Interacción Persona-Maquina: aplicaciones en robótica y juegos digitales

Yves Rybarczyk, PhD

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II. Aplicaciones en robótica
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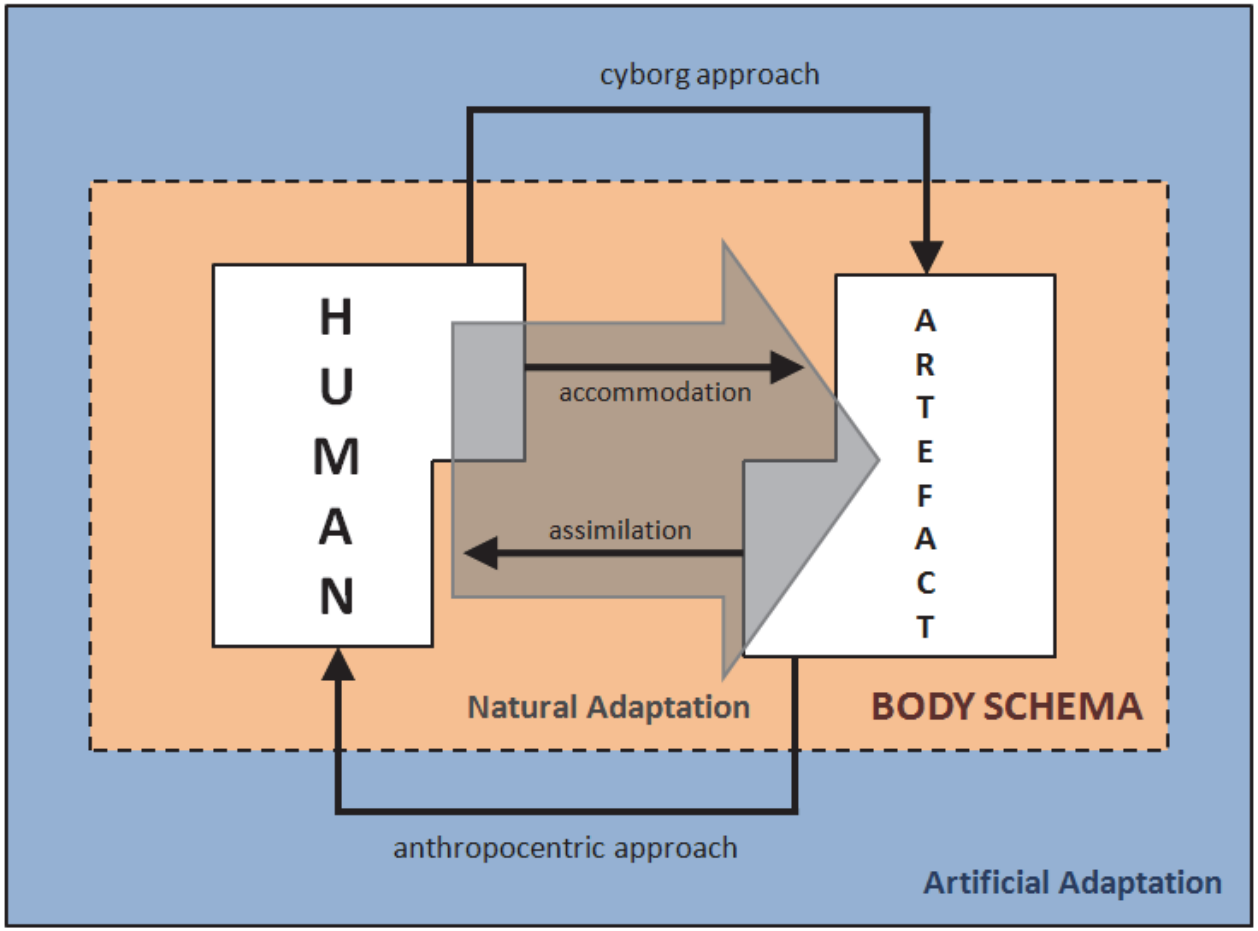
    II. Salud

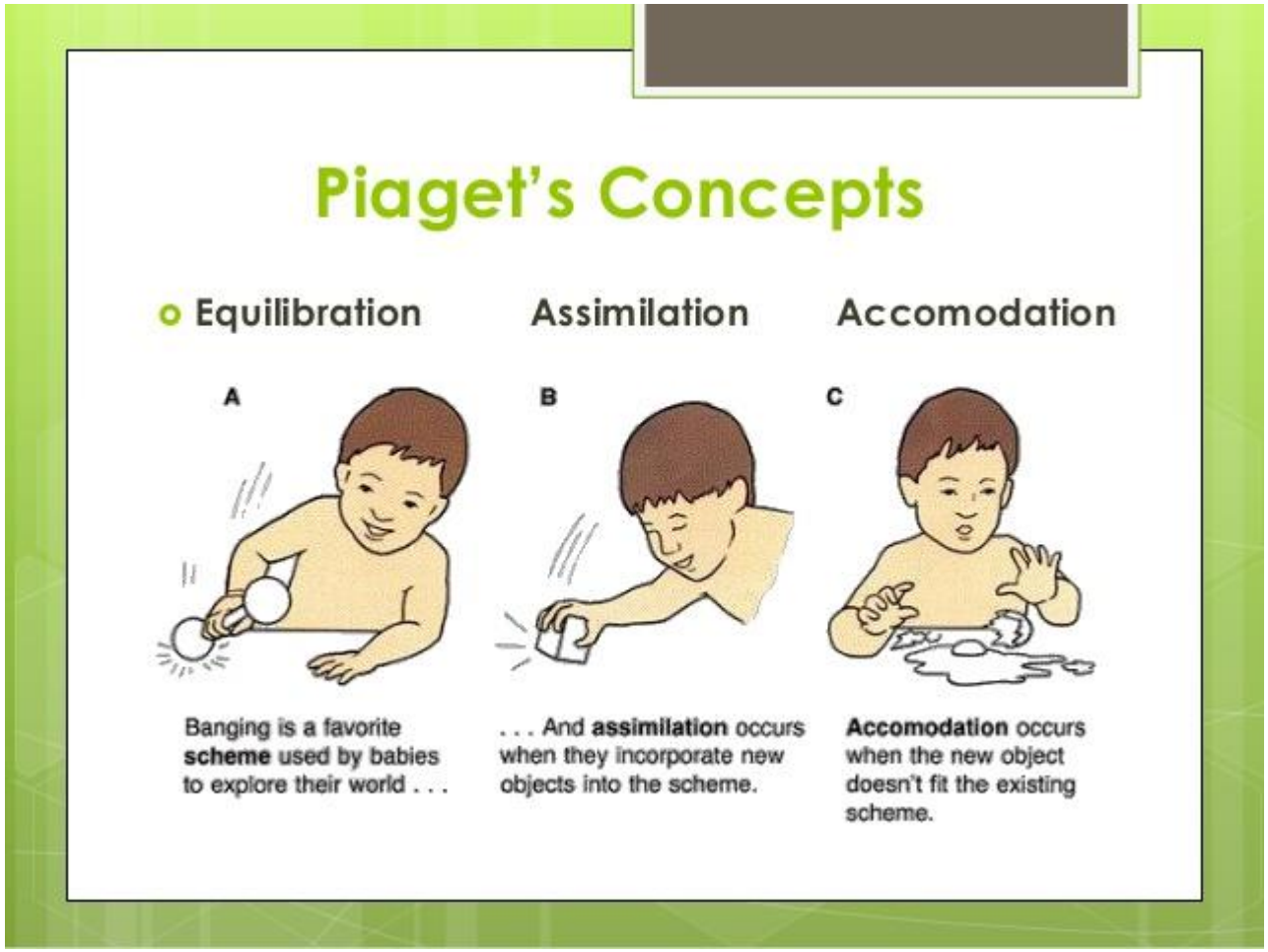
CONCEPTOS DE IHM

Procesos de apropiación de un artefacto



InTech (Rybarczyk et al., 2012)

Esquema corporal: punto de vista psicomotor



(Piaget, 1936)

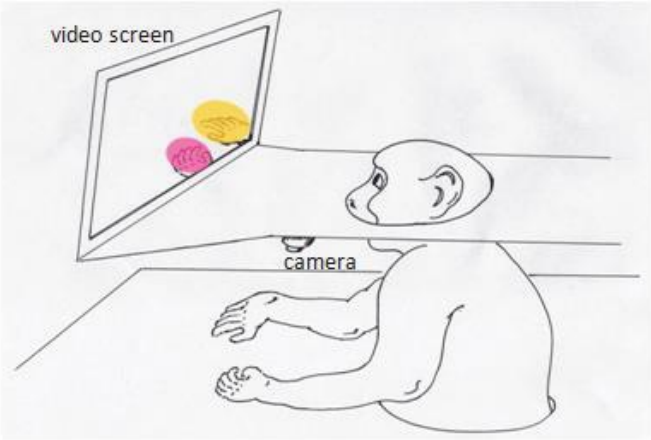
Esquema corporal: punto de vista neurofisiológico

- Con artefactos simples

(Iriki et al., 1996)

Esquema corporal: abordaje neurofisiológico

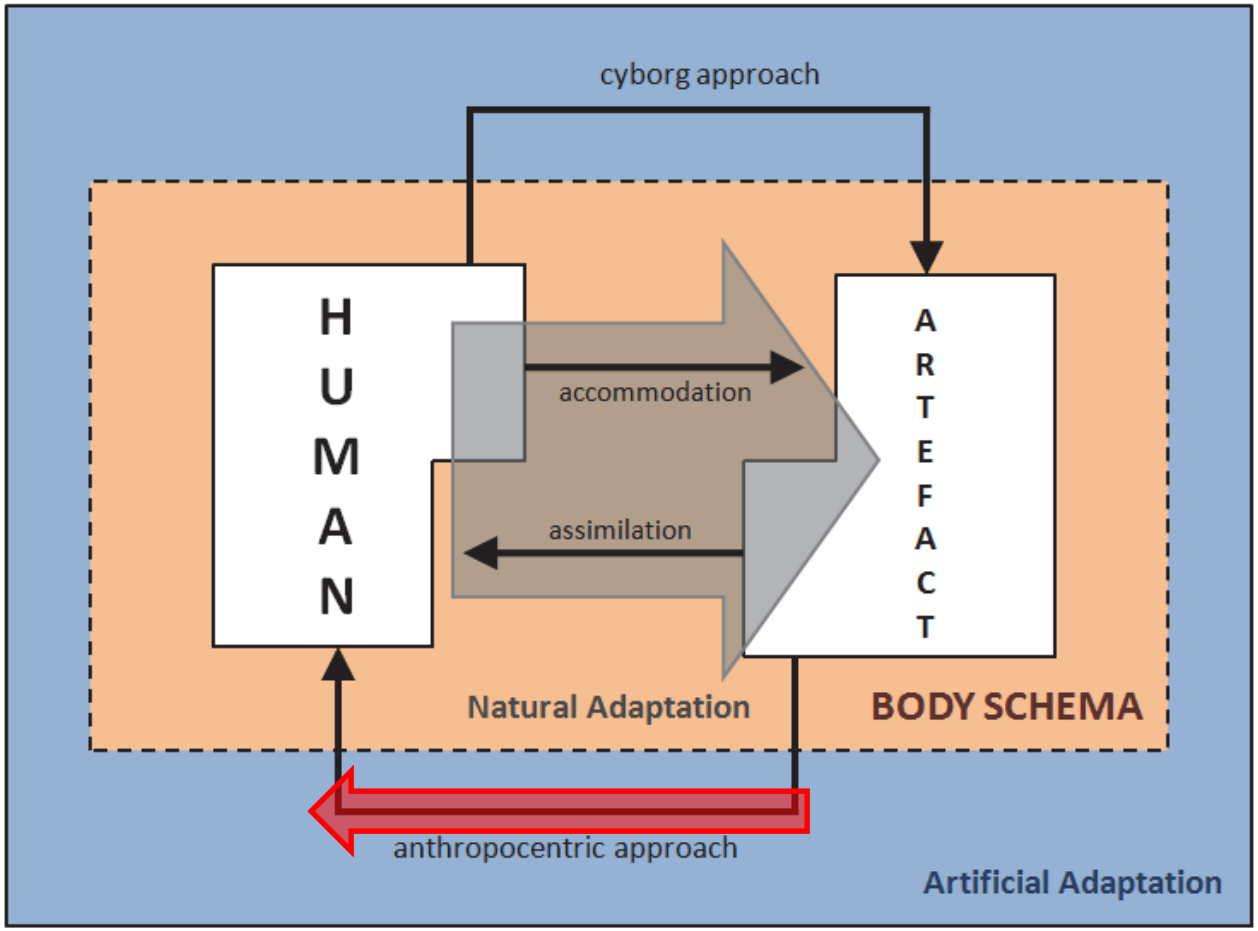
- Con dispositivos electrónicos



(Iriki et al., 2001)

