Golden Rules of UI Design:
8. Reduce STM Load

- Remember
  - $\mu_{WM}$ (and even $\mu_{WM^*}$) are small
  - $\delta_{WM}$ is short
- Minimize
  - amount of information to remember
  - time information must be remembered

\[
\begin{align*}
\mu_{WM} &= 3 & 2.5 \sim 4.1 & \text{chunks} \\
\mu_{WM^*} &= 7 & 5 \sim 9 & \text{chunks} \\
\delta_{WM} &= 7 & 5 \sim 225 & \text{sec} \\
\hat{\mu}_{WM} (1 \text{ chunk}) &= 73 & 73 \sim 226 & \text{sec} \\
\hat{\mu}_{WM} (3 \text{ chunks}) &= 7 & 5 \sim 34 & \text{sec}
\end{align*}
\]
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Back to that initial page,…
Errors

- Matching pairs: [], {}, <TAG> </TAG>, ...
  - If possible to correct, why require?
- Editor support for language
  - Automated checks
  - Syntax-directed editors / Structure editors
    - Editor knows about / enforces language syntax

Errors

- Package complete sequences of actions
  - Minimize need for user to repeatedly issue the same set of commands
    - Predefined sequences ("wizards")
    - Facilities for defining/invoking sequences
      - Macros
Errors

- Prevention
  - Command completion
    - Automated vs. requested
    - Menu of possible completions
  - Correction
    - Fix individual commands/arguments
      - “Thier” → “Their”

Example: Forcing your user to make a mistake  May 2005

- Fill out an address

  Note
  - “Address”
  - “Zip/postal code”
  - “City”
  - “State, region or county”
  - “Country”

Credit Card?
Example: Forcing your user to make a mistake  May 2005

- Address is automatically “propagated” from previous page,…
- But, what went wrong?
- How can I fix it?

Example: Forcing your user to make a mistake  May 2005

- What’s wrong?
- It’s worse than you think!
- Charge is denied (instantly)
Test, test, test!

- Heuristics aside, how do users respond to the design/system?
  - Do they “get it”?  
- Does the system implement the design?  
- What about boundary conditions?

Example: Terminology

- Consistency with standard usage
Example: Terminology

- Consistency with standard usage
  - What do “This Week” and “Next Week” mean?
Example: Terminology

- Consistency with standard usage
  - What do "This Week" and "Next Week" mean?
  - How about "Next 30 Days" and "Next Month"?
**Example: Terminology**

- Consistency with standard usage
  - What do “This Week” and “Next Week” mean?
  - How about “Next 30 Days” and “Next Month”?

**Example**

- New version, new problems,…
- Filtering
Guidelines for Display
Smith & Mosier 86 (hcibib.org/sam/)

- Consistency of data display
  - Unless there’s a good reason to be inconsistent
- Efficiency of information assimilation by the user
  - Familiar terminology/formatting
  - Understandable layout
  - Minimize unneeded information
  - Choose appropriate “encoding”
- Minimal memory load on the user
- Compatibility of display and input
  - Use same format for both
  - Combine if possible (make output editable)
- Flexibility for user control
  - Fit the task
    - How/when: Mapping to display, spatiotemporal layout of output

Guidelines for Input
Smith & Mosier 86 (hcibib.org/sam/)

- Consistency of data input
  - Unless there’s a good reason to be inconsistent
- Minimal input actions by user
  - But note tradeoffs
    - Consistency: Keep the rules simple (Reisner)
    - Memory load
    - KLM/CPM issues (e.g., homing time may outweigh keystroke and widget manipulation savings; are savings on the critical path?)
- Minimal memory load on the user
- Compatibility of display and input
  - Use same format for both
  - Combine if possible (make output editable)
- Flexibility for user control
  - Fit the task
    - What: Quantity and kind of information input
    - How/when: Spatiotemporal order of input
Keeping it Simple

2006

2007

2008

Keeping it Simple

2009

2010
Keeping it Simple

2011

![Google Search in 2011](image)

2012

![Google Search in 2012](image)

2013

![Google Search in 2013](image)

2014

![Google Search in 2014](image)
Keeping it Simple

2015

2016

Keeping it Simple

2017

2018