# UI Design Principles

- They guide towards optimal equilibrium of requirements
- Do not provide analytical solution
- Should allow to avoid errors in early phases
  - System, User Requirements, Prototyping
- And not to rediscover each time dos and donts
  - "color blindness"
- They may be Ambiguous and Contradictory
- Goal to **UNDERSTAND** the motivations of such principles so to **GUIDED in executive decisions.**

# Guidelines – A
## (Shneiderman 1987)

- Strive for Consistency
- Cater to Universal Usability
- Offer Informative Feedback
- Design Tasks Flows to yield closure
- Prevent Errors
- Permit Easy Reversal of Actions
- Make Users feel They are in Control
- Minimize Short-Term Memory Load

# Guidelines – B
## (Nielsen and Molich 1990)

- Consistency and Standards
- Visibility of System Status
- Match between System and Real World
- User Control and Freedom
- Error Prevention
- Flexibility and Efficiency of Use
- Aesthetics and Minimalist Design
- Help Users Recognize, Diagnose and Recover from Errors
- Provide Online Documentation and Help

# What they do come from?

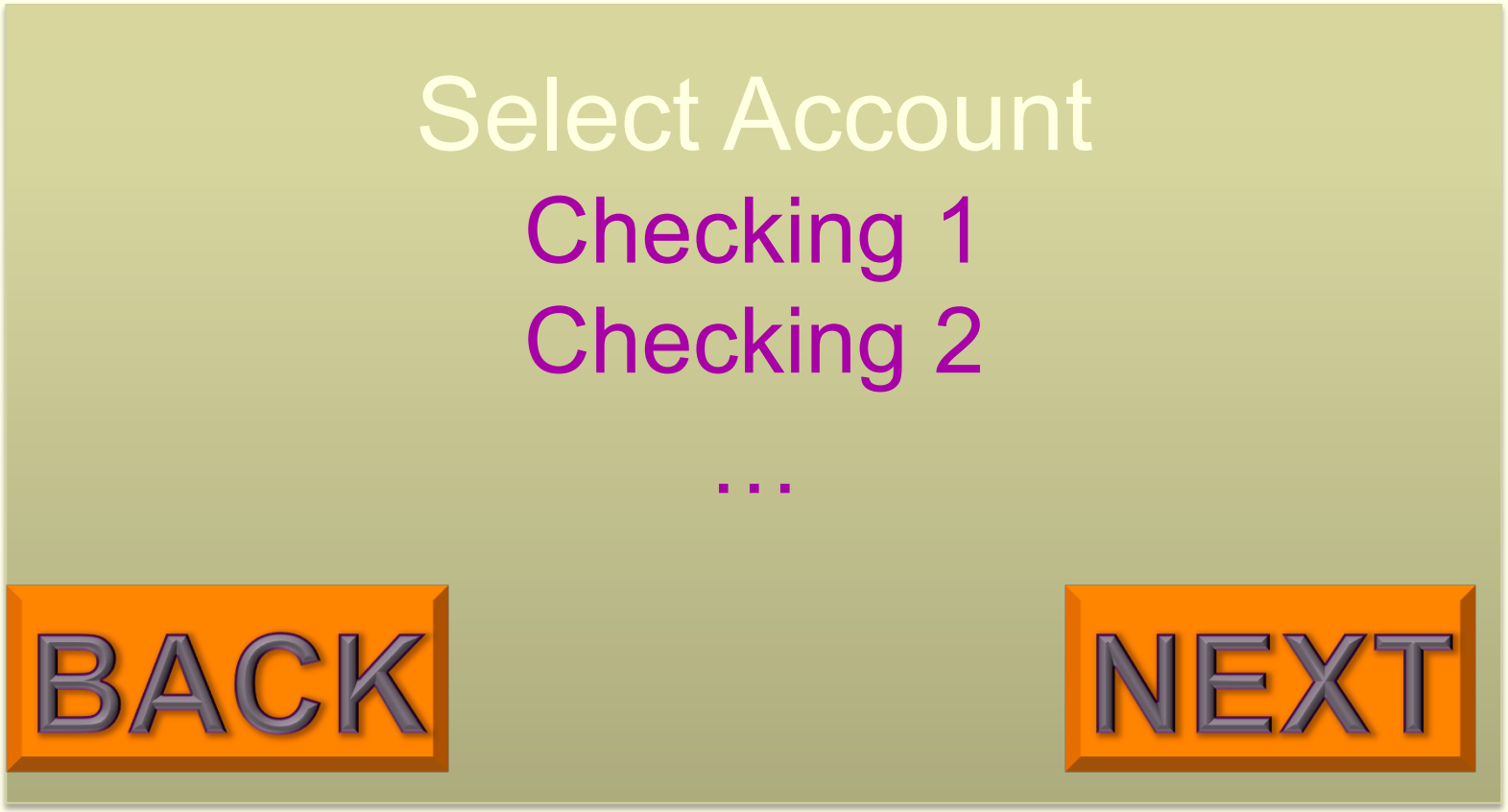
- They are inspired from human psychology processes
- Science on how people
  - Perceive
  - Learn
  - Remember
  - Reason
  - Ground Intentions into Actions

# Perception

- Perception is the process of **interpreting** signals being collected by our sense organs into our nervous system.
  - Hearing (Hair Cells),
  - Sight (Retina)
  - Smell (Olfactory Receptors)
  - Taste (Taste buds)
  - Touch (Neural Receptors)
- Not only Bottom-up Processing!

