

Theories, Principles & Guidelines

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- High-Level Theories
- Object-Action Interface Model
- Principles
- Guidelines for Data Entry

High-Level Theories

- Conceptual, semantic, syntactic and lexical model
- GOMS and the keystroke-level model
- Stages of action models
- Consistency through grammars

Conceptual, semantic, syntactic, and lexical model

- Foley and Van Dam developed in the late 1970s
- Four-level approach
 - Conceptual
 - Semantic
 - Syntactic
 - Lexical

Contd...

- Conceptual level – user's mental model of the interactive system
- Semantic level - describes the meanings between the input and output
- Syntactical level - a set of rules to create a sentence, which will give the computer a set of instructions to complete a particular task

Contd...

- Lexical level - input device dependencies

Example

Conceptual: Provides a mental model

Example: text editor objects = characters,
files, paragraphs

relationships = files contain paragraphs
contain chars

operations = insert, delete, etc.

Contd...

Semantic: meaning/desired function

Example: move the paragraph

Syntactic: how the semantic command is formed

Example: Edit, Highlight, Cut, Paste

Contd...

Lexical: sequence of actions

Example: how mouse and keyboard combined into menu, button, string, pick, etc.

Point to edit on menu bar->click ->select option within edit menu.

GOMS & KEYSTROKE

GOMS

- Goals
- Operations
- Methods
- Selections

Example

```
GOAL: DELETE-FILE
.   GOAL: SELECT-FILE
.   .   [select:  GOAL: KEYBOARD-TAB-METHOD
.   .   GOAL: MOUSE-METHOD]
.   .   VERIFY-SELECTION
.   GOAL: ISSUE-DELETE-COMMAND
.   .   [select*: GOAL: KEYBOARD-DELETE-METHOD
.   .   .   PRESS-DELETE
.   .   .   GOAL: CONFIRM-DELETE
.   .   .   GOAL: DROP-DOWN-MENU-METHOD
.   .   .   MOVE-MOUSE-OVER-FILE-ICON
.   .   .   CLICK-RIGHT-MOUSE-BUTTON
.   .   .   LOCATE-DELETE-COMMAND
.   .   .   MOVE-MOUSE-TO-DELETE-COMMAND
.   .   .   CLICK-LEFT-MOUSE-BUTTON
.   .   .   GOAL: CONFIRM-DELETE
.   .   .   GOAL: DRAG-AND-DROP-METHOD
.   .   .   MOVE-MOUSE-OVER-FILE-ICON
.   .   .   PRESS-LEFT-MOUSE-BUTTON
.   .   .   LOCATE-RECYCLING-BIN
.   .   .   MOVE-MOUSE-TO-RECYCLING-BIN
.   .   .   RELEASE-LEFT-MOUSE-BUTTON]

*Selection rule for GOAL: ISSUE-DELETE-COMMAND
  If hands are on keyboard, use KEYBOARD-DELETE-METHOD,
  else if Recycle bin is visible, use DRAG-AND-DROP-METHOD,
  else use DROP-DOWN-MENU-METHOD
```

Keystroke-Level Model

- Simplified version of GOMS
- Predicting user performance
- Execution time is estimated by listing the sequence operators and then summing the times of the individual operators