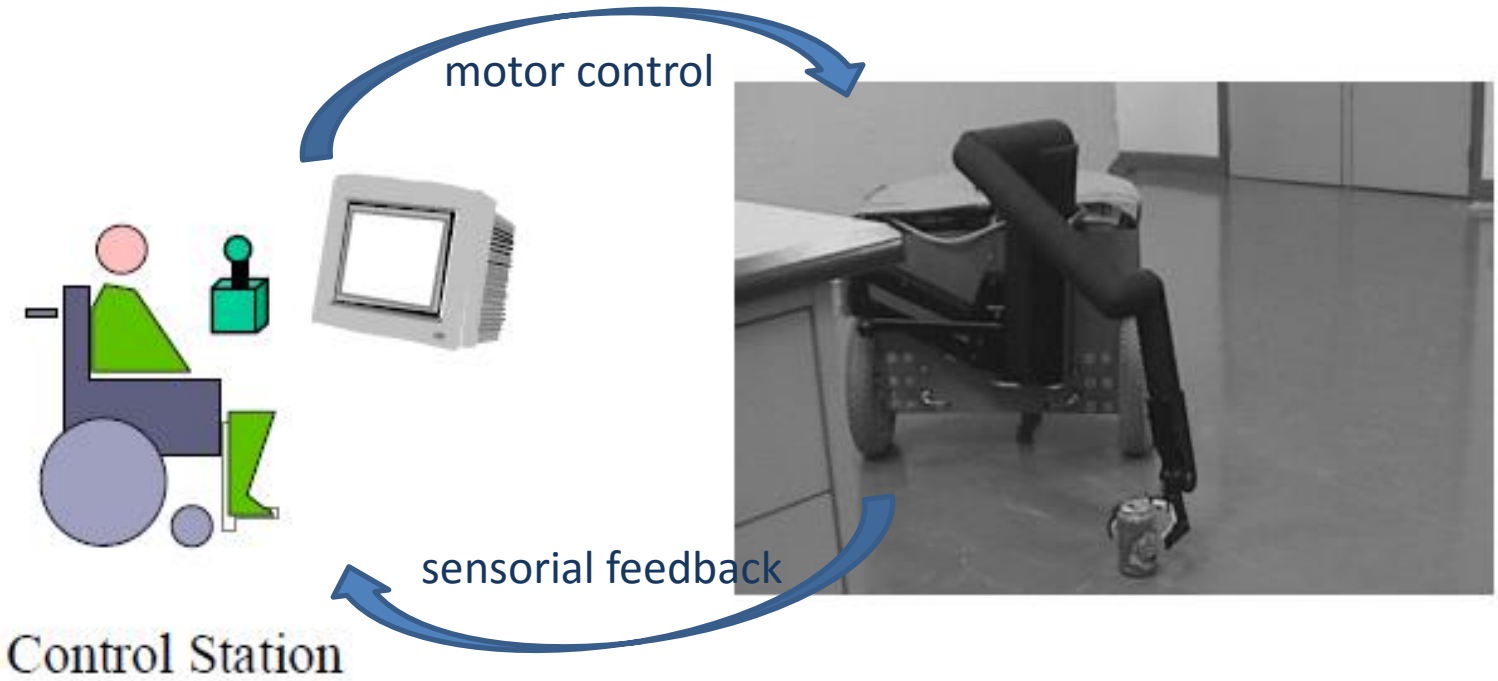
APLICACIONES EN ROBÓTICA

Proyecto ARPH



Proyecto ARPH

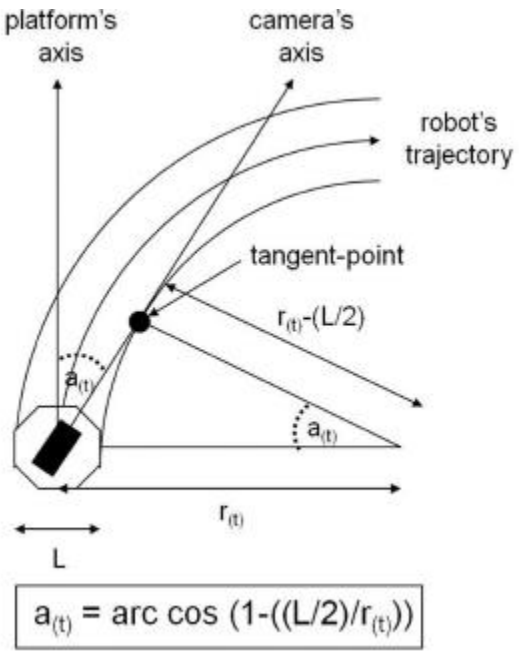
- **Arquitectura**



IEEE SMC (Colle, Rybarczyk & Hoppenot, 2002)

Proyecto ARPH

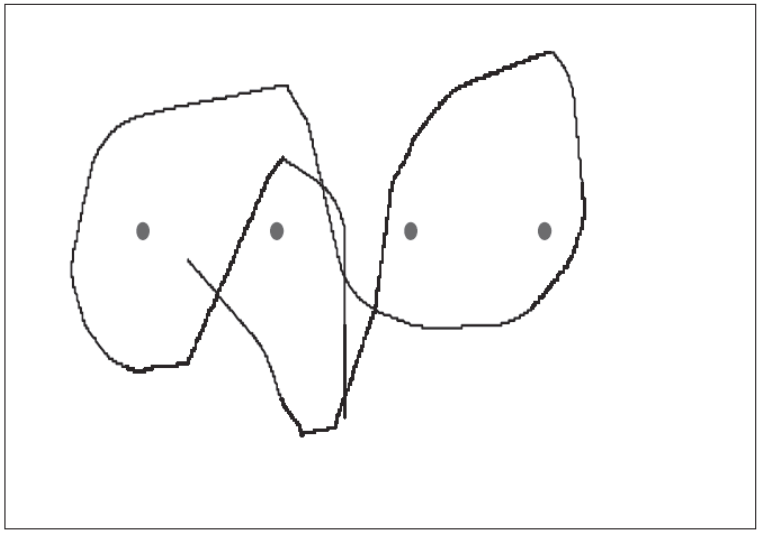
- **Abordaje antropocéntrico**



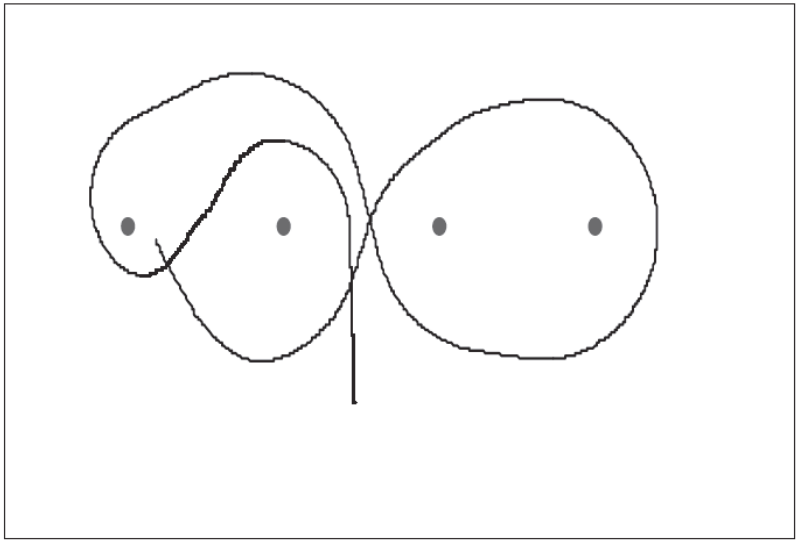
Le Travail Humain (Rybarczyk et al., 2004)