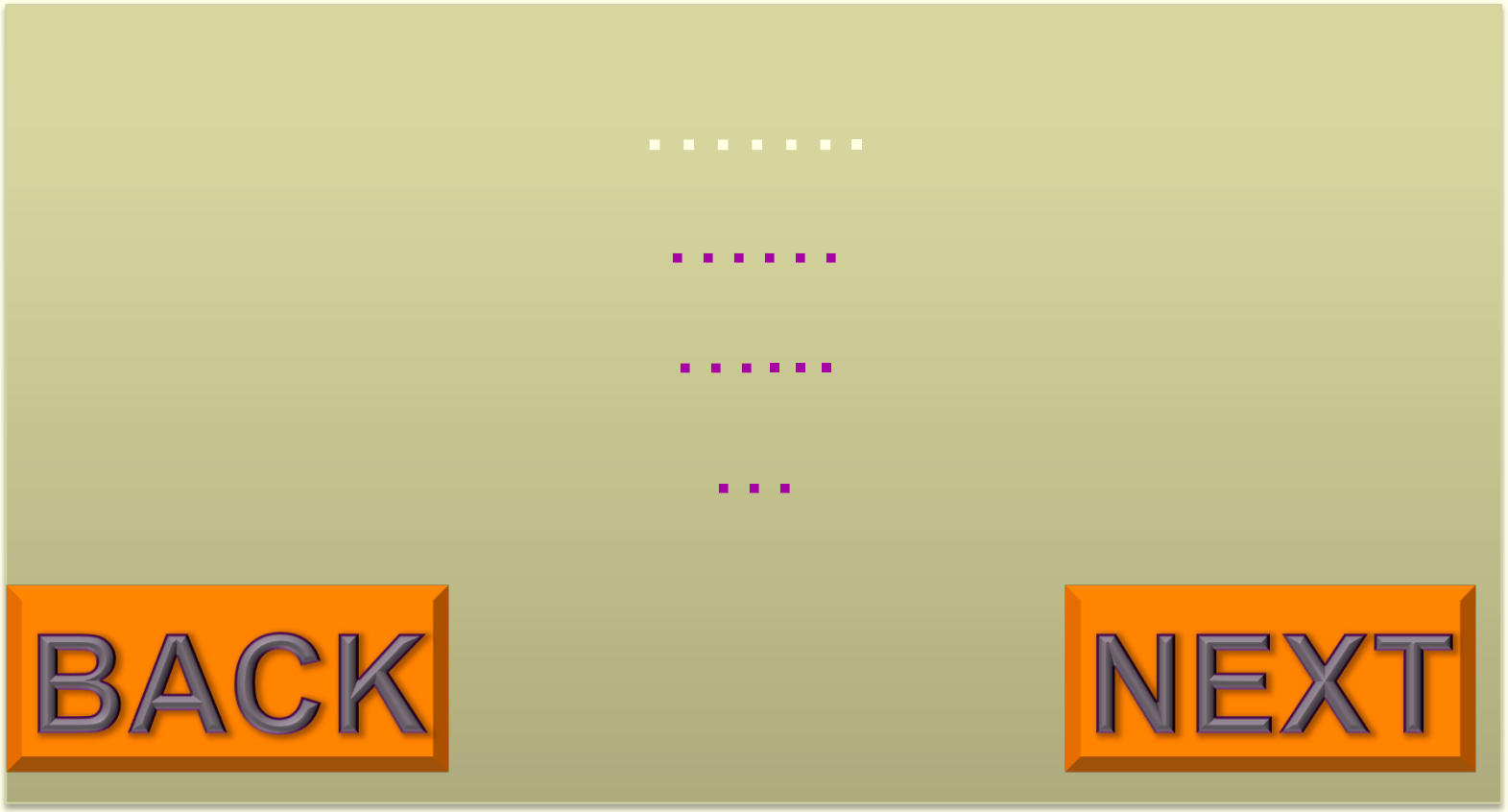
**“Vision”, W. H. Freeman, New York, NY**

# ATM Transaction



# ATM Transaction (cont.d)

# ATM Transaction (cont.d)



# ATM Transaction (cont.d)

# ATM Transaction

# Perception is biased by

- **Past** : Experience or prior information

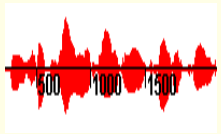
# Language is Ambiguous

- Giorgio e Luca erano compagni di **banco**
  - Senso ➔ **Mobile**
- Il direttore del **banco** di Napoli
  - Senso ➔ **Istituzione di credito**
- Il nuovo test sara' il **banco** di prova
  - Senso ➔ **Test**
- .....**Banco** ottico
- .....

# Perception is biased by

- **Past** : Experience or prior information
- **Present** : Current Context
  - Also from concurrent signals from different sensorial information ( sight & hearing)
  - Influence/Reinforce each other (e.g. lip reading)

# "Cocktail Party Problem"




Human Speech Recognition

**"yes I would like to make a reservation.. "**

- Human Perception Experiment
- Multiple audio sources
- Humans can "adaptively" **separate** a specific sound source
- Cocktail Party Problem
  - Audio sample 1 source
  - Audio sample 2 source
  - Audio sample 3 source

# Perception is biased by

- **Past** : Experience or prior information
- **Present** : Current Context
- **Future** : Our Goals
  - Our goals may filter our perception
  - Example of goal oriented information over web
  - Ignoring information ≠ Do not notice information

# Influencing where we look

## Observing, Measuring and Evaluating

EyeTracker

# Take Away Guidelines

## Perception

- **Avoid Ambiguity**
  - Requires effort
- **Be Consistent**
  - Exploit users past experience
- **Understand users' goals**
  - Either be explicit
  - Or Implicitly track them

# The Gestalt Theory

## Visual Perception

- Psychologists proposed in 20th century to explain how visual perception works
- Supported now by neurophysiological experiments
- Descriptive framework
- Support for graphic and user interface design

