

# Human-Computer Interaction

CPSC 481 - Spring 2019

Lessons from The Design of Everyday Things  
II

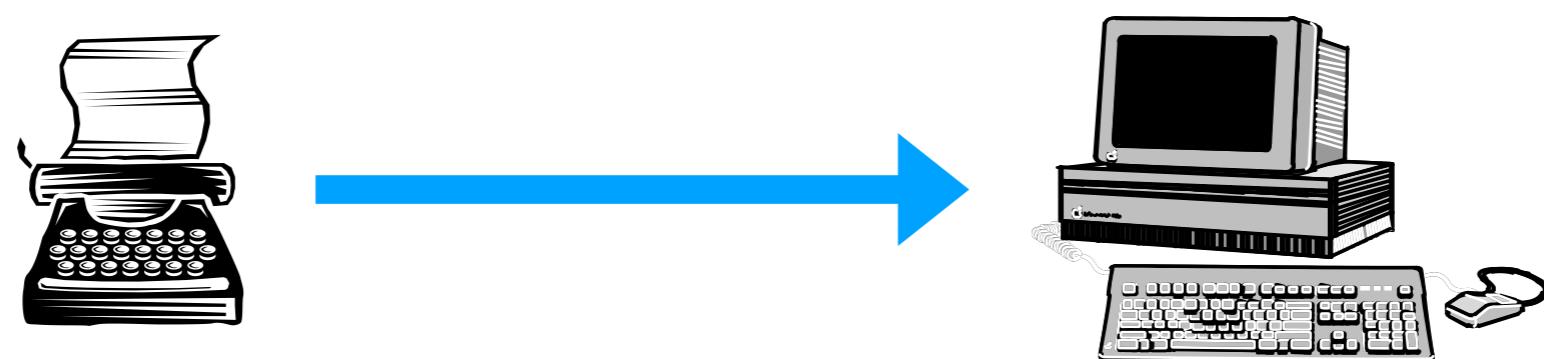
Adapted from Tony Tang

# Learning Objectives

- By the end of the lecture, you should be able to:
  - Distinguish between positive and negative transfer effects
  - Describe the role of interface idioms has with regard to interface innovation
  - Discuss how cultural associations impact interface idiom design
  - Identify components that contribute to conceptual models
  - Distinguish between conceptual models and conceptual design
  - Distinguish between {design | system | user} model, and describe why mismatches cause problems

# Transfer Effects

- People transfer their learning/expectations of similar objects to current objects
  - **Positive transfer:** previous learnings applied to new situation
  - **Negative transfer:** previous learnings conflicts with the new situation



# Transfer Effects in Real Life...



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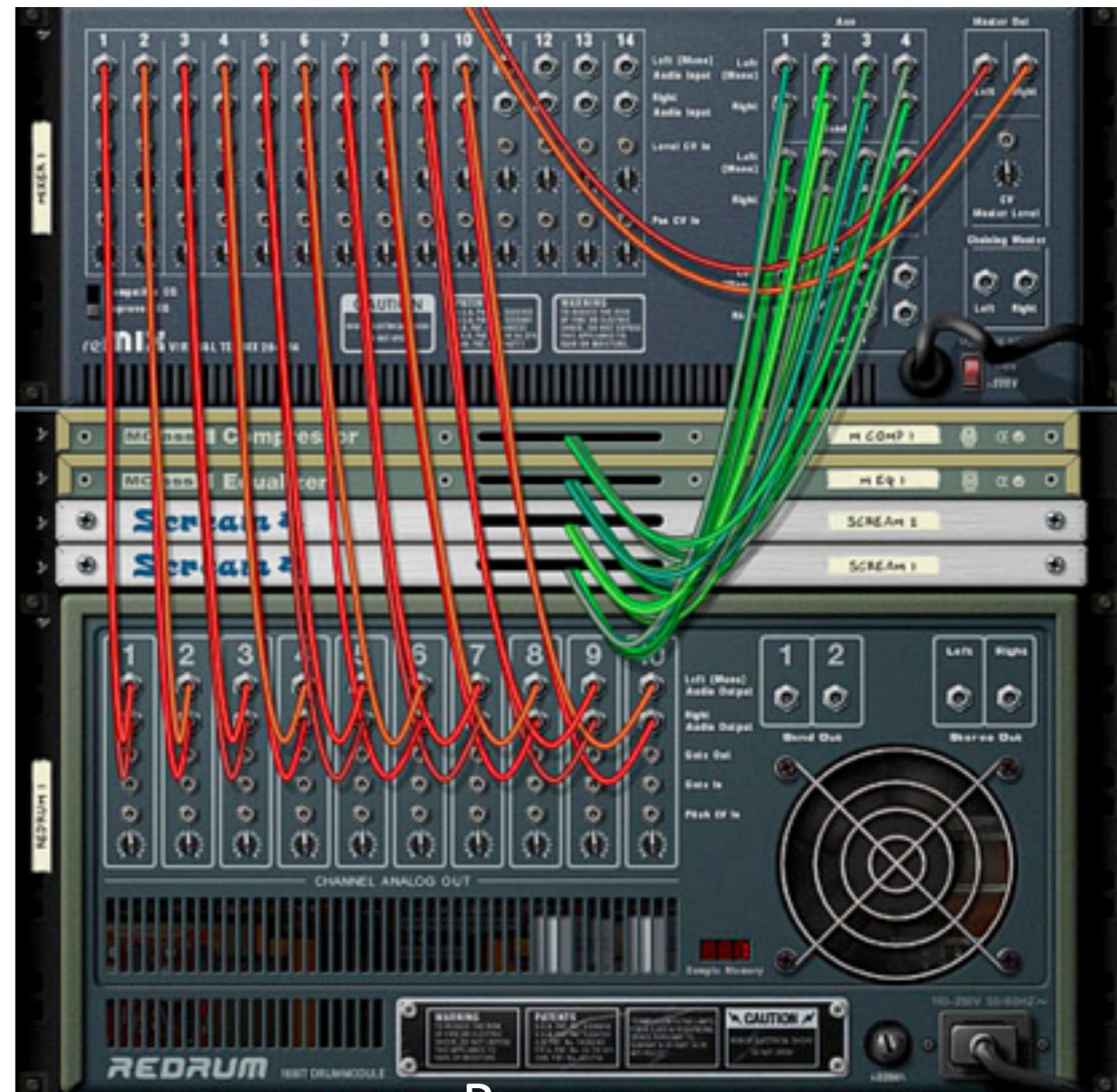
# Transfer Effects in Real Life...