Proyecto ARPH

- **Resultados**

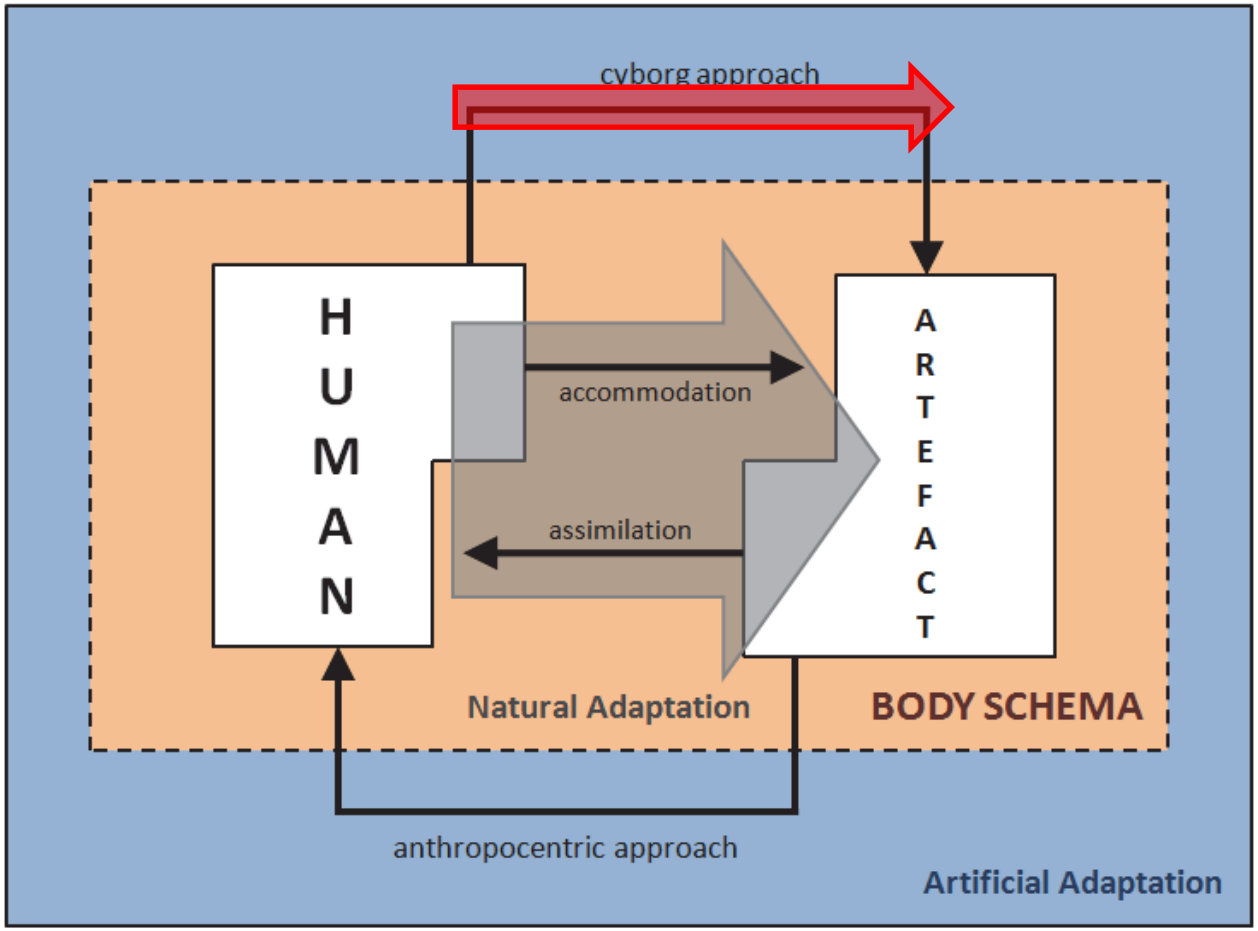


Sin comportamiento humano



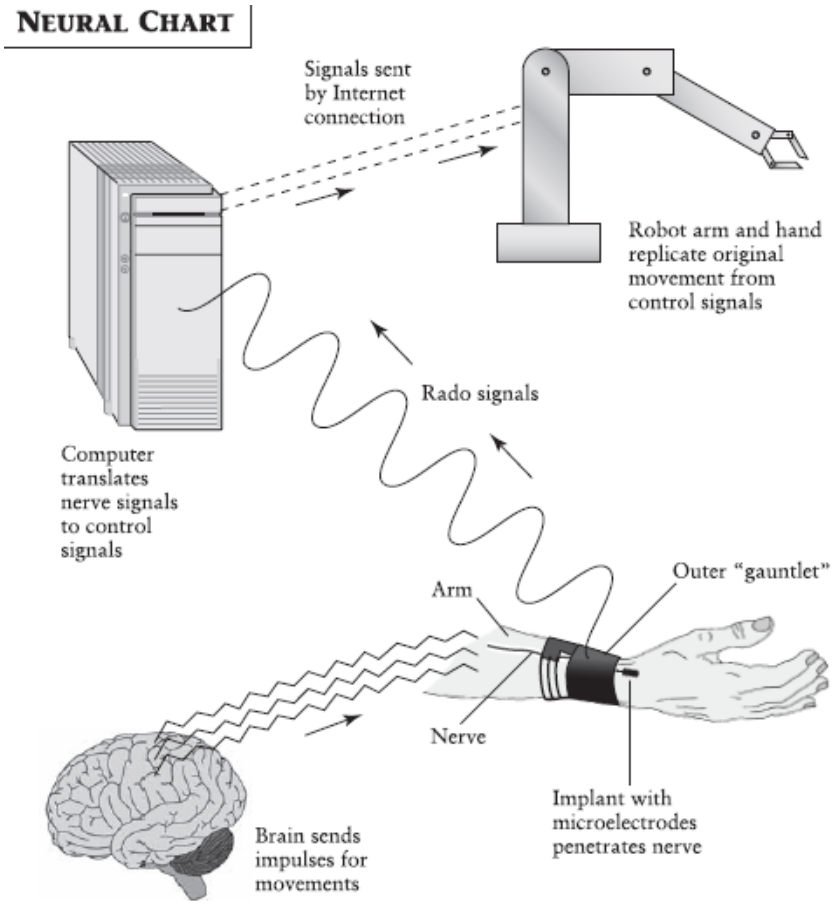
Con comportamiento humano

Cyborgs

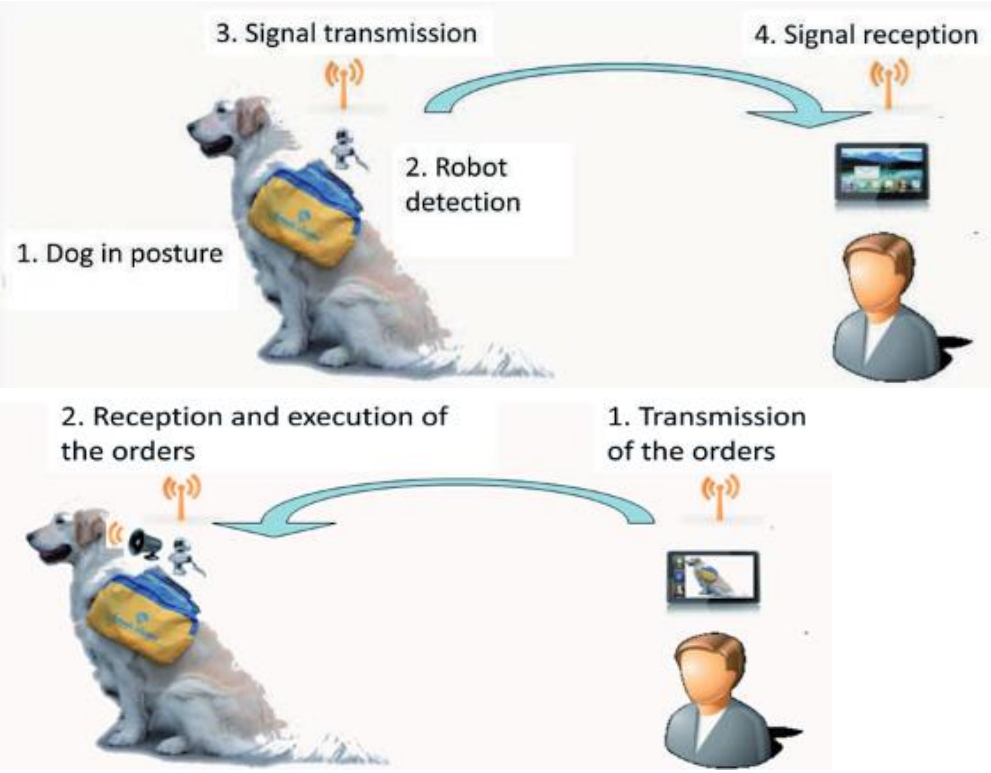

cyborg approach
HUMAN
accommodation
assimilation
ARTEFACT
Natural Adaptation
BODY SCHEMA
anthropocentric approach
Artificial Adaptation

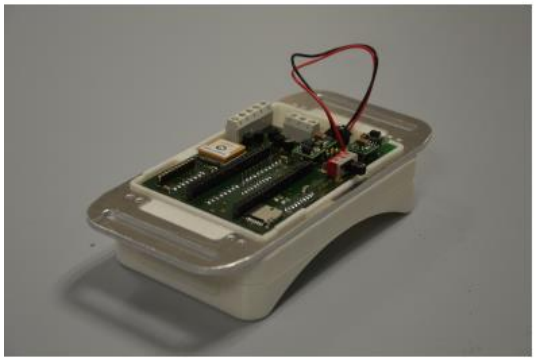
Cyborgs

- **Grupo del Dr. K. Warwick**



Proyecto COCHISE

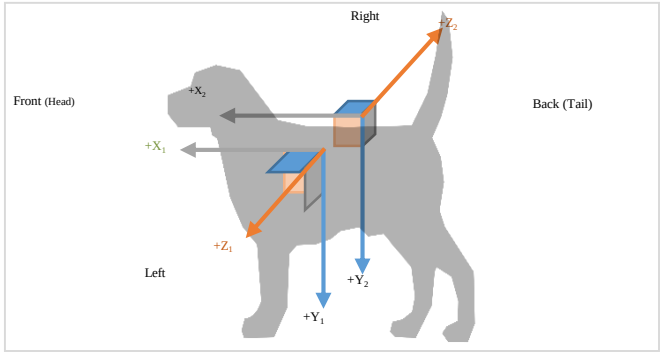


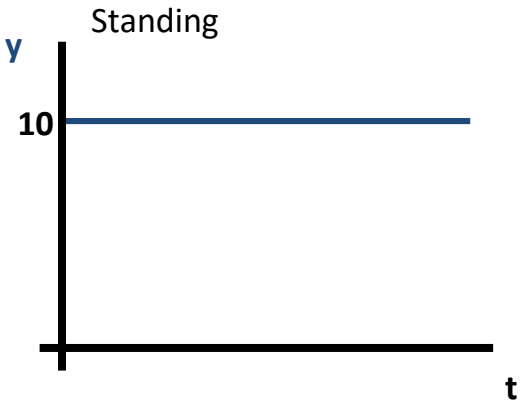


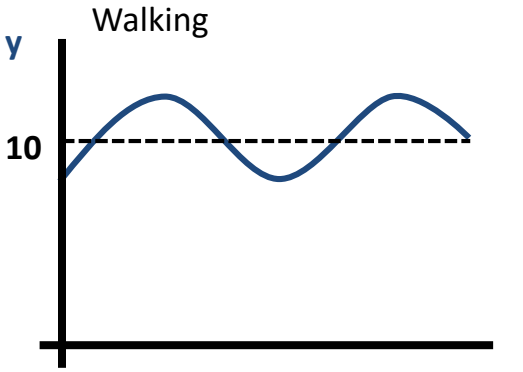
IEEE Roman (De Seabra, Rybarczyk, Bastista et al., 2014)

