Computational Corporeality:
Computers, Materials, and the Body

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INTRODUCTION

At their core, computers are design tools, they allow us to expand our ability to create, think, organize, and learn. The systems which we build to interface with the digital data they provide can be considered in the the same paradigm of all tools which we use for non-digital tasks in our daily lives. However, the complication of a human-computer interface lies in the fact that it provides both the raw material and the functionality of use in the same space and of the same material. There is no longer the distinction between organic materiality and the discrete function of the tool with which we manipulate it. This can allow for remarkable advantages in ease of use but also negates many experiences of bodily intuition and feedback.

As Tangible User Interfaces [1] become more refined and sophisticated, the future of human computer interaction lies in finding a bridge between the organic structures in the natural world which we seek to emulate and manipulate and the rigidity and exactness of the digital systems which provide the tools for manipulation. As Ellen Lupton comments, "organic forms and materials provide designers with a humanist vocabulary that affirm society's place within the natural world." [2] The constructed and the organic are converging, and the digital materials and tools in development should address this phenomenon by providing an organic material means to engage the tactile senses in the act of creating and modeling.

The rise of ubiquitous computing has brought about the development of innovative systems involving a multiplicity of small computers embedded in everyday objects and the surrounding environment, we are no longer constrained to think of computers as a box on a table. By combining the notion of ubiquitous computing with the approach of direct manipulation, to improve the 'directness' and 'manipulability' of an interface [3], the possibility for a new class of interaction tools and materials emerges. This new class of materials has it basis in the interaction techniques and tools of Tangible User Interfaces, designed to give physical form to digital information. In order for human-computer interfaces to reach a more sophisticated state, they must perform, respond and react in ways that mimic the body and human behavior, not just, or necessarily in their intelligence, but in their materiality.

I have identified four areas which are important for transitioning computer interactions to a more embodied state.

INTERFACING WITH THE BODY

Design has taught us that material choice changes the experience of any interaction. However, interactions with computational systems remains largely disembodied, constraining the digital data to be part of an 'other' or external object. The incorporation of different materials that mimic organic, softer bodily qualities (eg. silicons, textiles) as well as actuation technologies that mimic natural motion (eg. artificial muscle and shape memory alloy deformation) can expand how we interact with digital data and the kind of functionality which computers can offer us.

DISCRETE VS. CONTINUOUS: MODULARITY AND PRIMITIVES

All natural materials are in essence created of discrete components which combine to create continuous systems. The importance of modularity in creating a material language is evident in our environment from the microscopic level, such as building blocks of biological systems (cells) or chemistry (atoms) to the architectural level, such as refabricated panels. Modularity leads to systems of physical primitives, grammars forming the basis of constructive assembly systems. Our physical interface design should be informed and guided by this model.

PHYSICALITY IN THE FEEDBACK LOOP

The materials of our keyboards, the haptic feedback of our buttons, for example, define our computer experience as much as the pixels on the screen which we control. However, this phenomenon is rarely addressed in interface design. The notion of extending the feedback loop of our interfaces to include a input from the physical behavior

of the materials we control and manipulate. can tie our interactions to the natural world and the intuition of our bodily experience.

FORM FOLLOWS FUNCTION FOLLOWS INTERACTION

Physical form can no longer just be considered just to prescribe the function of an object. With multilayered interfaces, and multifunctional devices, the demands of the form are complex and often times at odds with each other. A camera has very different ergonomic considerations than a phone, however they are increasingly incorporated into the same device. The challenge for designers is to look first at the interaction and ascertain how this affects the function which will in turn determine the form. Digital and physical modularity can offer some options to these paradoxical problems, but we must first put interaction first in the design process and have functionality follow.

REFERENCES

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