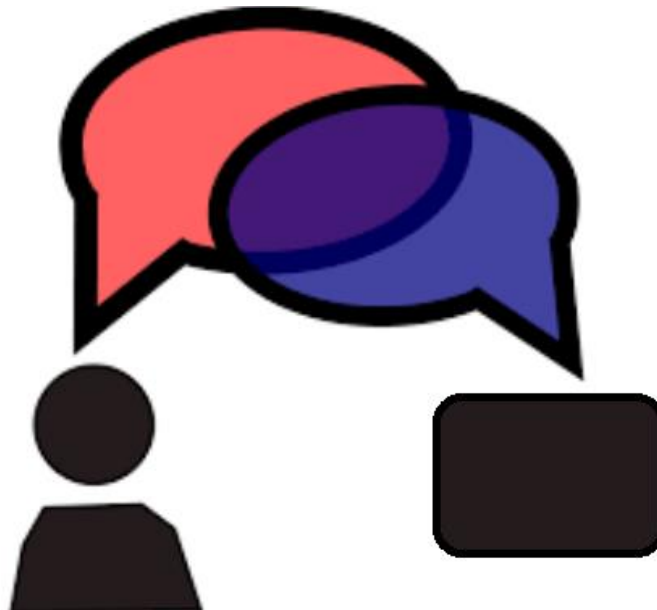




Other Interaction Styles



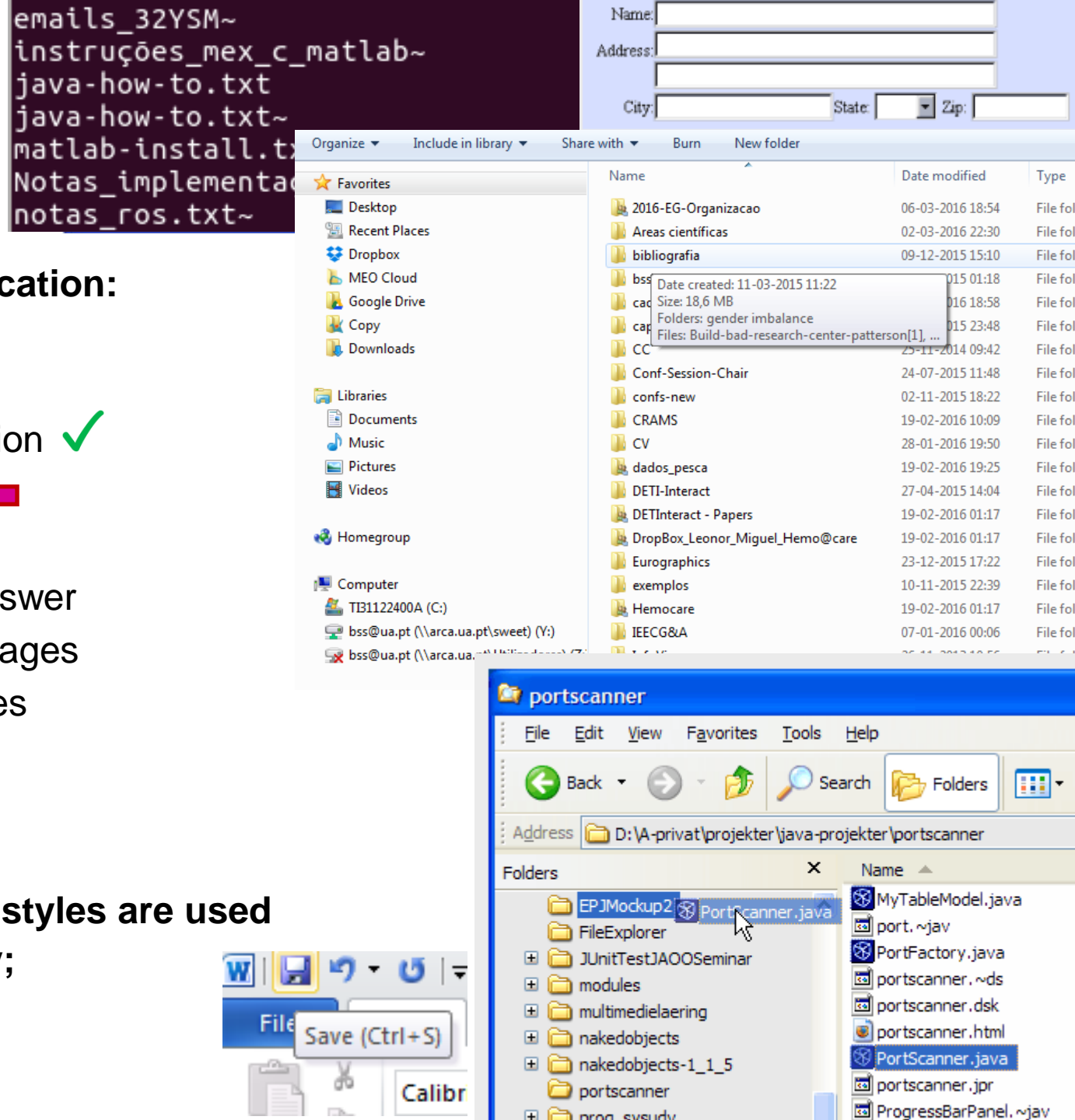
Interaction styles

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	<input type="text" value="Beatriz"/>
Last Name	<input type="text" value="Sousa Santos"/>
Title	<input type="text"/>
Company	<input type="text"/>
Street Address	<input type="text"/>
Department/Mail	<input type="text"/>
Stop	<input type="text"/>
City	<input type="text"/>
State/Province	<input type="text" value="Select State/Province"/>
Zip/Postal Code	<input type="text"/>
<small>USA/U.S. Military: Enter Zip +4 code without the h CANADA: Enter postal code per usual (e.g. A1B 2C)</small>	
E-mail Address	<input type="text" value="bss@det.ua.pt"/>
<small>You may receive renewal reminders and other con Computer Graphics World magazine via e-mail. If receive correspondence from other PennWell publ please check here. <input type="checkbox"/></small>	
<small>You may receive subscription renewal notices via to receive other business related third-party offer, please check here. <input type="checkbox"/></small>	

IDA	
Origem	<input type="text" value="Aveiro"/> Estações
Destino	<input type="text" value="Oriente"/> Estações <input type="button" value="x"/>
Data	<input type="text" value="2014-03-17"/> <input type="button" value="Calendar"/>
Partida	<input type="text" value="Partida"/> pelas <input type="text" value="Horas"/>
Tipo de Serviço	
<input checked="" type="radio"/> Todos	
<input type="radio"/> Alfa Pendular	
<input type="radio"/> Intercidades	
<input type="radio"/> InterRegional	
<input type="radio"/> Regional	
<input type="radio"/> Urbano	
VOLTA	