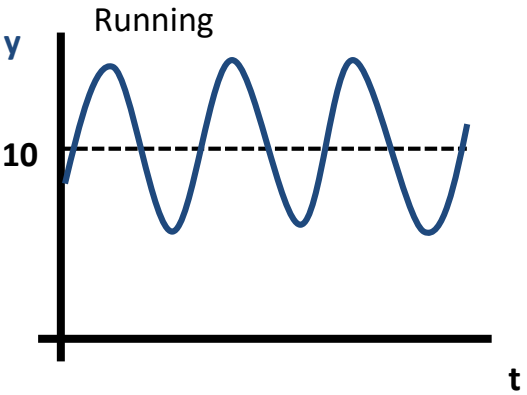
Proyecto COCHISE

- **Detección de la actividad**



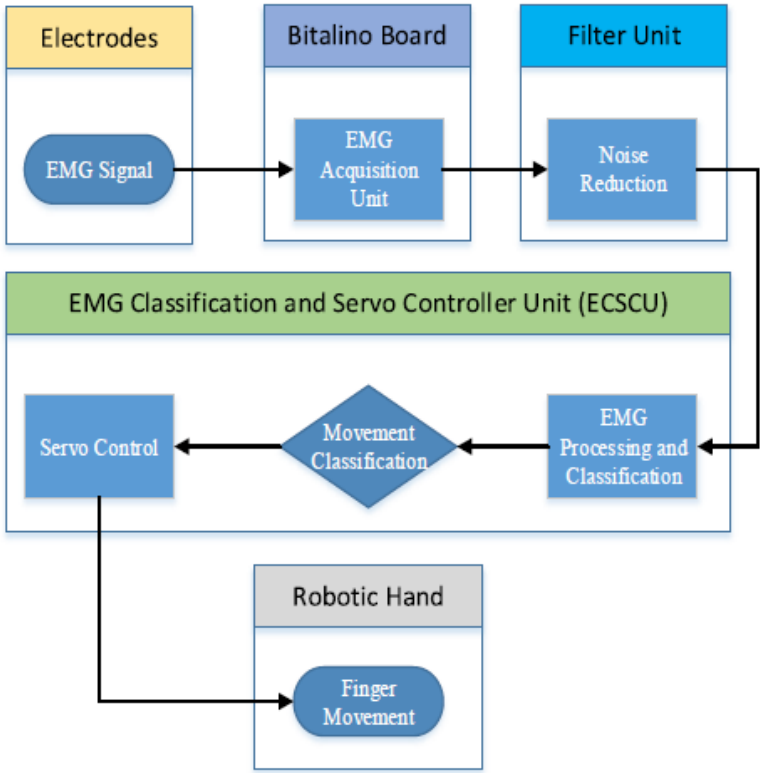


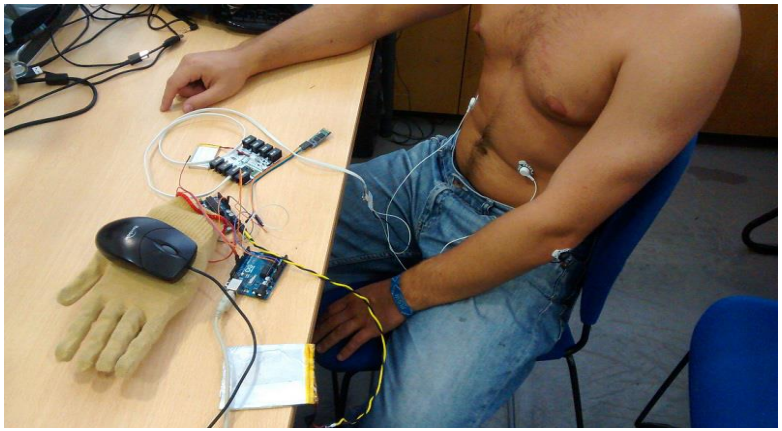


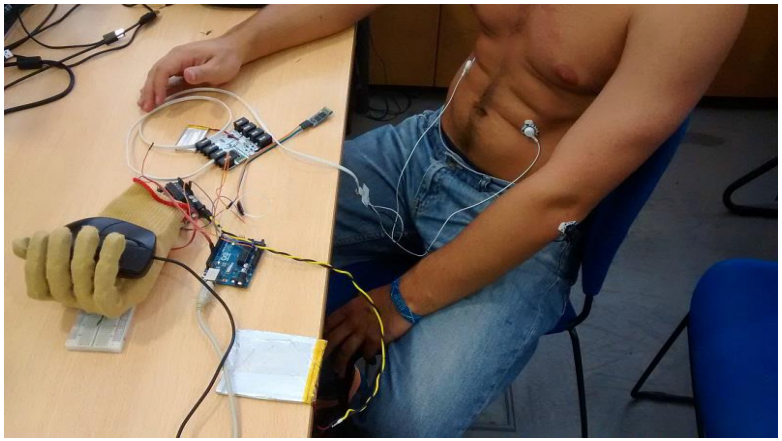


Bioseñal para controlar una mano artificial

- **Arquitectura**

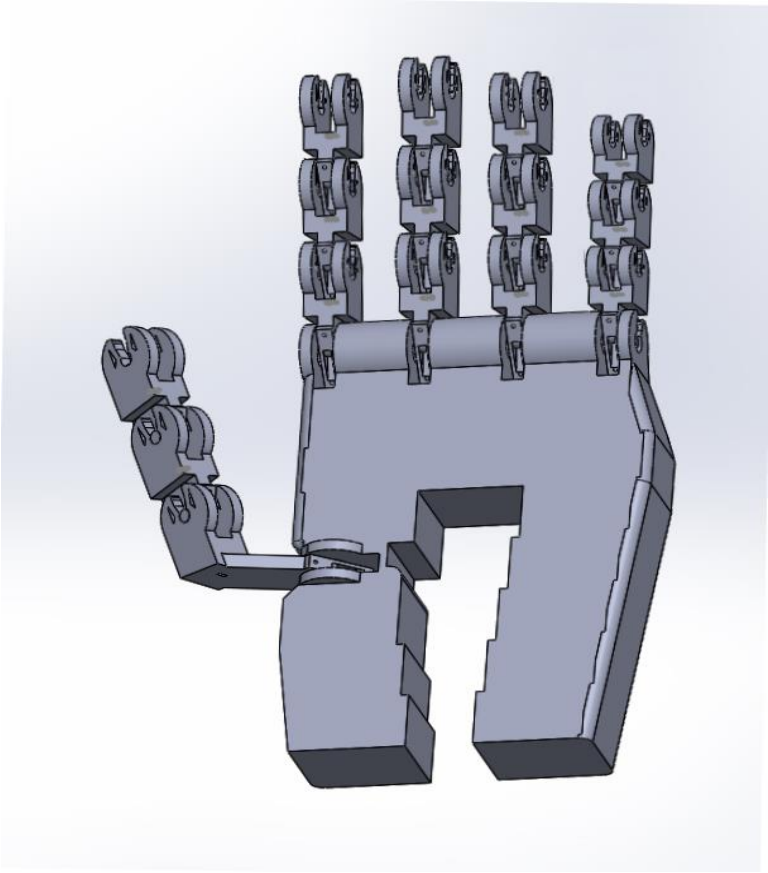






Bioseñal para controlar una mano artificial

- **Demostración**

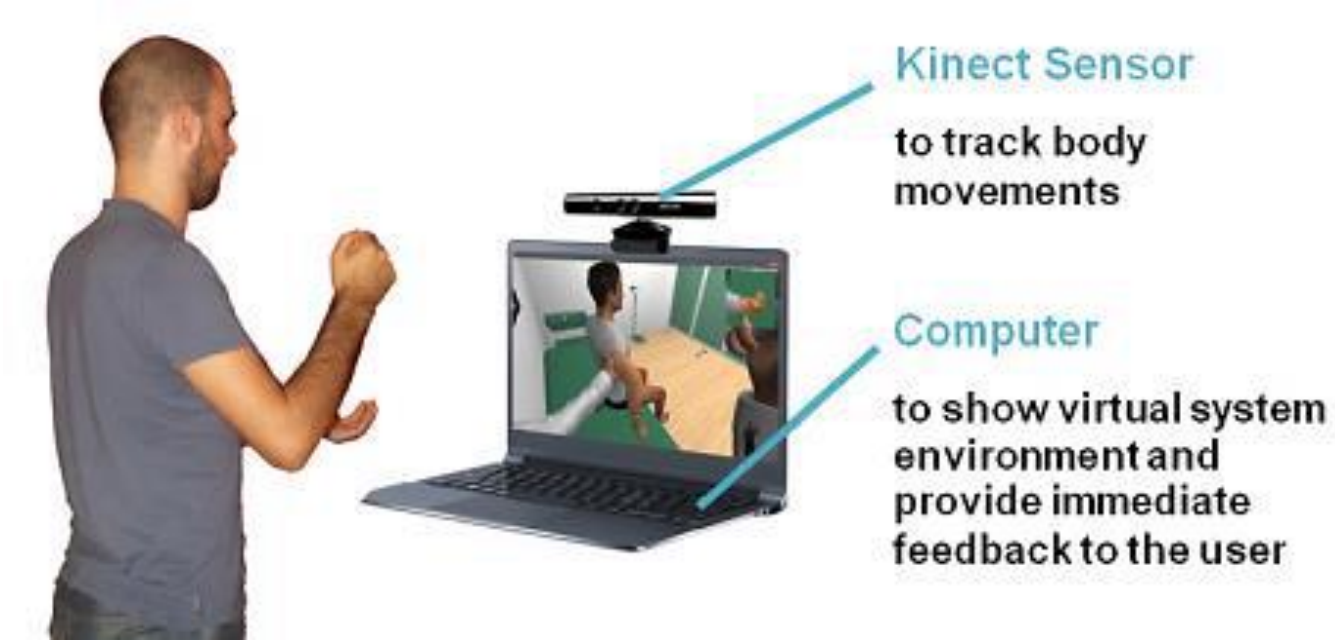


ACE (Bernardino, Rybarczyk & Barata, 2014)

APLICACIONES EDUCATIVAS

Juego serio para estudiantes en medicina

- **Sistema interactivo**



ICERI (Carrasco, Rybarczyk, Cardoso et al., 2013)

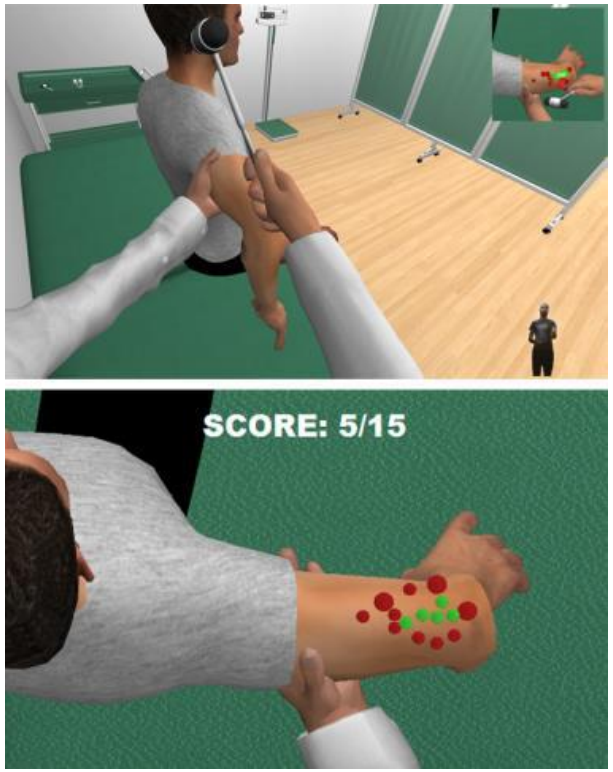
Juego serio para estudiantes en medicina

- **Modelación del ambiente 3D**

Juego serio para estudiantes en medicina

- **Ej. de ejercicios**

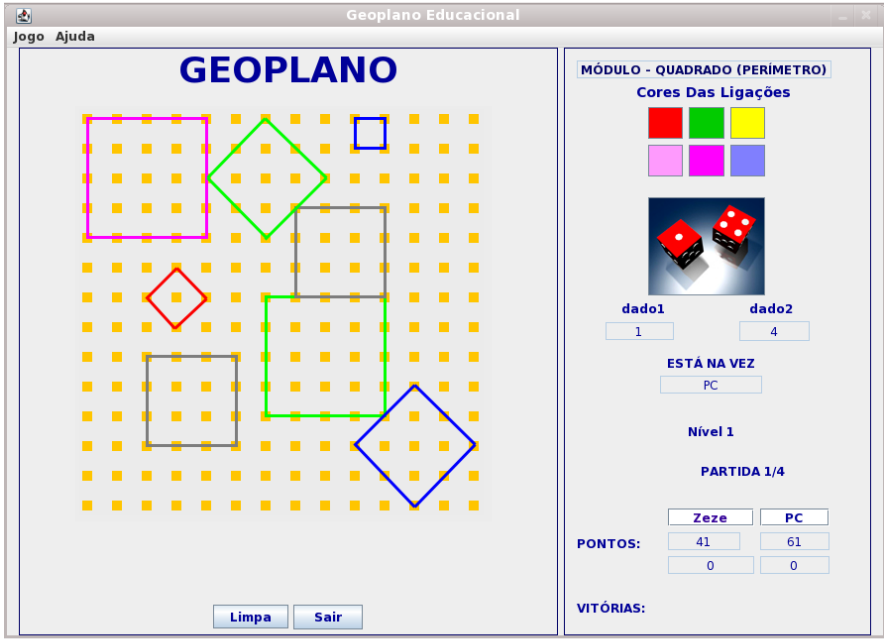
Examinación del reflejo pupilar y de la óculomotricidad