# The Gestalt Theory

## Visual Perception

It identifies rules/principles

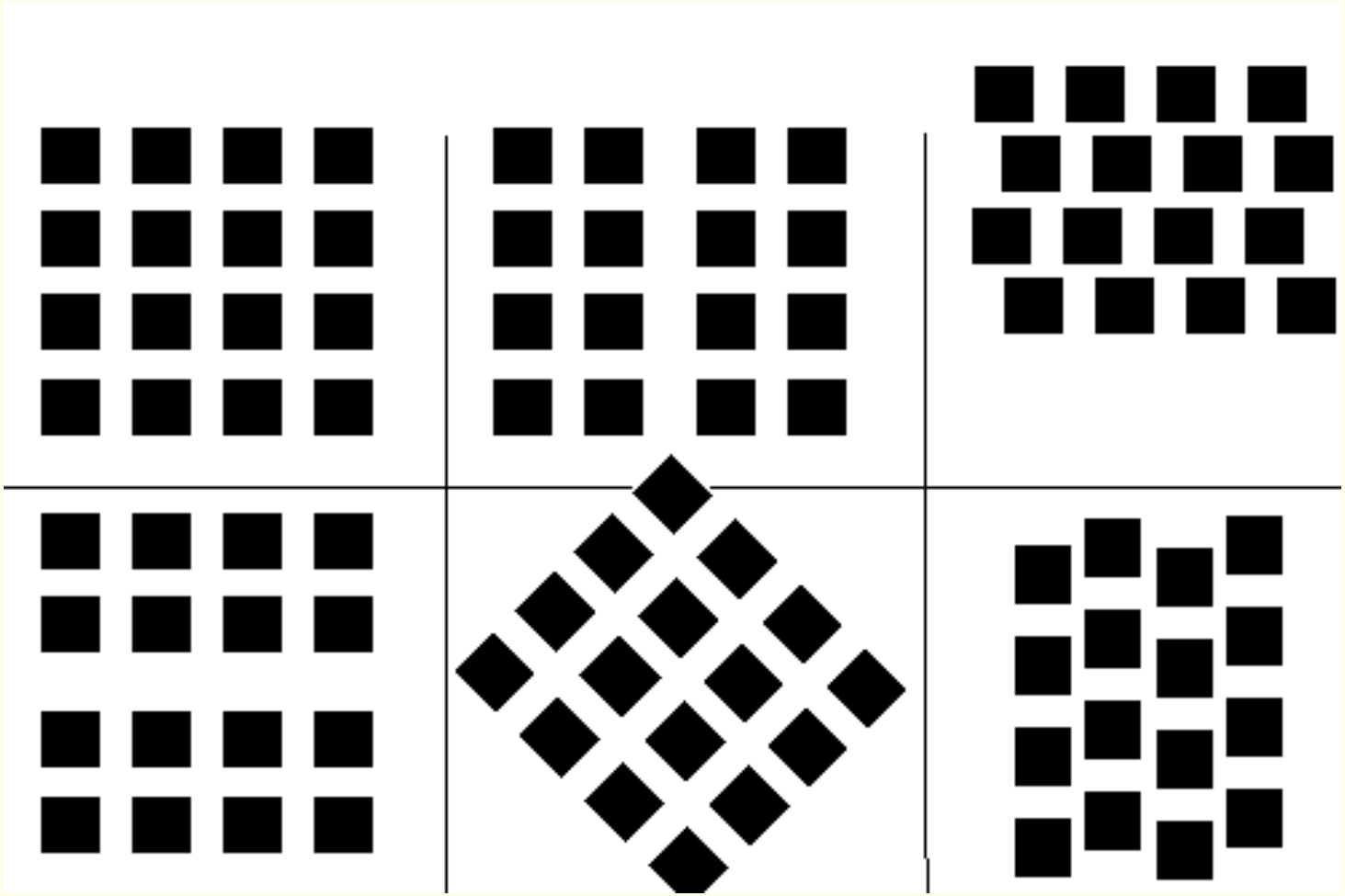
human visual perception

groups tokens together

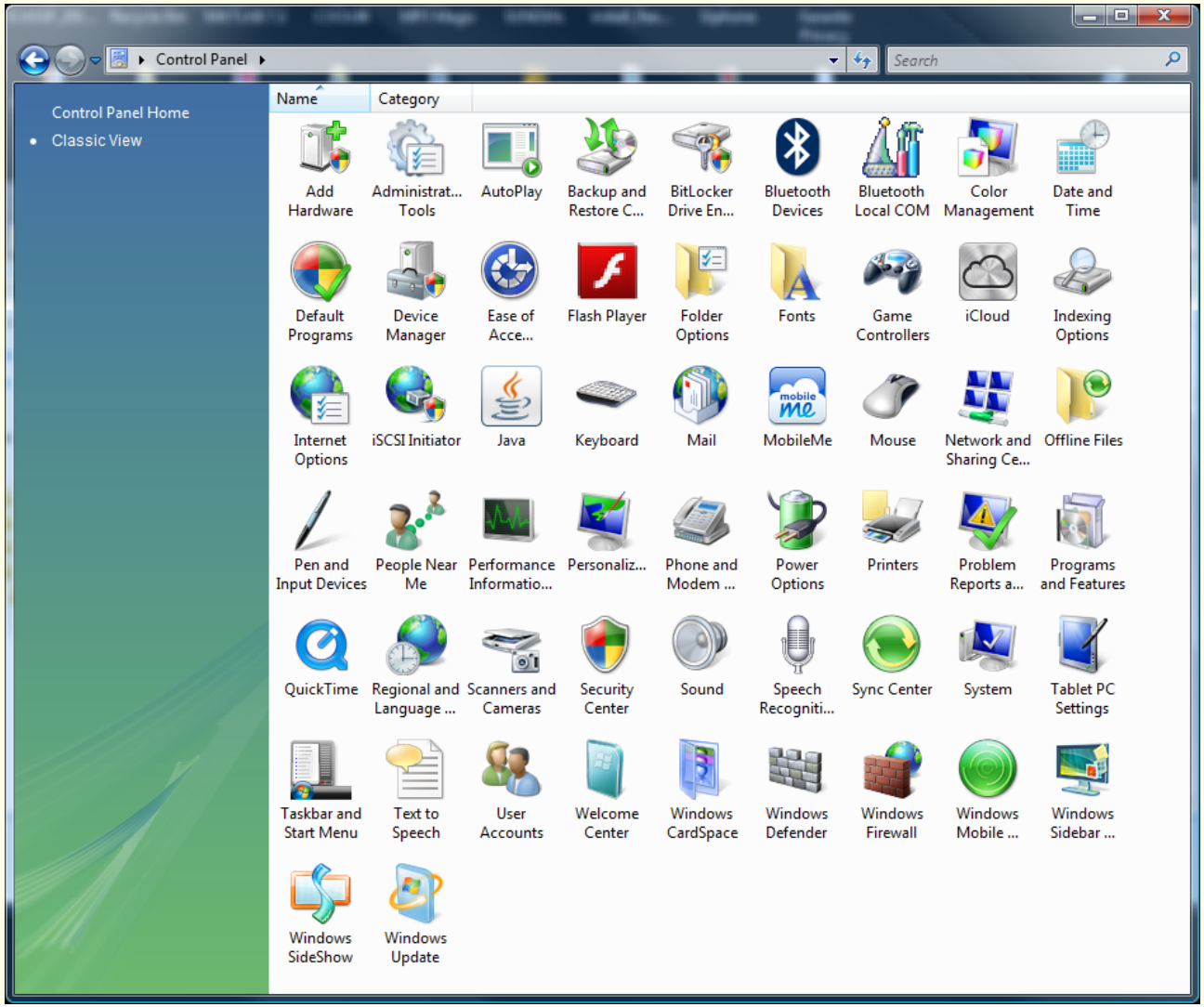
# Rules

- Proximity
- Similarity
- Continuity
- Closure
- Symmetry
- Figure/Ground

# Proximity (1)



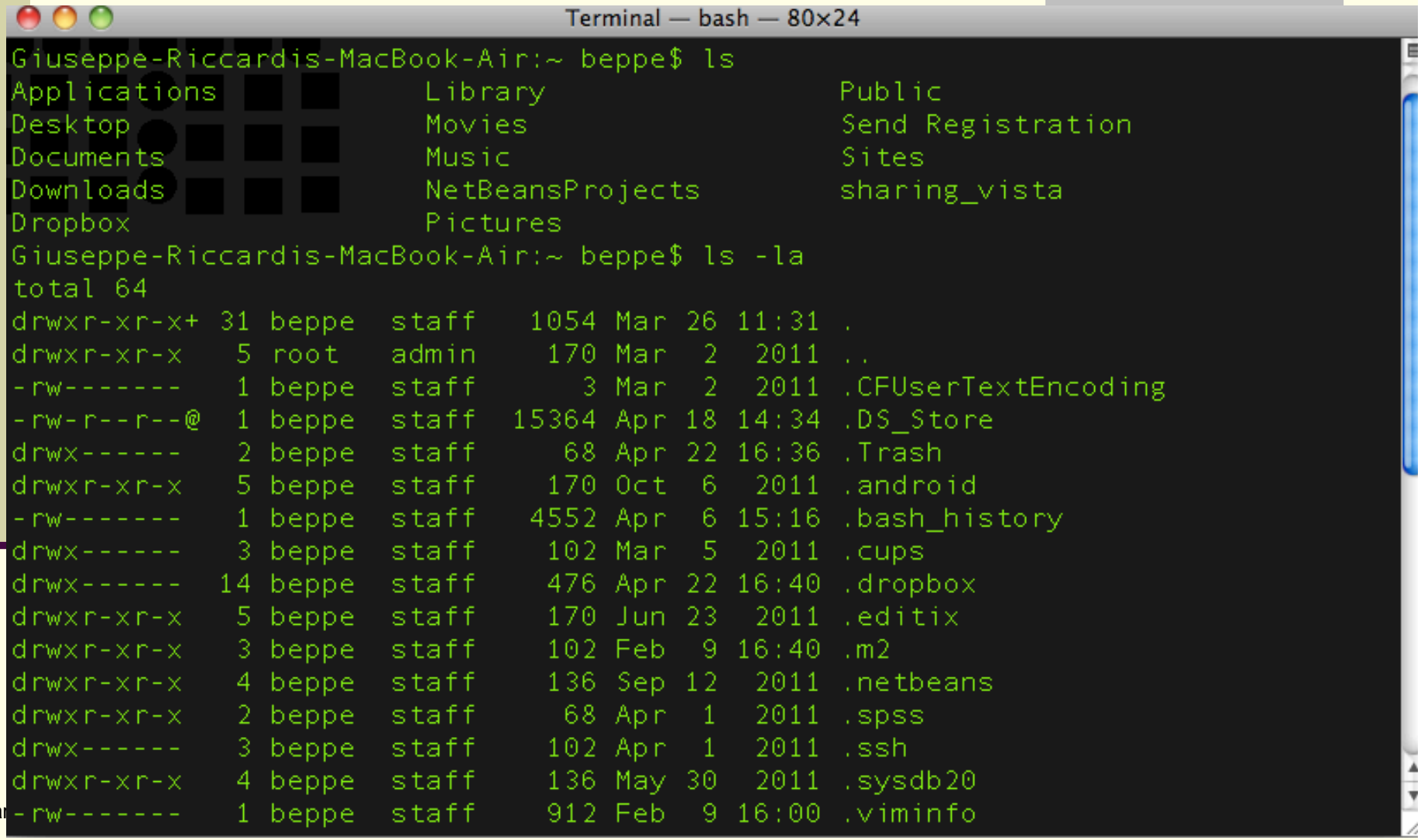
# Proximity (2)


Control Panel
Search
Control Panel Home
Classic View
Name
Category
Add Hardware
Administrat... Tools
AutoPlay
Backup and Restore C...
BitLocker Drive En...
Bluetooth Devices
Bluetooth Local COM
Color Management
Date and Time
Default Programs
Device Manager
Ease of Acce...
Flash Player
Folder Options
Fonts
Game Controllers
iCloud
Indexing Options
Internet Options
iSCSI Initiator
Java
Keyboard
Mail
MobileMe
Mouse
Network and Sharing Ce...
Offline Files
Pen and Input Devices
People Near Me
Performance Informatio...
Personaliz...
Phone and Modem ...
Power Options
Printers
Problem Reports a...
Programs and Features
QuickTime
Regional and Language ...
Scanners and Cameras
Security Center
Sound
Speech Recogniti...
Sync Center
System
Tablet PC Settings
Taskbar and Start Menu
Text to Speech
User Accounts
Welcome Center
Windows CardSpace
Windows Defender
Windows Firewall
Windows Mobile ...
Windows Sidebar ...
Windows SideShow
Windows Update

