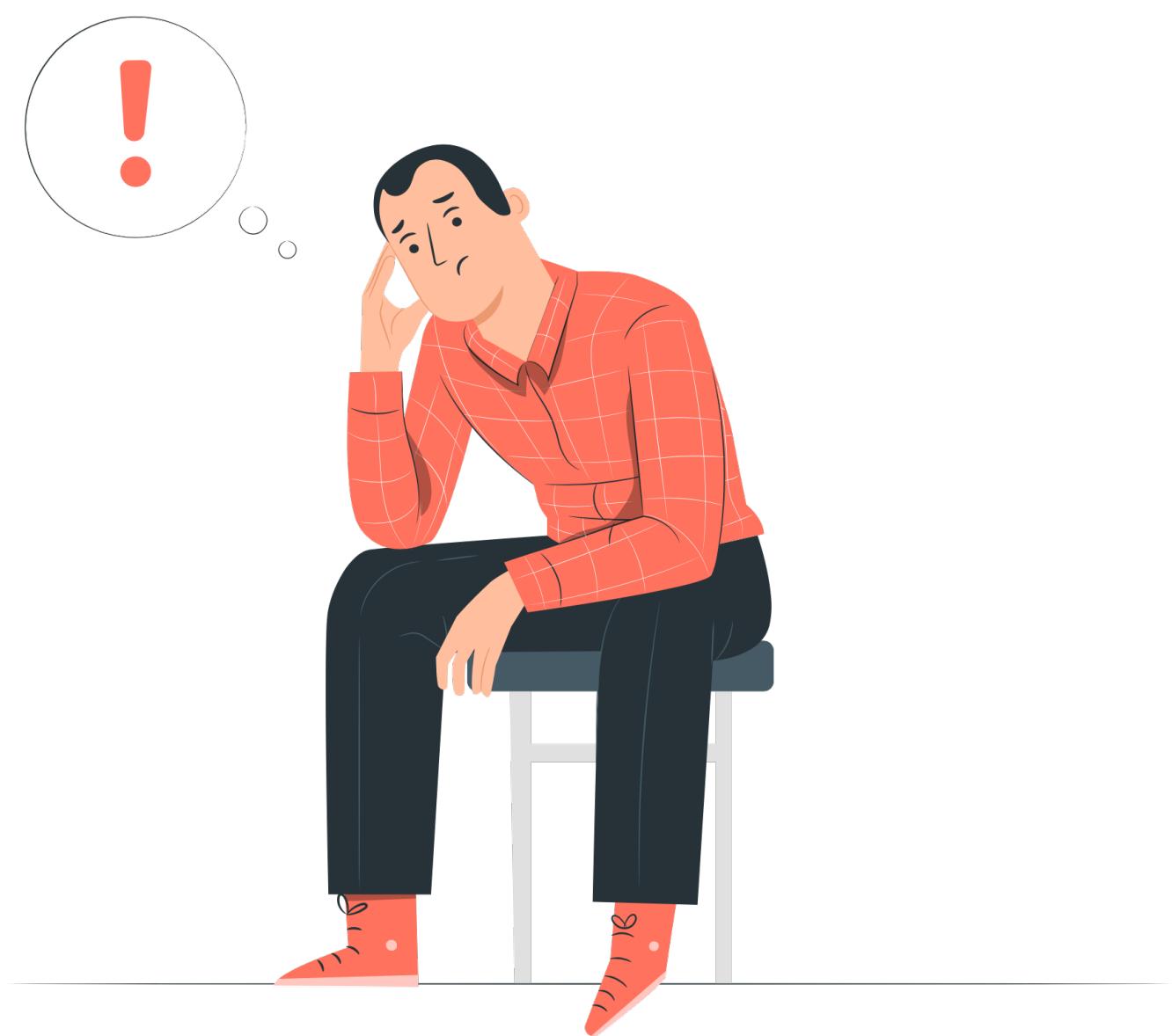


Users : Cognitive Capabilities

Chapter 4



Understand the User: Cognition

- Interacting with technology is cognition
- We need to take into account cognitive processes involved and cognitive limitations of users.
- Understand the user, so that we can :
 - provide knowledge about what users can and cannot be expected to do.
 - Identify and explain the nature and causes of problems users encounter.
 - apply related theories, model and methods that can lead to the design of better interactive products.

Cognition

Cognition is a term used to describe the **INTERPRETATION** of information in the mind.

We constantly receive Info (eyes, ears, touch, etc.) -> **INTERPRET** -> plan an action -> execute the action.

Core Cognitive Aspects

- Attention
- Perception and recognition
- Memory
- Reading, speaking and listening
- Problem-solving, planning, reasoning and decision-making, learning
- Most relevant to interaction design are attention, perception & recognition, and memory.
- Cognition is a set of faculties that allow human mind to process inputs from the external world to determine action in the external world.

Attention

- Allows us to focus on information that is relevant to what we are doing
(Involves audio and/or visual senses)
- Information at the interface should be structured to capture users' attention,
e.g. use perceptual boundaries (windows), colour, reverse video, sound and
flashing lights

Find the price of a double room at the **Holiday Inn** in **Bradley**

Pennsylvania

Bedford Motel/Hotel: Crinaline Courts

(814) 623-9511 S: \$18 D: \$20

Bedford Motel/Hotel: Holiday Inn

(814) 623-9006 S: \$29 D: \$36

Bedford Motel/Hotel: Midway

(814) 623-8107 S: \$21 D: \$26

Bedford Motel/Hotel: Penn Manor

(814) 623-8177 S: \$19 D: \$25

Bedford Motel/Hotel: Quality Inn

(814) 623-5189 S: \$23 D: \$28

Bedford Motel/Hotel: Terrace

(814) 623-5111 S: \$22 D: \$24

Bradley Motel/Hotel: De Soto

(814) 362-3567 S: \$20 D: \$24

Bradley Motel/Hotel: Holiday House

(814) 362-4511 S: \$22 D: \$25

Bradley Motel/Hotel: Holiday Inn

(814) 362-4501 S: \$32 D: \$40

Breezewood Motel/Hotel: Best Western Plaza

(814) 735-4352 S: \$20 D: \$27

Breezewood Motel/Hotel: Motel 70

(814) 735-4385 S: \$16 D: \$18

Find the price for a double room at the **Quality Inn** in **Columbia**

South Carolina

City	Motel/Hotel	Area code	Rates	
			Phone	Single Double
Charleston	Best Western	803	747-0961	\$26 \$30
Charleston	Days Inn	803	881-1000	\$18 \$24
Charleston	Holiday Inn N	803	744-1621	\$36 \$46
Charleston	Holiday Inn SW	803	556-7100	\$33 \$47
Charleston	Howard Johnsons	803	524-4148	\$31 \$36
Charleston	Ramada Inn	803	774-8281	\$33 \$40
Charleston	Sheraton Inn	803	744-2401	\$34 \$42
Columbia	Best Western	803	796-9400	\$29 \$34
Columbia	Carolina Inn	803	799-8200	\$42 \$48
Columbia	Days Inn	803	736-0000	\$23 \$27
Columbia	Holiday Inn NW	803	794-9440	\$32 \$39
Columbia	Howard Johnsons	803	772-7200	\$25 \$27
Columbia	Quality Inn	803	772-0270	\$34 \$41
Columbia	Ramada Inn	803	796-2700	\$36 \$44
Columbia	Vagabond Inn	803	796-6240	\$27 \$30

Tullis (1987) found that the two screens produced quite different results

1st screen - took an average of 5.5 seconds to search

2nd screen - took 3.2 seconds to search

WHY??

Pennsylvania
Bedford Motel/Hotel: Crinaline Courts
(814) 623-9511 S: \$18 D: \$20
Bedford Motel/Hotel: Holiday Inn
(814) 623-9006 S: \$29 D: \$36
Bedford Motel/Hotel: Midway
(814) 623-8107 S: \$21 D: \$26
Bedford Motel/Hotel: Penn Manor
(814) 623-8177 S: \$19 D: \$25
Bedford Motel/Hotel: Quality Inn
(814) 623-5189 S: \$23 D: \$28
Bedford Motel/Hotel: Terrace
(814) 623-5111 S: \$22 D: \$24
Bradley Motel/Hotel: De Soto
(814) 362-3567 S: \$20 D: \$24
Bradley Motel/Hotel: Holiday House
(814) 362-4511 S: \$22 D: \$25
Bradley Motel/Hotel: Holiday Inn
(814) 362-4501 S: \$32 D: \$40
Breezewood Motel/Hotel: Best Western Plaza
(814) 735-4352 S: \$20 D: \$27
Breezewood Motel/Hotel: Motel 70
(814) 735-4385 S: \$16 D: \$18

South Carolina					
City	Motel/Hotel	Area code	Phone	Rates	
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Charleston	Holiday Inn SW	803	556-7100	\$33	\$47
Charleston	Howard Johnsons	803	524-4148	\$31	\$36
Charleston	Ramada Inn	803	774-8281	\$33	\$40
Charleston	Sheraton Inn	803	744-2401	\$34	\$42
Columbia	Best Western	803	796-9400	\$29	\$34
Columbia	Carolina Inn	803	799-8200	\$42	\$48
Columbia	Days Inn	803	736-0000	\$23	\$27
Columbia	Holiday Inn NW	803	794-9440	\$32	\$39
Columbia	Howard Johnsons	803	772-7200	\$25	\$27
Columbia	Quality Inn	803	772-0270	\$34	\$41
Columbia	Ramada Inn	803	796-2700	\$36	\$44
Columbia	Vagabond Inn	803	796-6240	\$27	\$30

Design Guidelines for Attention

- Make information noticeable when it needs attending.
- Use techniques that make things stand out like colour, ordering, spacing, underlining, sequencing and animation
- Avoid cluttering the interface - e.g. google.com
- Menu choices/information displayed on screen should be arranged in a pleasing and/or **LOGICAL WAY**



PERKHIDMATAN



- Pelajar
- Pendeposit SSPN-i
- Pendeposit SSPN-i Plus
- Institusi
- Warga PTPTN

- Syarat-syarat Permohonan
- Tawaran Pembiayaan Pendidikan
- Permohonan Secara Online
- Tarikh Tutup Permohonan
- Senarai IPT & Kursus Tajaan PTPTN

[selanjutnya>](#)

- Pengenalan
- Keistimewaan
- Kemudahan SSPN-i
- Pelepasan Taksiran Cukai
- Perlindungan Takaful
- Semakan Senarai Pendeposit Yang Layak Untuk Perlindungan Takaful Kemalangan Diri SSPN-i
- Semakan nombor akaun SSPN-i bagi Permohonan Pembiayaan Pendidikan

[selanjutnya>](#)



- Tarikh Tutup Permohonan
- Pengeluaran Pembiayaan
- Perlindungan Takaful
- Pemberhentian Pembiayaan
- Panel Bank
- Semakan Lebihan Bayaran Balik Pembiayaan (Refund)

[selanjutnya>](#)



- Webmail
- Intranet
- Dasar Keselamatan ICT
- Dasar Keselamatan & Kesihatan Pekerjaan
- Pusanita
- KSK
- Muat Turun Borang



- Pengenalan
- Keistimewaan
- Pelan Simpanan
- Kelayakan

[selanjutnya>](#)

INFO TERKINI

Vaganza! Siri Kedua Tahun 2015. [Selanjutnya](#)

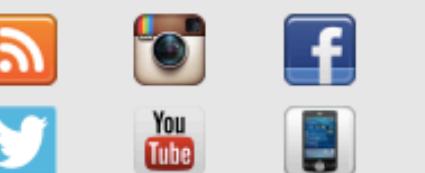
TERKINI :: Senarai Pemenang Cabutan Wow! SSPN-i Plus Siri Pertama Tahun 2015 [Selanjutnya](#)