Ejercitación para activar los reflejos tendinosos

Juegos educativos para aprender la matemática

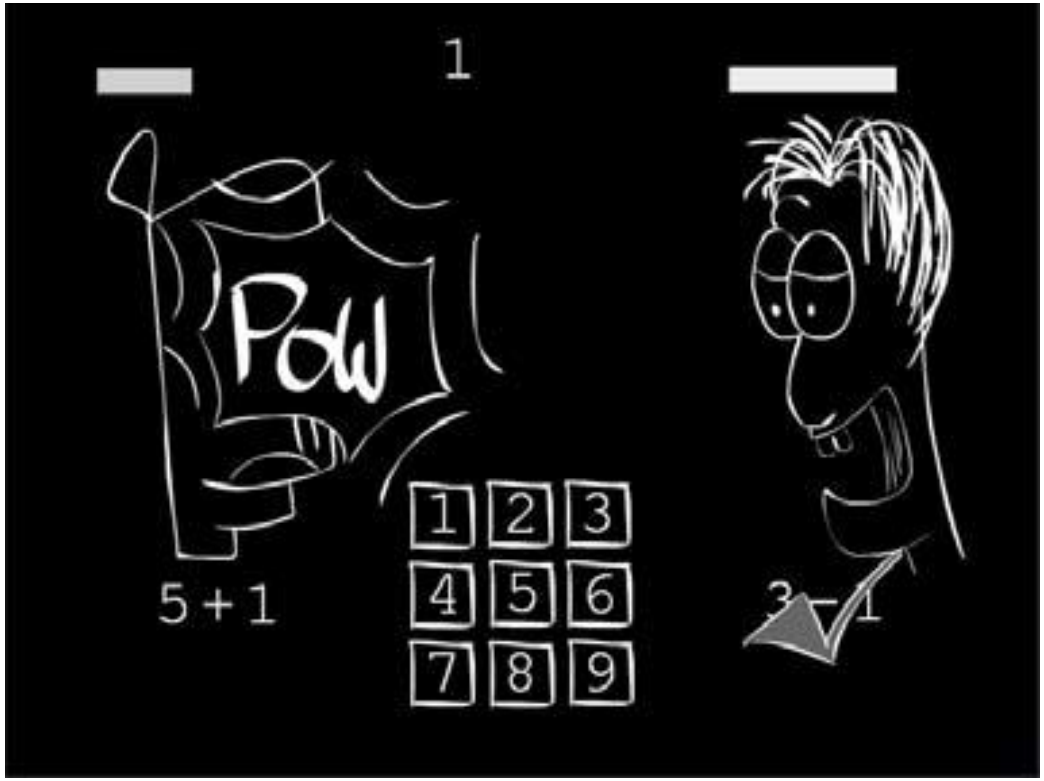
- **Geoplano/Geoespaço**



(Moraes & Machado, 2009)

Juegos educativos para aprender la matemática

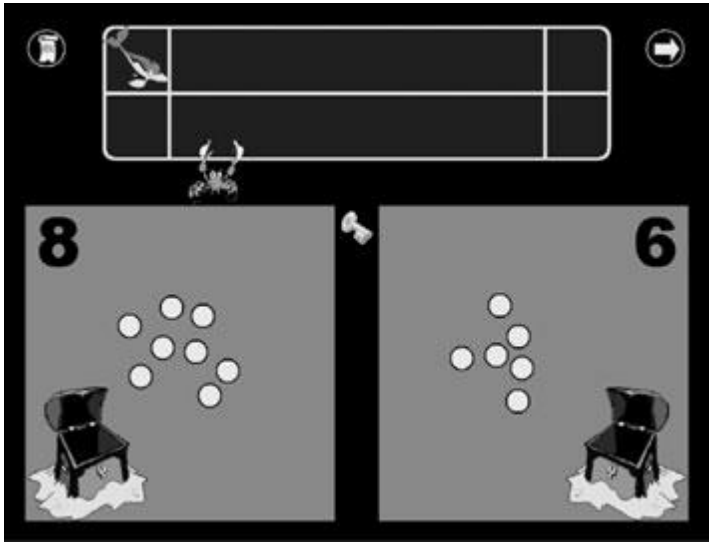
- **Number to Number Combat**

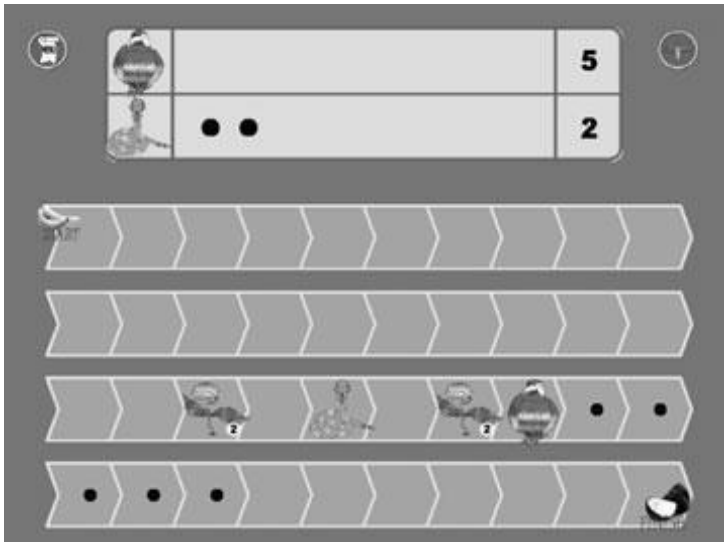


(Tremblay et al., 2010)

Juegos educativos para aprender la matemática

- **The Number Race**

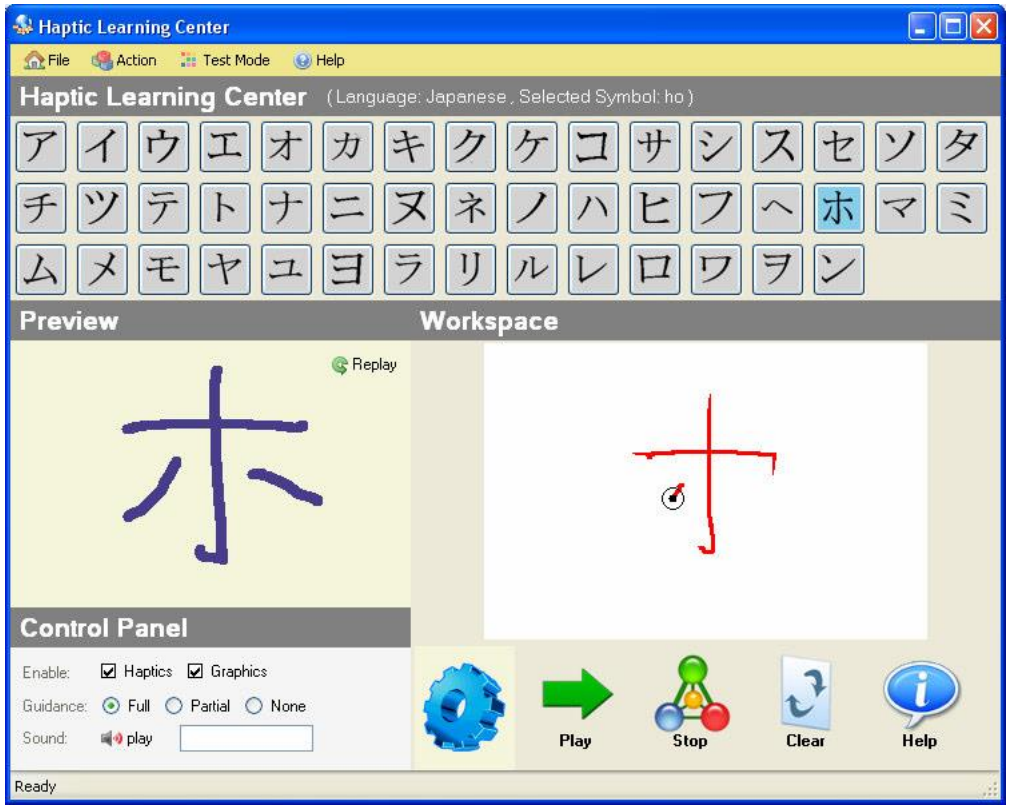




(Wilson et al., 2009)

Juegos educativos para aprender a escribir

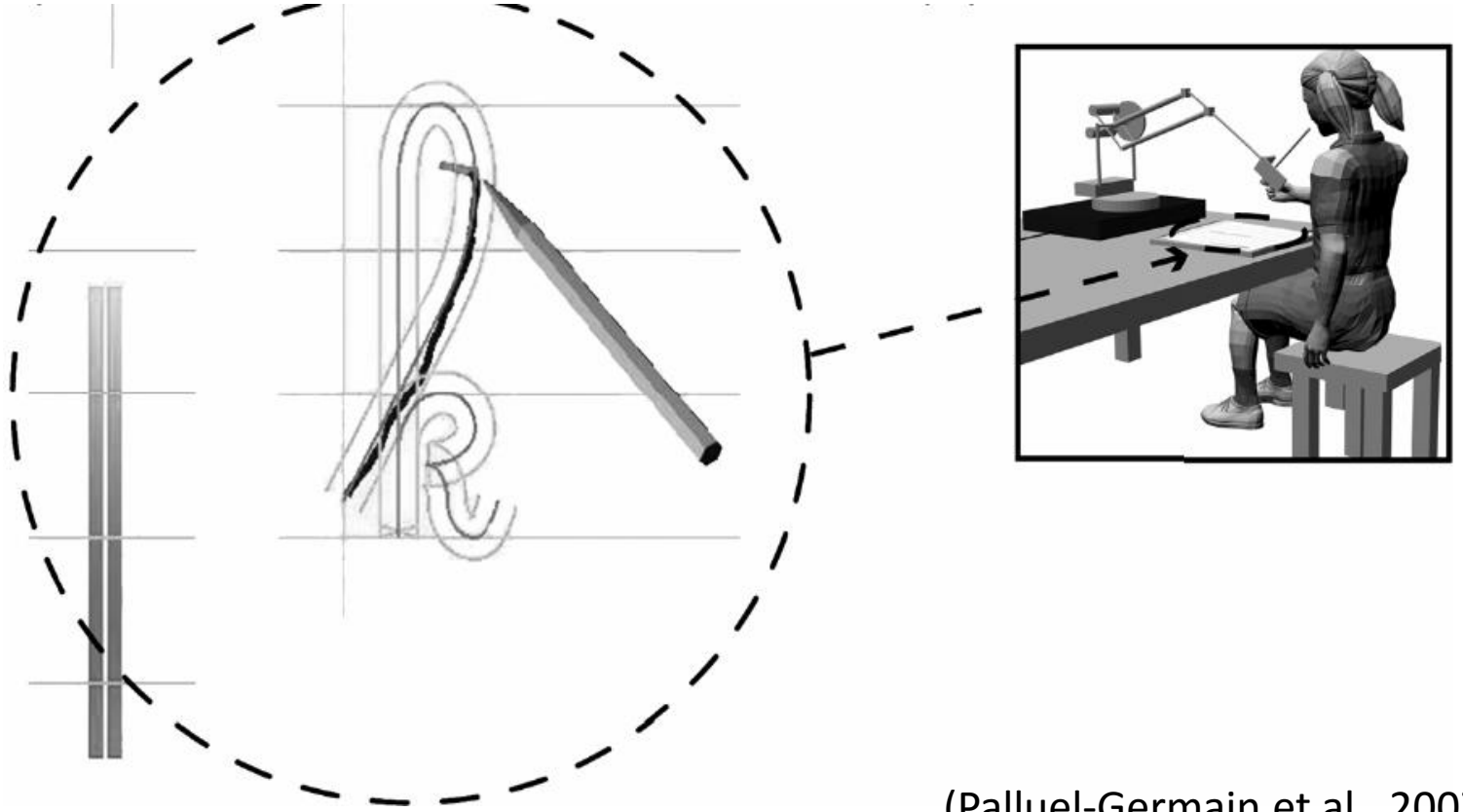
- **Haptic Learning Center**



(Mansour et al., 2007)