# Transfer Effects for GUIs

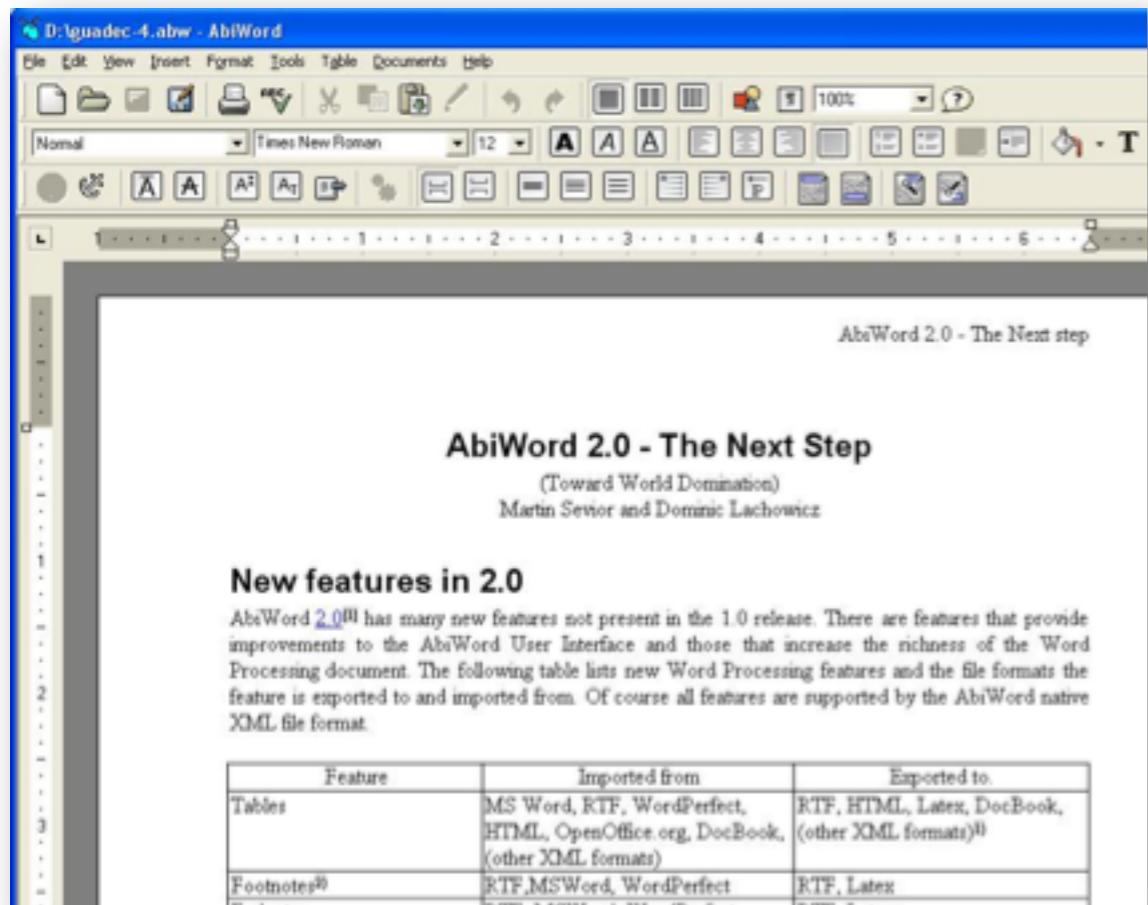


Real life



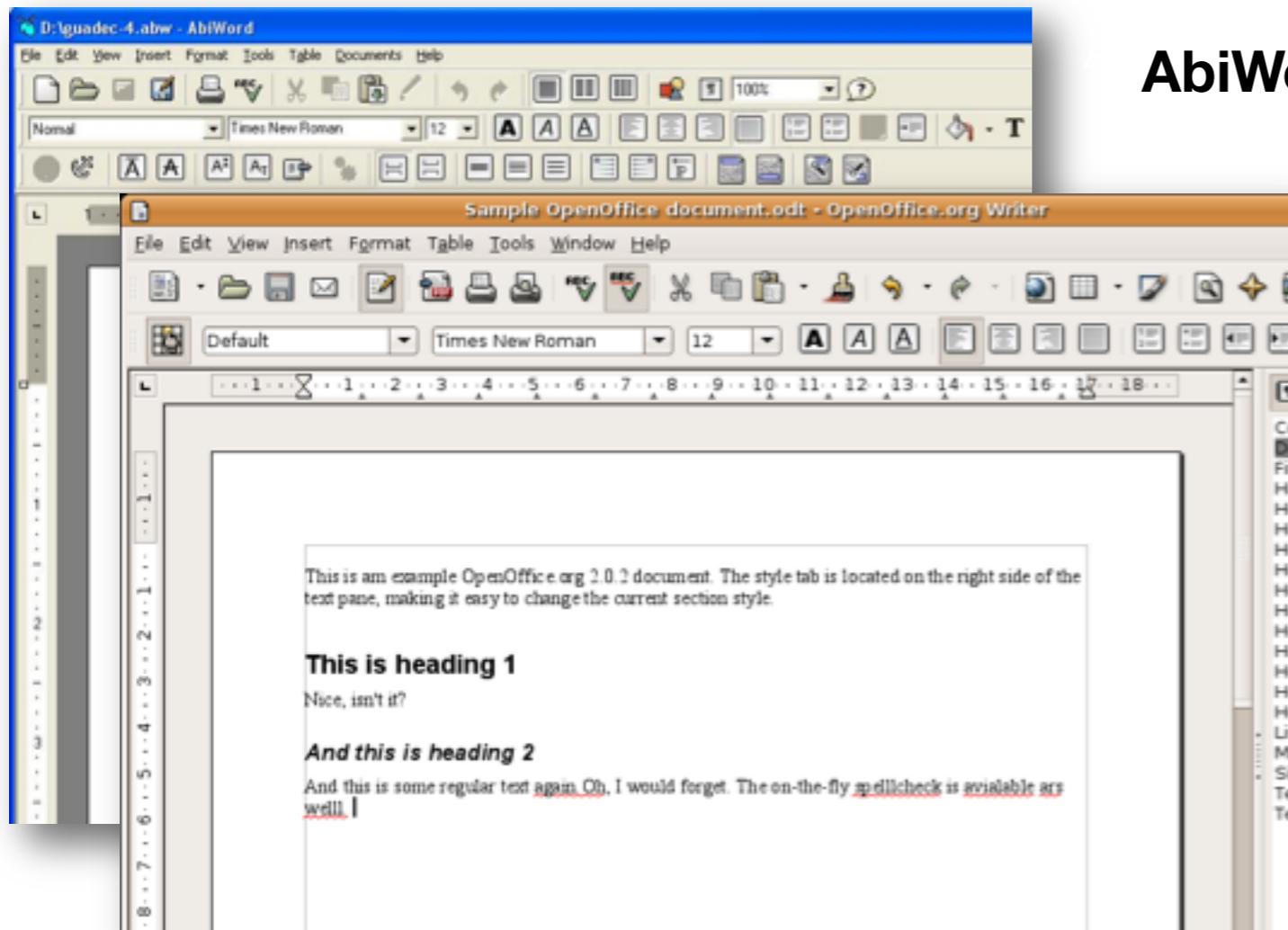
Reason