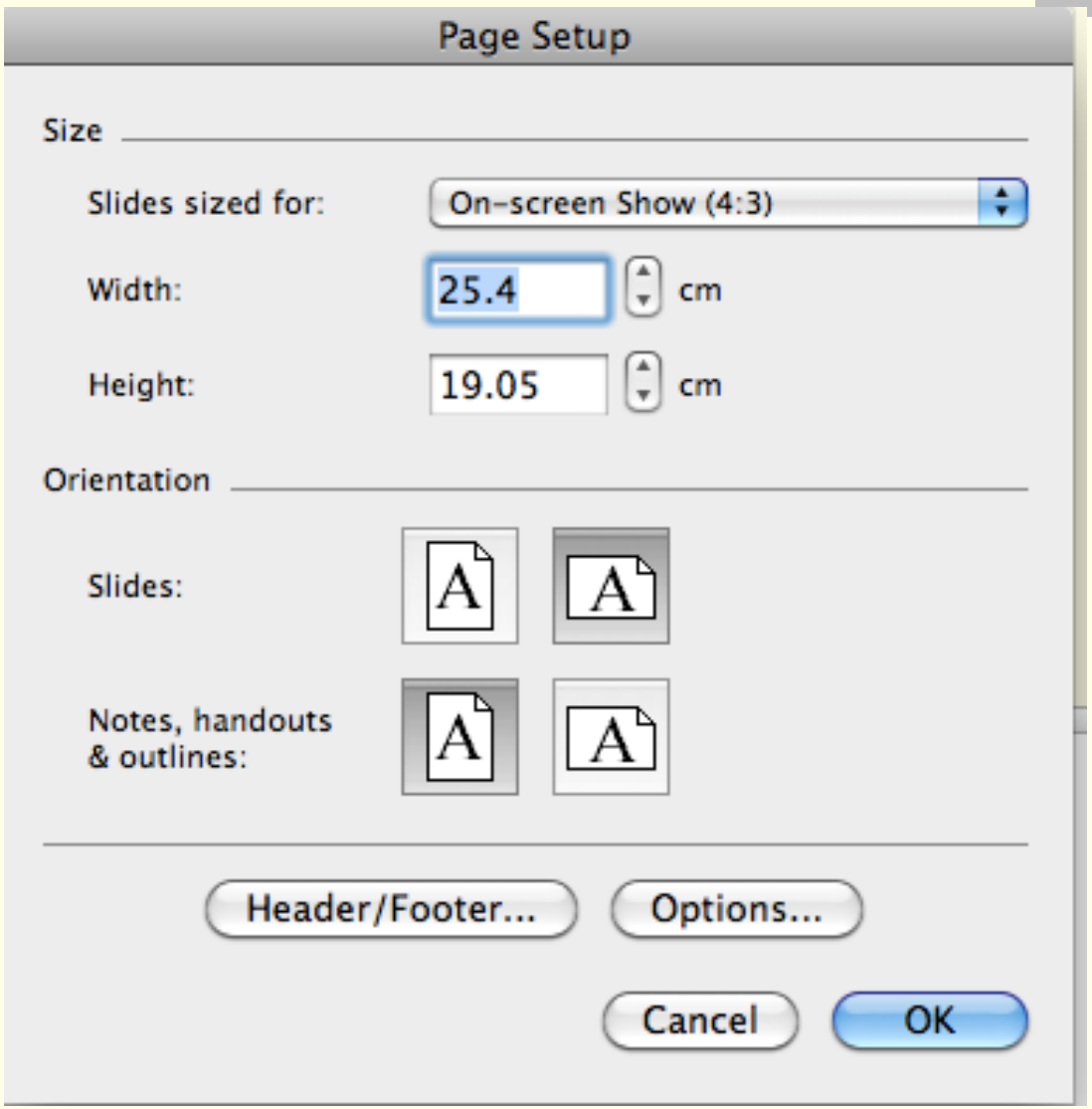
# Proximity (3)


System Preferences
Show All
Personal
Appearance
Desktop & Screen Saver
Dock
Exposé & Spaces
Language & Text
Security
Spotlight
Hardware
CDs & DVDs
Displays
Energy Saver
Keyboard
Mouse
Trackpad
Print & Fax
Sound
Internet & Wireless
MobileMe
Network
Bluetooth
Sharing
System
Accounts
Date & Time
Parental Controls
Software Update
Speech
Startup Disk
Time Machine
Universal Access
Other
DivX
Flip4Mac WMV
Growl
TeX Distribution