Data	<input type="text"/> <input type="button" value="Calendar"/>
Partida	<input type="text" value="Partida"/> pelas <input type="text" value="Horas"/>
<input type="button" value="OK"/>	

- 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

Aveiro

10|April, 2018

April 2018

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

Lis|

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*:

Visa/MasterCard/Eurocard

Visa/MasterCard/Eurocard

PayPal

American Express

Bank/Wire transfer

Discover/Novus

Diners Club

JCB

Fax

Billing currency*:

Month

Year

Card number*:

Month

Year

Card type*:

Month

Year

Card expiration date*:

Month

Year

CVV2/CVC2 code*:

Month

Year

Card holder name*:

Month

Year

Provide a format for fields that may be ambiguous

Show which fields are mandatory

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

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

Registar

● ● ● voltar

Área Cliente

Nome do utilizador:

Password:

OK

Registar

Recuperar Password

Informação

13 Anos de Experiência, 14 Lojas para o servir!

Loja 1 - Porto Torrinha

Pesquisa

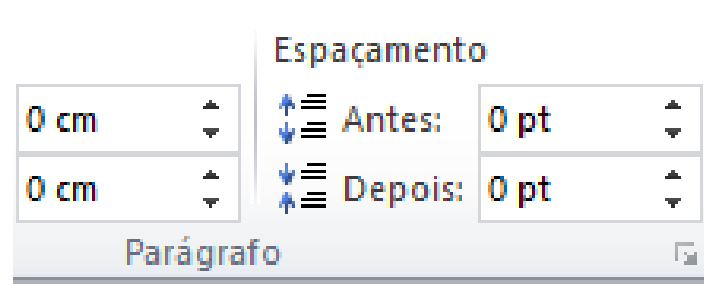
OK

Top Vendas

Usually indicated by *

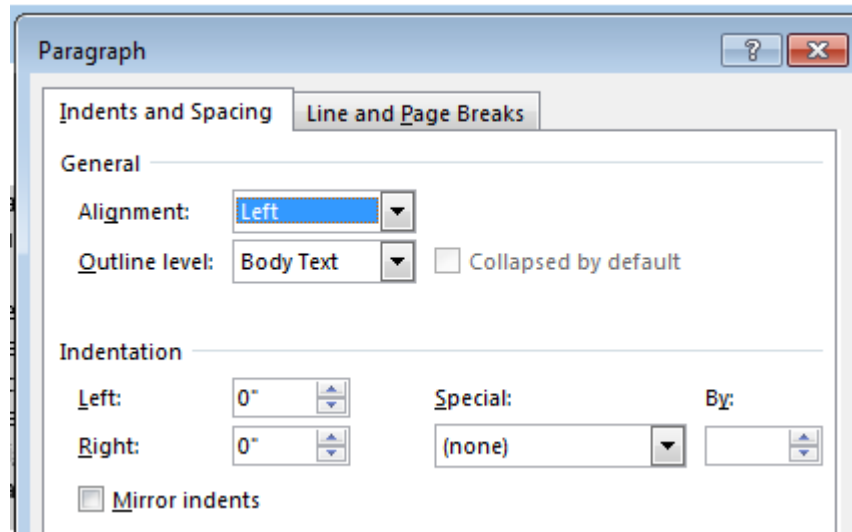
It should be possible for the user to choose the type of input (it prevents errors) or adapt to the context

Portuguese version (cm):



The image shows a dialog box titled "Parágrafo" (Paragraph) with a tab labeled "Espaçamento" (Spacing). It contains two input fields for spacing, both set to "0 cm". To the right, there are two sets of icons (arrows and lines) for "Antes" (Before) and "Depois" (After) spacing, both set to "0 pt".