# Transfer Effects for GUIs



**AbiWord**

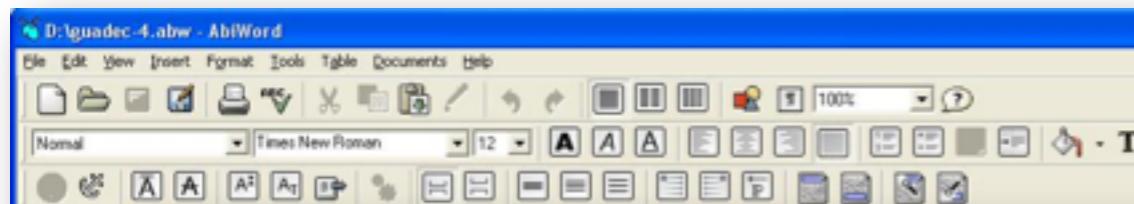
# Transfer Effects for GUIs



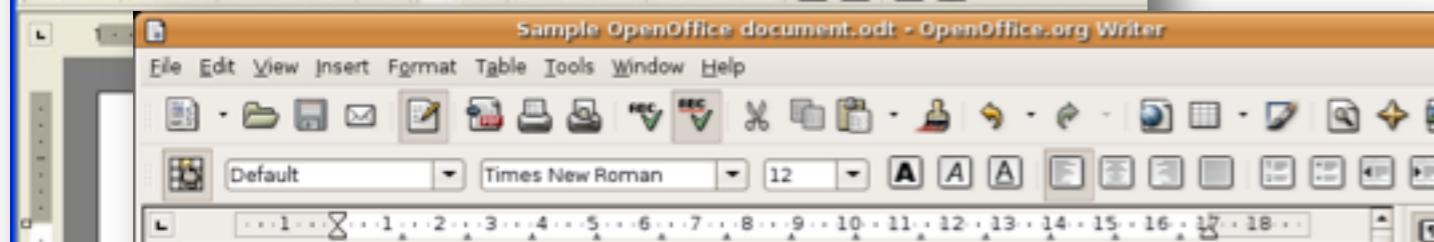
AbiWord