Juegos educativos para aprender a escribir

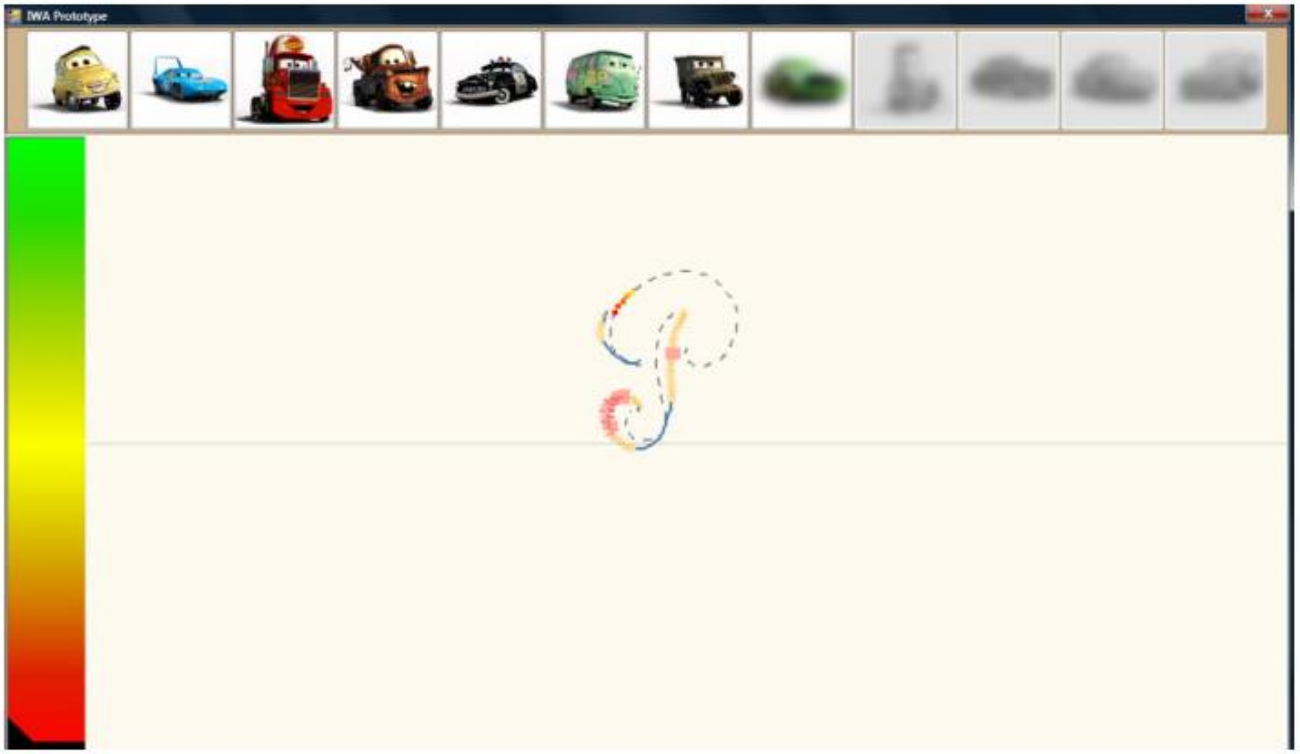
- **Telemaque**



(Palluel-Germain et al., 2007)

Juegos educativos para aprender a escribir

- **IWA**



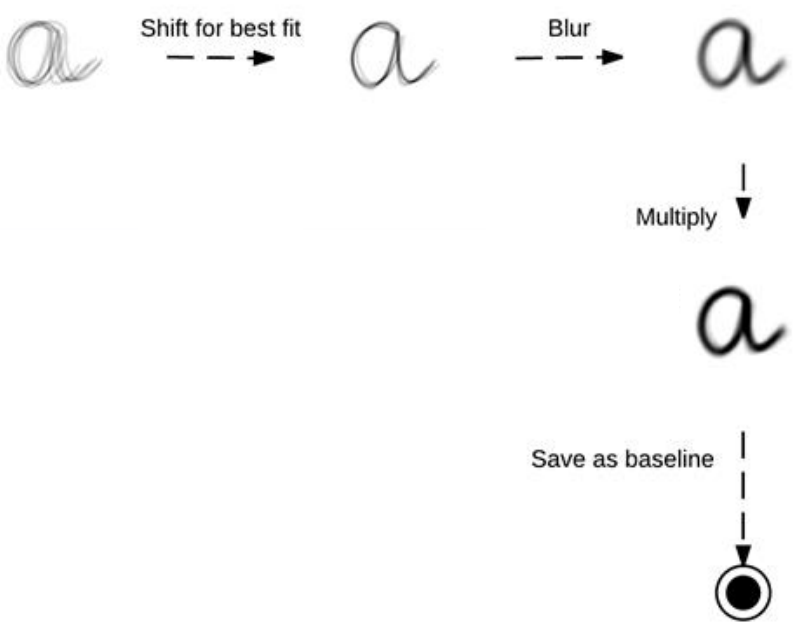
(Pereira et al., 2009)

Aprendizaje de la escritura a través de una interface táctil

- Image processing

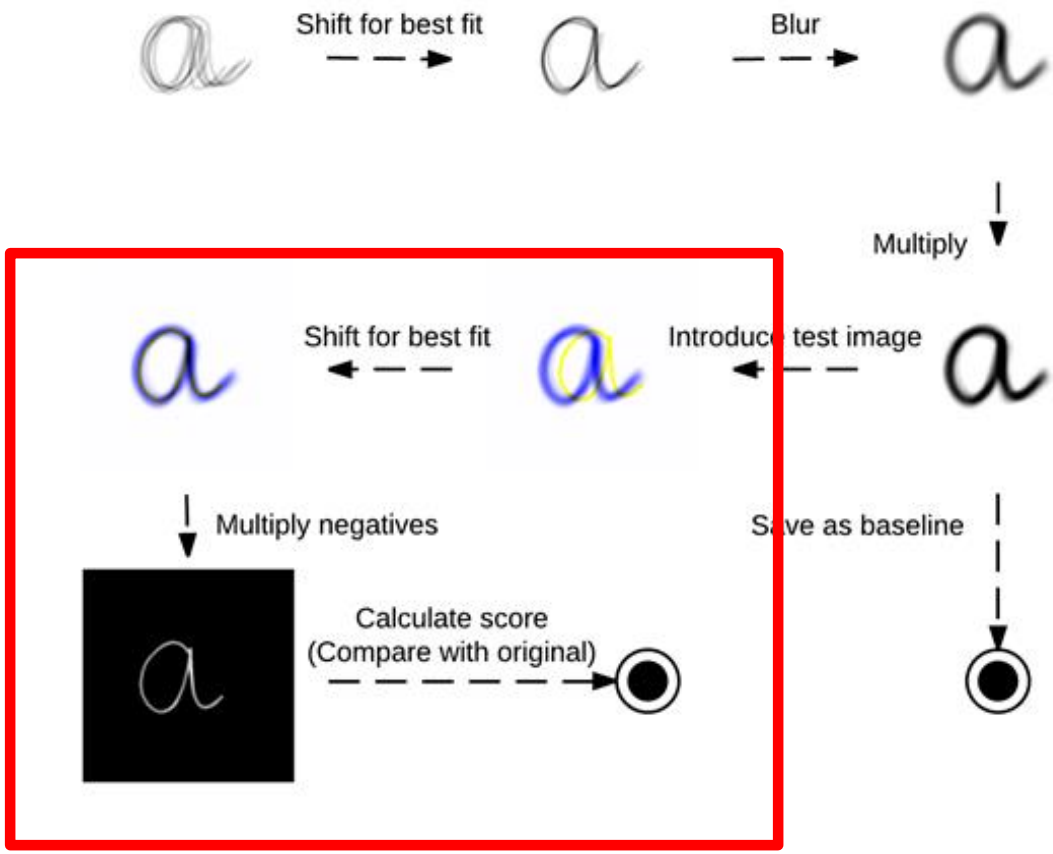
  For each character, an image type (or baseline) is built from a combination of images of the same character, such as images are:

  - centred;
  - blurred;
  - multiplied;
  - saved.



Aprendizaje de la escritura a través de una interface táctil

- Character classification
  - The image trial is:
    - introduced;
    - centred.
  - Trial & baseline pixels are:
    - inverted (=> ideal line is white);
    - multiplied.



Aprendizaje de la escritura a través de una interface táctil

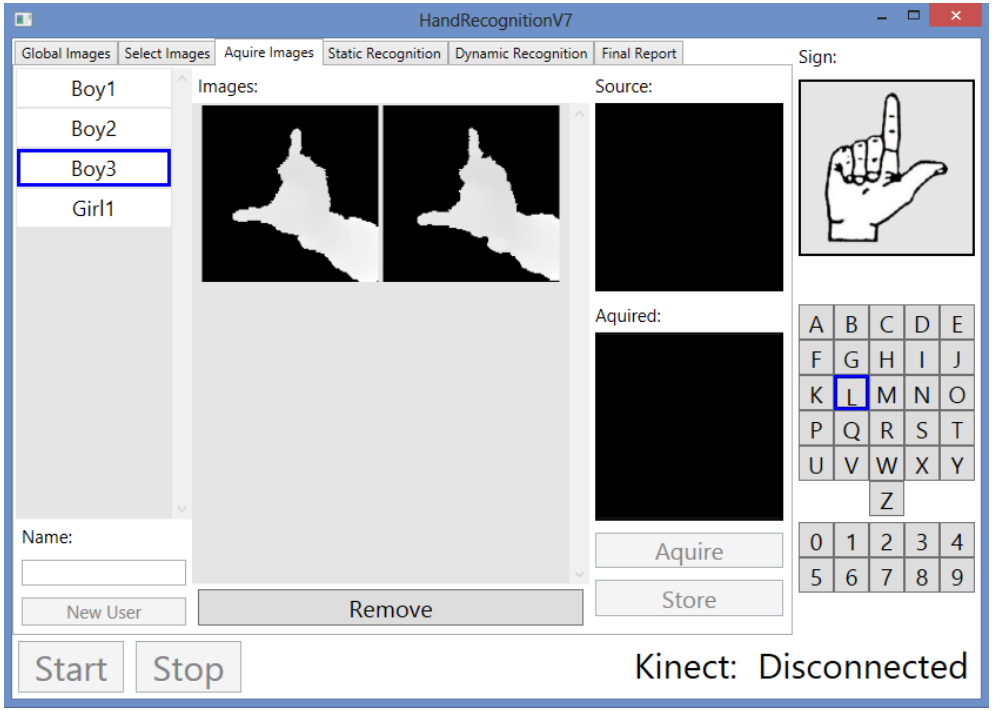
- Result
  - Example:
    - trial ‘c’ / baseline ‘a’

