

Informatics 134

Software User Interfaces
Spring 2021

Mark S. Baldwin

baldwinm@ics.uci.edu

4/01/2021

Agenda

1. Evaluating Widgets
2. A2: Five and Five
3. Next Week's Agenda

Evaluating Widgets

WIMP

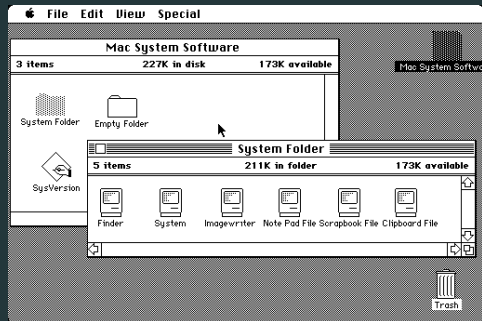
Some History

W Windows

I Icons

M Menus

P Pointers



Macintosh System 1.0 [1]

Benefits of WIMP

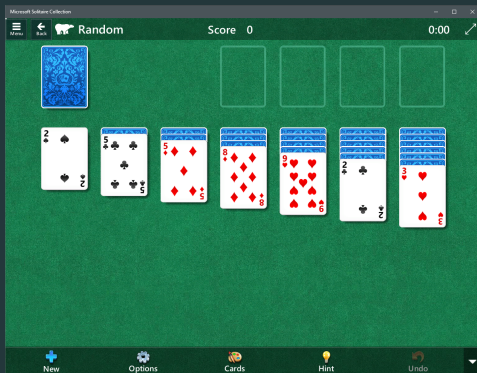
Introduced core input and interaction methods that could be standardized across multiple systems.

This consistency opened a path to non-technical skill development, transferable across different computing environments.

Some History

Benefits of WIMP

Direct Manipulation



Obstacles of WIMP

Not accessible without additional architecture and semantic and lexical context.

Can lead to cluttered interfaces, affecting **task at hand**

WIMP's pervasiveness limits what is possible with technology today.

Post WIMP Interfaces

- Tangible User Interfaces
- Natural User Interfaces (*e.g.*, multi-touch, wearable, spatial)
- Voice User Interfaces
- Many more...

Evaluating WIMP and Post-WIMP Interfaces

$$MT = a + b \cdot \log_2 \left(\frac{D}{W} + 1 \right)$$

Fitts' Law

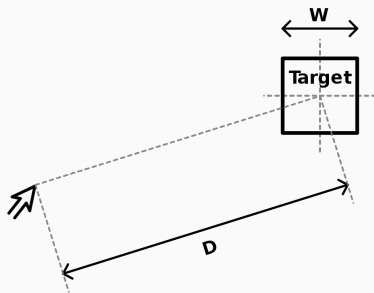
MT - The time it takes to move a pointer to a target

D - The distance of movement

W - The size of the target

a - Device specific coefficient (*e.g.*, time to move hand)

b - Movement coefficient (*e.g.*, sticky mouse, etc.)



$$MT = a + b \cdot \log_2 \left(\frac{D}{W} + 1 \right)$$

Implications for User Interface Design

Fitts' Law tells us:

The larger the target (W), the easier it is to interact with it.

The faster we move a pointer (MT), the time to interact is shortened.

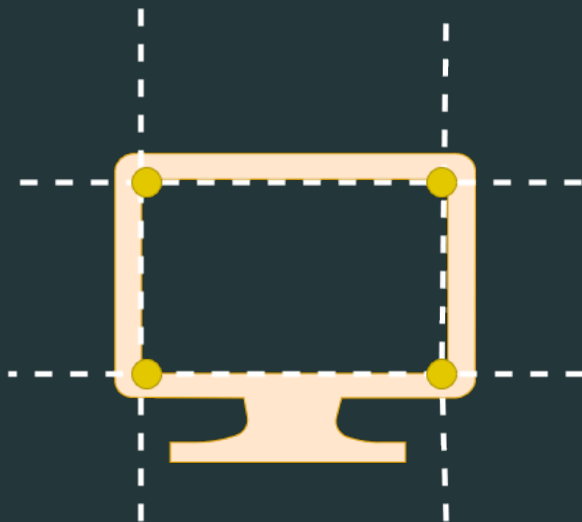
Implications for User Interface Design

So how do we take advantage of these principles in user interface design?

Implications for User Interface Design

So how do we take advantage of these principles in user interface design?

- Group related interactors (widgets), examples?
- Infinite Width (when constrained by screen), examples?



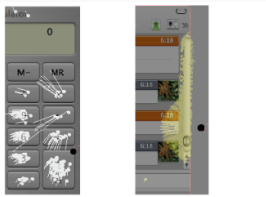
Infinite Edges [2]

Implications for User Interface Design

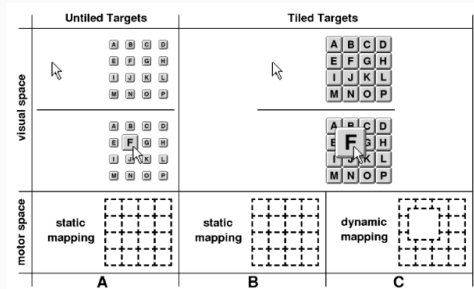
So how do we take advantage of these principles in user interface design?