OpenOffice

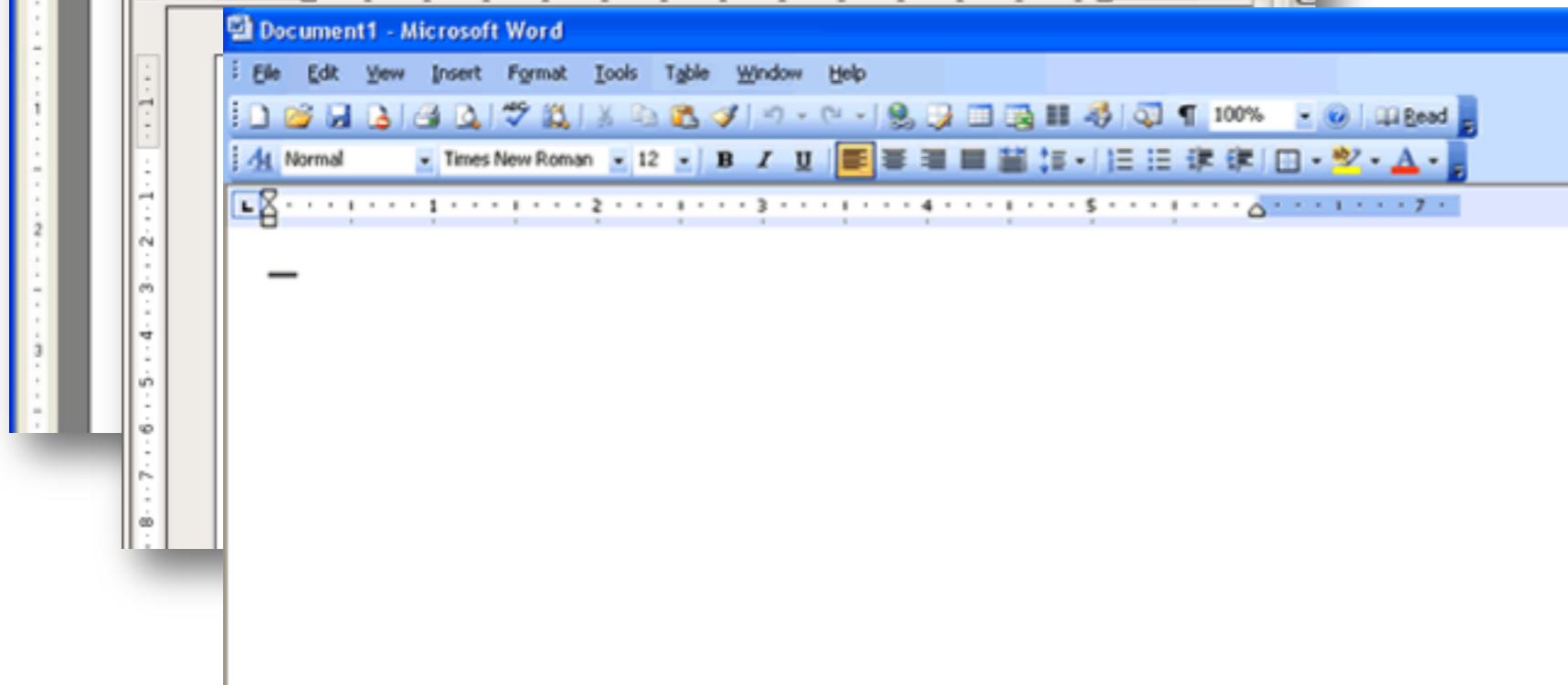
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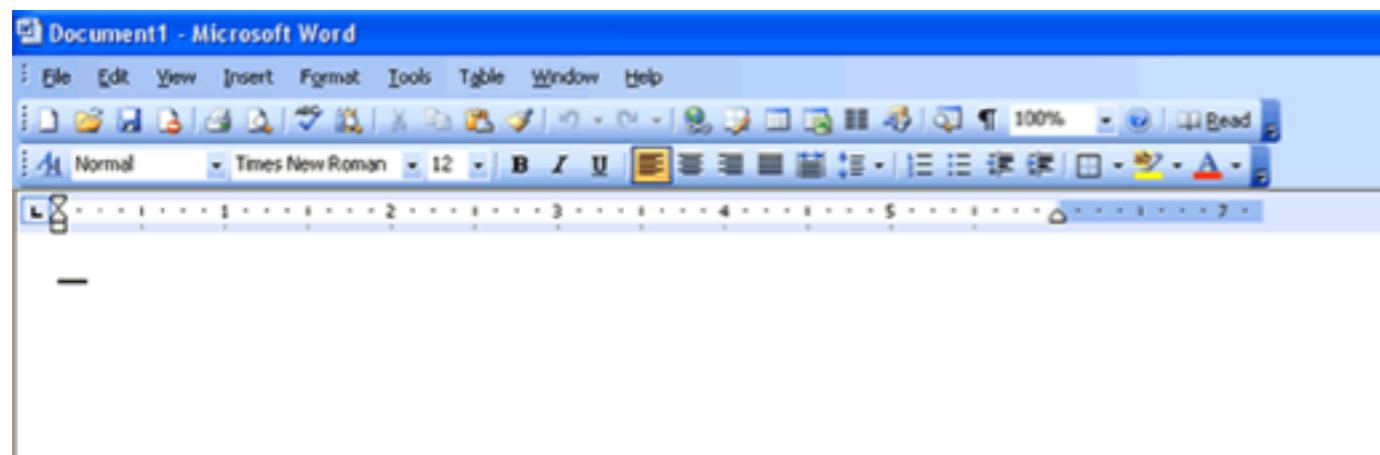