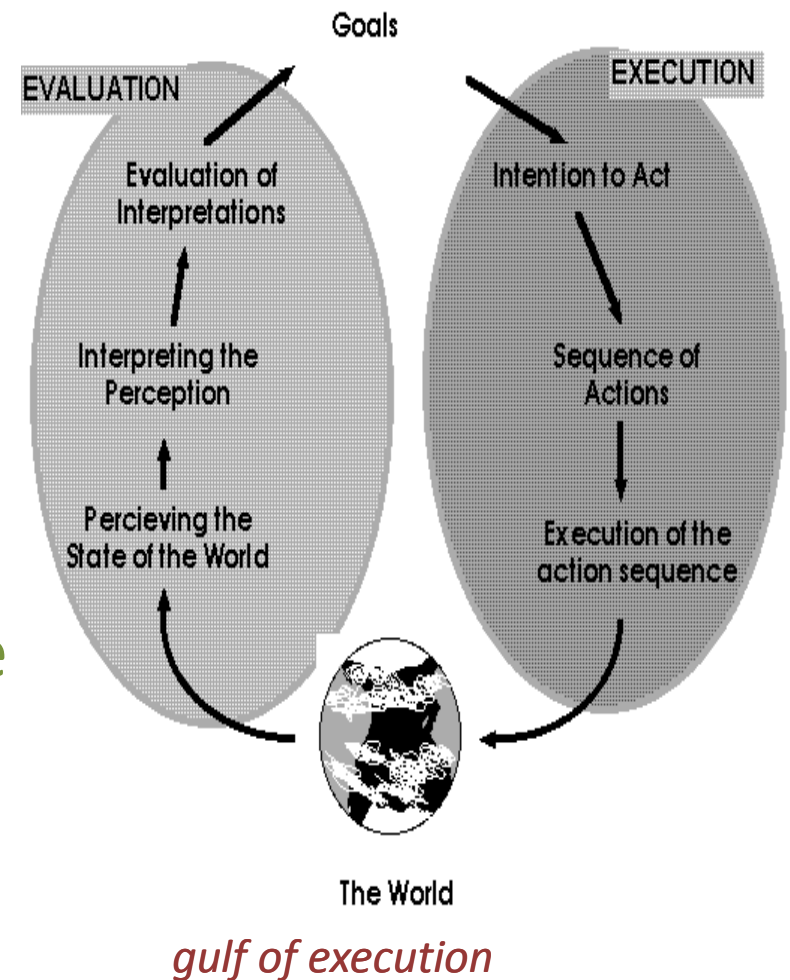
Example

Description	Operation	Time (sec)
Reach for mouse	H[mouse]	0.40
Move pointer to "Replace" button	P[menu item]	1.10
Click on "Replace" command	K[mouse]	0.20
Home on keyboard	H[keyboard]	0.40
Specify word to be replaced	M4K[word]	2.15
Reach for mouse	H[mouse]	0.40
Point to correct field	P[field]	1.10
Click on field	K[mouse]	0.20
Home on keyboard	H[keyboard]	0.40
Type new word	M4K[word]	2.15
Reach for mouse	H[mouse]	0.40
Move pointer on Replace-all	P[replace-all]	1.10
Click on field	K[mouse]	0.20
Total		10.2

According to this KLM model, it takes 10.2 seconds to accomplish this task.

Stage of Action

- Forming the goal
- Forming the intention
- Specifying the action
- Executing the action
- Perceiving the system state
- Interpreting the system state
- Evaluation the outcomes



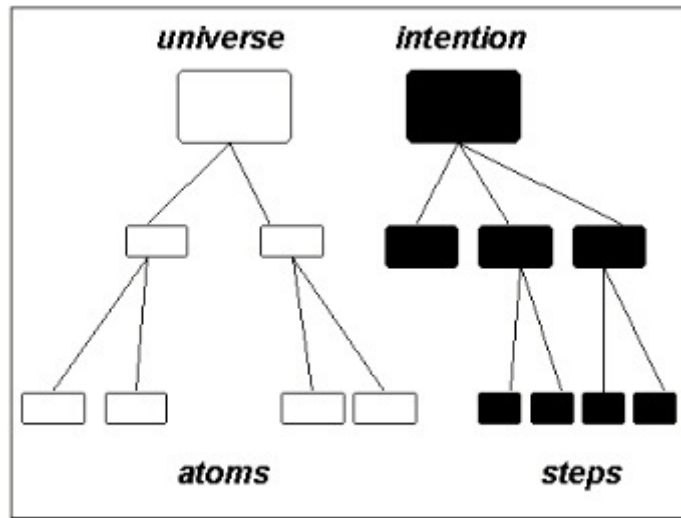
Consistency through grammars

Consistent	Inconsistent A	Inconsistent B
delete/ insert character	delete/ insert character	delete/ insert character
delete/insert word	remove/bring word	remove/insert word
delete/ insert line	destroy/ create line	delete/ insert line
delete/ insert paragraph	kill/birth paragraph	delete/ insert paragraph

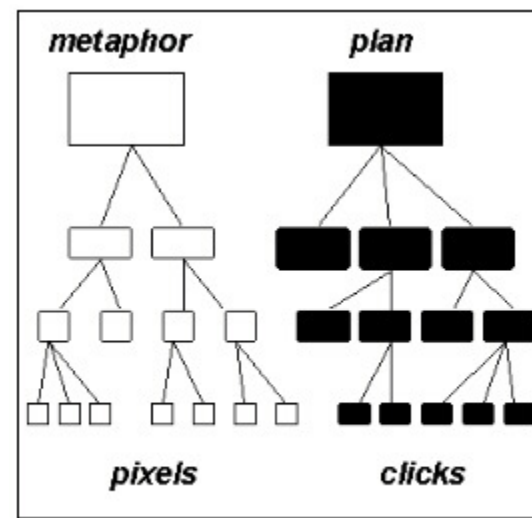
- Simpler grammar are easier to learn

Object-Action Interface Model

- The user first selects an **object** and then selects the **action** to be performed on the selected **object**
- The OAI model is also in harmony with the software engineering model of Object Oriented programming model



