**Foreword**

Avi Parush:   
 *Conceptual Design for Interactive Systems: Designing for Performance and User Experience*

Technology designers who shape user experiences seek to smooth the path for novices and serve the demanding needs of experts. This was true for 15th century book designers, 19th century train designers, and 21st century smartphone designers. Their innovative designs emerged from a deep empathy for people, sensitivity to diverse social contexts, and imaginative sparks to create new ways of thinking about technology.

When scrolls were re-conceived as books, the idea of numbered pages made it possible to have tables of contents, indexes, and cross references. These breakthrough inventions depended on an understanding of how books would be used differently from scrolls. Similarly, when horse-drawn carriages were re-conceived as iron-horse trains and then again as horse-less carriage automobiles the changes were more profound than giving up on buggy whip holders. New user needs and new technologies required a reconceptualization of the entire user experience. The metaphors, terminology, visual presentation, color, sounds, texture, shapes, and sizes of every component had to be rethought. Then the actions permitted were refashioned to accommodate fresh opportunities and new human needs.

Each generation of designers faces fresh opportunities to remake human experiences in ways that will be easier, safer, more enjoyable, and even more compelling than the past. These considerations were strong in my mind as I developed the direct manipulation concept, which accelerated design thinking by providing a set of principles based on cognitive models. The key principle in the conceptual model was the “visual representation of the objects and actions of interest.” For example the document and file folder icons were the objects and the trash can was a visual representation of the action of deletion. A second direct manipulation principle was “rapid, incremental and reversible operations.” The bold change was to shift from keyboard typing of commands to mouse or touchscreen dragging, dropping, clicking, double-clicking, hovering, and other actions directly on the objects and actions of interest.

This direct manipulation formulation of the desktop concept enabled teaching and redesign of many applications. It also triggered the idea of making words selectable as highlighted links that helped make the World-Wide Web such a remarkable phenomenon. Direct manipulation also led to varied touchscreen designs including tiny keyboards plus gestures on mobile devices, as well as touchscreen home controls, airport kiosks, and museum exhibits. The direct manipulation conceptual model also triggered interactive information visualization strategies with multiple coordinated windows controlled by dynamic query sliders to filter data items from 5-15 windows simultaneously.

Other conceptual model designers carried old designs into new directions, such as transforming paper books into electronic books and automobile dashboard knobs into touchscreen widgets. However, the greatest success of user experience designers is manifest in the 6 billion users of cell phones. While Moore’s Law and other technology advances were important ingredients, I think the designer chefs who cooked up the Web browsers, desktops and the smartphone apps deserve ample credit for their widely-admired contributions. Life has been made better, much of the time, because of the facility for human communication to bind families, e-commerce to promote business, improved healthcare to lengthen and improve quality of life, and much more. Of course cyber-criminals, scammers, spammers, and terrorists have also taken advantage of these new technologies, reminding us that ease of use and universal access have troubling downsides for which we must remain vigilant.

The remarkable modern Renaissance thinker Buckminster Fuller promoted “comprehensive anticipatory design science” which encouraged designers of new conceptual models to think about future impacts, consider unexpected side effects, respect the needs of diverse stakeholders, and ensure universal usability. He also constantly advanced the awareness of planetary impacts and ethical aspects of design. We should continue to read and be inspired by his thinking.

In summary, the progress of technology brings great opportunities and challenges for designers. There are thousands of books and websites about the diverse aspects of design, including design thinking, design methods, design theories, design research, and design science. Novice designers can learn much from these diverse sources, but now Avi Parush provides a fresh perspective on how designers can develop the basic concepts, as well as the attendant information architectures that support clear function, logical configuration, memorable navigation and policy, comprehensible forms, and engaging details. Such layered approaches have been a standard feature of design guides, but Parush walks novice and expert designers through the steps of creating functional chunks, conceptual model elements, physical model elements, detailed conceptual elements, and the user interface elements.

Parush’s characterizations are precise and illustrated with helpful examples. His careful choice of wording and clear figures guide readers and clarify the concepts. Of course every traveler and designer has to find their own path, but Parush’s valuable guide will help user experience designers to make it even easier for novice to learn new systems, while giving experts even more flexibility.

-- Ben Shneiderman, University of Maryland, February 2015