# Proximity (4)

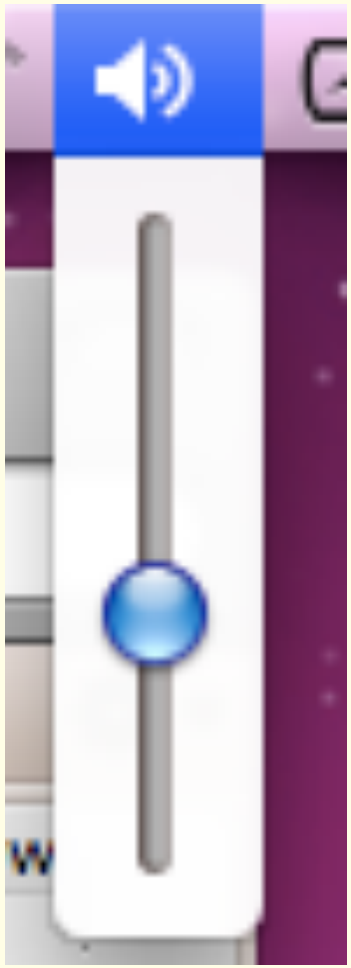

Terminal — bash — 80×24
Giuseppe-Riccardis-MacBook-Air:~ beppe$ ls
Applications Library Public
Desktop Movies Send Registration
Documents Music Sites
Downloads NetBeansProjects sharing_vista
Dropbox Pictures
Giuseppe-Riccardis-MacBook-Air:~ beppe$ ls -la
total 64
drwxr-xr-x+ 31 beppe staff 1054 Mar 26 11:31 .
drwxr-xr-x 5 root admin 170 Mar 2 2011 ..
-rw------- 1 beppe staff 3 Mar 2 2011 .CFUserTextEncoding
-rw-r--r--@ 1 beppe staff 15364 Apr 18 14:34 .DS_Store
drwx------ 2 beppe staff 68 Apr 22 16:36 .Trash
drwxr-xr-x 5 beppe staff 170 Oct 6 2011 .android
-rw------- 1 beppe staff 4552 Apr 6 15:16 .bash_history
drwx------ 3 beppe staff 102 Mar 5 2011 .cups
drwx------ 14 beppe staff 476 Apr 22 16:40 .dropbox
drwxr-xr-x 5 beppe staff 170 Jun 23 2011 .editix
drwxr-xr-x 3 beppe staff 102 Feb 9 16:40 .m2
drwxr-xr-x 4 beppe staff 136 Sep 12 2011 .netbeans
drwxr-xr-x 2 beppe staff 68 Apr 1 2011 .spss
drwx------ 3 beppe staff 102 Apr 1 2011 .ssh
drwxr-xr-x 4 beppe staff 136 May 30 2011 .sysdb20
-rw------- 1 beppe staff 912 Feb 9 16:00 .viminfo

# Similarity

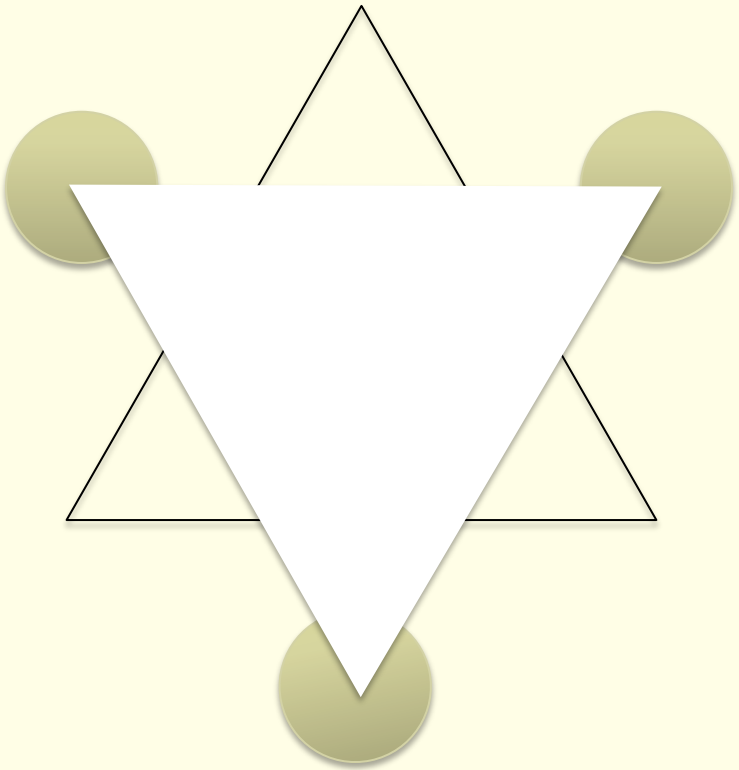

Page Setup
Size
Slides sized for:
On-screen Show (4:3)
Width:
25.4
cm
Height:
19.05
cm
Orientation
Slides:
Notes, handouts & outlines:
Header/Footer...
Options...
Cancel
OK

# Continuity (1)

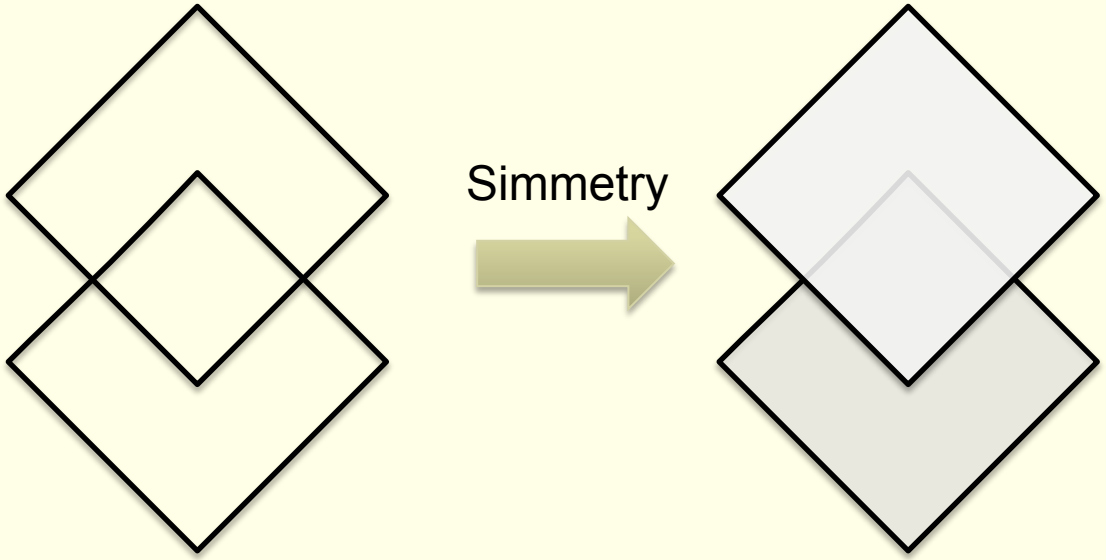
# Continuity (2)