TASK



INTERFACE

PRINCIPLES

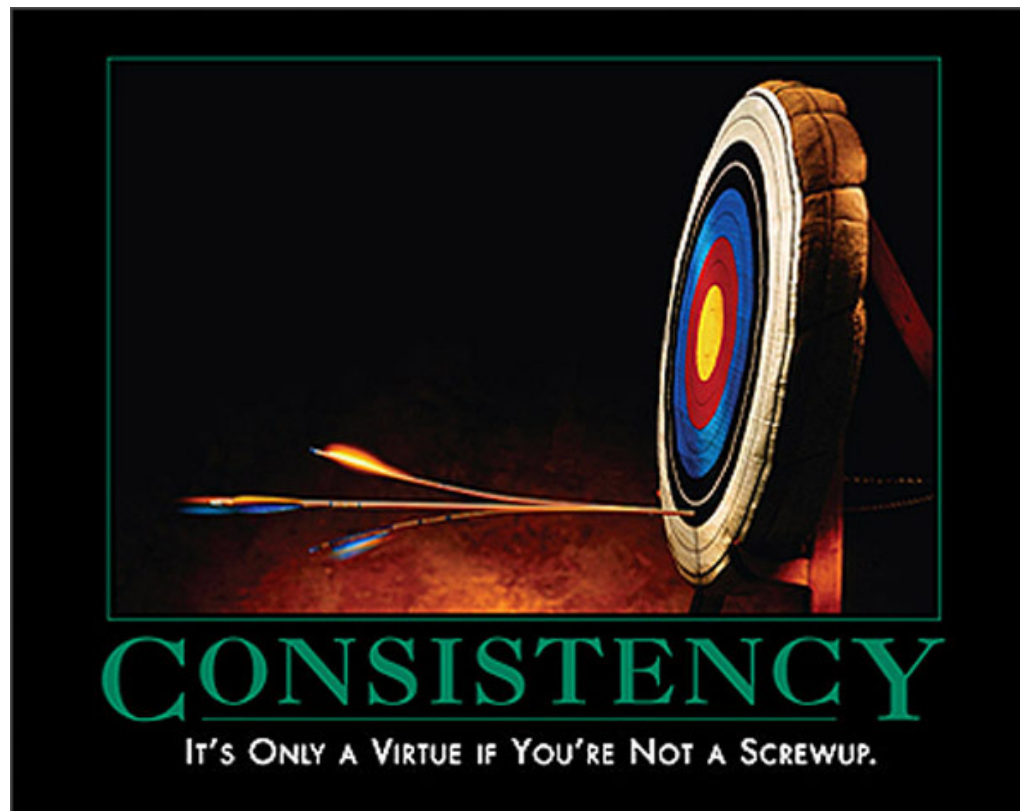
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PRINCIPLE 1: RECOGNIZE THE DIVERSITY

- User Profiles
 - Novice
 - Knowledgeable
 - Expert
- Task Profile
 - Frequent
 - Intermediate and Infrequent
- Interaction Styles
 - Direct Manipulation
 - Menu Selection
 - Form Fillin
 - Command Language
 - Natural Language

PRINCIPLE 2: USE THE EIGHT GOLDEN RULES OF INTERFACE DESIGN

- Strive for Consistency



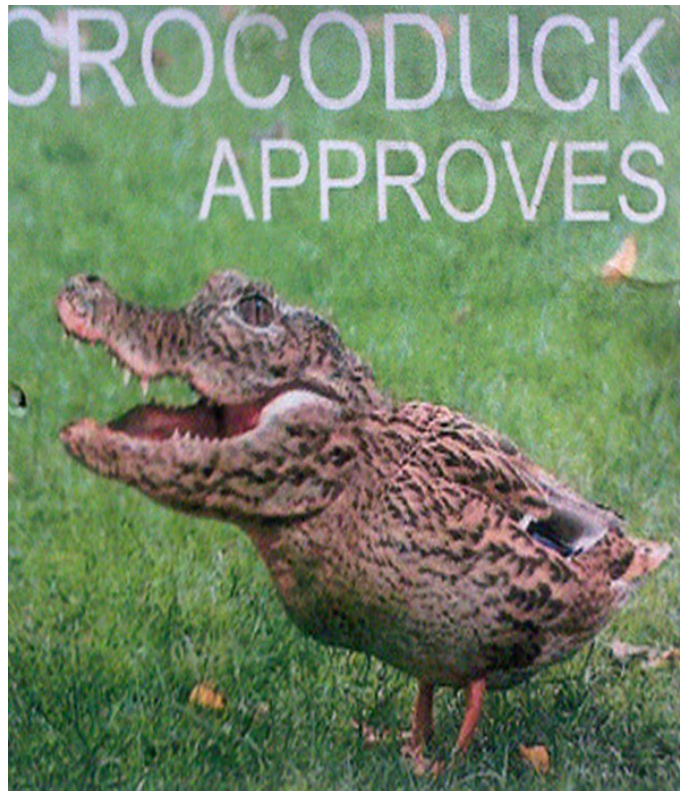
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- Enable frequent users to use shortcuts



Contd...