English version (inches):



The image shows a dialog box titled "Paragraph" with two tabs: "Indents and Spacing" and "Line and Page Breaks". The "Indents and Spacing" tab is active. Under the "General" section, "Alignment" is set to "Left" and "Outline level" is set to "Body Text". Under the "Indentation" section, "Left" and "Right" are both set to "0\". "Special" is set to "(none)" and "By" is set to "1\". There is a checkbox for "Mirror indents" which is unchecked.

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

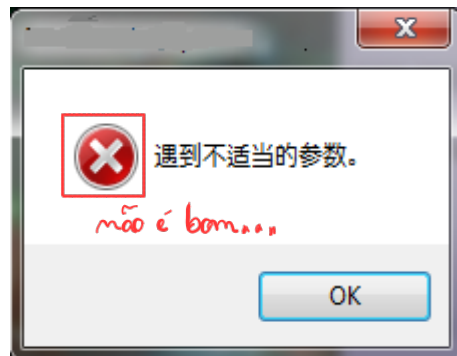
Font Size: (plain text only)

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!

This message did not help me much...

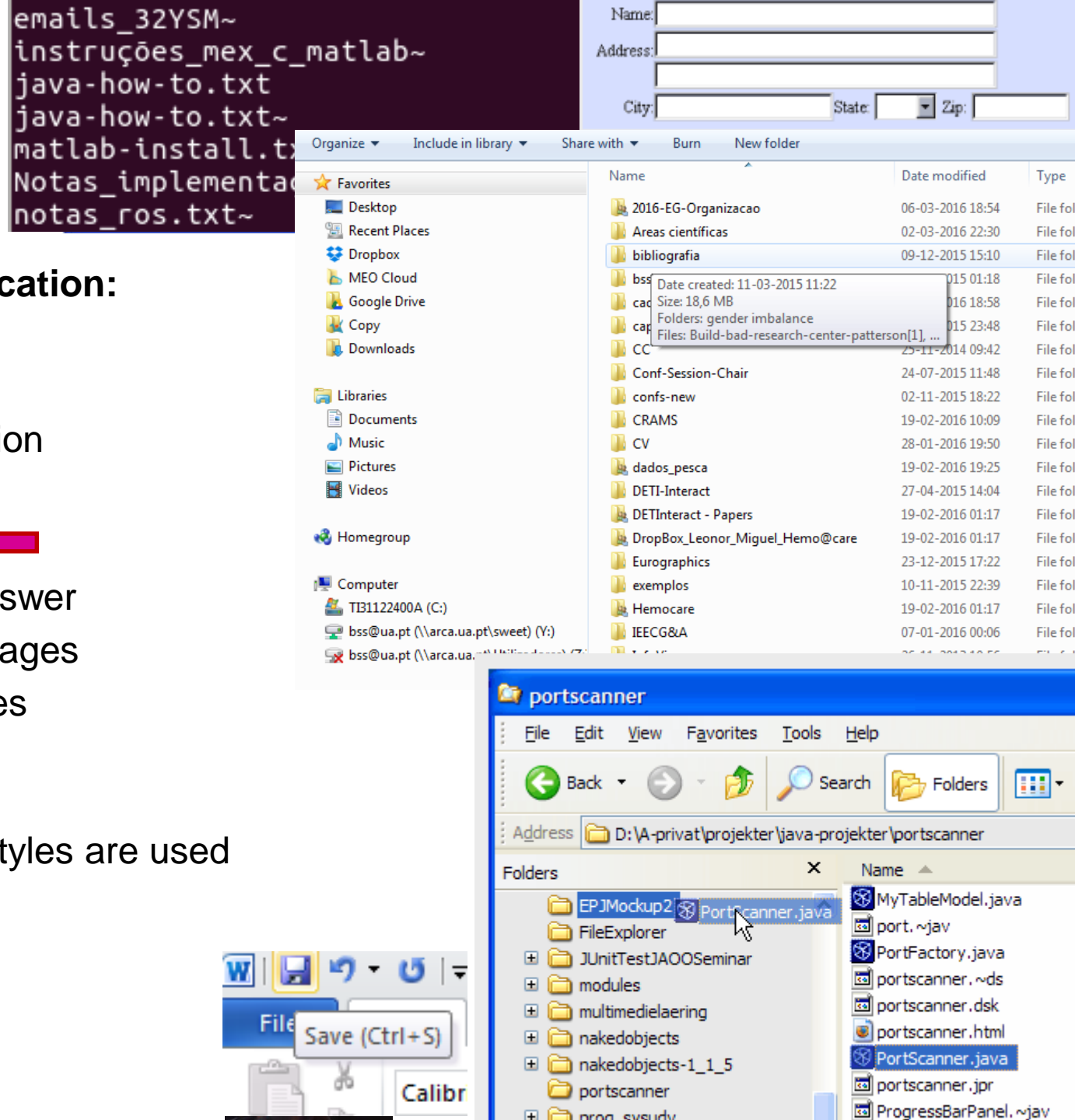


Interaction styles

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)

← uma tecla ...

- **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)

← dependem de outros ...

- 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

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

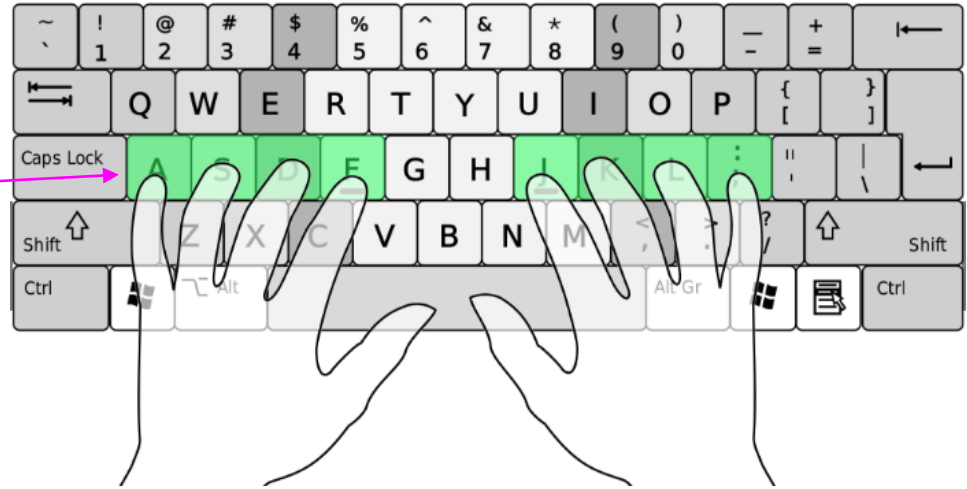


Shop system keyboard



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 styles

A possible classification:

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

...