TERKINI :: Untuk makluman, terdapat gangguan capaian ke atas permohonan online. Bagi pelajar-pelajar yang tidak berjaya menghantar permohonan bagi tarikh tutup permohonan 30/08/2015, proses permohonan akan di lakukan pada 15/09/2015. Semakan tarikh tutup permohonan mengikut IPT boleh disemak di alamat berikut: <http://www.ptptn.gov.my/web/guest/tarikh-tutup-permohonan>

TERKINI :: Untuk memastikan transaksi bayaran balik / simpanan dikemasukan dalam penyata pada bulan semasa, transaksi melalui agen/pihak ketiga hendaklah dibuat **selewat-lewatnya pada 27**



BERSAMA KAMI



PENAFIAN & STATISTIK



Kemaskini Terakhir Portal : 10 Februari 2016

Anda adalah pelawat yang ke :26,408,425

[Bil. Transaksi Perkhidmatan Online PTPTN](#)

[Penafian | Dasar Privasi & Keselamatan](#)

[Peta Laman | Bantuan Portal](#)

Sesuai dipaparkan menggunakan resolusi 1024 x 768,

pelayar IE11, Mozilla Firefox

© Hakcipta terpelihara PTPTN 2016

Perkhidmatan i-Rundingan



KLIA 2
017-249 3000
017-276 3000
017-285 3000



Hubungi
Careline
03-2193 3000



Eksekutif Pemasaran &
Alamat Cawangan



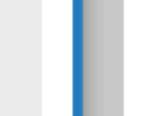
Saluran
Bayaran



FPX



MyPay



KWSP

JomPAY
Semakan JomPAY

Visa / MasterCard / American Express

[Saluran Bayaran Balik
Pinjaman PTPTN](#)

[Mohon Direct Debit
Secara Online](#)

[Inginkan Diskaun
Daripada PTPTN?](#)

[Percuma RM50](#)

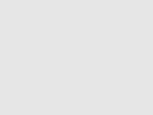
Perkhidmatan Atas Talian



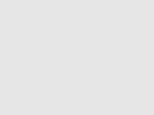
Permohonan
Pinjaman



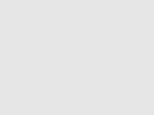
Kemaskini Emel &
No. Telefon Peminjam



Permohonan
Direct Debit



Pengesahan Baki
Pinjaman / Surat
Penyelesaian Hutang



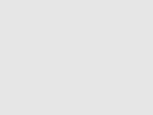
Permohonan
Potongan Gaji



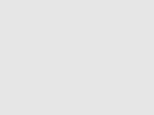
Semakan
Penyata
Pinjaman



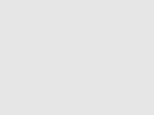
Semakan
Senarai Hitam



Semakan
WPP



Jadual
Bayaran Pinjaman



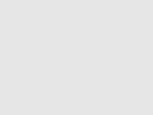
Jadual Sesi
Kutipan Dokumen
Tarawan IPTA



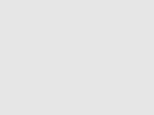
Pembukaan Akaun/
Penambahan Deposit
SSPN-i



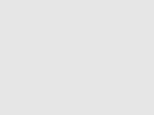
Pembukaan Akaun/
Penambahan Deposit
SSPN-i Plus



CCRIS



Tindakan
Saman



Aduan



e - Survey

BERSAMA KAMI



- Pelajar
- Pendeposit
- Institusi
- Warga PTPTN

- Syarat-syarat Permohonan
- Tawaran Pinjaman Pendidikan
- Permohonan Secara Online
- Jadual Tarikh Tutup Permohonan Pinjaman

- Borang
- Pekelliling
- Sebutharga
- Panduan
- Media
- Kerjaya

- Borang Penyertaan Pertandingan Video Pendek 20 Tahun PTPTN
- Borang Permohonan Penangguhan Bayaran Balik
- Borang Kebenaran Potongan Gaji Bagi Peminjam PTPTN
- Borang Permohonan Pengesahan Baki Pinjaman (Individu)

SSPN-i

Pekelliling PTPTN :



TABUNG

Pendidikan

PORTAL RASMI
PERBADANAN TABUNG PENDIDIKAN TINGGI NASIONAL



KEMENTERIAN
PENGAJIAN
TINGGI

Carian...

UTAMA

KORPORAT

SIMPANAN

PINJAMAN

BAYARAN BALIK

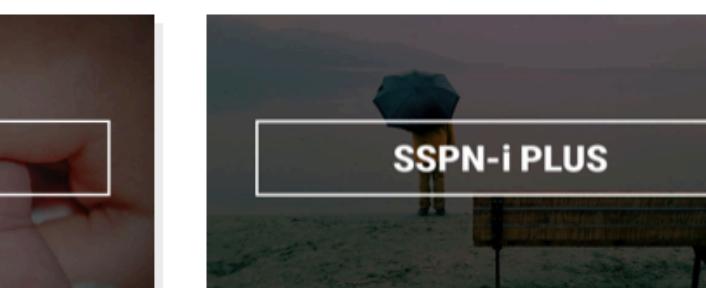
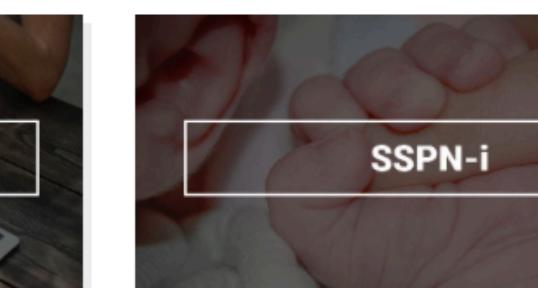
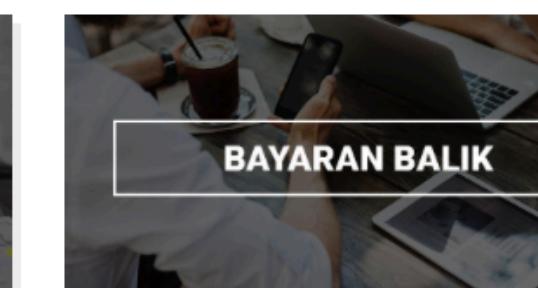
e-PERKHIDMATAN

HUBUNGI

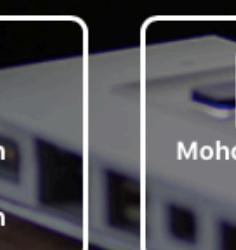
PROMOSI

KERJAYA

SOALAN LAZIM



MAKLUMAN TERKINI



Makluman

@PTPTN

Pautan Agensi



DuckDuckGo

A large, empty search bar with a magnifying glass icon on the right side.

The search engine that doesn't track you. [Learn More.](#)

.....

<https://duckduckgo.com/>



Window live tile

Alignment and layout are also important:

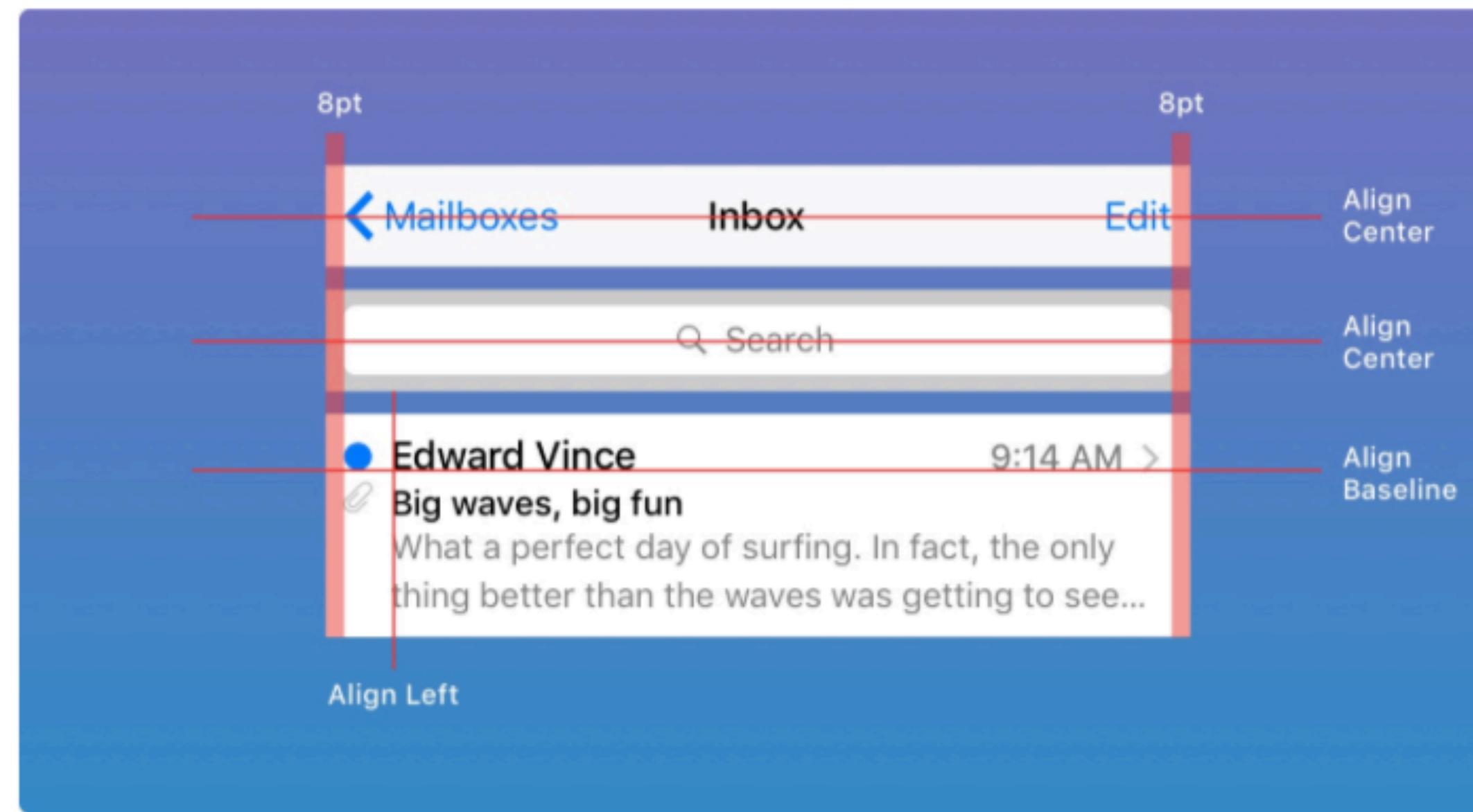
532.56	627.865
179.3	1.005763
256.317	382.583
15	2502.56
73.948	432.935
1035	2.0175
3.142	652.87
497.6256	56.34

Find the **Bigest** Figure in Each Column.

Which column allow you to perform this task easier?

Spacing and Alignment

A general rule is to have a minimum **padding** or **margin** of **8pt**. This creates enough breathing room, which makes the layout easier to scan and the text more readable. Also, UI elements should be aligned and texts should have the same baseline position.



<https://designcode.io/iosdesign-guidelines>

Perception

- Perception is the ability to see, hear or become aware of something through the senses.
- Obvious implication is to design representations that are readily perceptible, e.g.
 - Text should be clear to read.
 - Icons should be easy to distinguish and read

Which is easiest to read and why?

1

What is the time?

4

What is the time?

2

What is the time?