- Offer informative feedback



Contd...

- Design dialogues to yield closure



Amazon.com Checkout: Edit Address - Windows Internet Explorer

https://www.amazon.com/go/checkout/address/edit.html

amazon.com. SIGN IN SHIPPING & PAYMENT GIFT-WRAP PLACE ORDER

Please update the shipping address.
When finished, click the "Ship to this address" button to proceed with your order. Or you may return to your Address Book.

Full Name:

Address Line1:
Street address, P.O. box, company name, c/o

Address Line2:
Apartment, suite, unit, building, floor, etc.

City:

State/Province/Region:

ZIP/Postal Code:

Country:

Phone Number:

OR

Address Accuracy
Make sure you get your stuff! If the address is not entered correctly, your package may be returned as undeliverable. You would then have to place a new order. Save time and avoid frustration by entering the address information in the appropriate boxes and double-checking for typos and other errors. Need help? Click for address tips:

- [General Address Tips](#)
- [APO/FPO Address Tips](#)

Contd...

- Offer error prevention and simple error handling



amaz		Advanced
amazon	740,000,000 results	Preferences
ananzi	312,000 results	Language
anasazi	1,120,000 results	
anazao	5,730 results	
anazapta	26,600 results	
amazon uk	16,600,000 results	
amazon.ca	21,200,000 results	
anazao salon	827 results	
anazârmekhem	220 results	
amazing	301,000,000 results	close

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- Permit easy reversal of action



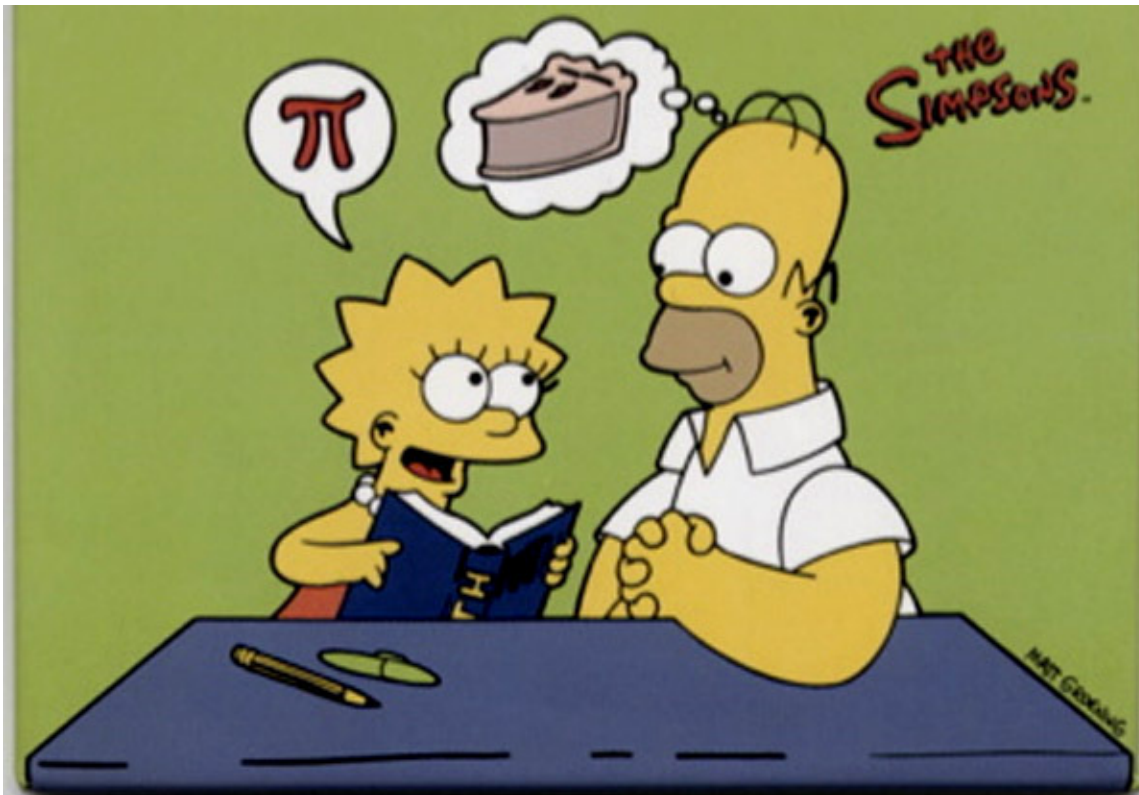
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- Support internal locus of control



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- Reduce short term memory load



PRINCIPLE 3: PREVENT ERRORS

- There is no medicine against death, and against error no rule has been found.