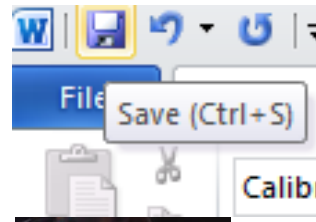
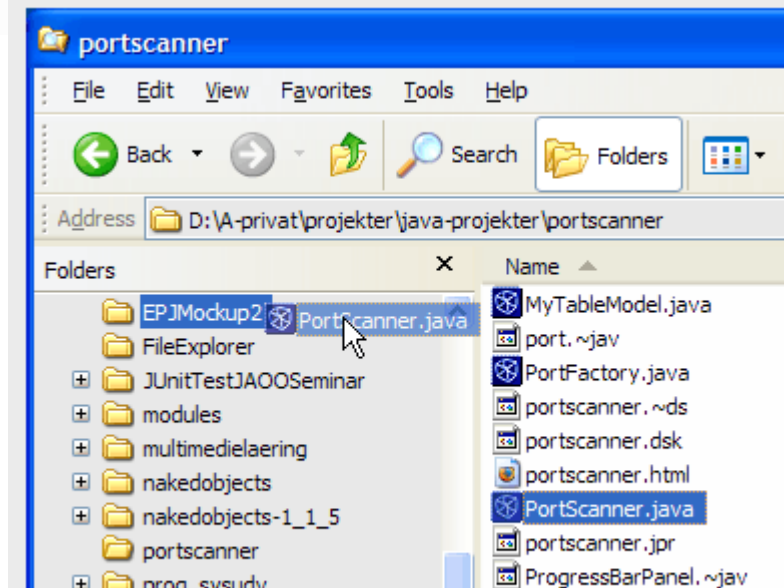
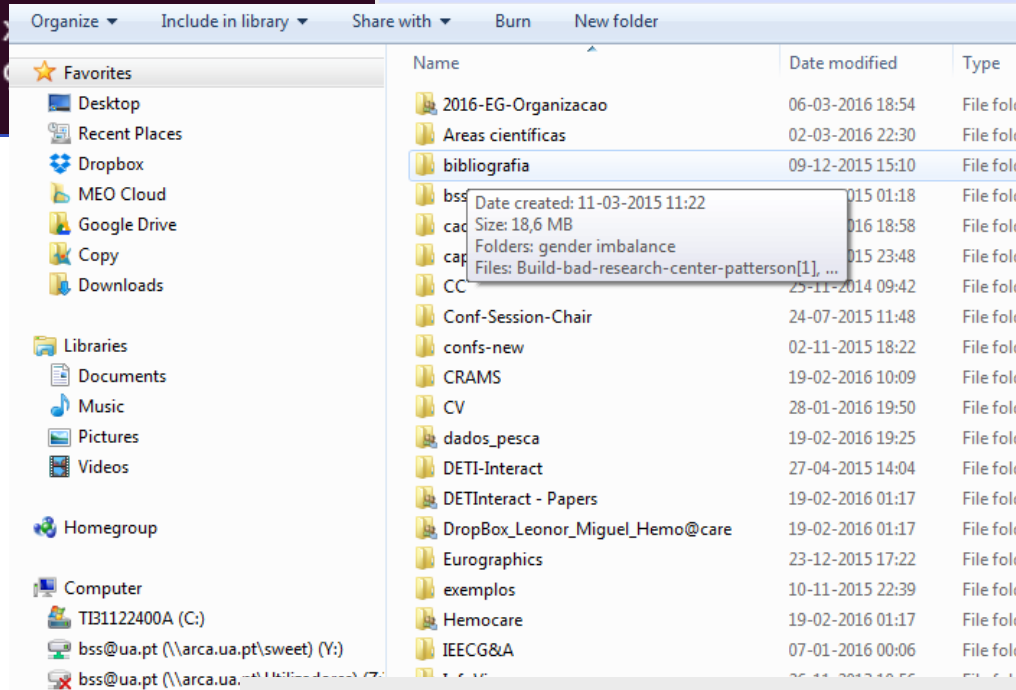
Often two or more styles are used simultaneously

```
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:



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

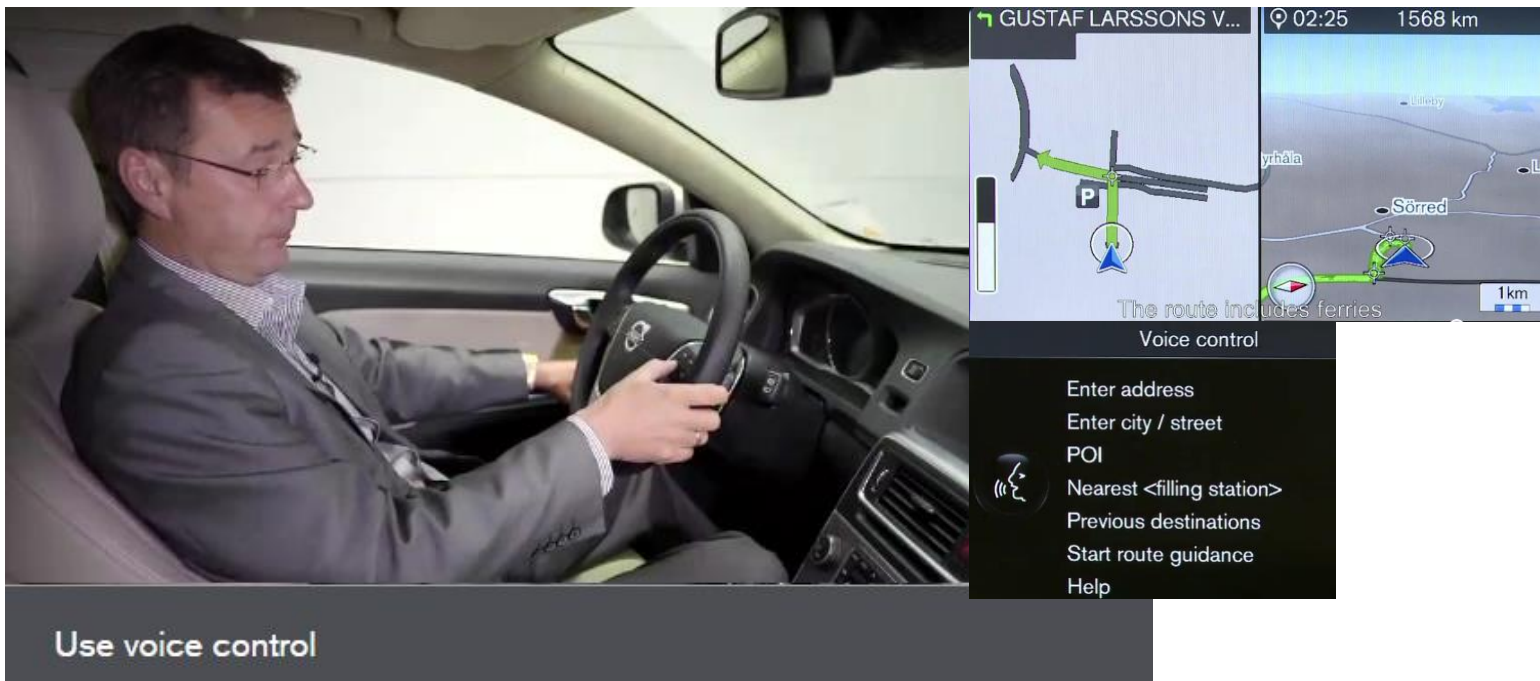
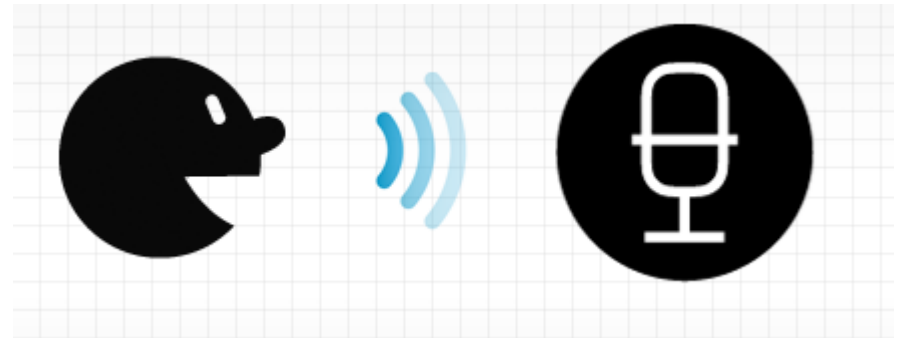
- Difficult to learn
- Not self-explainable
- Error prone
- Improvements are not visible

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**