5

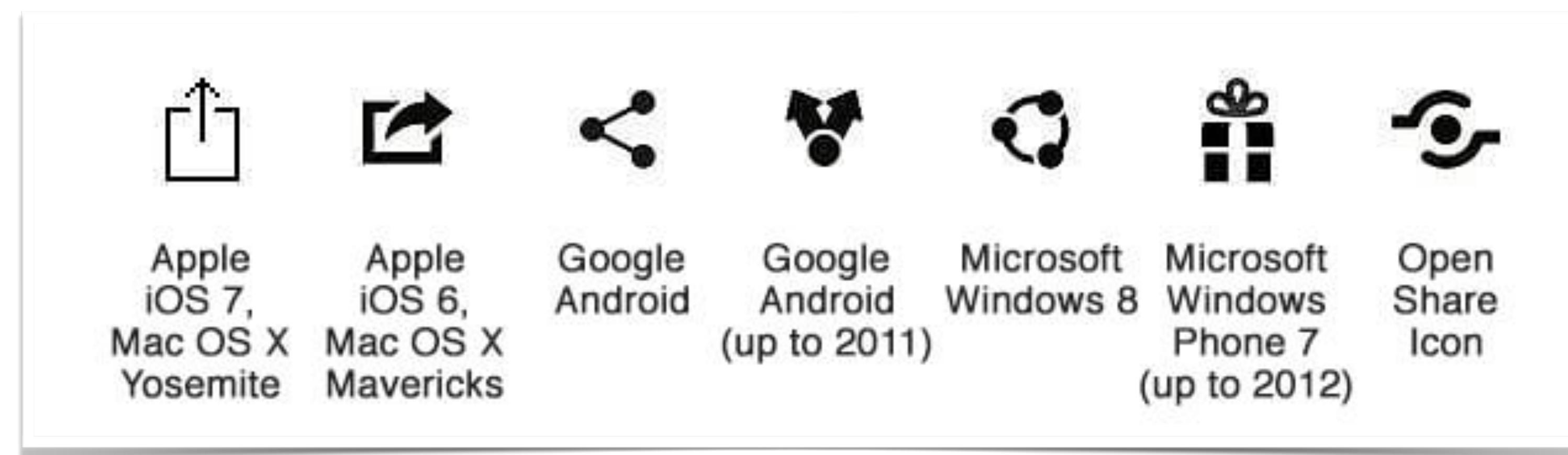
What is the time?

3

What is the time?

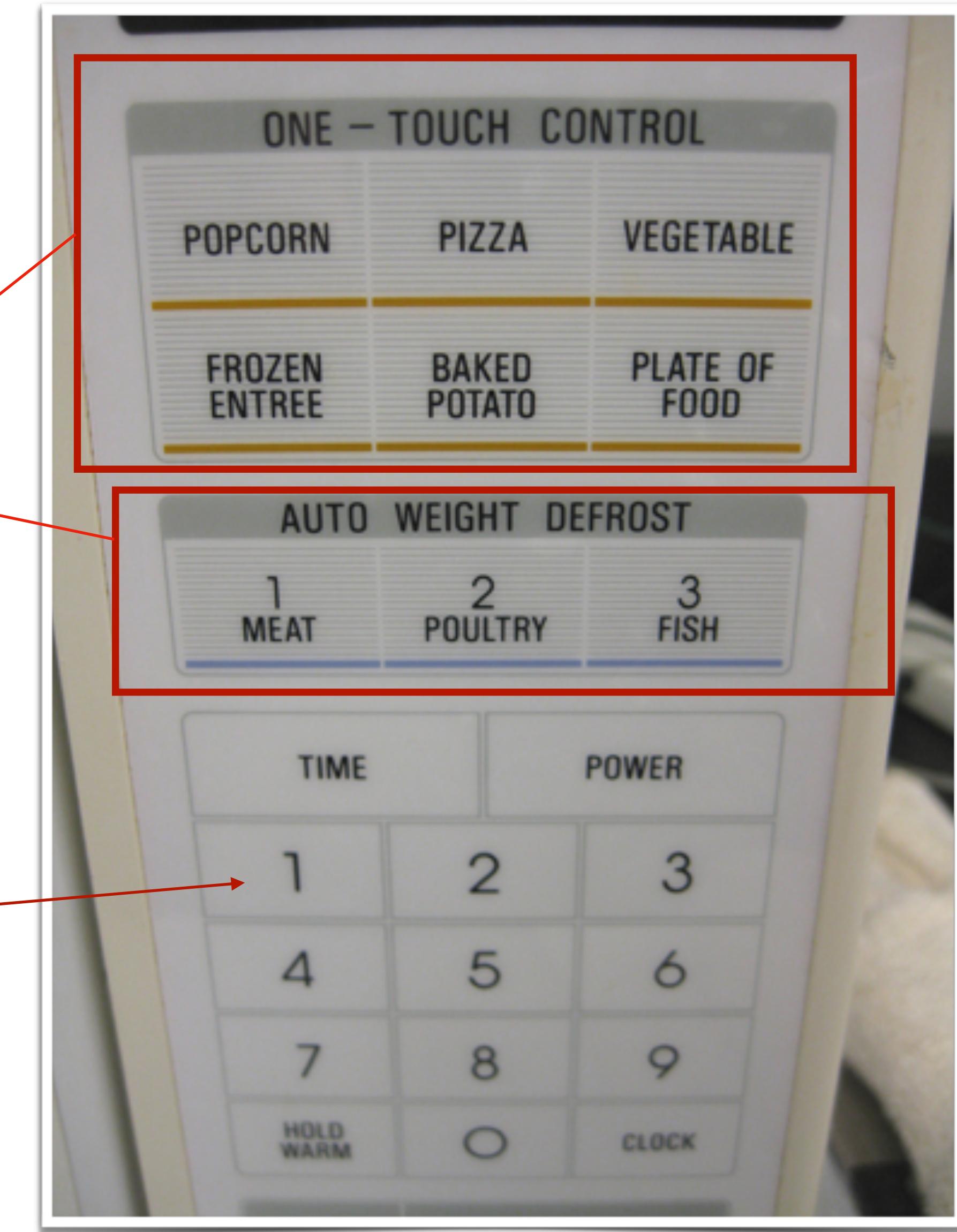
Design Guidelines for Perception

- Representations of information need to be designed to be perceptible and recognizable
- Icons and other graphical representations should enable users to readily *distinguish* their meaning



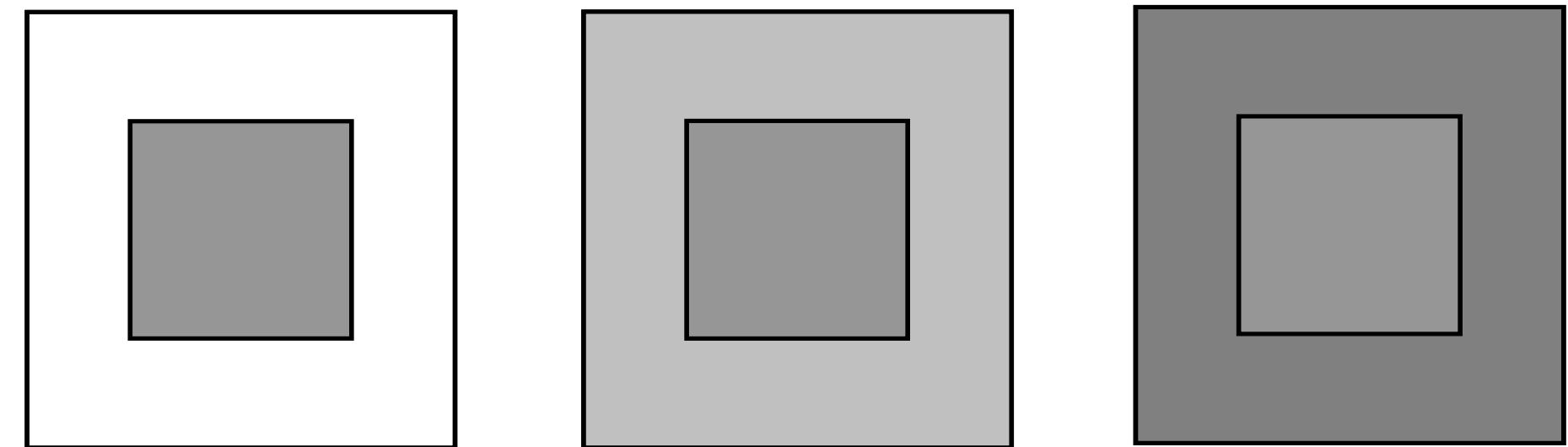
Share icons

- Bordering and spacing are effective visual ways of grouping information
- Text should be legible and distinguishable from the background



- Ensure sufficient **CONTRAST** between the foreground and the background (Text)
- Contrast is the difference between the light emitted from the foreground and the light emitted from the background.

Contrast from high -----> low

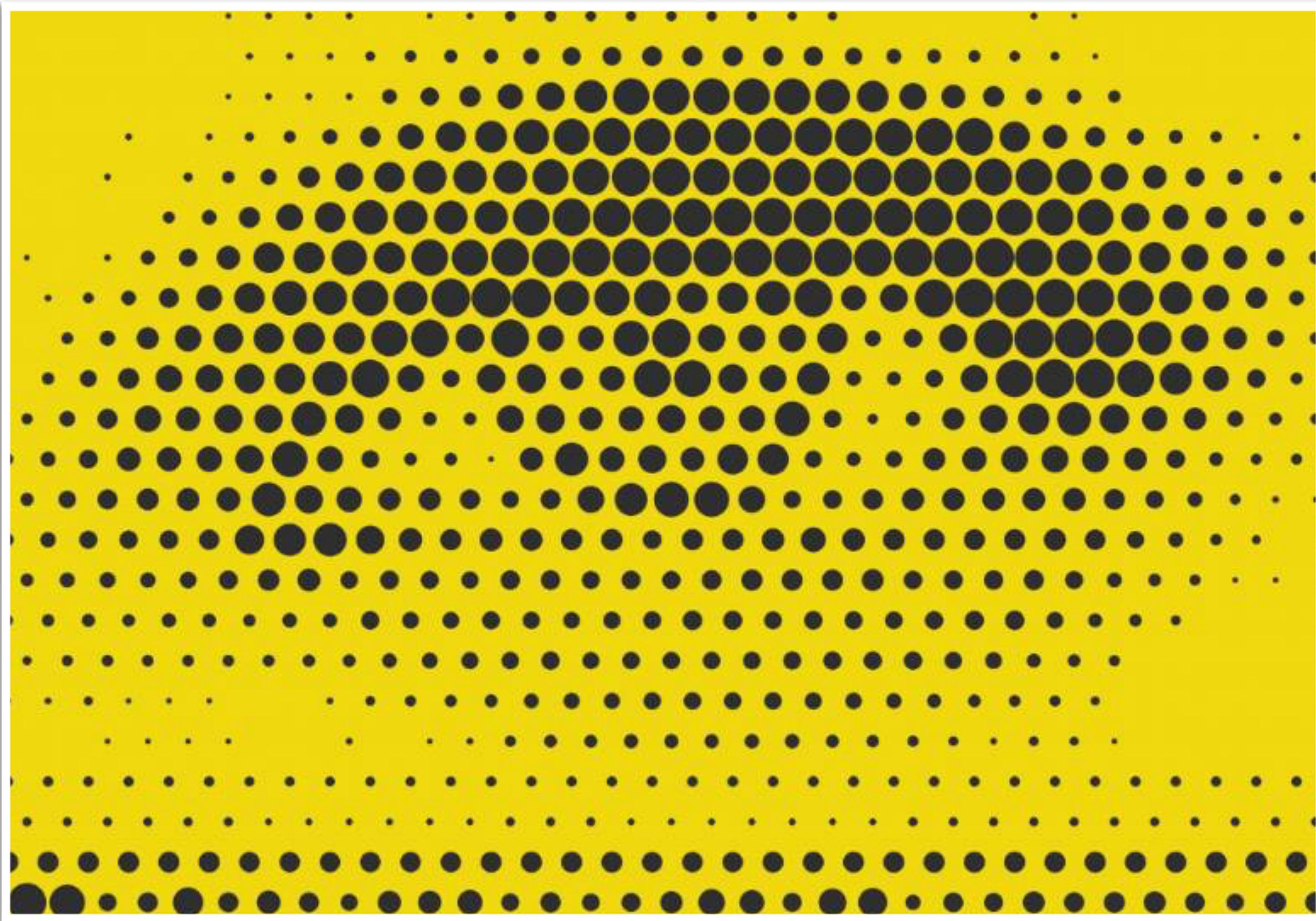


It is also important to stick to same type of font, because too *many* different types of font mixed together on a screen can lead to a **jumbled effect**