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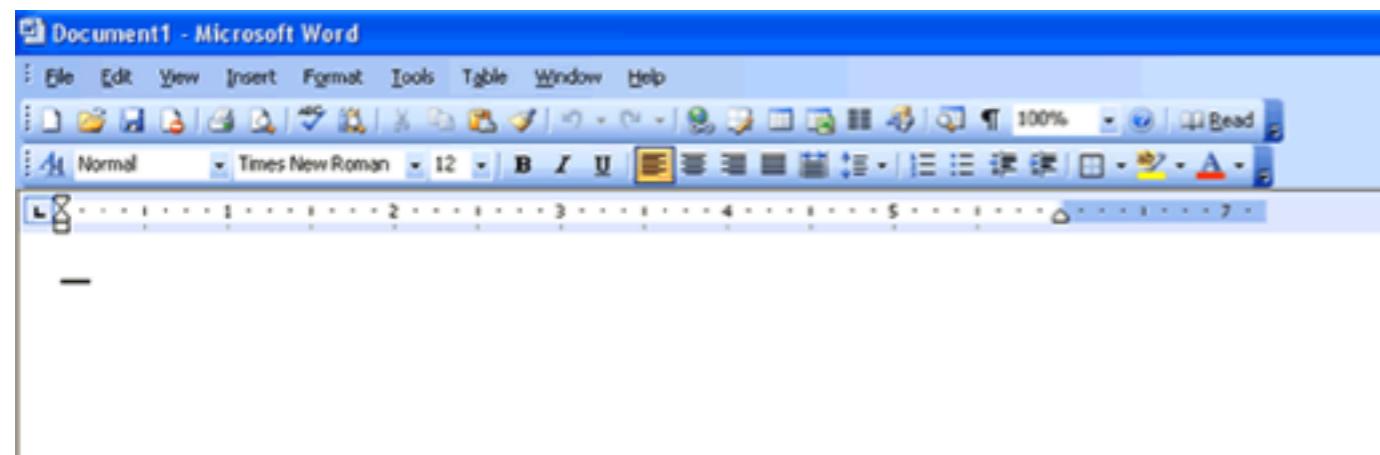
**MS Word**

