



Universidade de Aveiro  
Departamento de Electrónica,  
Telecomunicações e Informática

# Other Interaction Styles



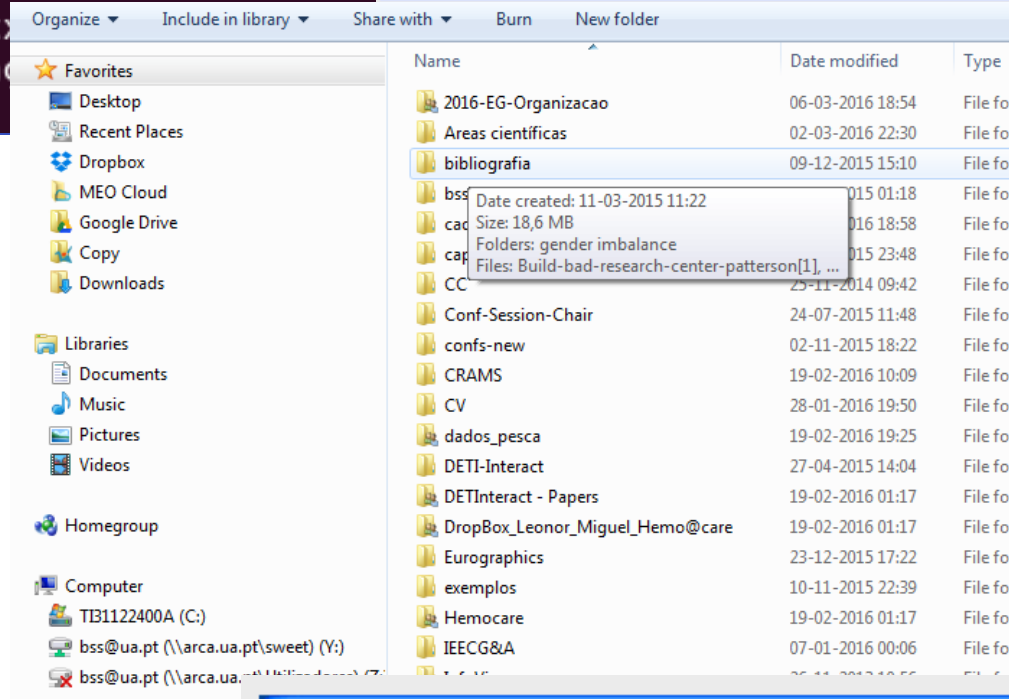
# Interaction/ Dialog styles

```
emails_32YSM~
instruções_mex_c_matlab~
java-how-to.txt
java-how-to.txt~
matlab-install.t
Notas_implementa
notas_ros.txt~
```

Name:   
Address:   
City:  State:  Zip:

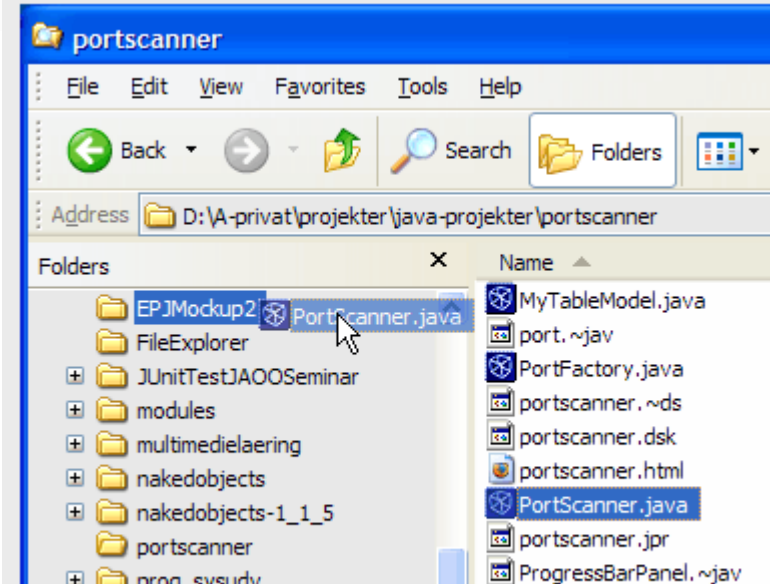
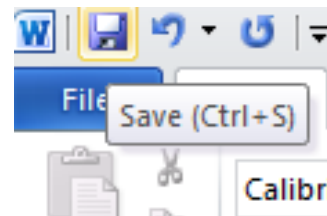
## A possible classification:

- Menus ✓
- Direct manipulation ✓
- Fill-in-forms ←
- Function keys
- Question and answer
- Command languages
- Natural languages
- ...



Often two or more styles are used  
simultaneously;

Why?



# Fill in forms

Endereço  http://www.ameda.com/cgi-win/cgw.cgi?ADD

## BUSINESS ADDRESS (Required)

denotes a required field in this business address block.

First Name

Last Name

Title

Company

Street Address

Department/Mail

Stop

City

State/Province

Zip/Postal Code

USA/U.S. Military: Enter Zip +4 code without the h  
CANADA: Enter postal code per usual (e.g. A1B 2C)

E-mail Address

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receive correspondence from other PennWell publ  
please check here.

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IDA

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Destino [Estações](#)

Data

pelas  Horas

Tipo de Serviço

- Todos
- Alfa Pendular
- Intercidades
- InterRegional
- Regional
- Urbano

VOLTA

Data

pelas  Horas

- Fill in forms are particularly useful for routine, clerical work or for tasks that require much data entry
- The concept already existed long ago
- Currently they are often used with other styles



```
PINE 3.96 ADDRESS BOOK (Edit)
Nickname : NBA
Fullname  : Players in the NBA
Fee       :
Comment   :
Addresses : mjordan@nba.com,
           kmalone@nba.com,
           drobinson@aol.com
^G Get Help  ^X eXit/Save  ^R RichView  ^V PrvPg/Top
^C Cancel    ^U NxtPg/End
```

# Main advantages and disadvantages

## Advantages (potential)

- Self-explanatory
- Recognition instead of recall
- Allow many different inputs (unlike menus)
- Give context and guide the user
- New functionality is visible (unlike command languages)

## Disadvantages

- Imply knowledge of valid inputs
- Error prone
- Not very flexible

## **Fill in form design:** relevant aspects in design

- Organization and layout
- Titles and fields
- Input formats
- Instructions and help
- Navigation
- Error handling

# Fill in form design: guidelines

**Which is preferable?**

**Example:**

Zip code:

Name:

Country:

Address:

City:

**Better:**

Name:

Address:

Zip code:

City:

Country:

**Avoid unfamiliar layouts!**


Provide a menu when possible inputs are known  
(combining two interaction styles...)