Gestalt Law of Perception

- Mind understands external stimuli as whole rather than the sum of their parts.
- In other words, the whole (a picture, a car) carried a different and altogether greater meaning than its individual components (paint, canvas, brush; or tire, paint, metal, respectively).
- In viewing the "whole," a cognitive process takes place – the mind makes a leap from comprehending the parts to realizing the whole,
- Created a group of grouping laws that can be summarised as below:
 - Proximity, Continuity, Similarity, figure-ground

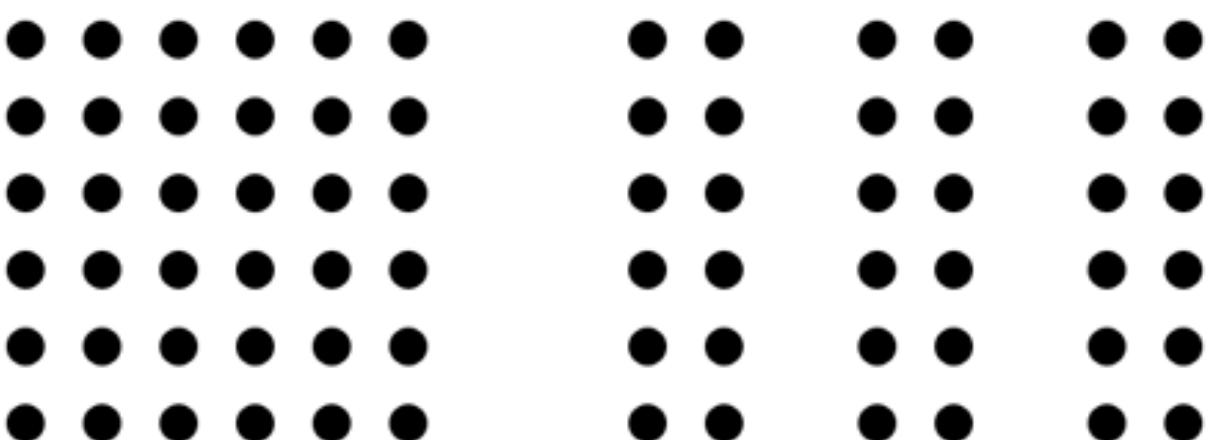
** Gestalt law is not limited to this 4 laws



Gestalt Law of Perception

Proximity

- Objects appearing closed together in space or time tend to be perceived together.
- If your intent is that items in a user interface are to be “read” by the user as being grouped, place them in close proximity.
- If items in the user interface are not intended to be “read” as being grouped, be careful to allow enough space between them.



Using Lies in Research

By Nate Bolt • March 8, 2011

While it might be an uncomfortable topic, uncovering the lies behind a product or interface can be one of the most effective ways to turn ailing projects around.

[Read More](#)

Considerations for Mobile Design (Part 2): Dimensions

By David Leggett • March 1, 2011

In part two of this series, David helps readers adapt their design regimes to the (typically) small screens of mobile devices. Using responsive design, our experiences adapt to a variety of conditions.

[Read More](#)

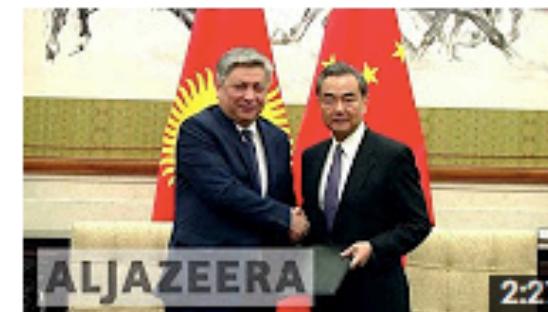
A Simple, Usable Review

By Paul Seys • February 24, 2011

In this detailed review, Paul Seys describes an up-and-coming UX title that's jam-packed with lessons for designers both new and established. Follow along to learn how author Giles Colborne's teaches his readers the essence of great design.

[Read More](#)

China seeks to revive 'Silk Road' project



[China seeks to revive 'Silk Road' project](#)

Al Jazeera English 216 views • 1 hour ago



[Reviving the Silk Road](#)

Wall Street Journal 5,189 views • 21 hours ago



[Duterte should prioritize infrastructure push, analyst says](#)

ABS-CBN News 1,150 views • 18 hours ago



[PM in Beijing for Belt and Road forum](#)

The Star Online 1,272 views • 21 hours ago



[China needs Silk Road as 'hard landing' looms in 2018: analyst](#)

ABS-CBN News 6,362 views • 2 days ago

Pope visits Portugal to make shepherd children saints



[Pope visits Portugal to make shepherd children saints](#)

euronews (in English) 233 views • 5 hours ago



[Early start for pilgrims attending Pope's Mass in Fatima](#)

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[Thousands gather for Pope Francis in Fatima](#)

INQUIRER.net 1,078 views • 10 hours ago



[Pope Francis arrives in Portugal for Fatima trip](#)

euronews (in English) 1,693 views • 19 hours ago



My Name

First Name

Gender

Birthday Day

I live in

Postal Code

Please select Country *

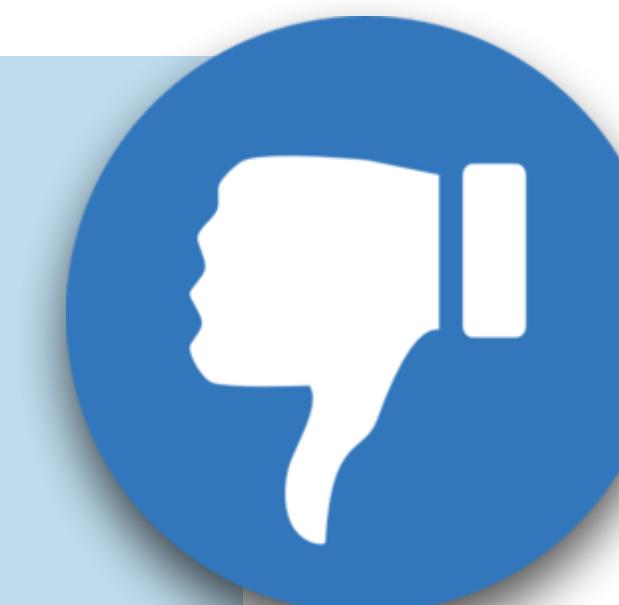
Login Information

Username *

Password *

Re-enter Password *

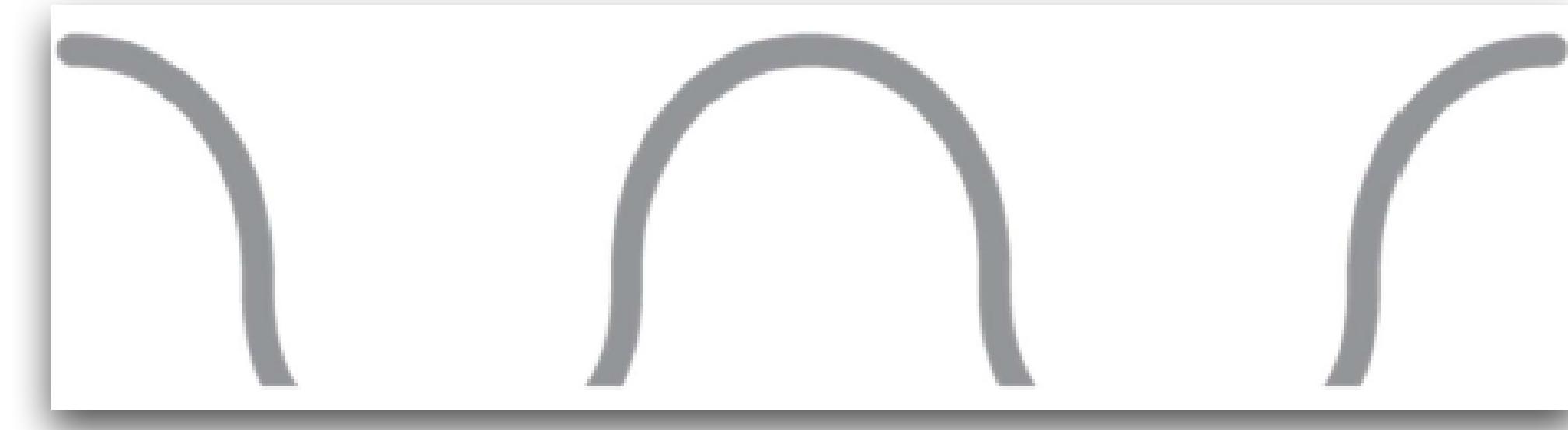
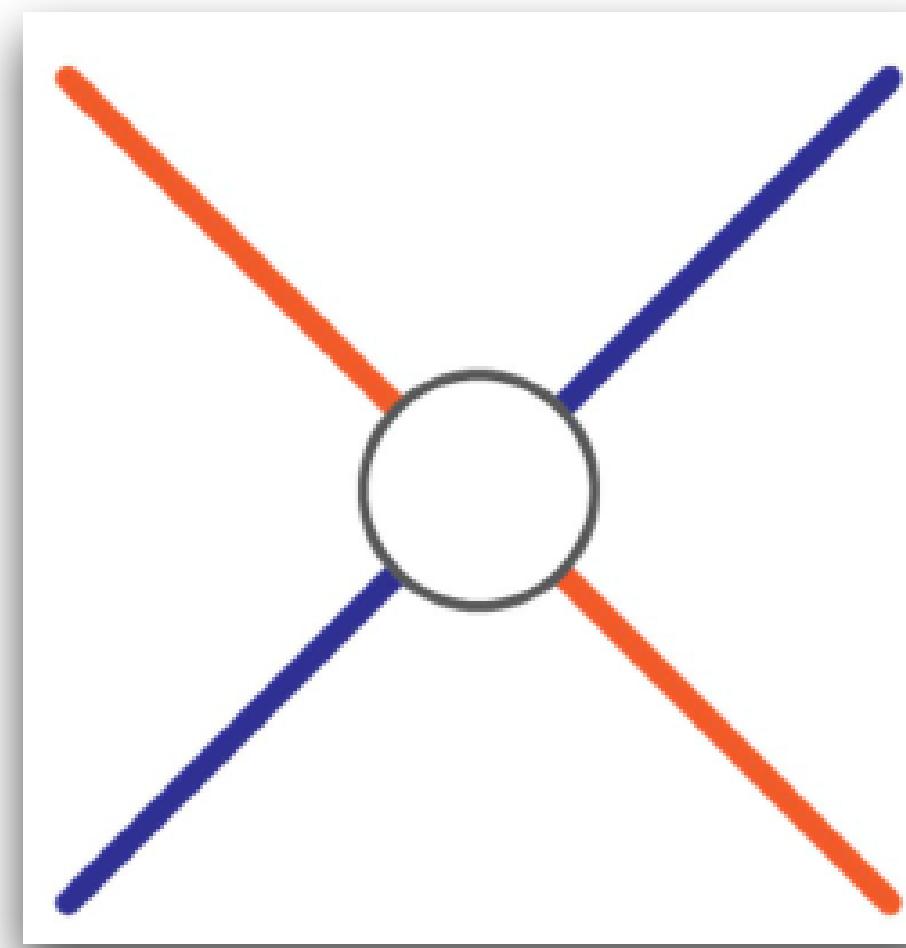
If you are a department administrator applying on behalf of a professor,
please check here and enter the professor's information on this form.