# Transfer Effects in GUI

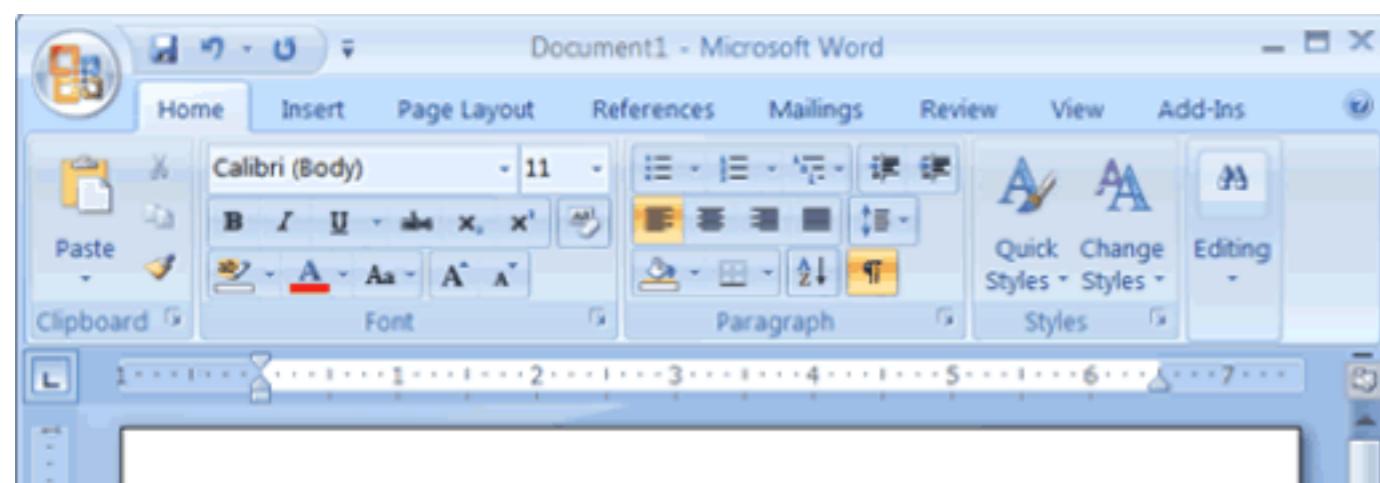


**MS Word 2003**

# Transfer Effects in GUI

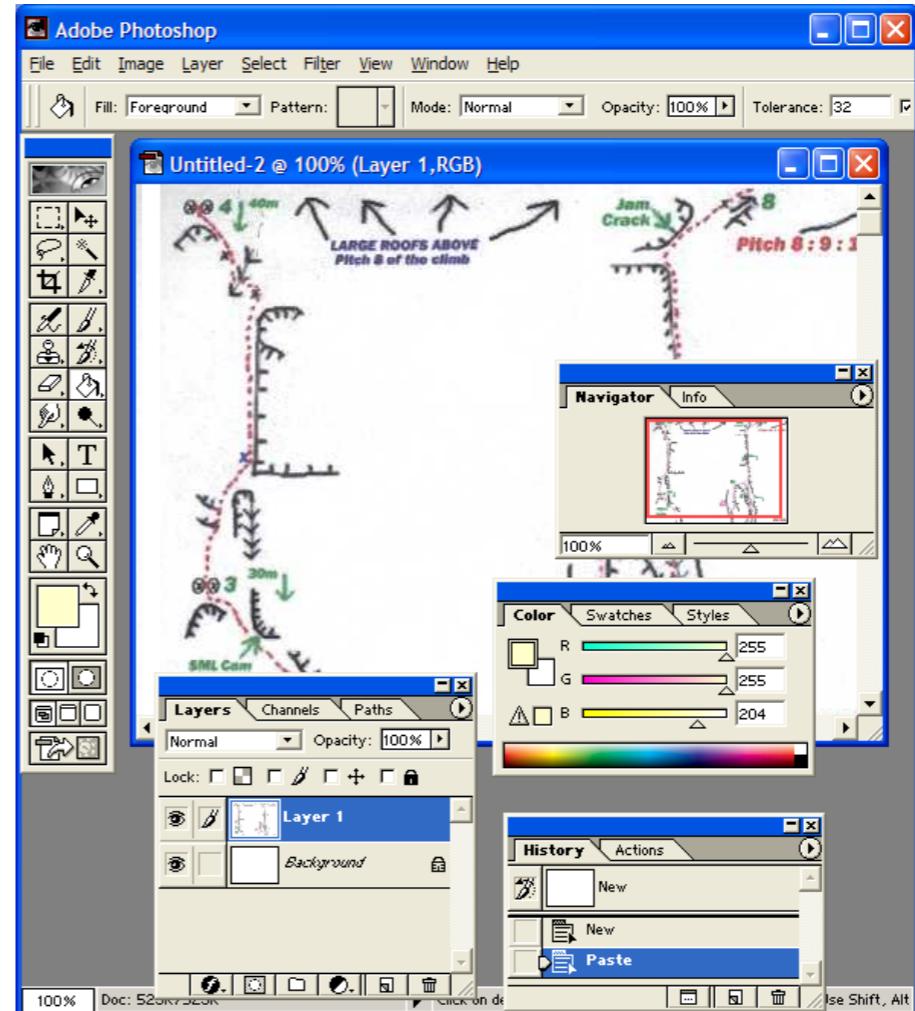
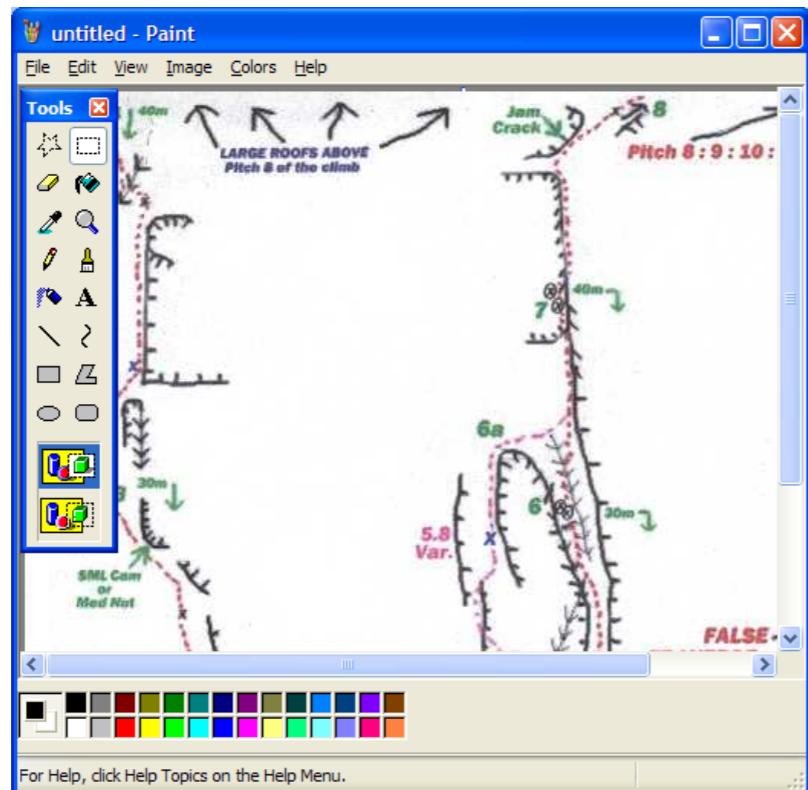