### Timetables and Prices

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	1	2	3	4	5

- Lisboa - Cais do Sodre
- Lisboa - Entrecampos
- Lisboa - Oriente
- Lisboa - Rossio
- Lisboa - Santa Apolonia
- Lisboa - Sete Rios

Cartão

Mastercard 

Número do cartão

Data de validade

MM / AA

Titular do cartão

Titular do cartão

Cód. de segurança

Cód. de segurança

#### Payment options

Payment options\*:

Billing currency\*:

Card number\*:


Card type\*:

Card expiration date\*:

CVV2/CVC2 code\*:

Card holder name\*:

- Visa/MasterCard/Eurocard
- PayPal
- American Express
- Bank/Wire transfer
- Discover/Novus
- Diners Club
- JCB
- Fax



Provide a format for fields that may be ambiguous



# Show which fields are mandatoty

**Mbit.pt > Registo de Clientes**

Username\*

Password\*

Password\*

Nome\*

Email\*

N.º de Contribuinte\*

Morada\*

Código Postal\*  -

Telefone\*

Fax

Telemóvel

Data de Nascimento\* 1  Jan  1995

● ● ● voltar

**Área Cliente**

Nome do utilizador:

Password:

[Registrar](#)

[Recuperar Password](#)

**Informação**

13 Anos de Experiência, 14 Lojas para o servir!

Loja 1 - Porto Torrinha

**Pesquisa**

**Top Vendas**

**Árvore de Navegação:**

- Audio/Multimédia
  - Apontadores Multimédia
  - Auscultadores/Microfones
  - Colunas de som
  - Emissores FM
  - Leitores de Mp3
  - Placas de Som
  - WebCams
- Caixas ATX/Fontes
  - Barebones
  - Caixas ATX
  - Fontes
- Câmaras Digitais
  - Acessórios
  - Câmaras
  - Cartões de Memória
- Captura de TV/Video
  - Placas de Edição de Video
  - Placas de TV
- CD/DVD
  - Bolsas
  - Caixas
  - Cd/R/RW
  - DVD/R/RW
- Computadores
  - Acer
  - Configurações Mbit
- Consumíveis
  - Epson
  - HP
  - Tinteiros
  - Reciclados/Compatíveis
- Descontinuados/Ocasão
  - Descontinuados/Ocasão
- Discos
  - Rígidos/Controladoras/Caixas para Disco
  - Acessórios p/ Disco
  - Caixas para Disco
  - Controladoras
  - Discos externos
  - Discos IDE
  - Discos p/ Portáteis
  - Discos SCSI

Usually indicated by \*

## Input format must be familiar and clear

Date: \_\_\_\_\_  
(eg. 1/12/2000)

Better:

Date: \_\_\_/\_\_\_/\_\_\_\_\_  
(e.g. 1/ 12 /2022)

Date: \_\_\_\_\_  
(e.g. 01122000)

Time: \_\_\_\_\_  
(eg. 8-15 )

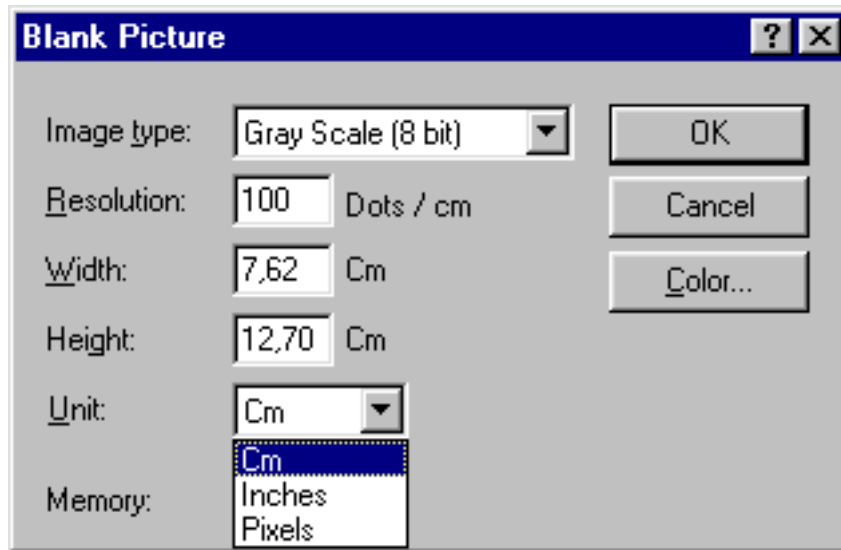
Time: \_\_\_ - \_\_\_\_\_  
(e.g. 08-15)

Time: \_\_\_\_\_  
(e.g. 0815)

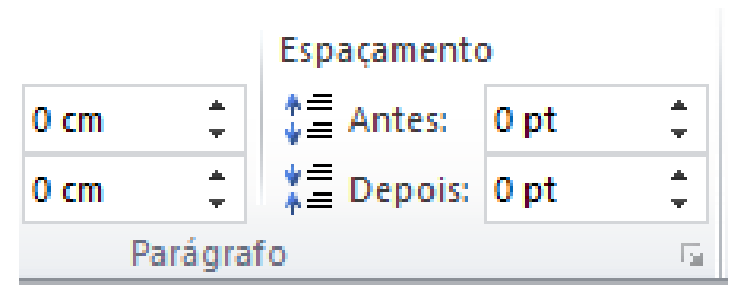
Card#: \_\_\_\_\_  
(e.g. 123456789012 )

Card#: \_\_\_ - \_\_\_ - \_\_\_\_\_  
(1234-5678-9012)