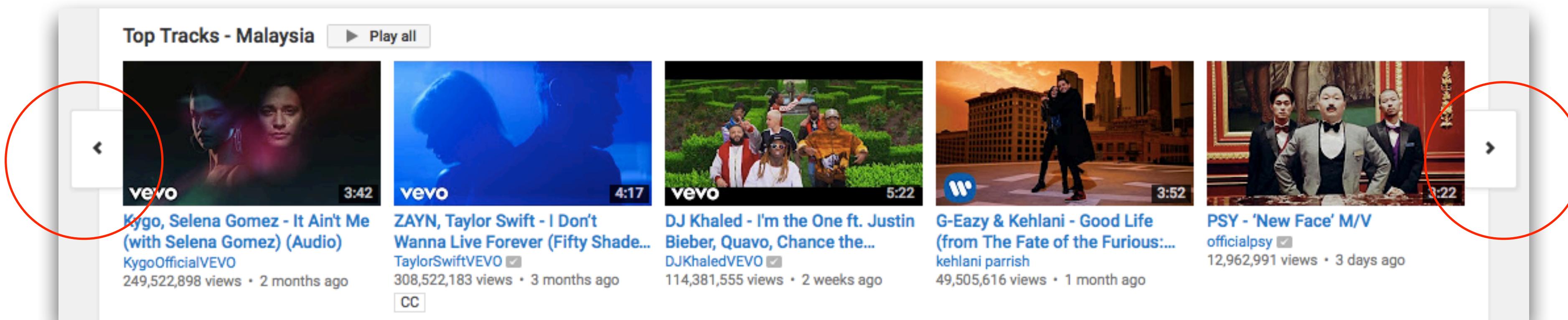
Gestalt Law of Perception

Continuity

- Perceive smooth, continuous patterns as one rather than disjoint and interrupted one.
- Our mind fills in missing segments automatically, completing an incomplete form.



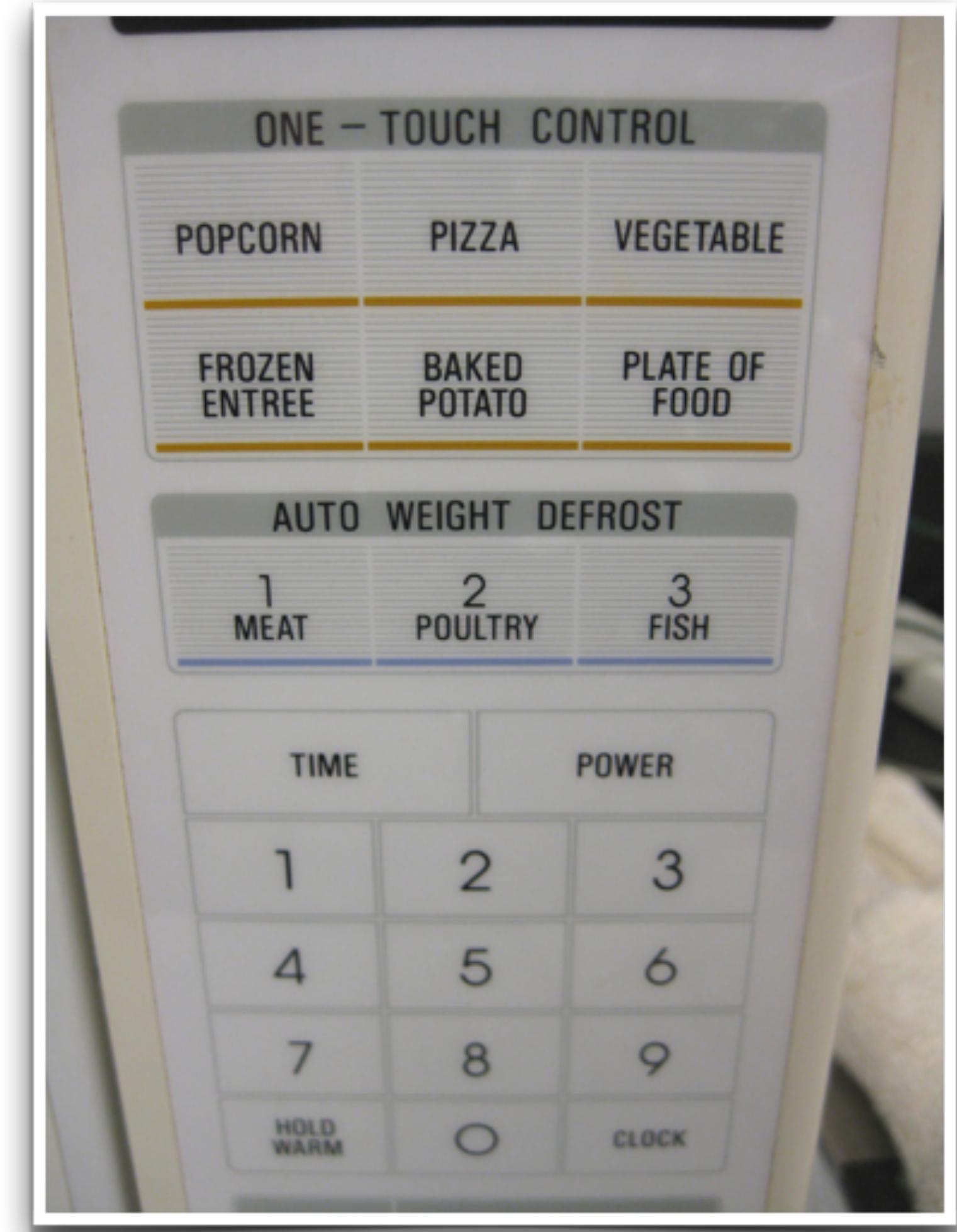
Eyes can easily and naturally follow elements that are arranged along a continuous line, those elements are therefore perceived as a unit. Further, elements that follow each other either logically or temporal, are perceived as unit as well.



Gestalt Law of Perception

Similarity

- Elements that appear similar are perceived as one unit.
- Elements with same color or shape, are perceived to be belonging together.
- Useful to group elements together that belong to one category.



1. Tell us about yourself...

My Name

Gender

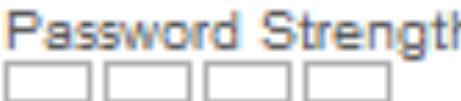
Birthday

I live in

Postal Code

2. Select an ID and password

Yahoo! ID and Email @

Password Password Strength 

Re-type Password

3. In case you forget your ID or password...

Alternate Email

1. Security Question

Your Answer

2. Security Question

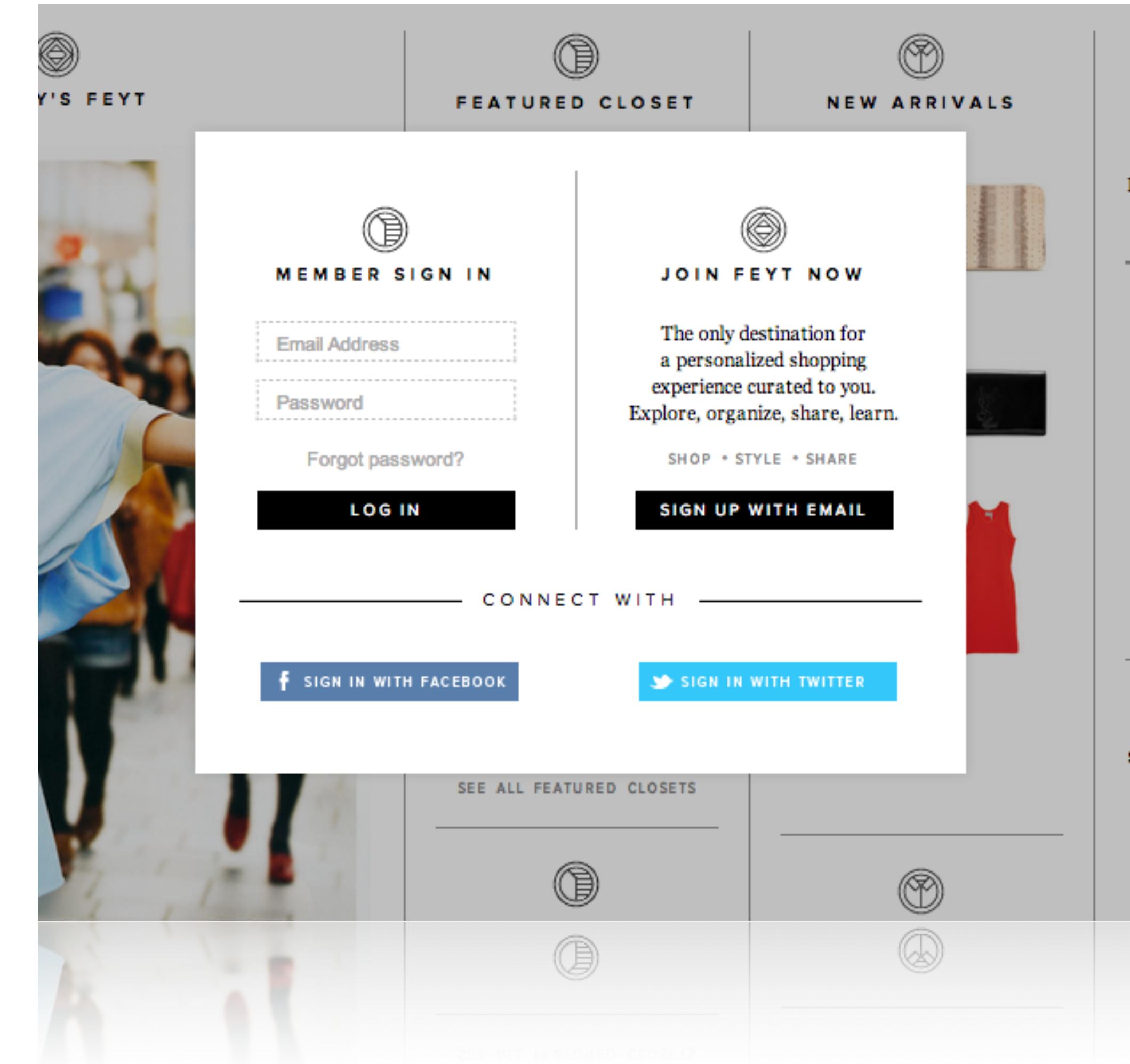
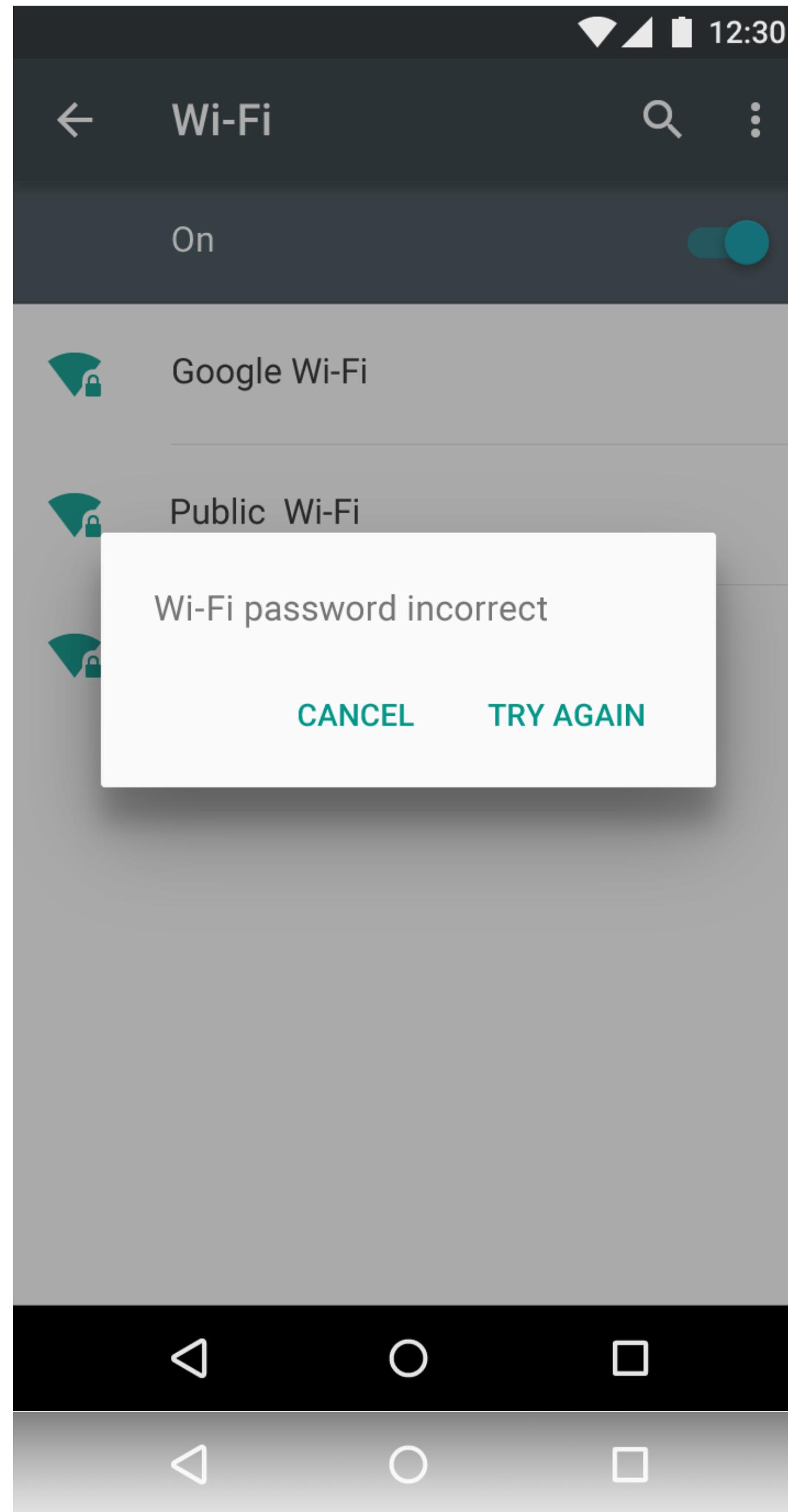
Your Answer

