Notes - Design - User-Interface Design Rules

- Dr Nick Hayward

An introduction to user-interface design rules, and their use relative to HCI and application design and development.

Contents

- Intro
- Recent updates
- Design rules
- Conflicting goals
- Defined as laws
  - comparison
  - similarity
- Resources

Intro   With the advent of interactive computer systems, we began to see the desire to codify and promote perceived *good* design. This has, more often than not, led to the publication of user-interface design guidelines.

There have been many different attempts to produce such guidelines with a few notable examples from as early as 1976.

For example,

- 1976: CHERITON outlined prospective user-interface guidelines for early interactive computer systems.
- 1983: NORMAN presented rules for designing user-interfaces based upon human cognition. This included cognitive errors.
- 1986: SMITH & MOSIER penned one of the most comprehensive sets of user-interface design guidelines
- 1987: SHNEIDERMAN's "Eight Golden Rules of Interface Design" was published, which is now in its fifth edition.
- 1988: BROWN wrote a set of design guidelines, simply entitled "Human-Computer Interface Design Guidelines"
- 1990: NIELSEN & MOLICH suggested a set of design rules for the application of heuristic evaluation of user interfaces. (a rule of thumb - by trial and error, or by following a set of loosely defined rules)
- 1992: MARCUS presented guidelines for graphic design in online documents and user interfaces

Recent updates   As we moved into the 21st Century and, in particular, with the growing popularity of mobile and online systems, we now have many additional user-interface guidelines.

For example,

- 2005: STONE ET AL outlined general guidelines for user-interface design and evaluation.
- 2006: KOYANI, BAILEY, & NALL addressed design and usability guidelines specifically for research-based web design.
- 2007: JOHNSON embraced the popular trend for bloopers by suggesting some common user-interface design do's and don'ts.
- 2009: SHNEIDERMAN updated his well-known tome to its current 5th edition.

The new century also saw more and more platform specific publications. Apple, Google, Microsoft, Oracle &c. all published design guidelines for various sets of products and platforms.

Each set naturally promotes design suggestions, preferences, and rules required for various development on their platform.

We have UI design basics from Apple, human interface guidelines from Gnome, material design at Google, and the much maligned modern design, originally known as Metro, from Microsoft.

Examples include:

- Apple - UI Design Basics
- Gnome - Human Interface Guidelines
- Google - Material Design
- Microsoft - Guidelines for Windows Runtime apps
- and many, many more...

Design rules Even with all of these varied sets of guidelines and rules, following user-interface design guidelines, for example, is not as simple as following a cooking recipe.

Rules and design guidelines often describe aspirational goals rather than firm actions. They are inherently general in nature in order to broaden their potential application. This naturally means that their exact meaning and application to specific design situations is open to broad interpretation.

Just to complicate matters even further, it is often the case that more than one rule may seem applicable to a given design situation. In these cases, such applicable design rules will often appear to conflict. In essence, they will suggest potentially different designs.

Such scenarios will require designers to simply decide which competing design rule is more useful or applicable for a given situation, target audience, client, and so on. Effectively, as a designer we will need to choose an order of precedence for our design.

This is where a clear understanding of current design trends, and the heritage of graphic design in general, becomes particularly useful. It helps guide and suggest potential resolutions to such conflicts based upon experience and success.

Conflicting goals When we consider design problems and scenarios, we often encounter multiple conflicting goals. These are in addition to the aforementioned potential for conflicting design guidelines and rules.

For example, we are often interested in

- Powerful and Simple
- High Resolution and Fast Loading
- Multifunctional and Easy to Learn
- WYSIWYG (what you see is what you get) and Accessible for the Blind
- and so on...

As designers, we need to address such conflicts and make informed decisions that are guided, but not restricted or dominated, by design guidelines and rules.

In essence, there will normally have to be tradeoffs, and, in fact, quite often there will be many, many tradeoffs. It is essentially a case of finding the right balance between competing design rules.

Given such complications, user-interface design rules and guidelines need to be applied with careful consideration, not simply checking off a list, by skilled and experienced designers.

Defined as laws If we consider user-interface design rules and guidelines more like a set of defined laws, instead of a step-by-step, rote recipe, then we will start to better understand their application.

As a set of laws may be interpreted and applied by lawyers and judges, as designers we may choose how best to interpret and apply design guidelines and rules. Therefore, a set of user-interface design guidelines is, of course, best applied and interpreted by designers who understand the basis for these rules, and have learned their application from experience.

comparison The following table compares two of the best known user-interface guideline lists. It shows the types of rules they contain, and obviously how they compare to each other.

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

For example, both lists include a rule requiring consistency in design.

Each list also includes a rule concerning prevention of errors. The Nielson and Molich rule, "help users recognise, diagnose, and recover from errors", closely resembling that of Shneiderman's, "permit easy reversal of actions." We can also see that Nielson and Molich's "User control and freedom" corresponds well to Shneiderman's "make users feel they are in control".

What is important to note here, beyond the obvious rules themselves, is that the similarity between each set is not simply due to coincidence or inheritance.

These rules were also not simply the result of each author's whim or a reflection of their idiosyncracies.

similarity There is, in fact, noticeable similarity in each list, and close association in context and emphasis.

This is due to the influence of human psychology. In essence, how we perceive, learn, reason, remember, and process and convert intentions into actions.

It is also notable that many authors of such design guidelines had at least some background in psychology, which they applied to the design of computer interfaces.

Don Norman, who in 1983 penned rules for designing user-interfaces based upon human cognition, was a professor, researcher, and prolific author in the field of cognitive psychology. His design guidelines were, unsurprisingly, based on research into human cognition.

Other authors, including Brown, Molich, Nielsen, and Shneiderman applied knowledge of cognitive and perceptual psychology in an attempt to improve the design of interactive systems.

Therefore, user-interface design guidelines are based upon human psychology.

Resources

- Brown, CM. "Human-computer interface design guidelines." Ablex Publishing Corp. 1988.
- Cheriton, DR. "Man-machine interface design for time-sharing systems." *Proc ACM National Conference.* 1976. PP.362-380.
- Koyani, SJ. et al. "Research-based web design and usability guidelines." *U.S. Dept of Health and Hum Serv.* 2006.
- Marcus, A. "Graphic Design for electronic documents and user interfaces." Addison-Wesley. 1992.
- Nielsen, J. & Molich, R. "Heuristic evaluation of user interfaces." *Proc ACM CHI'90 Conference, Seattle.* 1990. PP.249-256. (NB: Updated by Nielsen, J. & Mack, RL. "Usability Inspection Methods." John Wiley & Sons, Inc. 1994.)
- Norman, DA. "Design rules based on analysis of human error." *Commun ACM.* 1983. PP.254-258.
- Norman, DA. "Design principles for human-computer interfaces." In Janda, A. ed.
- Shneiderman, B. & Plaisant, C. "Designing the user interface: Strategies for effective human-computer interaction." 5th Edition. Addison-Wesley. 2009.
- Smith, SL. & Mosier, JN. "Guidelines for designing user interface software." *National Technical Information Service.* 1986. Technical Report ESD-TR-86-278.
- Stone, D. et al. "User interface design and evaluation." Morgan Kaufmann. 2005.