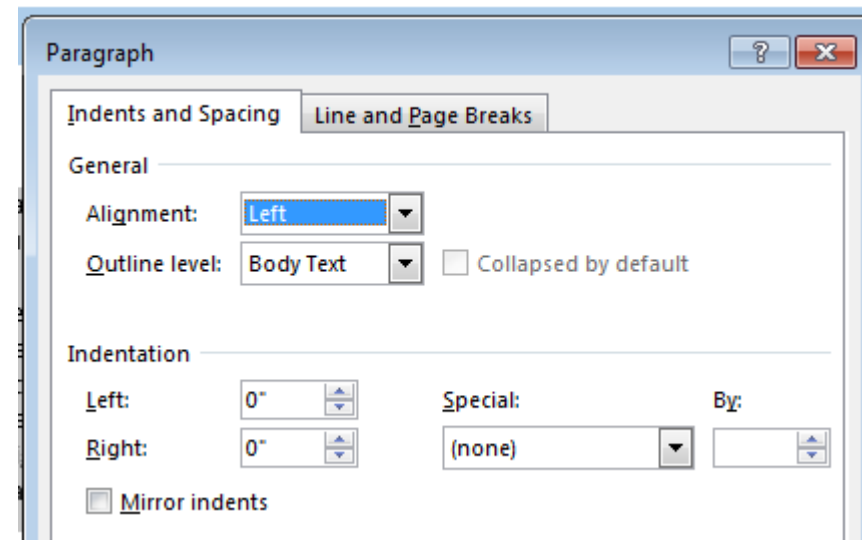
It should be possible for the user to choose the type of input (it prevents errors) or adapt to the context



Portuguese version (cm):



English version (inches):



Instructions to fill the fields should be clear as well as messages

**Messages**

Headers:  Show brief headers on incoming messages (recommended)  
 Show all headers on incoming messages

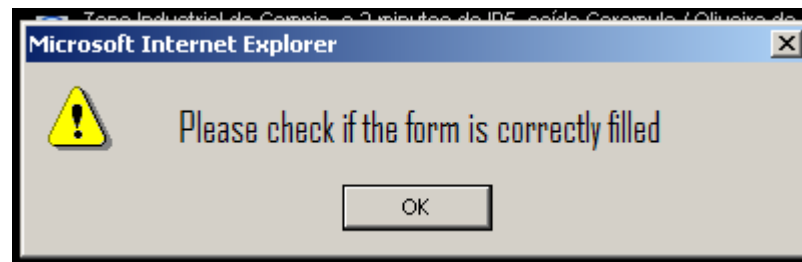
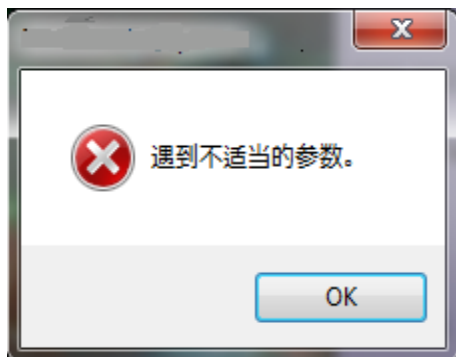
Font Size:  (plain text only)

Screen Width:  characters (range: 50 - 99 chars.)  
(viewing plain text mail) This is the maximum line length of your incoming messages.  
The default value is 72.

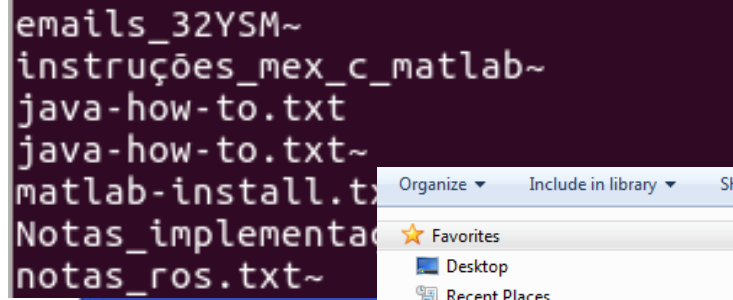
Screen Width:  characters (range: 50 - 99 chars.)  
(composing plain text mail) This is the maximum line length of your outgoing messages. The default value is 55.

Security:  Block HTML graphics in email messages from being downloaded [[what's This?](#)]  
 Warn me about sending information outside Yahoo!

These messages are not much helpful...