Gestalt Law of Perception

Figure-Ground

- The whole is greater than the sum of its parts.
- Our mind separates the visual field into the foreground and the background.





Memory

- 3 types of HUMAN MEMORY
- Sensory memory (SM)
- Short-term memory/working memory (STM/WM)
- Long-term memory (LTM)
- Overtaxing on user's memory can lead to Inefficiency, Anxiety & stress
- Sensory Memory : an area of conscious memory that deals with information from the senses, i.e. from the:eyes,ears,nose,haptic channel etc.

Memory:

Short-Term Memory (STM)

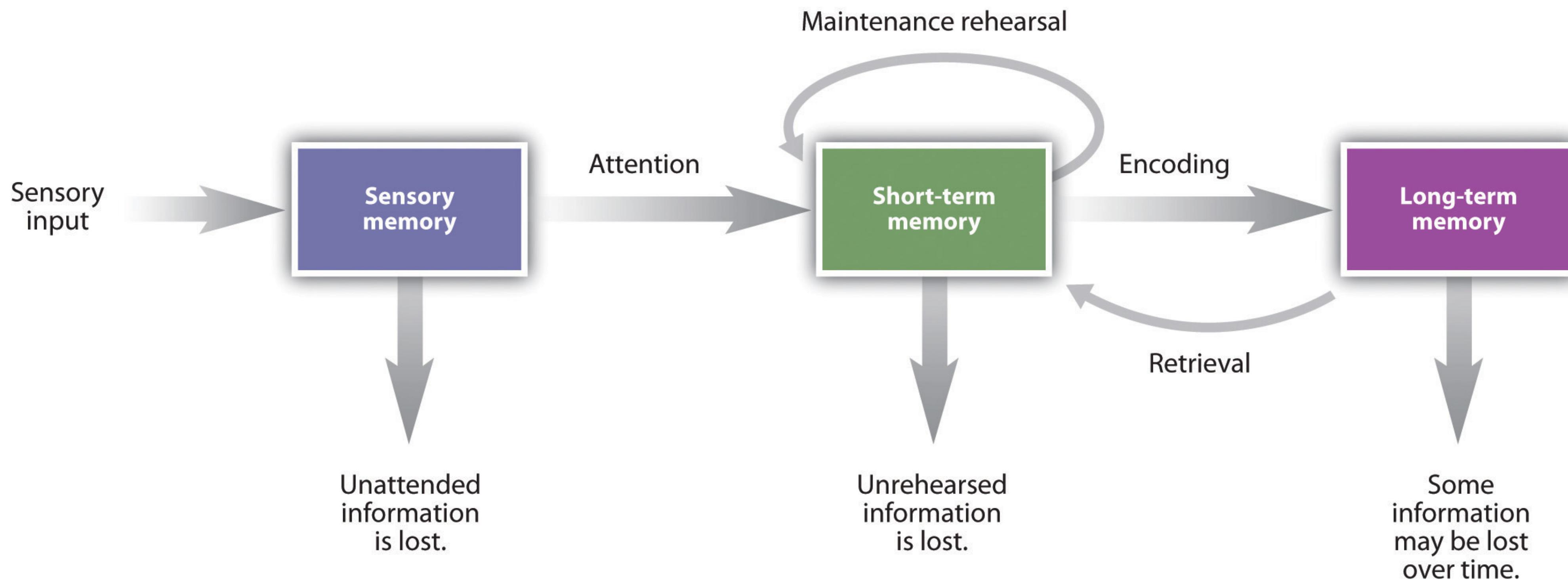
- It is an area of memory that is able to hold **LIMITED INFORMATION** (7 ± 2 chunks/pieces of information) for a very short period of time. (George Miller, 1956)
- Examples:
 - 9, 1, 5, 2, 3, 38, 17, 6, 2, 99, 22, 35, 11, 18, 20
 - Cat, house, paper, laugh, people, red, yes, number, shadow, broom, rain, plant, lamp, chocolate, radio, one, coin, aeroplane
- STM has **LIMITED CAPACITY** (7 ± 2 chunks/pieces of information)
- Information stored in STM can be **ACCESSED RAPIDLY**
- Information stored in STM also **DECAY(lost) RAPIDLY**

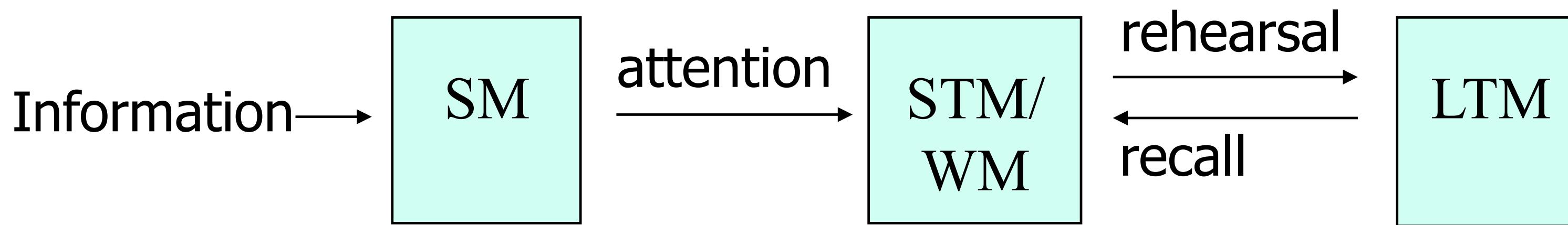
Memory:

Long-Term Memory (LTM)

- It is an area of memory where information is stored and can be retrieved over very **LONG PERIODS** of time.
- The capacity of LTM is **INFINITE**.
- **TIME** is needed to retrieve info stored in LTM
- Information stored in LTM can become **LESS ACCESSIBLE** after a long period of time

- Remembering things involves retrieving stored knowledge in human brain.





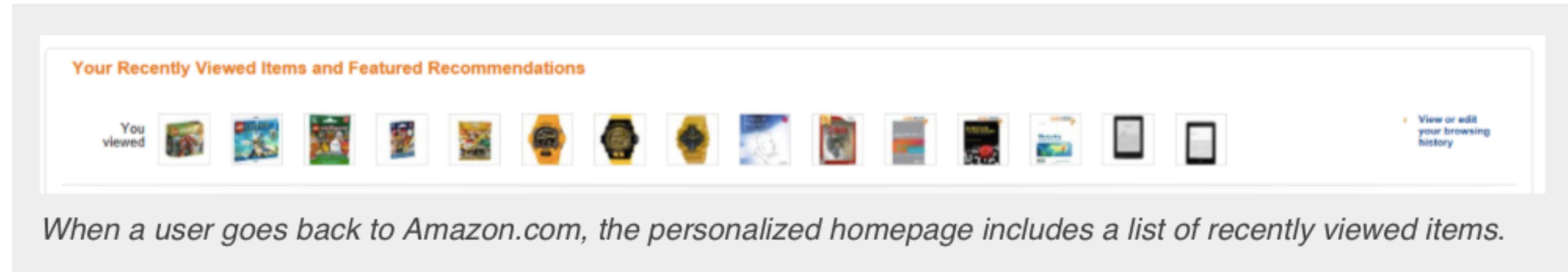
- A comparison between STM & LTM

	STM	LTM
CAPACITY	limited ($7 \pm 2 \dots$)	unlimited
ACCESS	fast	slow
DECAY	fast	slow

- Any system that requires the users to recall information from the LTM will **slow** him/her down

Recognition vs Recall

- Command-based interfaces require users to recall a name/ command.
- GUIs provide visually-based options
- Web browsers, provide lists of visited URLs, song titles etc., that support recognition memory



- People don't remember everything
- Context is important in affecting memory (i.e. where, when)
- People are very good at remembering visual cues about things
- We recognize things much better than being able to recall things
 - Usually better at remembering images than words
 - GUI > CLI

Design for Memory

Recognition

- Help users' memories with simple procedures to complete tasks
- Design interfaces that promote recognition rather than recall
- Provide users with a variety of ways of encoding digital information to help them remember where they have stored them. e.g., categories, colour, flagging, time stamping.