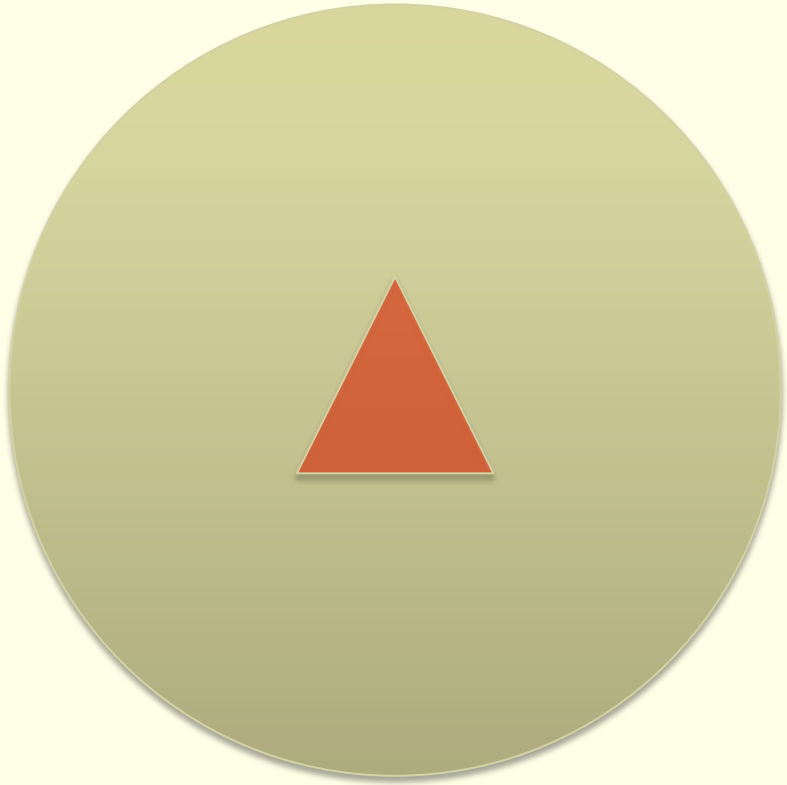
# Closure (1)



# Simmetry



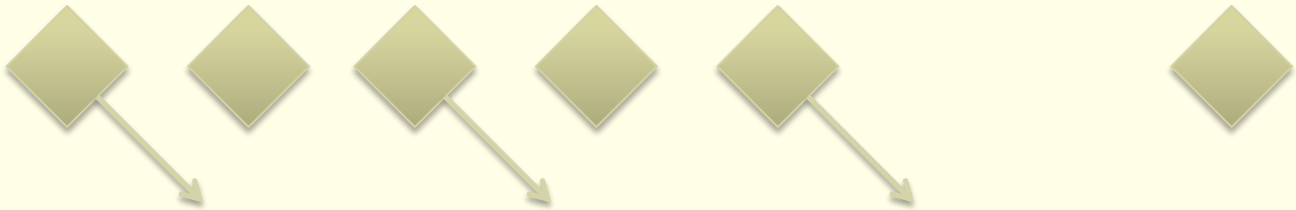
# Figure/Ground (1)



# Figure/Ground (2)

# Common Fate

## Moving Objects



# Closure-Symmetry-Continuity

Cover of “Coherence in Thought and Action” book by Paul Thagard


SiS
LAB
Signals & Interactive Systems

# Learning

- Learning a task
- Recall from experience
  - **Personal** Past experience → Learned Actions are easy to perform

"Stay away from walking over the edge of a cliff"

"Do not execute .exe files received from unknown recipients"

"Facebook is good for making friends" (User 1)

"Facebook is a waste of time" (User 2)

# Learning from Experience

## Issues

- Learning from experience is in general difficult and not perfect both for human and machines!
- Too much or too little data to learn from or too many conclusions to draw
- Learning from errors is not easy
- Credibility of the experience to learn from
  - Whose experience was that (brother vs friend..)
- Overgeneralization is used both by humans and machines and can undeniably lead to errors.

# Learned actions easy to perform

- Many tasks may be performed routinely
  - "Riding a bike", "Driving a car", "Walking on the sidewalk"…
  - For most part of the experience we do not consume any conscious resources ( attention or memory) (Schneider & Shiffrin 1977)
    - →We automate how and when to change gears
    - → We have learned from past experience
    - → We pay attention to obstacle avoidance

# Examples of Learned vs New Tasks

- "Recite letters of the alphabet A through P"
- "Recite letters of the alphabet from P to A"
- "Drive to work using your normal route"
- "Drive to work an unfamiliar one"
- "Spell out your telephone number"
- "Spell out your telephone number by grouping numbers by four"
- Write and post a letter at the post office
- Write and send an email (users age >50)