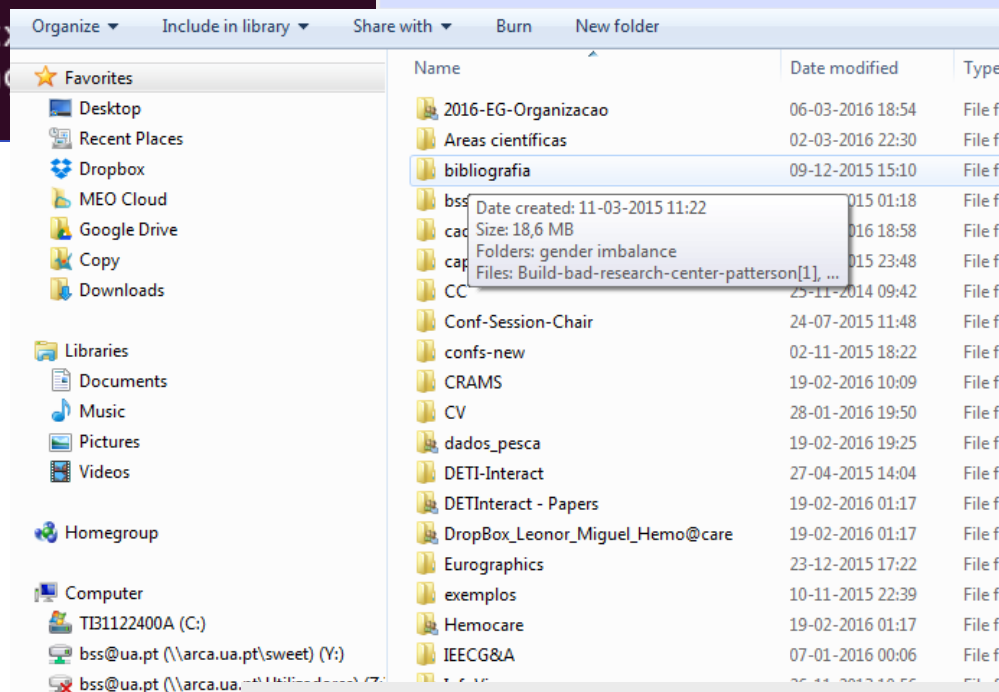


# Interaction/ Dialog styles

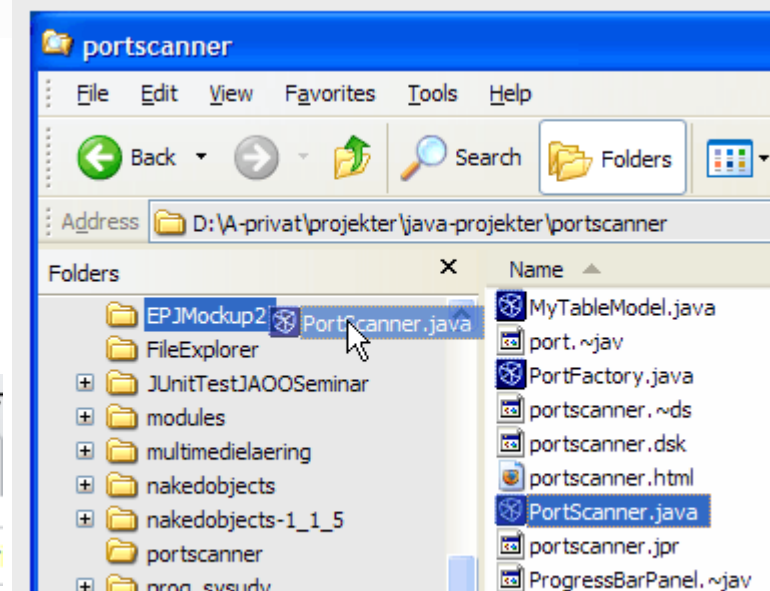
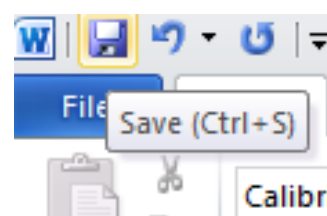
A light blue form with several input fields. The fields are labeled 'Name:', 'Address:', 'City:', 'State:', and 'Zip:'. The 'State' field has a dropdown arrow.

## A possible classification:

- Menus
- Direct manipulation
- Fill-in-forms
- Function keys ←
- Question and answer
- Command languages
- Natural languages



Often two or more styles are used simultaneously



# Function keys

- Two types:
  - *Hard Keys* – Always invoke the same functionality (as the keys of a calculator and some specific keys of PCs)
  - *Soft Keys* – invoke different functionality according the context of use (as the keys (F1...Fn) and the generic keys of an Automated Telling Machine, e.g. Multibanco)
- PCs have 12 generic Keys (F1 a F12) and a few other specific keys



Keys that invoke specific functionality in PCs and MACs



# Soft Keys

Soft function keys don't have abbreviations of default actions printed on/besides them, they may have "F-number" designations.



Function keys (generic)



[https://en.wikipedia.org/wiki/Function\\_key](https://en.wikipedia.org/wiki/Function_key)

# Main advantages and disadvantages

## Advantages (potential)

- Self-explanatory
- Recognition instead of recall
- Easy to use
- Flexible
- Require little or no screen real estate

## Disadvantages

- Limited number of keys
- Hardware expansions are expensive



# Function keys design: guidelines

Provide enough keys to call the functionality

But no too many as not to make it difficult to learn

Use:

- free space
- different size, color and shape to different groups
- category groups
- clear and distinctive names



Multi-media remote control keyboard



Industrial keyboard

ATM keyboard



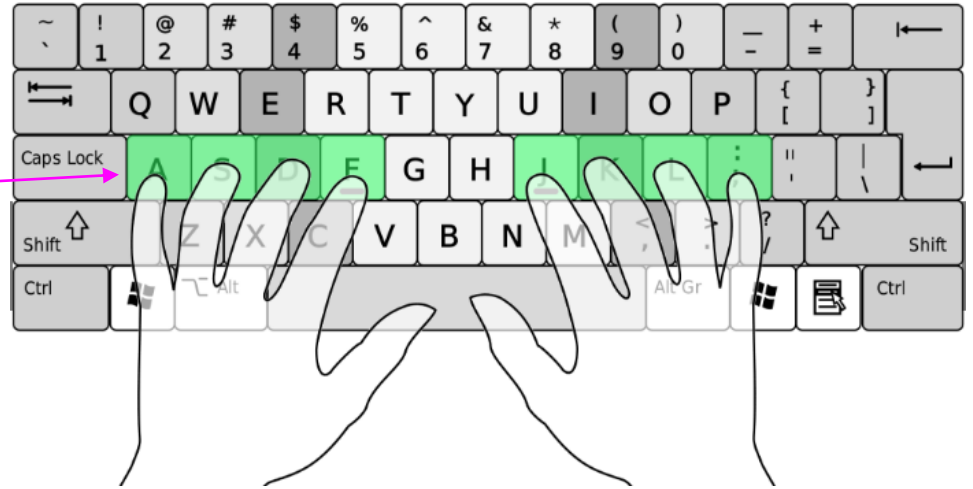
Shop system keyboard



TV remote control



Frequently used keys should be near the “home row”



Keys with serious consequences should not be easy to activate

(e.g. ctrl Alt Del)