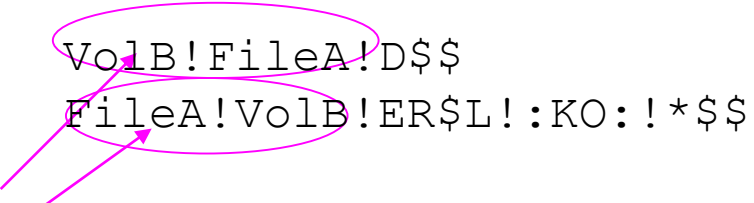
Relevant issues in Command Language design

- Semantics
- Syntax
- Lexicon
- Interaction



Use a coherent syntaxe

Use a natural and easy to remember action-object grammar



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

The diagram shows two lines of text. The first line is 'VolB!FileA!D\$\$' and the second line is 'FileA!VolB!ER\$L!:KO:!*\$\$'. Two pink ovals are drawn around the first line and the second line respectively. Two pink arrows point from the text 'Uncoherent syntax and unfamiliar commands' to the first oval and the second oval.

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

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

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

- 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

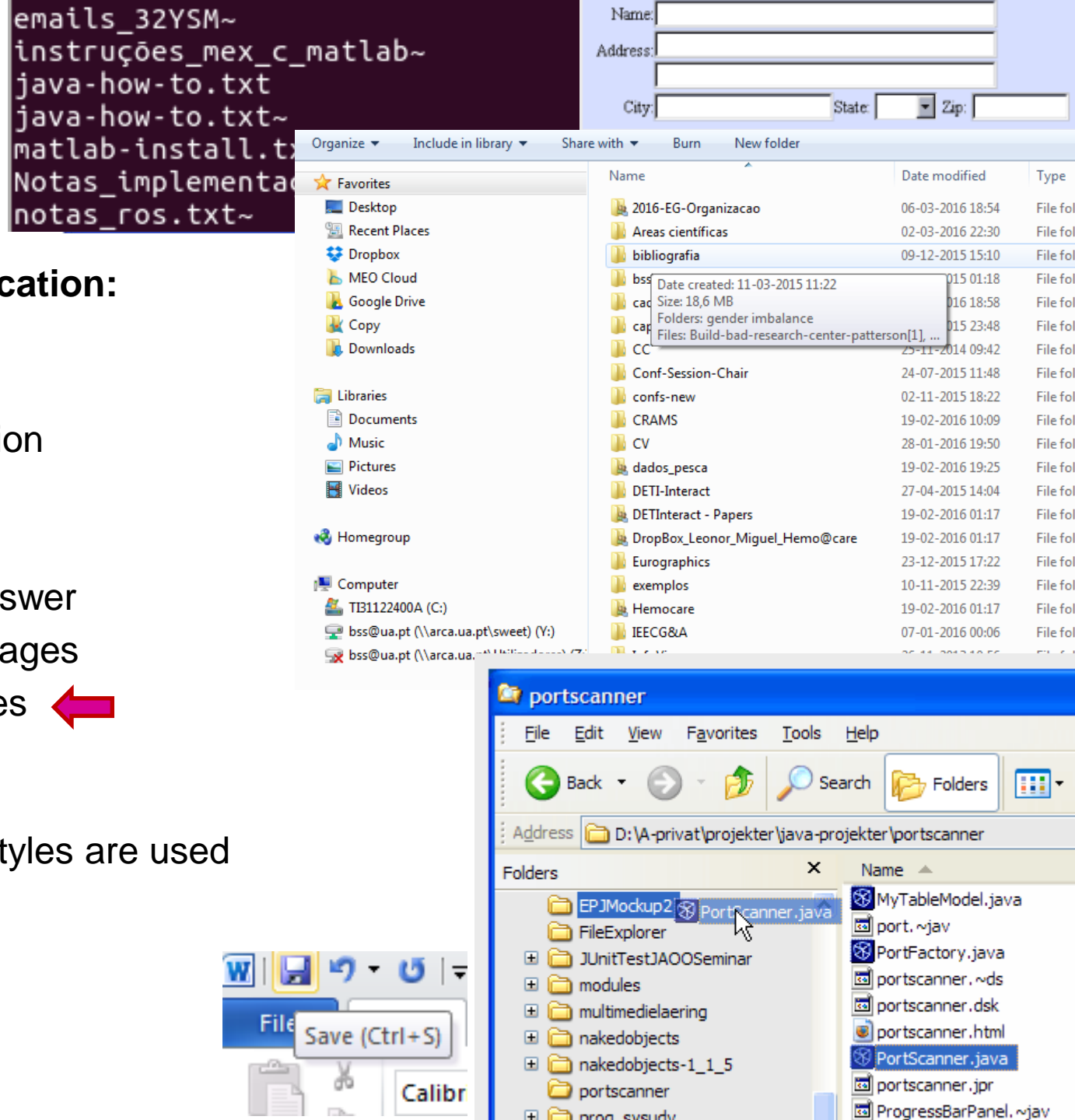
Etc..., etc., etc.

Interaction styles

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



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

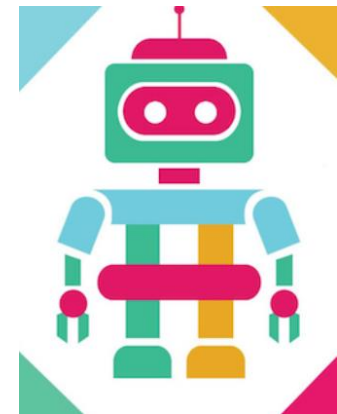
<https://www.nngroup.com/articles/chatbots/>