- Group related interactors (widgets), examples?
- Infinite Width (when constrained by screen), examples?
- Snap to target
- Expanding targets [3]
- Magnetic field (click patina) [4]

Fitts' Law



Magnetic Dust or Click Patina [4]



Expanding Targets [3]

Implications for User Interface Design

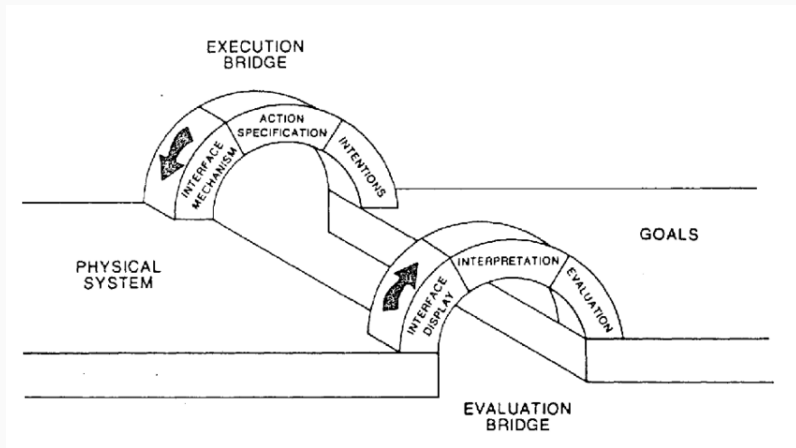
The more difficult it is to move towards and interact with widgets in your interface, the greater the risk of user discomfort, frustration, and dissatisfaction.

Implications for User Interface Design

"the greater the risk of user **discomfort**, **frustration**, and **dissatisfaction**."

Are these experiences universal?

The Gulf of Execution and The Gulf of Evaluation



The Gulf of Execution

The distance between what a user perceives and what a system supports.

The Gulfs

The Gulf of Evaluation

The distance between how a user assesses system state and how well the system supports discovery and interpretation of that state.

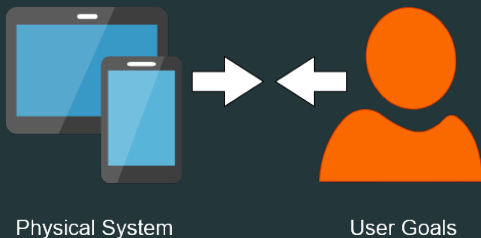
The Gulfs

Stages of Execution

Identify a goal

Translate that goal to an
intention to act

Identify steps necessary to
fulfill the intention



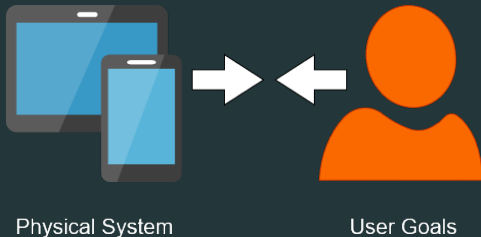
The Gulfs

Stages of Evaluation

Identify user perception of the world

Interpret perception to meet expectations

Evaluate by comparing expectations to execution of intention



An Example

**All the ingredients of a meal are properly measured and prepared for you, but you don't have the recipe to follow.
Is the gulf of execution wide or narrow?**

An Example

The meal is cooked, you need to determine if it tastes as expected. Is the gulf of evaluation wide or narrow?

The Gulfs

Using the gulfs to reason about widget and general user interface design

Visibility of System Status: Can the intent of the object (state, actions) be determined by looking at it?

Mapping: Can the user identify the relationship between action and outcome?

Consistency: Is object behavior the same, regardless of changes to system state?

Feedback: Does the object inform the user about its state after an action or outcome?

The more difficult it is to move towards and interact with widgets in your interface, the greater the risk of user discomfort, frustration, and dissatisfaction.

A2: Five and Five





Next Week's Agenda

Next Week's Agenda

- Teams announced next Monday
- Team Assignment 1 will be launched on Monday
- Finish A1 (DUE TONIGHT)
- Get started on A2
- We'll talk more about design, then start getting more technical!

References

References i

-  Wikipedia.
System 1, 2021.
-  Kevin Hale.
Visualizing fitts's law, 2007.
-  Michael J. McGuffin and Ravin Balakrishnan.
Fitts' law and expanding targets: Experimental studies and designs for user interfaces.
ACM Trans. Comput.-Hum. Interact., 12(4):388–422, December 2005.
-  Amy Hurst, Jennifer Mankoff, Anind K. Dey, and Scott E. Hudson.
Dirty desktops: Using a patina of magnetic mouse dust to make common interactor targets easier to select.
In *Proceedings of the 20th Annual ACM Symposium on User Interface Software and Technology*, UIST '07, page 183–186, New York, NY, USA, 2007. Association for Computing Machinery.