cultures. Rather, material and conceptual artifacts associated with cultures can consciously or unconsciously have an impact upon the structure and operation of computing systems. Developing computing systems explicitly based on cultural models can result in new and innovative designs. My GRIOT system for constructing interactive and generative multimedia narratives is presented as a modest example of a computing system with novel features explicitly grounded in a cultural model, in this case a carefully defined model called *trans-African oral literature (orature)*.

Key design concept: The idea of integrative cultural systems can help guide development of computing systems that are explicitly based on particular cultural models. The idea of metamedial cultural systems in which style and content are more definitive of the cultural system than the medium serves this purpose.

IV CRITICAL COMPUTING

Building on the ideas that computers can powerfully affect individuals in subjective ways, and the argument describing how that power can be shaped by cultural phantasms, I look at how computers can have an impact upon society. By examining the relationship between computing systems and agency within culture and society, it is possible to better understand, use, and design cultural computing systems to serve human needs and values. The ways that users interact with computing systems are

SUMMARY 347

situated in society and can be used for expressive personal and social impact (agency play). Furthermore, computing systems can be used to enable critical reflection and engender conceptual and social change (critical computing systems). Finally, computers can play a role in empowering people (*critical-computational empowerment*).

7 AGENCY PLAY

It is well known that humans can interact with computers in a variety of ways. However, it is also clear that interaction is not intrinsically meaningful. It is more telling to investigate how interaction can be used for expressive aims, critically taking into account users' experiences of how interaction produces meaningful effects. *Agency play* is a concept for understanding how different forms of interaction can be used for expressive and critical aims. Agency play is a model of how user agency (enabled by a computer system) works in conjunction with system agency (interpreted by users).

Key design concept: The idea of agency play can guide development of systems that feature changing a user's agency to interact with the system over time for expressive aims. In particular, the concepts of agency relationship, scope, dynamics, and user direction serve this purpose.

8 CRITICAL-COMPUTATIONAL EMPOWERMENT

Now pervasive in society, computers have values and meanings built into their structures. Hence, computing systems play powerful roles in establishing, maintaining, and transforming social structures. We must critically consider the ways that computing systems can affect social power relationships—whether for oppression or empowerment. Toward this end, a theoretical account of power and empowerment is developed, drawing on a range of social theories. Informed by this account, we can explicitly design computing systems to aid in empowering people. A starting point is understanding the ways that real world information is mapped onto, and instantiated by, computational data structures (social-computational flow). Using this framework as a lens, we can then speculate on each of the concepts explored in the chapters of this book—*expressive epistemologies*, *polymorphic poetics*, *cultural phantasms*, *integrative cultural systems*, *agency play*, and *critical-computational empowerment*—in light of specific systems that address issues of social power.

Key design concept: The idea of social-computational flow can guide developer strategies for importing real-world content into computing systems. The idea of

critical-computational empowerment, in turn, can help guide developers in considering how their systems can prompt social change and user empowerment.

V CONCLUSION

9 PHANTASMAL MEDIA AND THE HUMAN CONDITION

I hope that the concepts of phantasmal media, and subjective, cultural, and critical approaches to computing, can lead to new possibilities of using the computer to better understand, and improve, the human condition through each of our human capacities to imagine.

Key design concept: The idea of phantasmal media can help guide system development driven by a desire to explore, and transform, the relationship between the computer and the human condition.