MS Word 2003



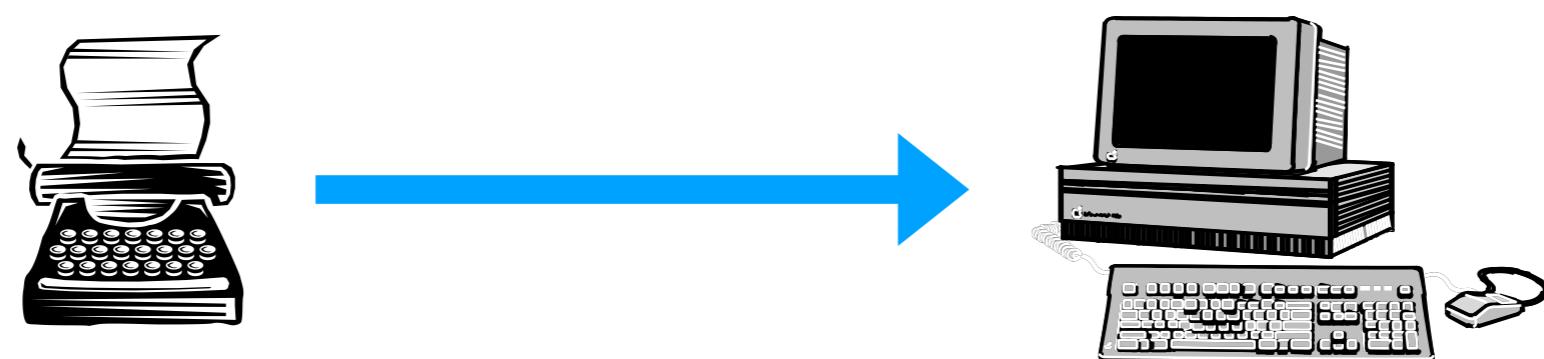
MS Word 2007

# Transfer Effects in GUILs



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# Idioms and Population Stereotypes

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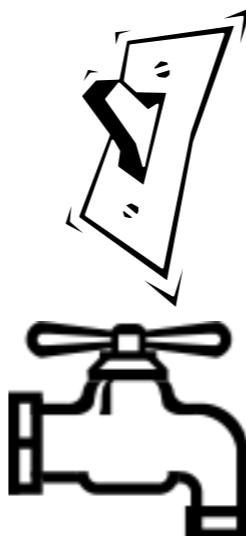
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  - 'standard' interface features we learnt, use and remember
- **Idioms may define arbitrary behaviours**
  - Red means danger
  - Green means safe



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# Idioms and Population Stereotypes

- **Interface idioms:**
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- **Idioms may define arbitrary behaviours**
  - Red means danger
  - Green means safe
- **Population stereotypes: idioms vary in different cultures**
  - Light switches
    - America: down is off
    - Britain: down is on
  - Faucets
    - America: anti-clockwise on
    - Britain: anti-clockwise off



# Idioms and Population Stereotypes

- Ignoring/changing idioms?
  - Home handyman
    - Light switches installed upside down
  - Calculators vs. Phone number pads
    - Which did computer keypads follow and why?

# Idioms and Population Stereotypes

- Difficulty of changing stereotypes
  - Qwerty keyboard: designed to prevent jamming of keyboard
  - Dvorak keyboard ('30s): probably faster to use



# Cultural associations



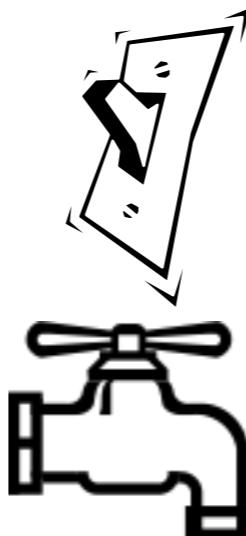
**Sun found their email icon  
problematic for some  
American urban dwellers  
who are unfamiliar with rural  
mail boxes.**





# Idioms and Population Stereotypes

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# Conceptual Models

- People have **mental (or conceptual) models** of how things work
- What do we construct these models from?
  - Affordances
  - Causality
  - Constraints
  - Mappings
  - Positive Transfer
  - Population stereotypes/cultural standards
  - Instructions
  - Interactions (including with other people)

# Conceptual Models

- Models may be wrong, especially if attributes are misleading
- Models allow us to mentally simulate device operation
- Designers only have control over the **system image**



**Our conceptual model of a bike isn't as good as we think it is, but it's good enough to recognise this as a bike!**

# Conceptual models of simple machines

- **Affordances**
  - Holes for something to be inserted
- **Constraints**
  - Big hole for several fingers, small hole for thumb
- **Mapping**
  - Holes-for-fingers suggested / constrained by appearance
- **Positive transfer & cultural idioms**
  - Learned when young; constant mechanism
- **Conceptual model**
  - Physical object implies how the operating parts work



# Conceptual models of simple machines



- **Affordances**
  - Holes for something to be inserted
- **Conceptual model**
  - A reasonable conceptual model can be formed by just looking at, and perhaps holding the object.
  - Major affordance: you don't understand everything, but do some things anyway: why big blade down?
- **Physical object**
  - model's not perfect: what about the “glide” style of cutting?
- Conceptual model
  - Physical object implies how the operating parts work

# Conceptual models of more complex devices

- **Affordances**
  - Space to put your hand under it
  - Often stops before you are done, but how do you continue?
- **Constraints and mapping unknown**
  - How to control temperature? (you can't)
- **Transfer of training**
  - Weak / no transfer from manual faucet
- **Conceptual model**
  - Must be taught / learned; often varies between models



# Conceptual models of more complex devices

- **Affordances**
  - Four buttons to push, but not clear what they will do
- **Constraints and mapping unknown**
  - No visible relation between buttons, possible actions and end result
- **Transfer of training**
  - Little relation to analog watches
- **Cultural idioms**
  - Somewhat standardized core controls and functions, but still highly variable
- **Conceptual model**
  - Must be taught / learn (experiment and learn over time)