# Take Away Guidelines

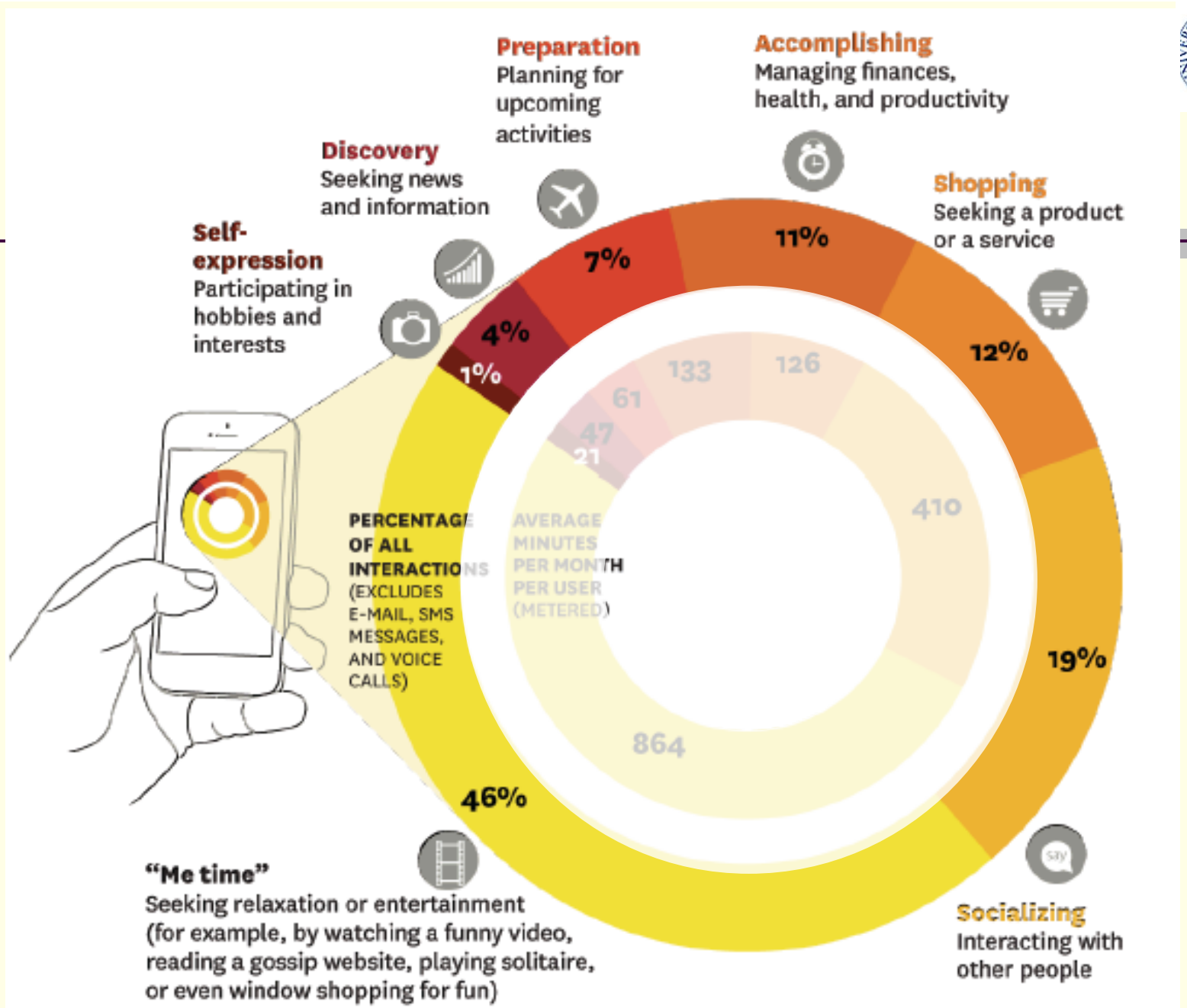
## Perception

- Provide System status and Users' progress toward their goal
  - → Relieve attention strain and minimize short-memory
- Guide users to goal

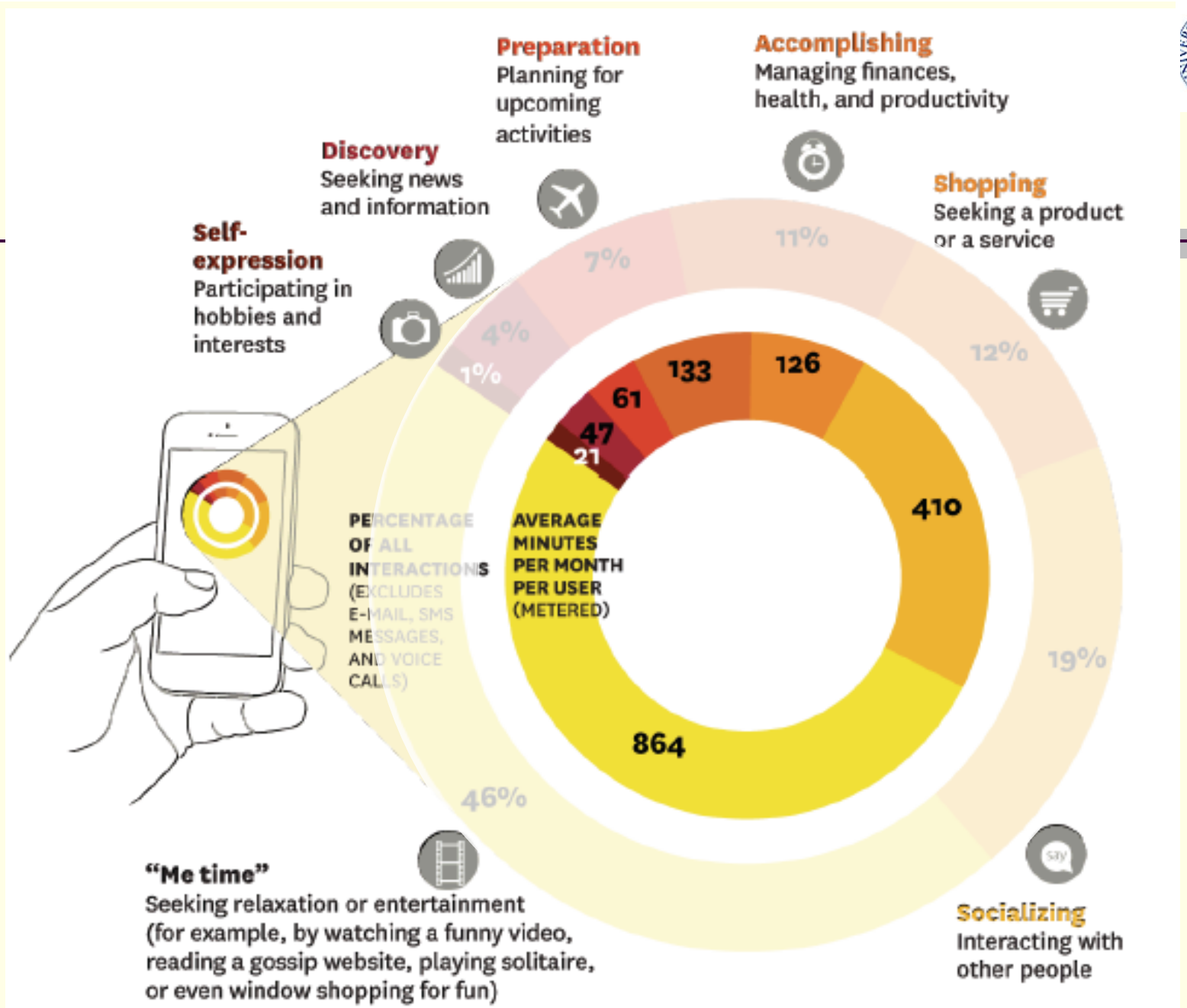
  →Consider one-time user or repeat-user experience

  →Expliciting needed information ( do not overload either)
- Let Computer do the "math"/"algorithm"
  - "Go the middle of the document"→ Solve it graphically

# Why People Really use Mobile Phones ?




SOURCES "Seven Shades of Mobile" study, conducted by InsightsNow for AOL and BBDO, 2012. In the first phase, 24 users completed a seven-day diary and in-depth interviews. In the second, 1,051 U.S. users ages 13 to 54 were surveyed, data on 3,010 mobile interactions were collected, and the mobile activities of two-thirds of those users were tracked for 30 days.

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