# Interaction/ Dialog styles

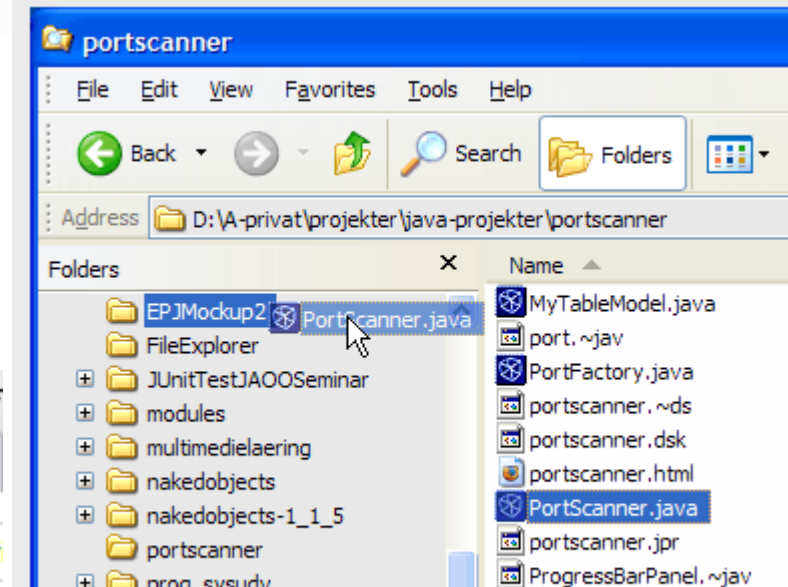
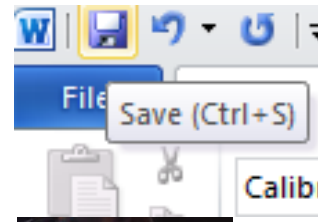
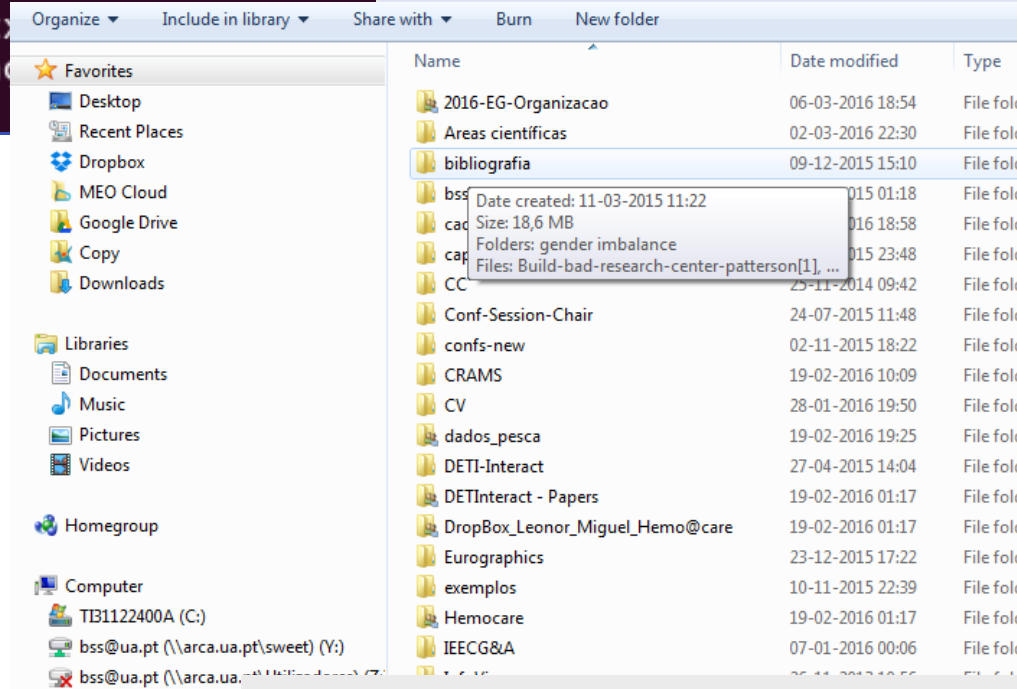
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instruções_mex_c_matlab~
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java-how-to.txt~
matlab-install.t
Notas_implementa
notas_ros.txt~
```

Name:   
Address:   
City:  State:  Zip:

## A possible classification:

- Menus
- Direct manipulation
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- Question and answer
- Command languages ←
- Natural languages

...  
Often two or more styles are used  
simultaneously



# Command languages

```
cd /tmp
echo "line 1
line 2
line 4" > tmp1$$
echo "line 2
line 3" > tmp2$$
diff tmp1$$ tmp2$$
rm tmp1$$ tmp2$$
```