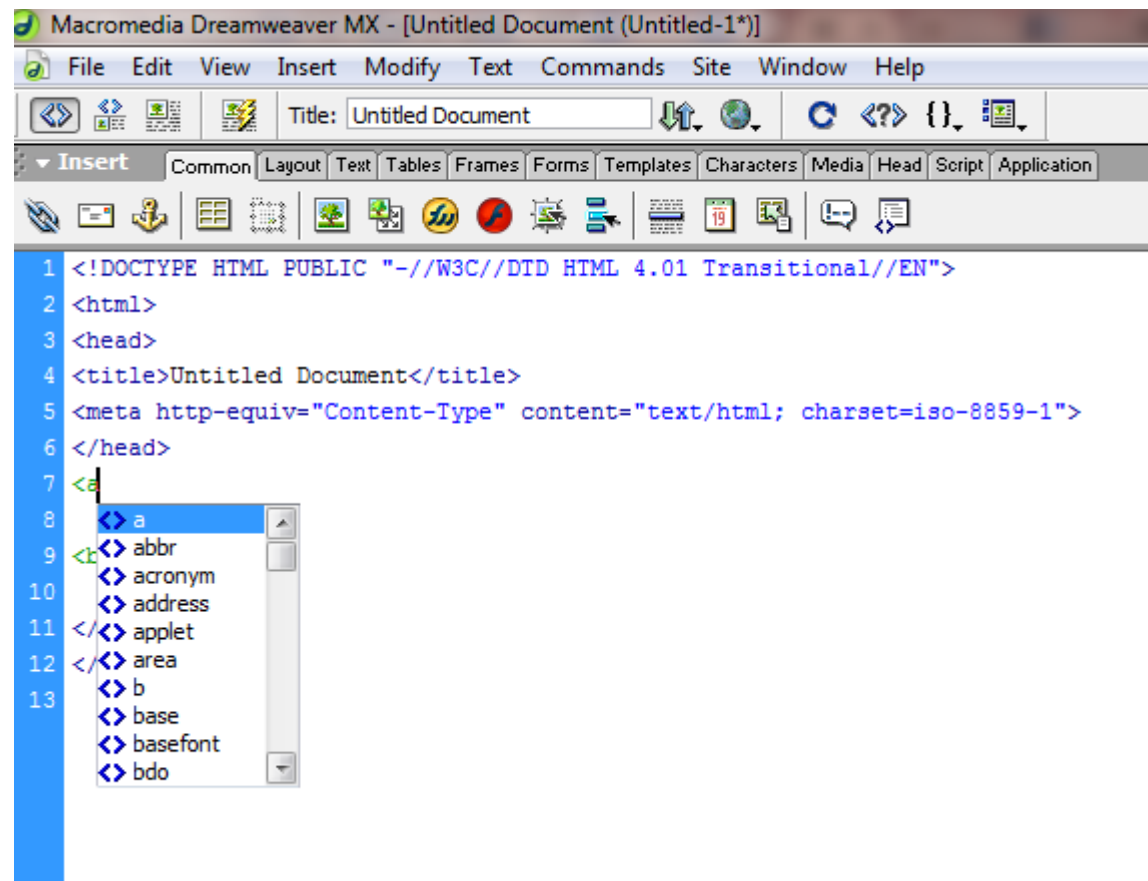
-Sigmund Freud

- Correct Matching Pairs { } HCl
- Complete Sequences
- Correct Commands

Complete Sequences

- When a pilot throws a switch to lower the landing gear, hundred of steps and checks are invoked automatically
- Designer can gather information about potential complete sequence by studying sequence of commands that people actually issue, and the patterns of errors that people actually make

Correct Commands



GUIDELINES FOR DATA DISPLAY

- Guidelines for Data Display
- Guidelines for Data Entry
 - Consistency of data-entry transactions
 - Minimal input actions by user
 - Minimal memory load on users
 - Compatibility of data entry with data display
 - Flexibility for user control of data entry

THANK YOU!!!