  - Overall:
    - more than **90% of correct classification**

Aprendizaje de la escritura a través de una interface táctil

- Demostración

Proyecto Kinect-Sign

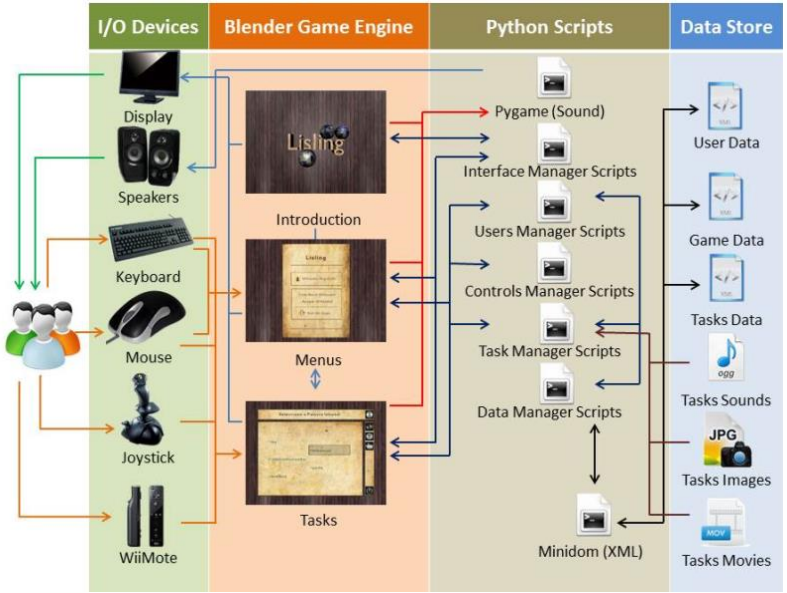


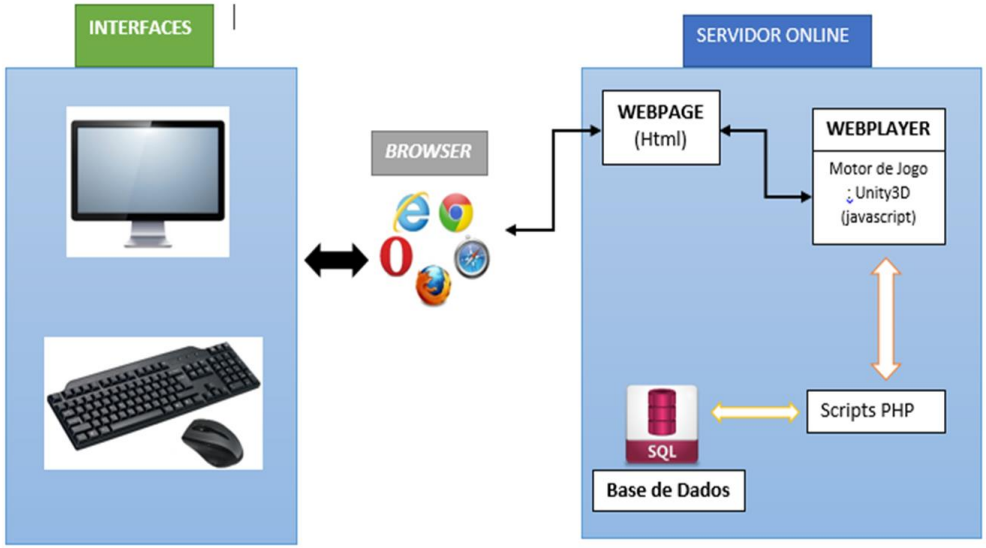
Springer IFIP, AICT (Gameiro, Cardoso & Rybarczyk, 2014)

APLICACIONES PARA LA REHABILITACIÓN

Proyecto Lisling

- **Arquitecturas**





AAATE (Rybarczyk, Fonseca & Martins, 2013)

ACE (Rodrigues, Rybarczyk & Gonçalves, 2014)

Game
Web (960x600)
Maximize on Play
Stats
Gizmos
WEBLISLING
USERNAME
PASSWORD
OK
REGISTAR
APAGAR UTILIZADOR

WEBLISLING

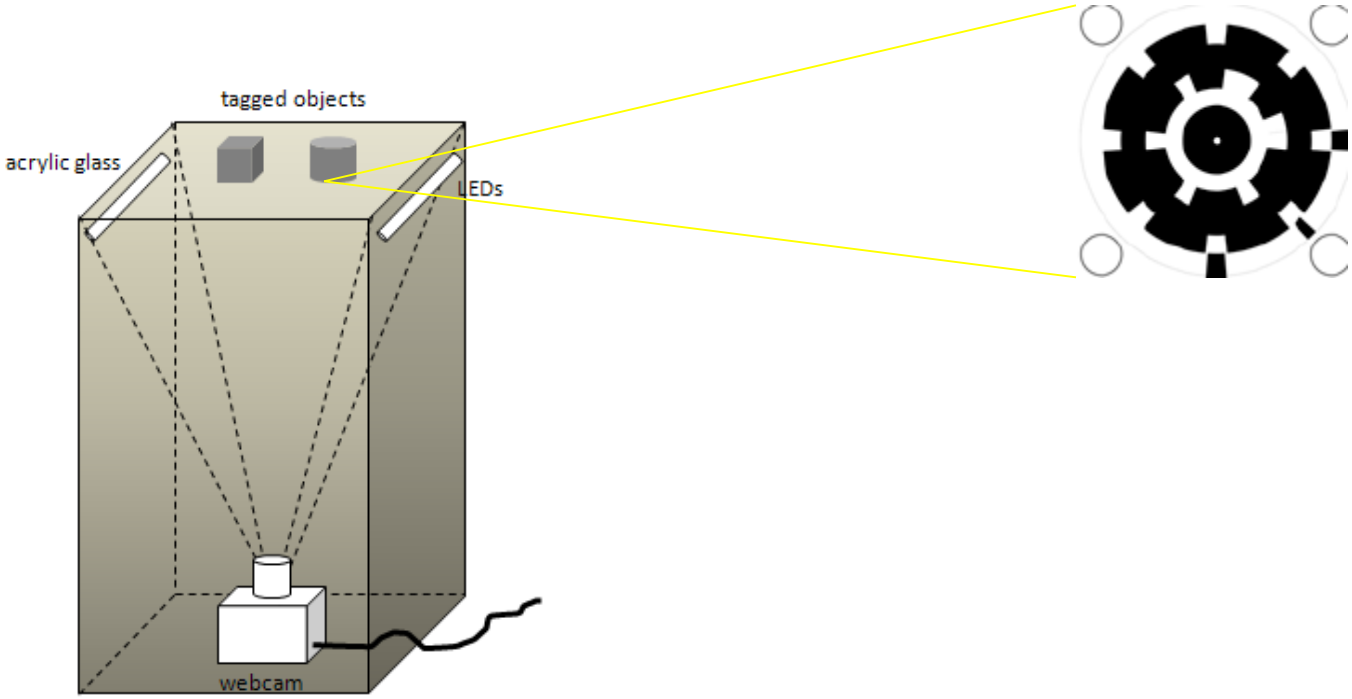
USERNAME PASSWORD OK

REGISTAR

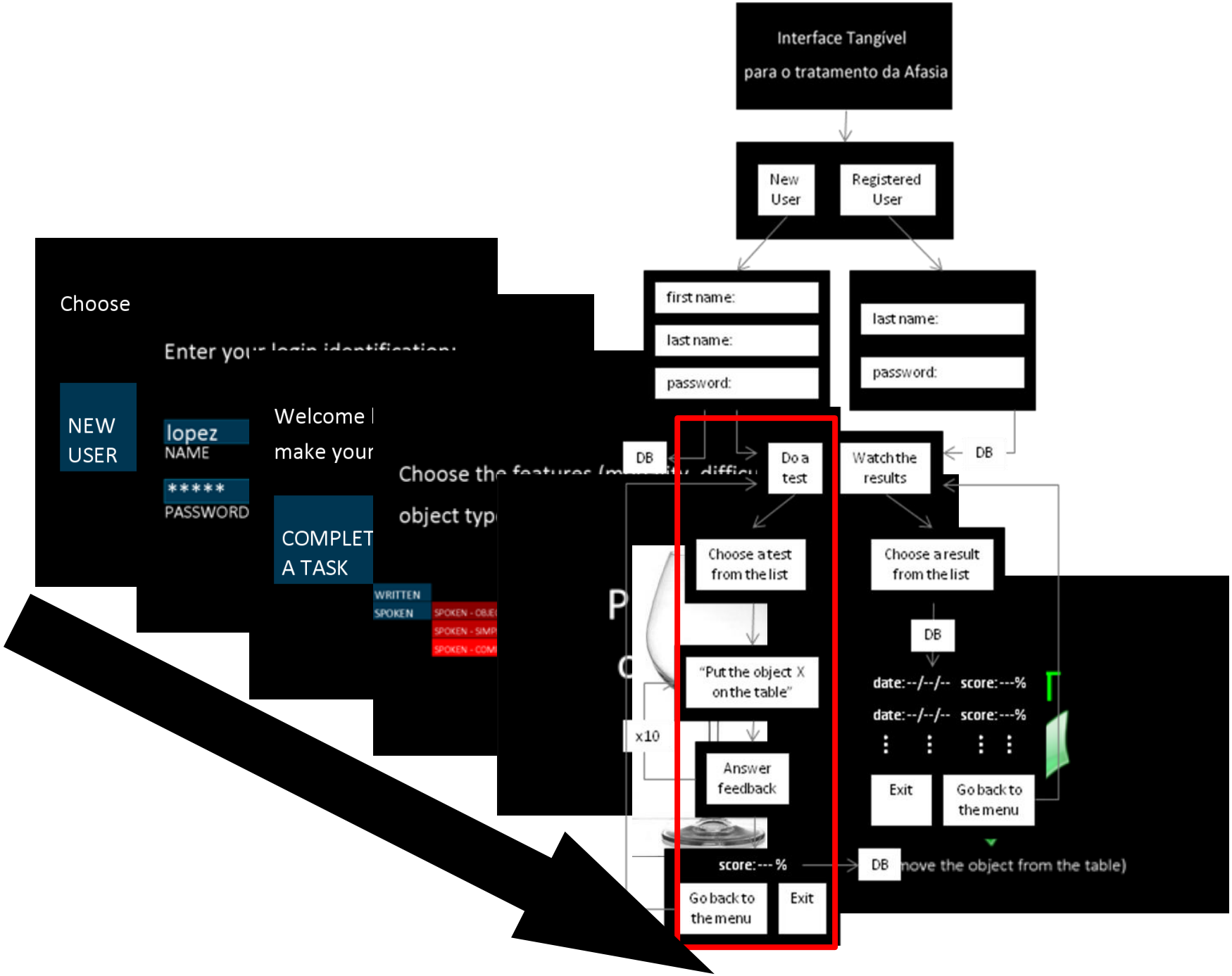
APAGAR UTILIZADOR

Interface tangible para ejercitar la comprensión en paciente afásicos

- **Arquitecturas**



AAATE (Rybarczyk & Fonseca, 2011)


