Introduction

USER-INTERFACE DESIGN RULES: WHERE DO THEY COME FROM AND HOW CAN THEY BE USED EFFECTIVELY?

For as long as people have been designing interactive computer systems, some have attempted to promote *good* design by publishing user-interface design guidelines (also called design rules), including these early ones:

- **Cheriton** (1976) proposed user-interface design guidelines for early interactive (time-shared) computer systems.
- **Norman** (1983a,b) presented design rules for software user interfaces based on human cognition, including cognitive errors.
- **Smith and Mosier** (1986) wrote perhaps the most comprehensive set of user-interface design guidelines.
- **Shneiderman** (1987) included "Eight Golden Rules of Interface Design" in the first edition of his book *Designing the User Interface* as well as in all the editions that followed.
- **Brown** (1988) wrote a book of design guidelines appropriately titled *Human–Computer Interface Design Guidelines.*
- **Nielsen and Molich** (1990) offered a set of design rules for use in heuristic evaluation of user interfaces, and Nielsen and Mack (1994) updated them.
- **Marcus** (1992) presented guidelines for graphic design in online documents and user interfaces.

More recently, in the 21st century many more user-interface design guidelines have been published:

- Several authors have written books that include UI/UX design guidelines: Stone et al. (2005), Koyani et al. (2006), Johnson (2007), Shneiderman and Plaisant (2009), and Rosenberg (2020).
- A few organizations have published usability guidelines for the Web: W3C (2016), Yale University (2020).
- Computer companies have published guidelines for designing desktop apps on their platforms: Microsoft Corporation (2018), Apple Computer (2020a).

- Providers of mobile application platforms also have published guidelines to help developers create more usable apps for mobile devices: Oracle Corporation (2017), Google (2019), Apple Computer (2020b).

USER-INTERFACE DESIGN AND EVALUATION REQUIRES UNDERSTANDING AND EXPERIENCE

But how valuable are user-interface design guidelines? That depends on who applies them to design problems.

Following user-interface design guidelines is not as straightforward as following cooking recipes. Design rules often describe goals rather than actions. They are purposefully very general to make them broadly applicable, but that means their exact meaning and applicability to specific design situations is open to interpretation.

Complicating matters further, more than one rule will often seem applicable to a given design situation. In such cases, the applicable design rules often conflict: they suggest different designs. This requires designers to determine which competing design rule is more applicable to the given situation and should take precedence.

Design problems, even without competing design guidelines, often have multiple conflicting goals—for example:

- bright screen *and* long battery life
- lightweight *and* sturdy
- multifunctional *and* easy to learn
- powerful *and* simple
- high resolution *and* fast loading
- WYSIWYG (what you see is what you get) *and* usable by blind people

Satisfying all the design goals for a computer-based product or service usually requires trade-offs—lots and lots of trade-offs. Finding the right balance point between competing design rules requires further tradeoffs.

Given all these complications, user-interface design rules and guidelines must be applied thoughtfully, not mindlessly, by people skilled in the art of user-interface design and/or evaluation. User-interface design rules and guidelines are more like *laws* than like *rote recipes*. Just as a set of laws is best applied and interpreted by lawyers and judges well versed in the laws, a set of user-interface design guidelines is best applied and interpreted by people who understand the basis for the guidelines and have learned from experience in applying them.

Unfortunately, with a few exceptions (e.g., Norman, 1983a), user-interface design guidelines are provided as simple lists of design edicts with little or no rationale or background.

Furthermore, although many early members of the user-interface design and usability profession had educations that included studying cognitive psychology, most newcomers to the field do not. That makes it difficult for them to apply user-interface design guidelines sensibly. Providing that rationale and background education is the focus of this book.

COMPARING USER-INTERFACE DESIGN GUIDELINES

Table I.1 places the two best-known user-interface guideline lists side by side to show the types of rules they contain and how they compare (see the Appendix for additional guideline lists). For example, both lists start with a rule calling for consistency in design. Both lists include a rule about preventing errors. The Nielsen–Molich rule to "help users recognize, diagnose, and recover from errors" corresponds closely to the Shneiderman–Plaisant rule to "permit easy reversal of actions." "User control and freedom" corresponds to "make users feel they are in control." There is a reason for this similarity, and it is not simply that later authors were influenced by earlier ones.

Table I.1 Two Best-Known Lists of User-Interface Design Guidelines

Shneiderman (1987); Shneiderman and Plaisant (2009)	Nielsen and Molich (1990)
Strive for consistency	Consistency and standards
Cater to universal usability	Visibility of system status
Offer informative feedback	Match between system and real world
Design task flows to yield closure	User control and freedom
Prevent errors	Error prevention
Permit easy reversal of actions	Recognition rather than recall
Make users feel they are in control	Flexibility and efficiency of use
Minimize short-term memory load	Aesthetic and minimalist design
	Help users recognize, diagnose, and recover from errors
	Provide online documentation and help

WHERE DO DESIGN GUIDELINES COME FROM?

For present purposes, the detailed design rules in each set of guidelines, such as those in Table I.1, are less important than what they have in common: their basis and origin. Where did these design rules come from? Were their authors—like clothing fashion designers—simply trying to impose their own personal design tastes on the computer and software industries?

If that were so, the different sets of design rules would be very different from each other as the various authors sought to differentiate themselves from others. In fact, all of these sets of user-interface design guidelines are quite similar if we ignore

differences in wording, emphasis, and the state of computer technology when each set was written. Why?

The answer is that all the design rules are based on human psychology: how people perceive, learn, reason, remember, and convert intentions into action. Many authors of design guidelines had at least some background in psychology that they applied to computer system design.

For example, Don Norman was a professor, researcher, and prolific author in the field of cognitive psychology long before he began writing about human–computer interaction. Norman's early human–computer design guidelines were based on research—his own and others'—on human cognition. He was especially interested in cognitive errors that people often make and how computer systems can be designed to lessen or eliminate the impact of those errors.

Similarly, other authors of user-interface design guidelines—for example, Brown, Shneiderman, Nielsen, and Molich—used knowledge of perceptual and cognitive psychology to try to improve the design of usable and useful interactive systems.

Bottom line: User-interface design guidelines are based on human psychology.

By reading this book, you will learn the most important aspects of the psychology underlying user-interface and usability design guidelines.

INTENDED AUDIENCE OF THIS BOOK

This book is intended mainly for software design and development professionals who have to apply user-interface and interaction design guidelines. This includes interaction designers, user-interface designers, user-experience designers, graphic designers, and hardware product designers. It also includes usability testers and evaluators, who often refer to design heuristics when reviewing software or analyzing observed usage problems.

A second important audience is students of interaction design and human–computer interaction. In fact, the second edition of this book turned out to be a popular textbook for college-level courses on UI/UX design. Because of that, one of my goals in updating and refining the book to produce this third edition has been to make it a better textbook.

A third intended audience is software development managers who want enough of a background in the psychological basis of user-interface design rules to understand and evaluate the work of the people they manage.