```
guru99@VirtualBox:~$ history
 1  cat > sample
 2  cat sample
 3  cat sample ^a
 4  cat sample a
 5  cat sample | grep a
 6  cat sample | grep ^a
 7  useradd home
 8  useradd mycomputer
 9  sudo useradd mycomputer
10  sudo adduser MyLinux
11  sudo adduser mylinux
12  vi scriptsample.sh
```

Command languages shall also be **designed as to be as usable as possible**

# Basic Goals of Language Design

- Precision
- Compactness
- Ease in writing and reading
- Speed in learning
- Simplicity to reduce errors
- Ease of retention over time

## Usability Questions concerning a command language

- Does the language support necessary functions?
- Is it fast to enter a command?
- Is it easy to recognize what the command might do?
- Is it easy to recall a command?
- Are there few errors when using the language?

# Main advantages and disadvantages

## Advantages (potential)

- Powerful
- Flexible
- Efficient
- Do not take much screen real estate

## Disadvantages

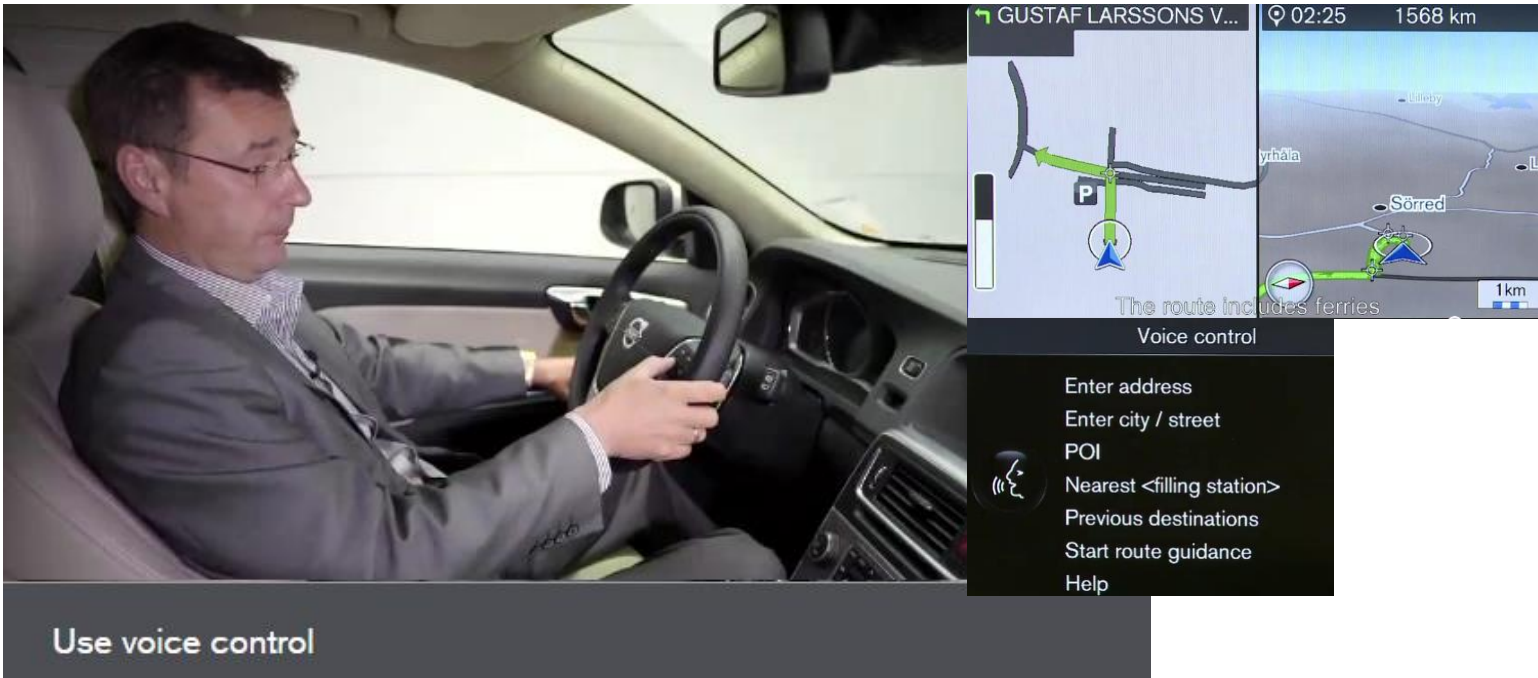
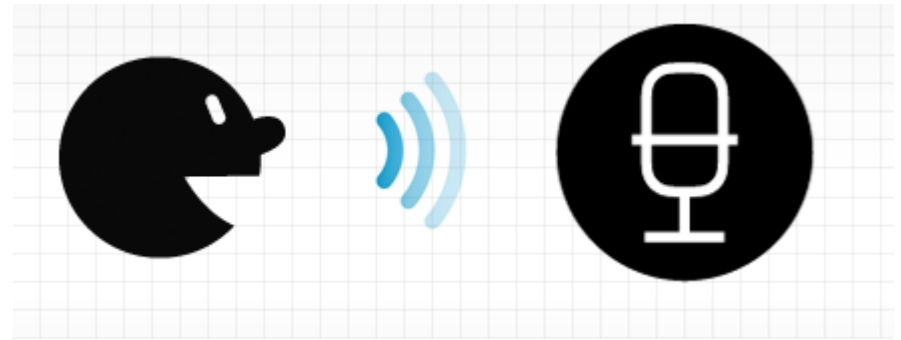
- Difficult to learn
- Not self-explainable
- Error prone
- Improvements are not visible

Note that:

Command languages may be used not only through text but also via voice  
But they must be very simple ...

e.g.

While driving a car to control the media, the phone or navigate



**Interaction style: command language;**  
**interaction devices: speech recognition/synthesis**



# Relevant issues in Command Language design

- Semantics
- Syntax
- Lexicon
- Interaction

# Command Languages Design guidelines

Balance richness and minimalism  
(similar to semantic distance in direct manipulation)

Examples :

## **Rich**

Delete

Insert

Replace

## **Minimal**

Delete

Insert

---

Copy

Move

Rename

Delete

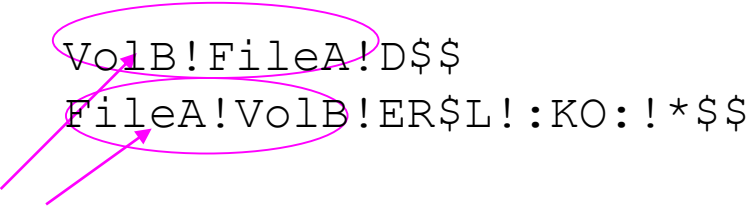
Copy

Delete

(the functionality is the same)

Use a coherent syntaxe

Use a natural and easy to remember action-object grammar



```
VolB!FileA!D$$  
FileA!VolB!ER$L!:KO:!*$$
```

Uncoherent syntax and unfamiliar commands