The image displays three views of a mobile calendar application:

- Birthday View:** Shows a monthly calendar for January 2017. The 3rd is marked as a birthday (green circle). The 21st and 22nd are highlighted in blue. The 16th, 17th, 18th, and 19th are grouped together in a blue box. The 20th, 23rd, 24th, 25th, 26th, and 27th are in a blue box. The 28th, 29th, 30th, and 31st are in a grey box. A red '+' button is at the bottom.
- Event View:** Shows a daily timeline for January 2017. Events include:
 - Sunday, Jan 1: Delora Birthday (blue box)
 - Sunday, Jan 1: New Year's Day (green box)
 - Monday, Jan 2: Brand Design (grey box)
 - Tuesday, Jan 3: Product Sync... (grey box)
 - Tuesday, Jan 3: Dribbble Trai... (pink box)
 - Wednesday, Jan 4: Dashboard Dis... (grey box)
 - Wednesday, Jan 4: Product Meet... (grey box)A red '+' button is at the bottom.
- Flagged Items View:** Shows a list of flagged items:
 - Red
 - Orange
 - Yellow
 - Green
 - Blue
 - Purple
 - Gray
 - Clear Flag**
 - VIPs
 - Flagged
 - Red (8)
 - Yellow (7)
 - Green (9)
 - Blue (7)
 - Sent
 - Junk

Design for Memory

Chuncking

GEORGE MILLER (1956)

- **MORE** can be remembered if the items can be chunked
- Chunking means **GROUPING** together pieces of information into sections so that they form one item to be remembered
- Idle when specific information must be memorized for later use

Miller's Magic Number

7 ± 2

4408675309
(440) 867-5309

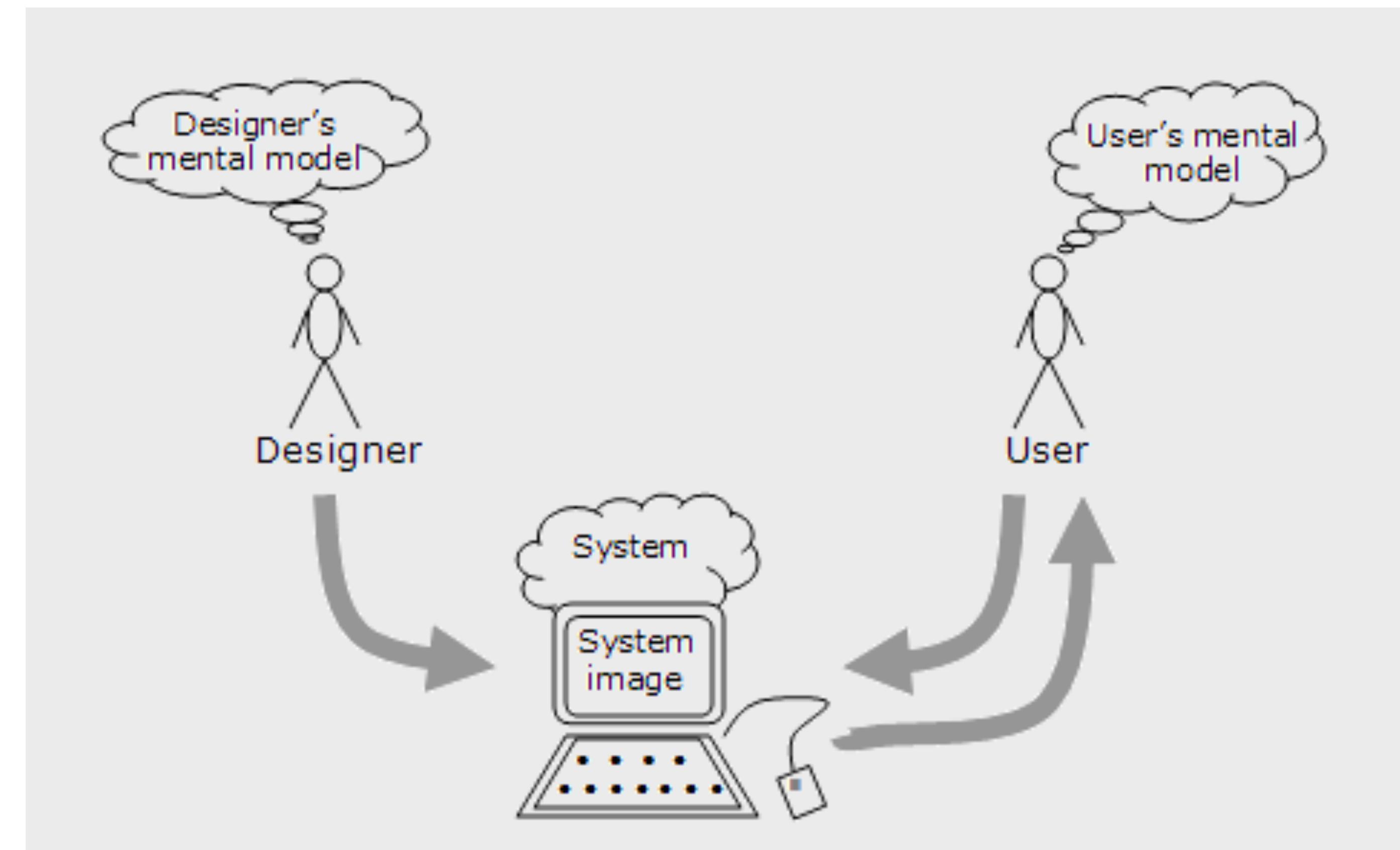
Without Chunking	With Chunking
Patient ID:678290234 Name: Joe Smith DOB:02111973	X

Mental model

- People have mental models of how things work:
 - how does your car start?
 - how does an ATM machine work?
 - how does your computer boot?
- Allows people to make predictions about how things will work

- Users develop an understanding of a system through learning and using it
- Knowledge is often described as a mental model
 - How to use the system (what to do next)
 - What to do with unfamiliar systems or unexpected situations (how the system works)
- People make inferences using mental models of how to carry out tasks. (especially with unfamiliar system)

- Make the system conform to users' mental models
- Improve users' mental models so that they more accurately reflect your system.

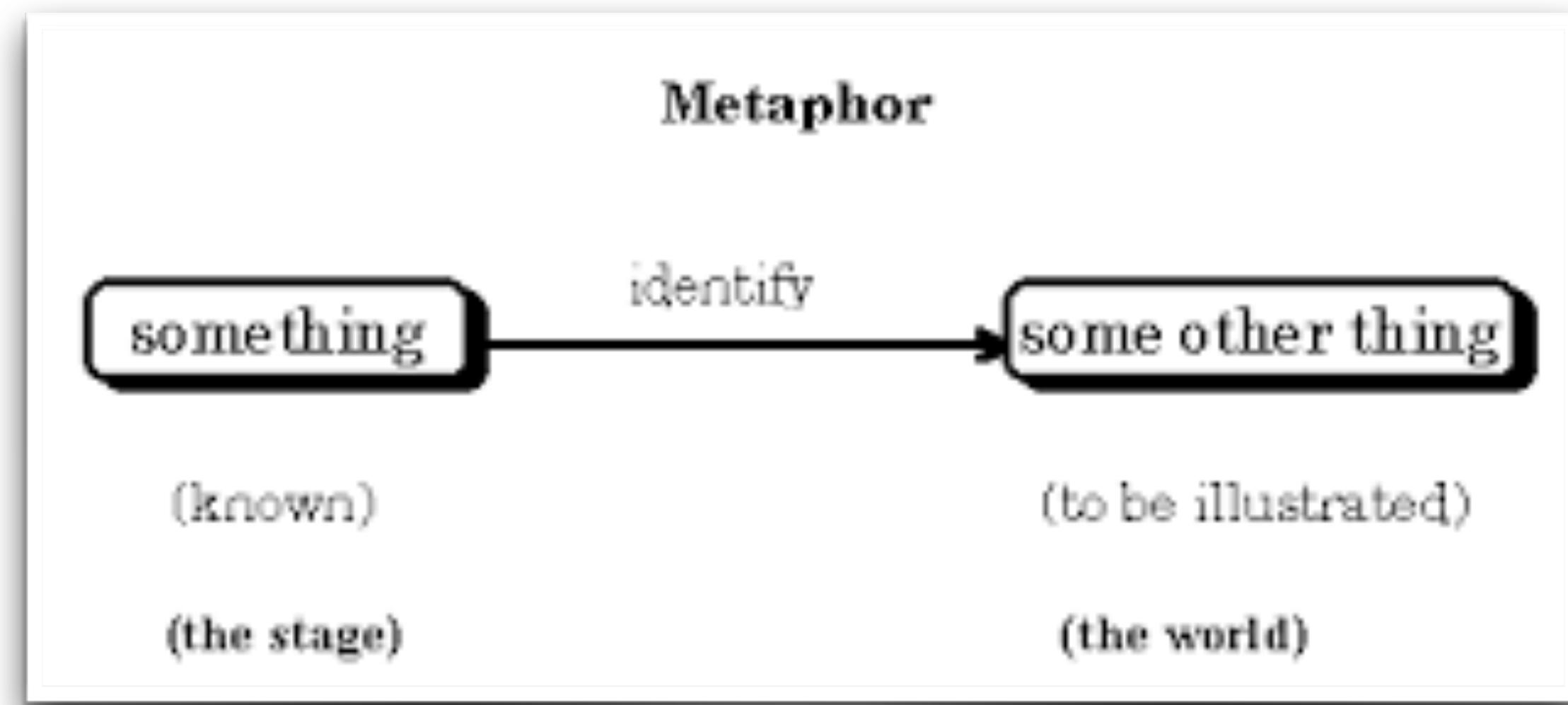


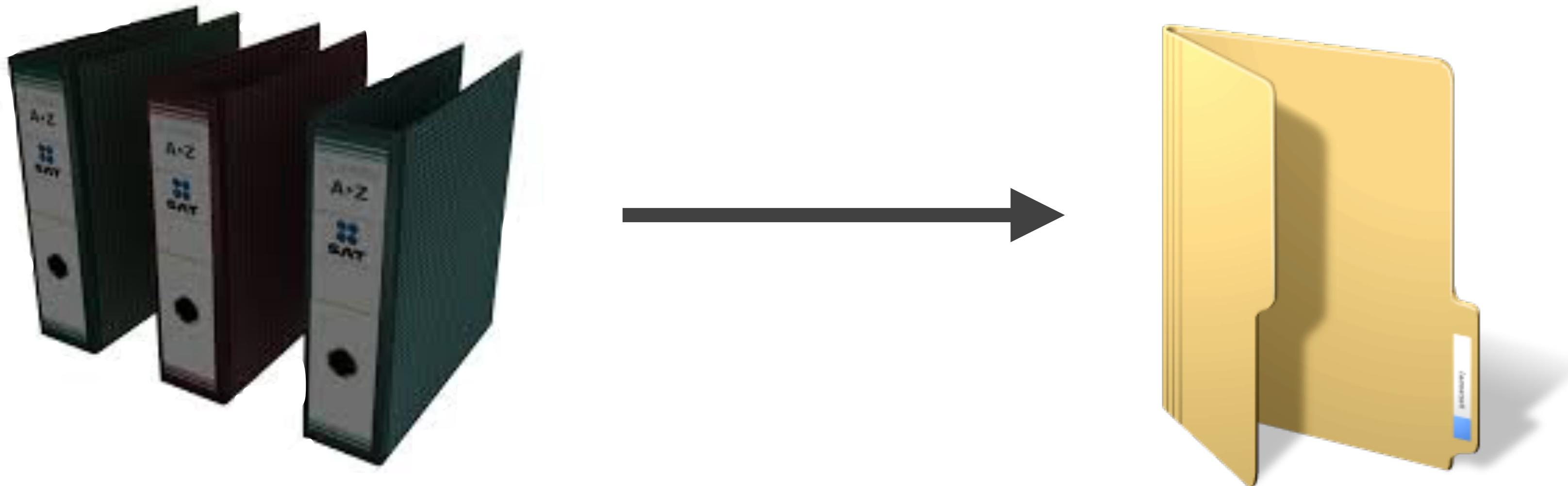
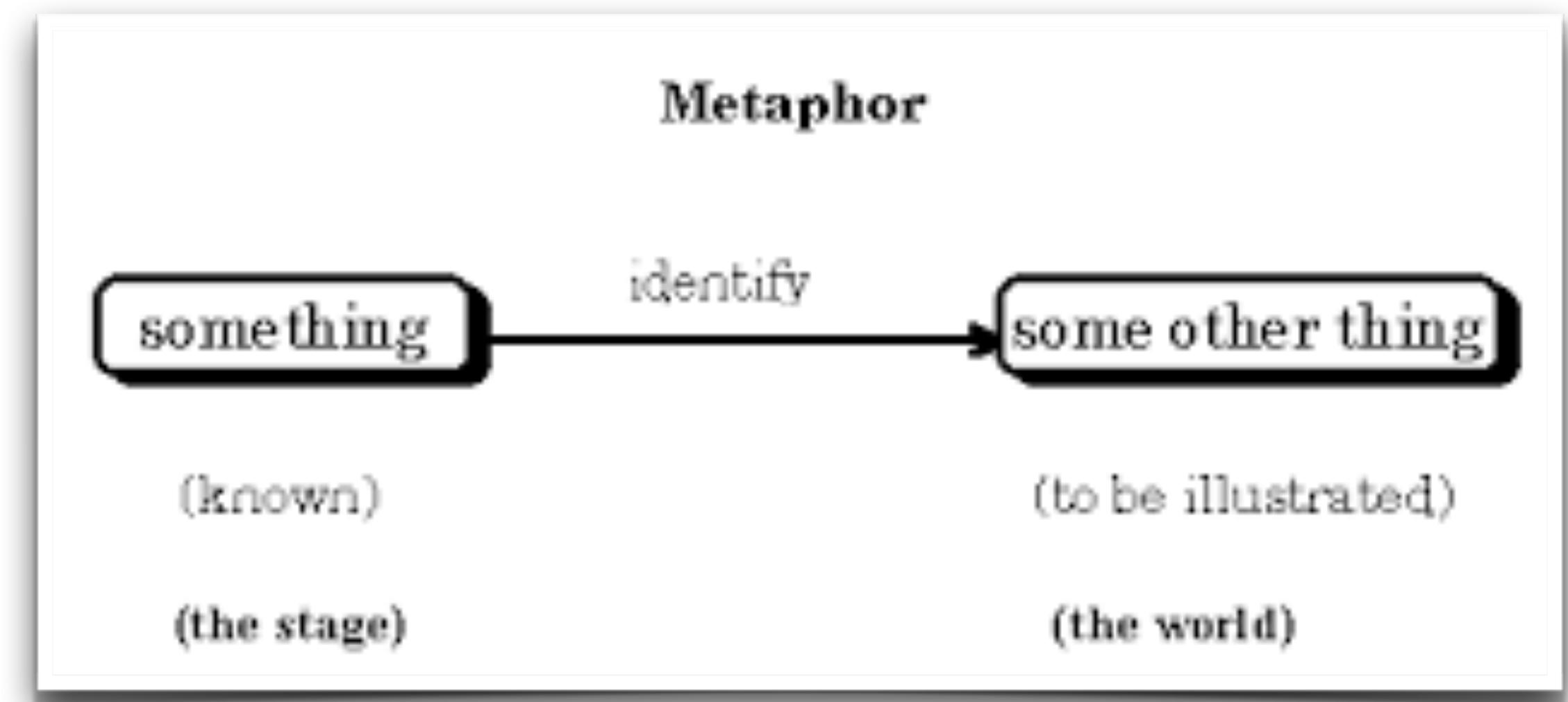
“The biggest limitation on the mental models theory is to capture and validate these models. Studies have shown that these models are built "on-the-fly", moreover, other studies have shown that asking a subject about his mental model can modify the mental model itself ”