# Conceptual Models

- “*In interacting with the environment, with others, and with the artefacts of technology, people form internal, mental models of themselves and of the things with which they are interacting.*”
- *These models provide **predictive** and **explanatory** power for understanding the interaction.”*
  - Don Norman

# Conceptual Model vs. Conceptual Design

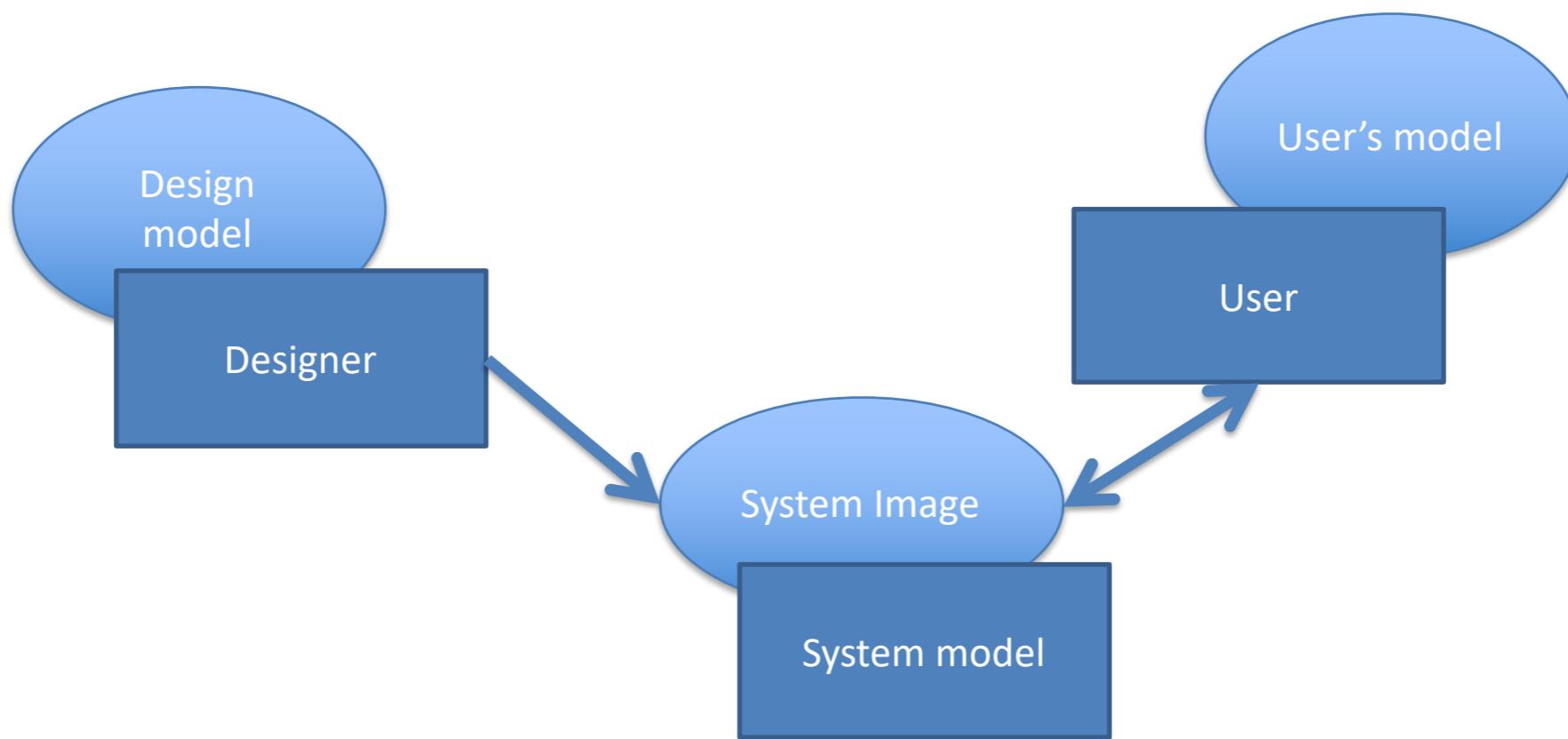
- **Conceptual Models:** something the **user** has (or forms)
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  - Users rely on mental models during usage

# Conceptual Model vs. Conceptual Design

- **Conceptual Models:** something the **user** has (or forms)
  - Users see and understand the system through mental models
  - Users rely on mental models during usage
- **Conceptual Design:** something the **designer** does
  - Defining the **intended** mental model (hiding the technology of the system)
  - Defining a suitable **system image** (applying appropriate design guidelines)

# Conceptual Design

- Designer's role is to provide a meaningful, useful system image a user's model matches the design model



# Some models...

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- **Design model**: what a designer intends to convey
- **System image**: what the user “sees” - the UI, documentation, labels etc.
- **User’s model (or conceptual or mental model)**: the user’s mental model developed by the user through interaction with the system
  - i.e. a belief system about the system

# Lessons from the DOET

- You should now be able to:
  - Distinguish between positive and negative transfer effects
  - Describe the role interface idioms has with regard to interface innovation
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  - Identify components that contribute to conceptual models
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# Acknowledgements

- Tony Tang
- Lora Oehlberg
- Ehud Sharlin
- Frank Maurer
- Saul Greenberg

# Course information

- Website
  - GitHub Pages <https://silvadasilva.github.io/CPSC481-2019S/>
- Communications
  - Slack <https://cpsc481-2019s.slack.com/>
- Readings and Slides
  - Posted online at the main website