- Voice assistants

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

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

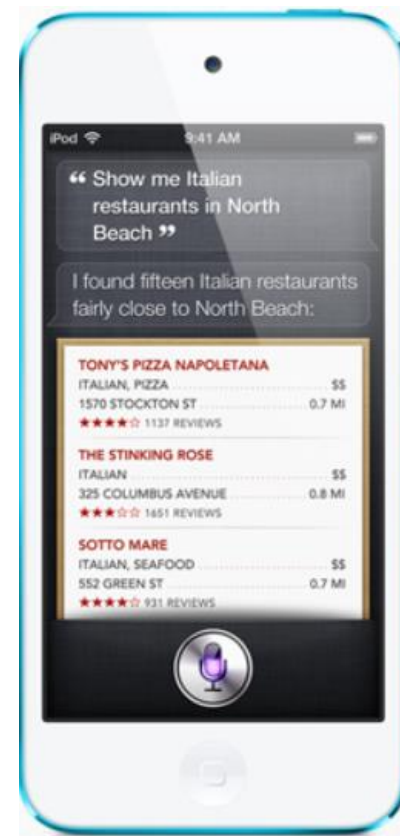
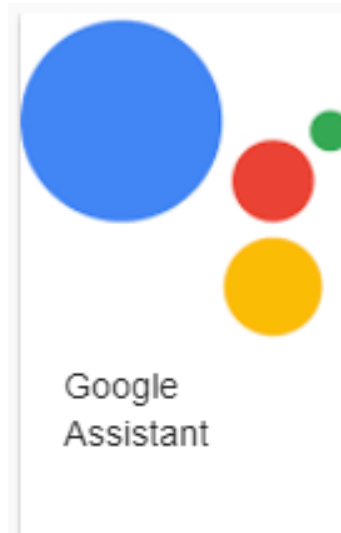
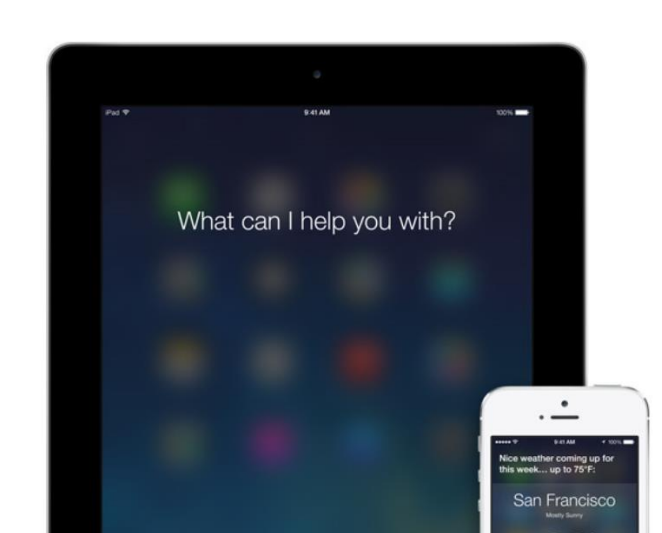
Products where the use case involves a technical user who wants fine grain control over the interface, e.g. CAD software, or a programming IDE....”



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/>

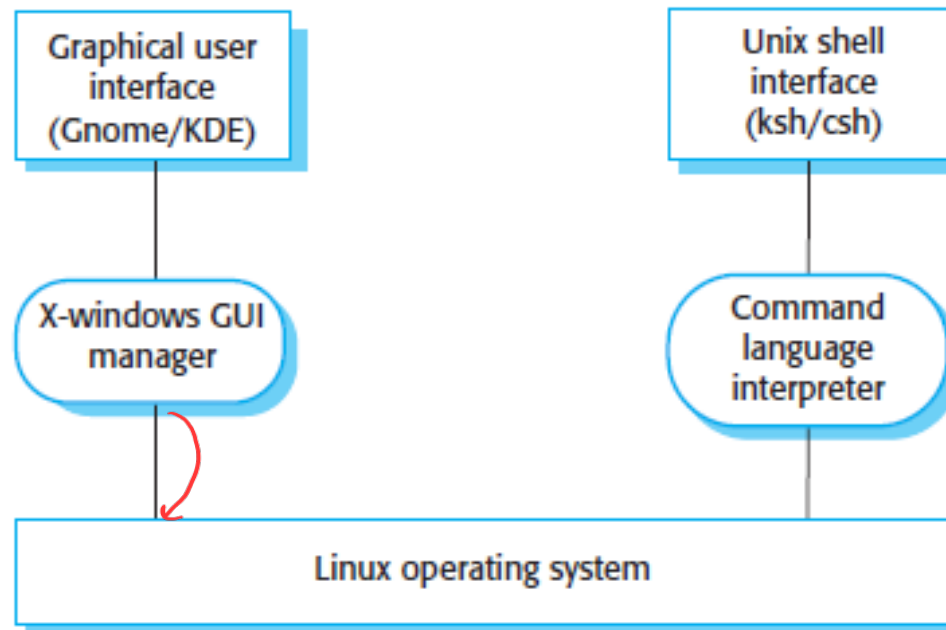