```
search filea volb.  
open filea volb.  
list all lines with "KO".
```

or

```
s filea volb.  
o filea volb.  
lal "KO".
```

Command abbreviations should be simple and coherent  
Easy to remember (not easy to recognize as for function keys)

---

Name	Abbreviations	
	Poor:	Improved:
Move forward	MovF	MovF
Move backward	Mvb	MovB
Insert	I	Ins
Delete	DI	Del
Replace	Repl	Rep
Search	Srch	Sea
Delete	X	Del
Send	Sn	Sen
Print	Prt	Pri
Search	Srch	Sea
Send	Sn	Sen
Find	Fi	Fin
Choose	Ch	Cho

Allow the following interaction features:

- Defaults
- Command edition
- Intelligent interpretation
- Type-ahead
- Feedback
- Help and documentation
- Make the language “user tailorable”

Example of intelligent interpretation:

“delate”: did you mean “delete”? Y or N

# Example of a (complex) command with defaults

## ls - Linux man page

---

You don't need to use all arguments;  
there are default values

### Name

ls - list directory contents

### Synopsis

ls [OPTION]... [FILE]...

### Description

List information about the FILES (the current directory by default). Sort entries alphabetically if none of **-cftuvSUX** nor **--sort**.

Mandatory arguments to long options are mandatory for short options too.

- a, --all**  
do not ignore entries starting with `.`
- A, --almost-all**  
do not list implied `.` and `..`
- author**  
with **-l**, print the author of each file
- b, --escape**  
print octal escapes for nongraphic characters

- d, --directory**  
list directory entries instead of contents, and do not dereference symlinks
- D, --dired**  
generate output designed for Emacs' dired mode
- f**  
do not sort, enable **-aU**, disable **-ls --color**
- F, --classify**  
append indicator (one of `*/=>@|`) to entries
- file-type**  
likewise, except do not append `/*`
- format=WORD**  
across **-x**, commas **-m**, horizontal **-x**, long **-l**, single-column **-1**, verbose
- full-time**  
like **-l --time-style=full-iso**
- g**  
like **-l**, but do not list owner
- group-directories-first**  
group directories before files.  
augment with a **--sort** option, but any use of **--sort=none** (**-U**) disables grouping
- G, --no-group**  
in a long listing, don't print group names
- h, --human-readable**  
with **-l**, print sizes in human readable format (e.g., 1K 234M 2G)
- si**  
likewise, but use powers of 1000 not 1024
- H, --dereference-command-line**  
follow symbolic links listed on the command line

Etc., etc., etc.

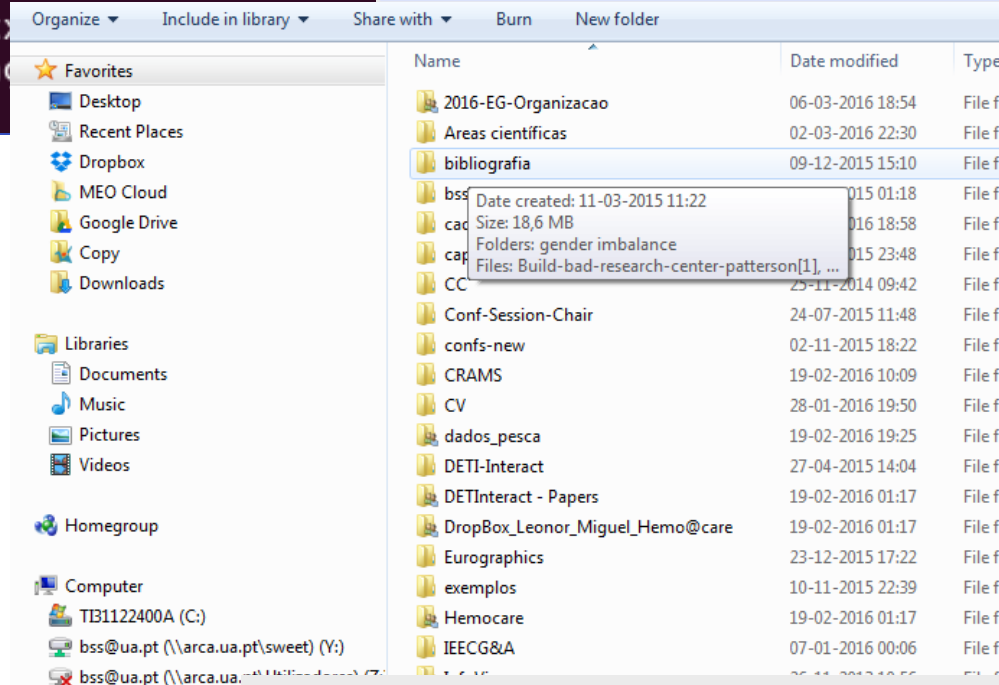
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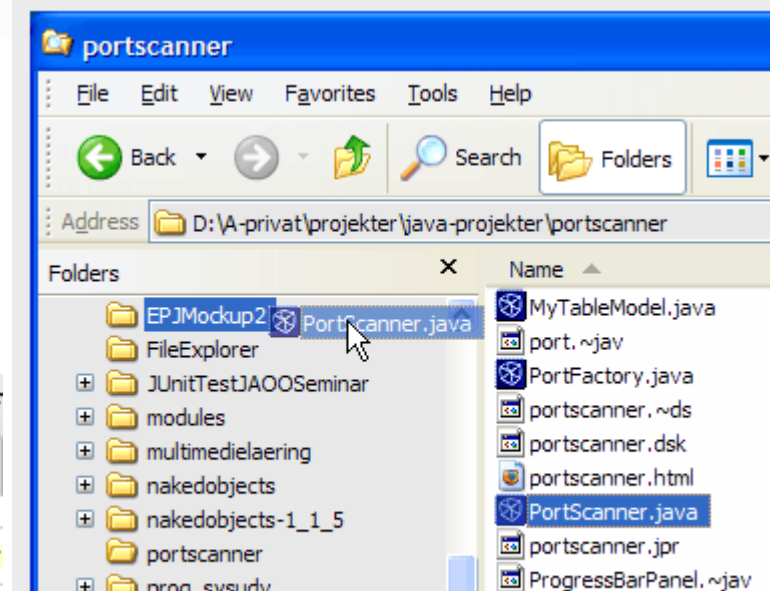
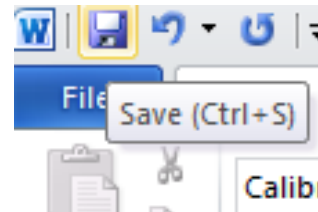
Name:   
Address:   
City:  State:  Zip:

## A possible classification:

- Menus
- Direct manipulation
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- Command languages
- Natural languages ←



Often two or more styles are used simultaneously



# Natural language

- Communication between humans and computers through natural language involves:
  - recognition
  - generation
- Natural language processing (NLP) has been evolving a lot ...

## **Note:**

**natural language as a interaction style and voice interaction are different things!**



# Conversational User interfaces (CUIs)

Based on natural language

Think of the potential advantages and disadvantages of CUIs:

- Chatbots

<https://www.nngroup.com/articles/chatbots/>

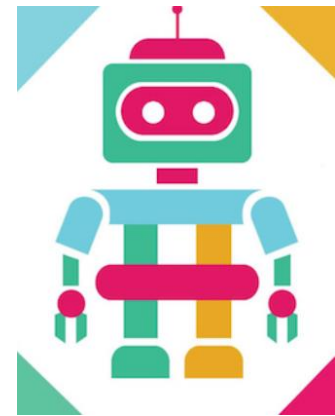
- Voice assistants

“Just like the touch interface, not everything will become conversational”

What doesn't fit the principles of Conversational UI well?

Products where the use case involves a technical user who wants fine grain control over the interface, .... e.g. CAD software, or a programming IDE....”

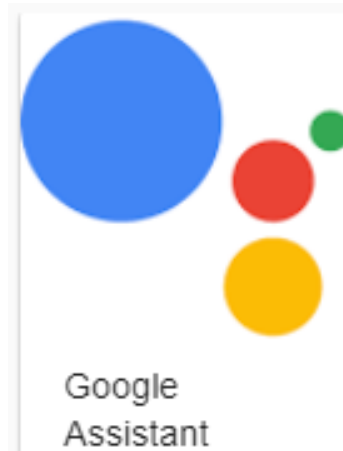
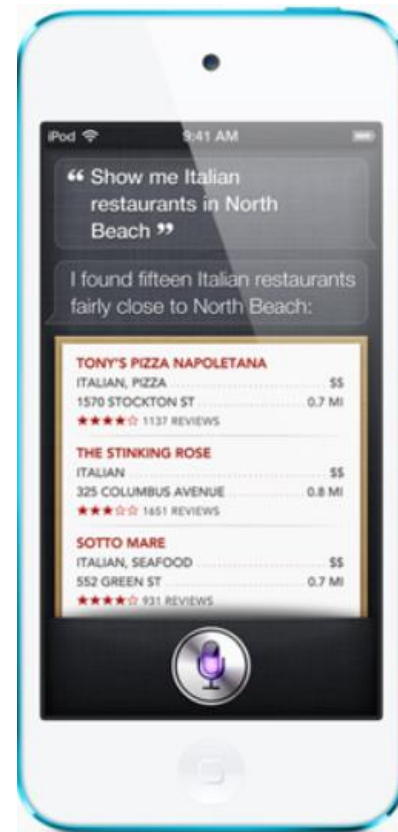
<https://uxdesign.cc/conversational-ui-its-not-just-chat-bots-and-voice-assistants-case-study-cb1865da306a>



# Current examples of Natural language interaction (mostly via voice)

Mobile phone personal assistants:

- Siri for Apple's iOS
- Google assistant



## Another example (natural language via voice)

Interaction style: natural language;  
interaction devices: speech recognition/synthesis

amazon echo



<https://www.nngroup.com/articles/voice-interaction-ux/>

# Main advantages and disadvantages of interaction styles

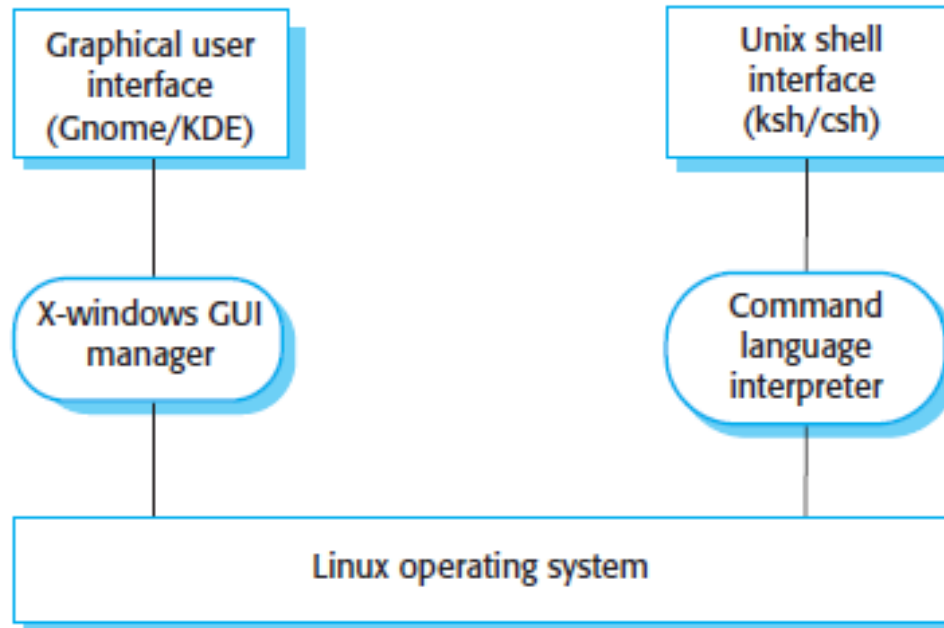
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<b>Interaction style</b>	<b>Main advantages</b>	<b>Main disadvantages</b>	<b>Application examples</b>
Direct manipulation	Fast and intuitive interaction Easy to learn	May be hard to implement Only suitable where there is a visual metaphor for tasks and objects	Video games CAD systems
Menu selection	Avoids user error Little typing required	Slow for experienced users Can become complex if many menu options	Most general-purpose systems
Form fill-in	Simple data entry Easy to learn Checkable	Takes up a lot of screen space Causes problems where user options do not match the form fields	Stock control Personal loan processing
Command language	Powerful and flexible	Hard to learn Poor error management	Operating systems Command and control systems
Natural language	Accessible to casual users Easily extended	Requires more typing Natural language understanding systems are unreliable	Information retrieval systems

---

(Sommerville, 2010, chap.29)

# Multiple user interfaces example



(Sommerville, 2010, chap.29)

# 3D User Interfaces

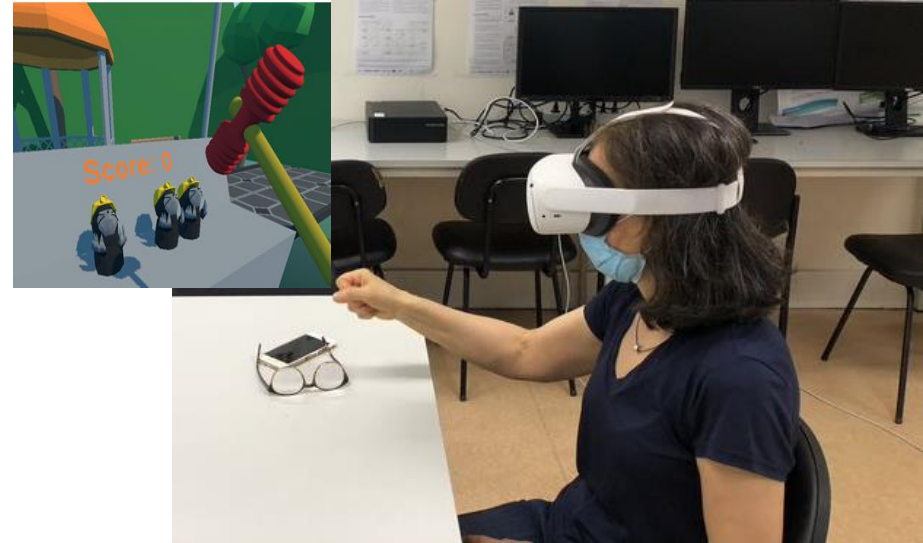
- User interfaces involving 3D interaction (i.e. interaction in which the user's tasks are performed directly in a 3D spatial context).
- Are more and more used:
  - Virtual and augmented reality
  - 3D workspaces
  - Data Visualization ...
- But have some issues:
  - User disorientation  
(in the real world we have more information)





# Applications of virtual and augmented reality:

- Training and simulation
- Assistance in tasks
- Project review
- Therapy
- Experiments
- Entertainment
- ...



# Main bibliography

- Soegaard, Mads. Interaction Styles

[http://www.interactiondesign.org/encyclopedia/interaction\\_styles.html](http://www.interactiondesign.org/encyclopedia/interaction_styles.html)

<https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/3d-user-interfaces>

- Ian Sommerville, Software Engineering, 9 ed, Addison Wesley , 2010

<https://ifs.host.cs.st->

[andrews.ac.uk/Books/SE9/WebChapters/PDF/Ch\\_29%20Interaction\\_design.pdf](https://ifs.host.cs.st-andrews.ac.uk/Books/SE9/WebChapters/PDF/Ch_29%20Interaction_design.pdf)