****Rogers, Y., Rutherford, A. and Bibby, P.A. eds., 1992. *Models in the mind*. Academic Press.**

Design for Mental Model

Metaphors (Transfer Effect) are used in human-computer interaction to describe unfamiliar concepts or systems, like a computer, in terms of familiar elements, like files and folders.

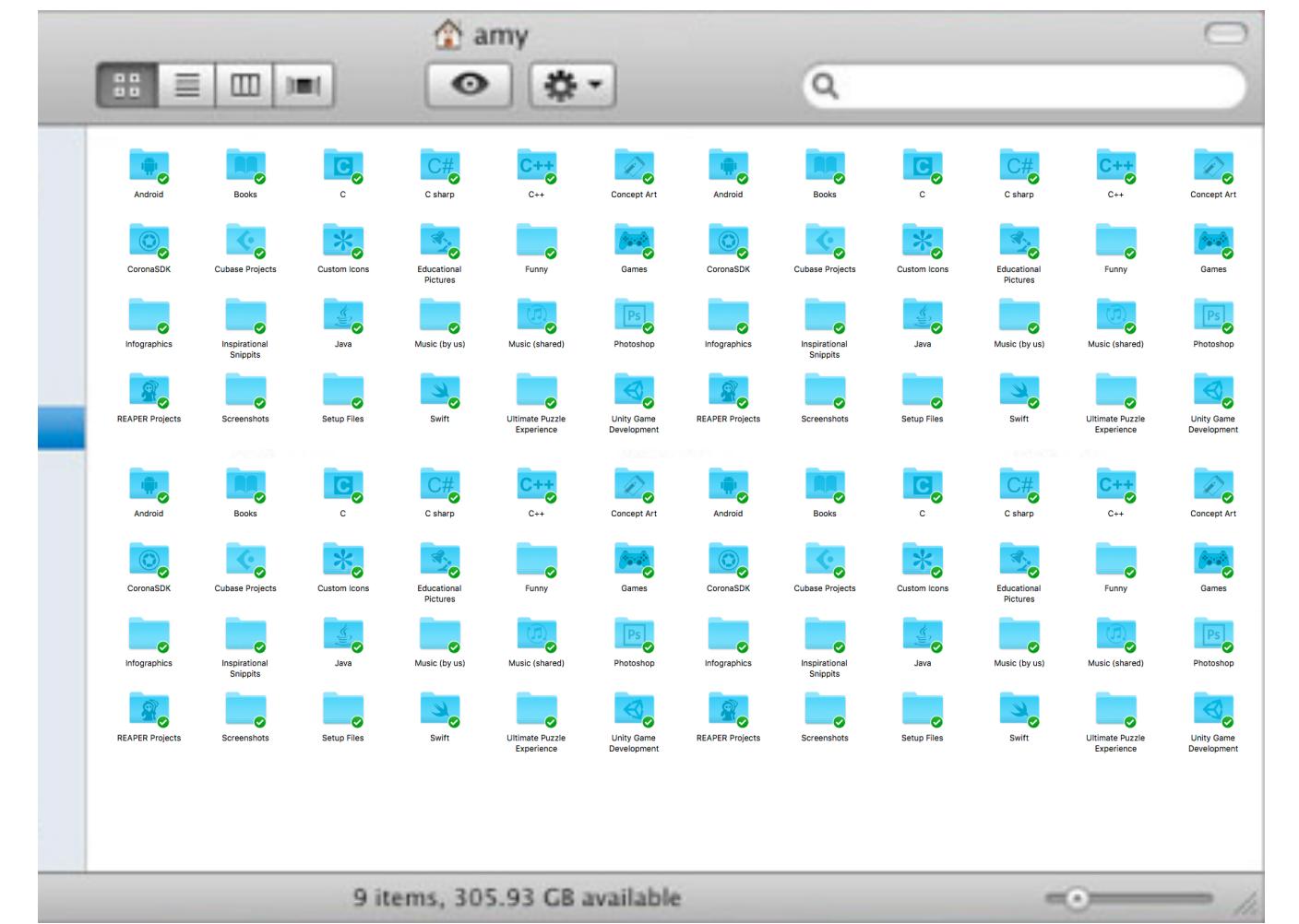
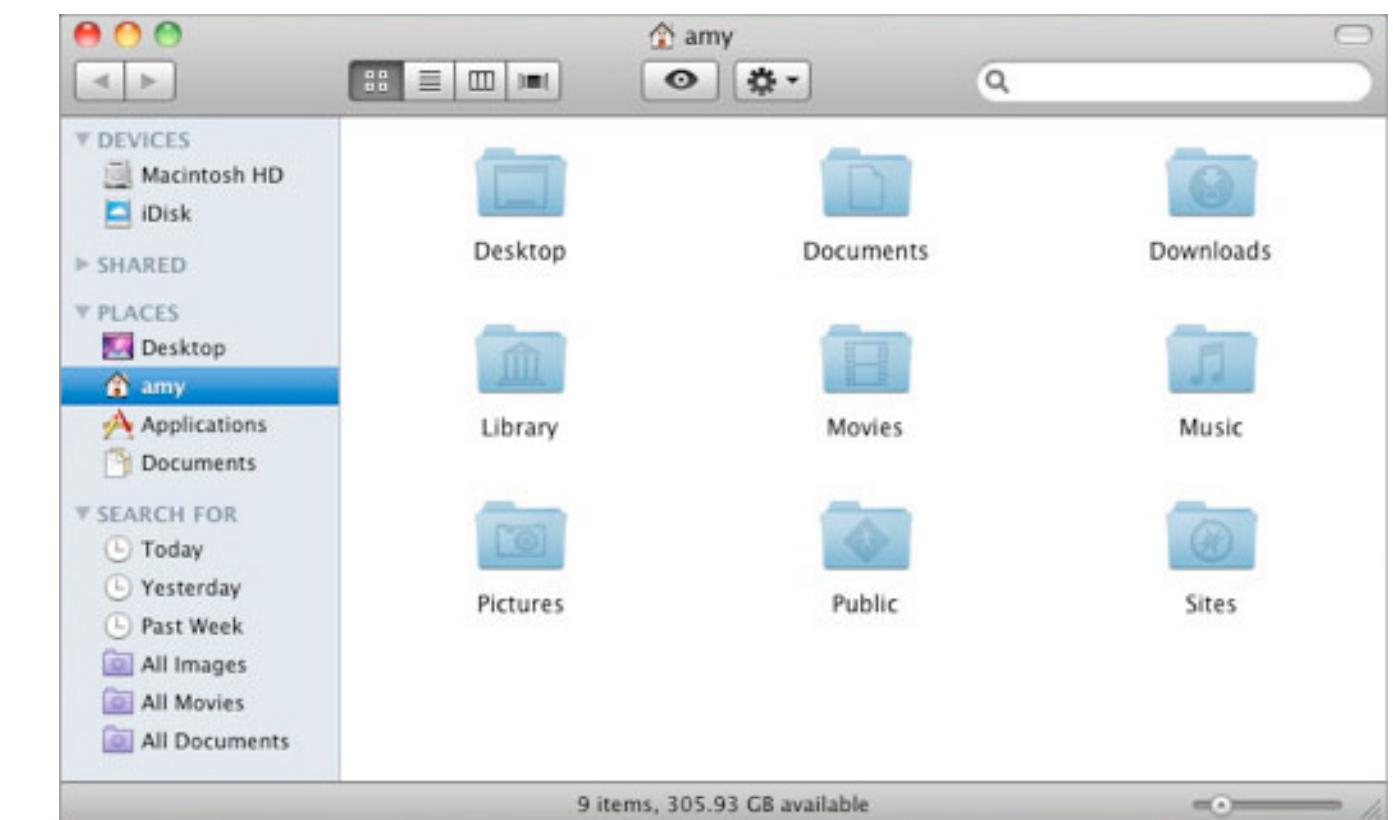




- Limitation:
 - metaphors don't scale very well. A metaphor that works well for a simple process in a simple program will often fail to work well as that process grows in size or complexity.
 - Sometimes it is misleading. If the user doesn't have the same cultural background as the designer, it is easy for metaphors to fail.

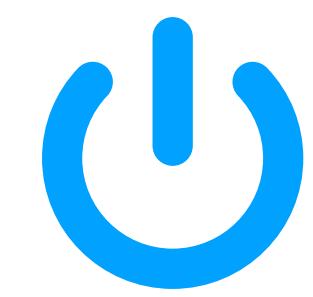


“check flight arrival information”
OR
“make airline reservations?”



File icons become too clumsy to use effectively.

- Cultural Association
- Example : red = danger, green = good to go
- But these differences in different places:
 - Light switches :
 - America: down is off , Britain: down is on
 - White Colour:
 - China: funeral, America: Wedding
 - Colour intications in stock merket:
 - China: up (red),green (down), America: up(green), green (up)

 **Thank you**