Main advantages and disadvantages of interaction styles

Interaction style	Main advantages	Main disadvantages	Application examples
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)

Has been improving

Multiple user interfaces example



(Sommerville, 2010, chap.29)

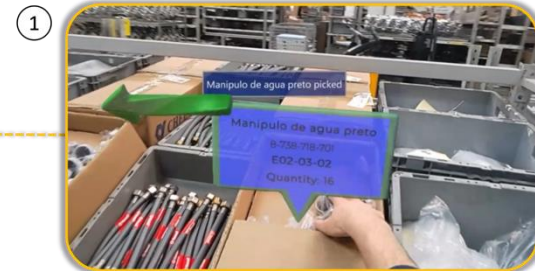
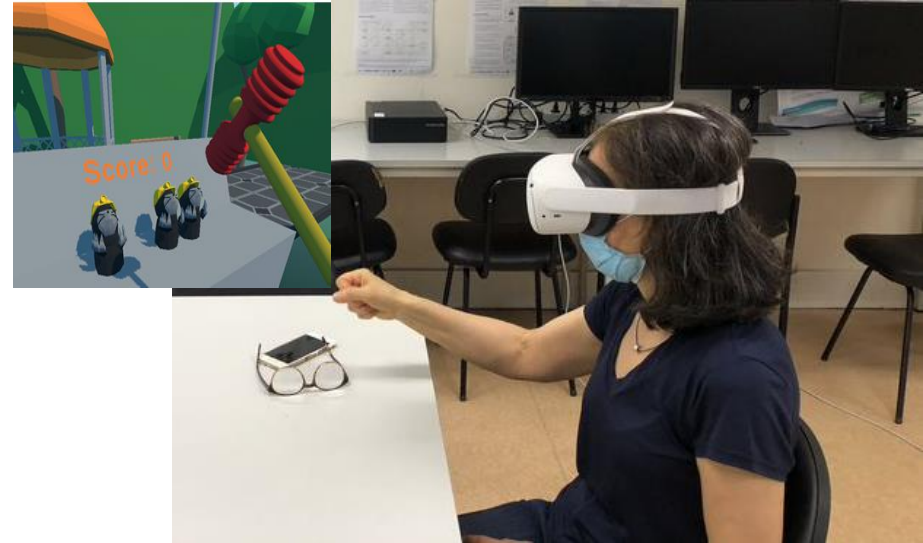
3D User Interfaces

- 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 (eXtended 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

<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