Interface Tangível
para o tratamento da Afasia
New User
Registered User
first name:
last name:
password:
last name:
password:
Choose
NEW USER
lopez
NAME
*****
PASSWORD
Welcome
make your
COMPLET
A TASK
WRITTEN
SPOKEN
object typ
DB
Do a test
Watch the results
DB
Choose a test from the list
Choose a result from the list
"Put the object X on the table"
x10
Answer feedback
DB
date:--/--/-- score:---%
date:--/--/-- score:---%
Exit
Go back to the menu
score:--- %
DB
Go back to the menu
Exit

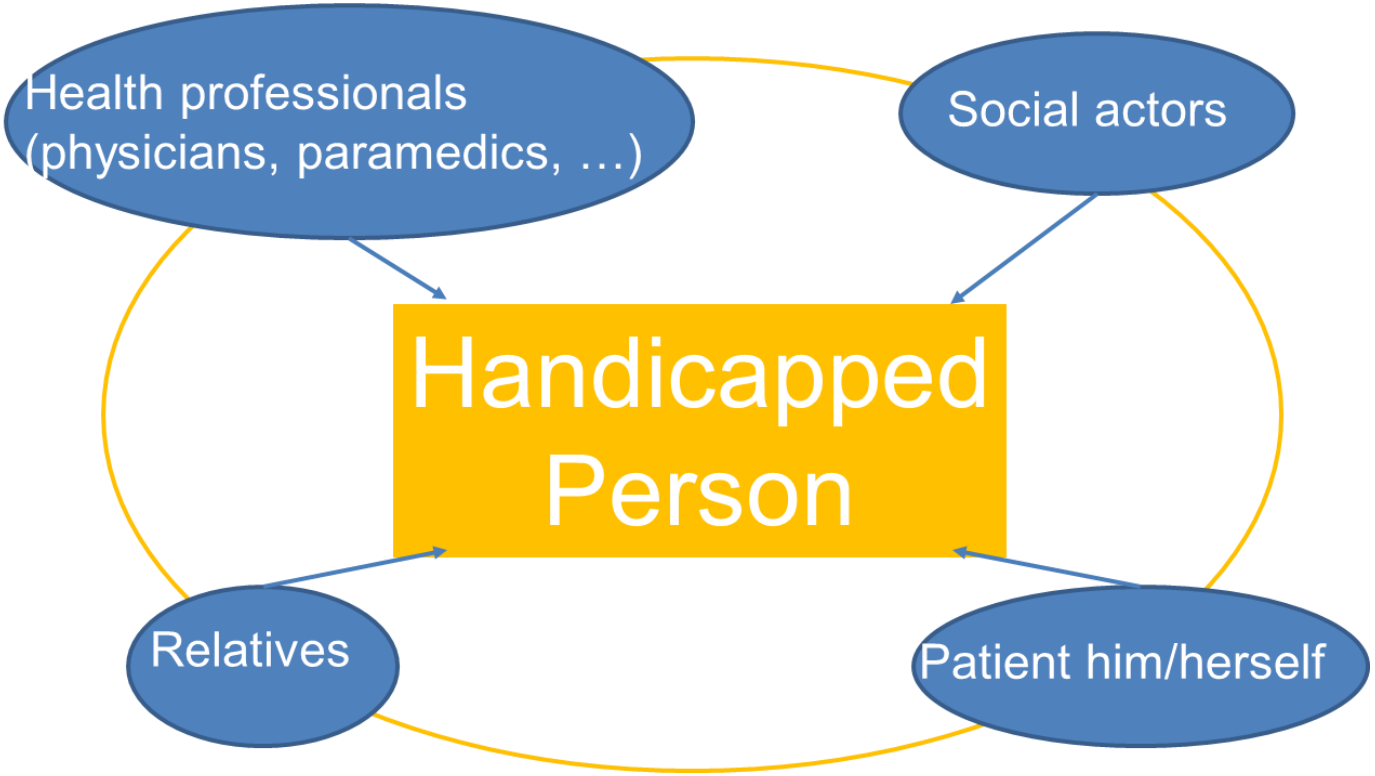
Interface tangible para ejercitar la comprensión en paciente afásicos

- **Demostración**

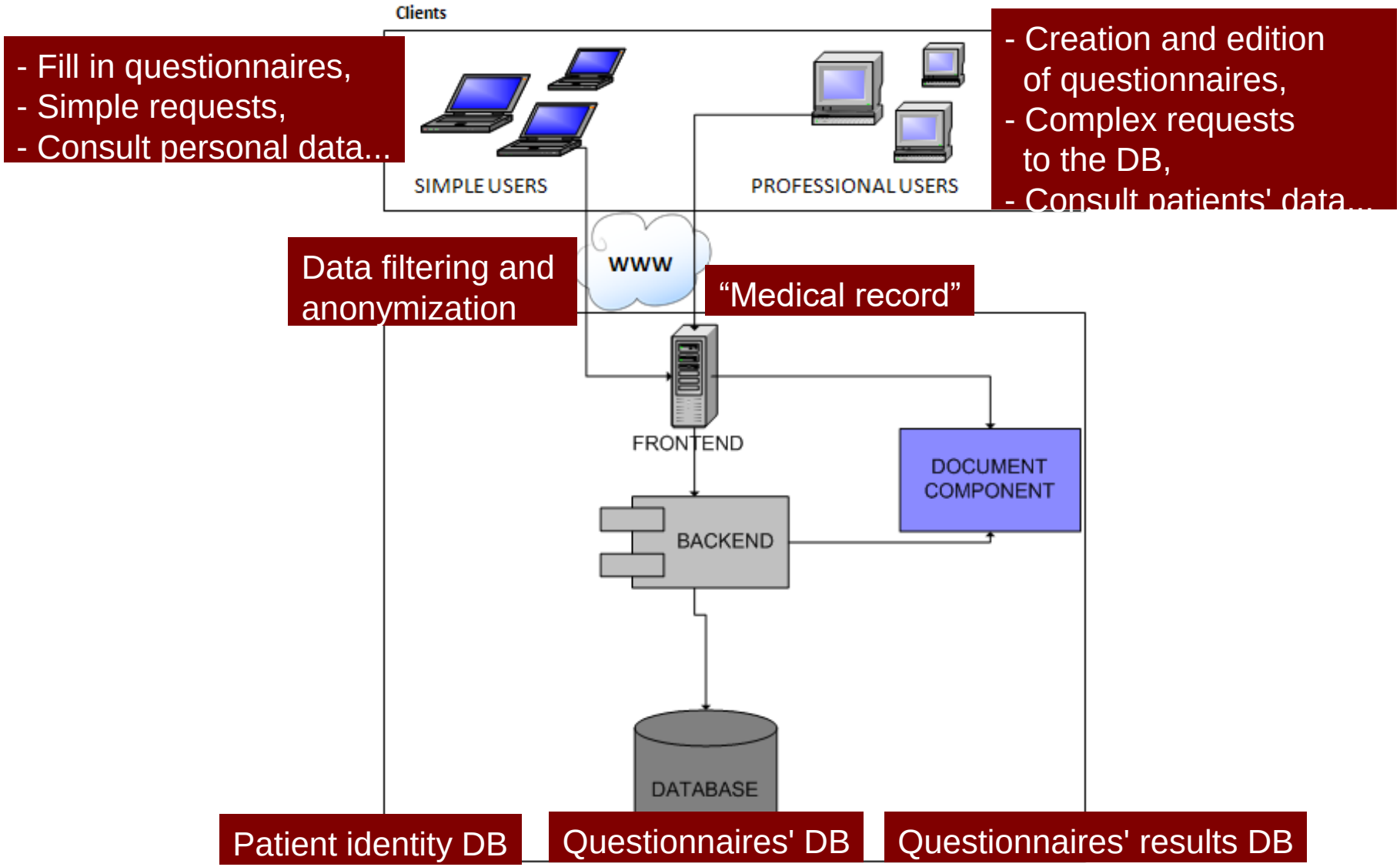
APLICACIONES WEB

Proyecto e-ESPOIRS-Handi

- **Problemática**

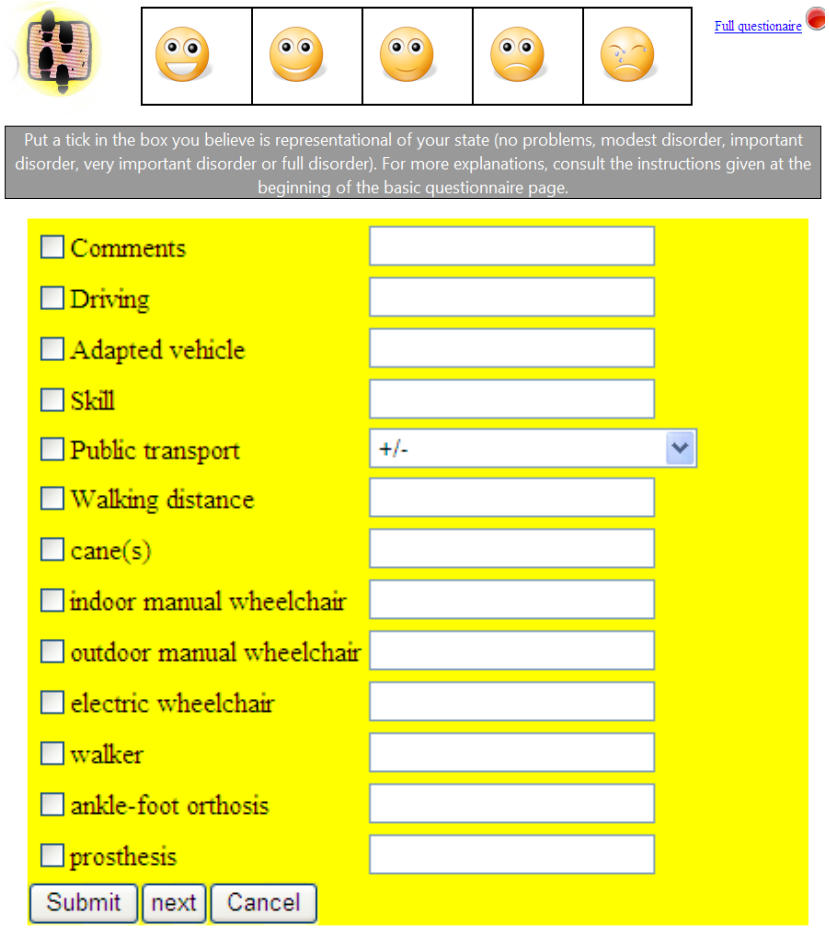


AAATE (Rybarczyk et al., 2011)


Clients
- Fill in questionnaires,
- Simple requests,
- Consult personal data...
SIMPLE USERS
PROFESSIONAL USERS
- Creation and edition of questionnaires,
- Complex requests to the DB,
- Consult patients' data...
Data filtering and anonymization
www
"Medical record"
FRONTEND
DOCUMENT COMPONENT
BACKEND
DATABASE
Patient identity DB
Questionnaires' DB
Questionnaires' results DB

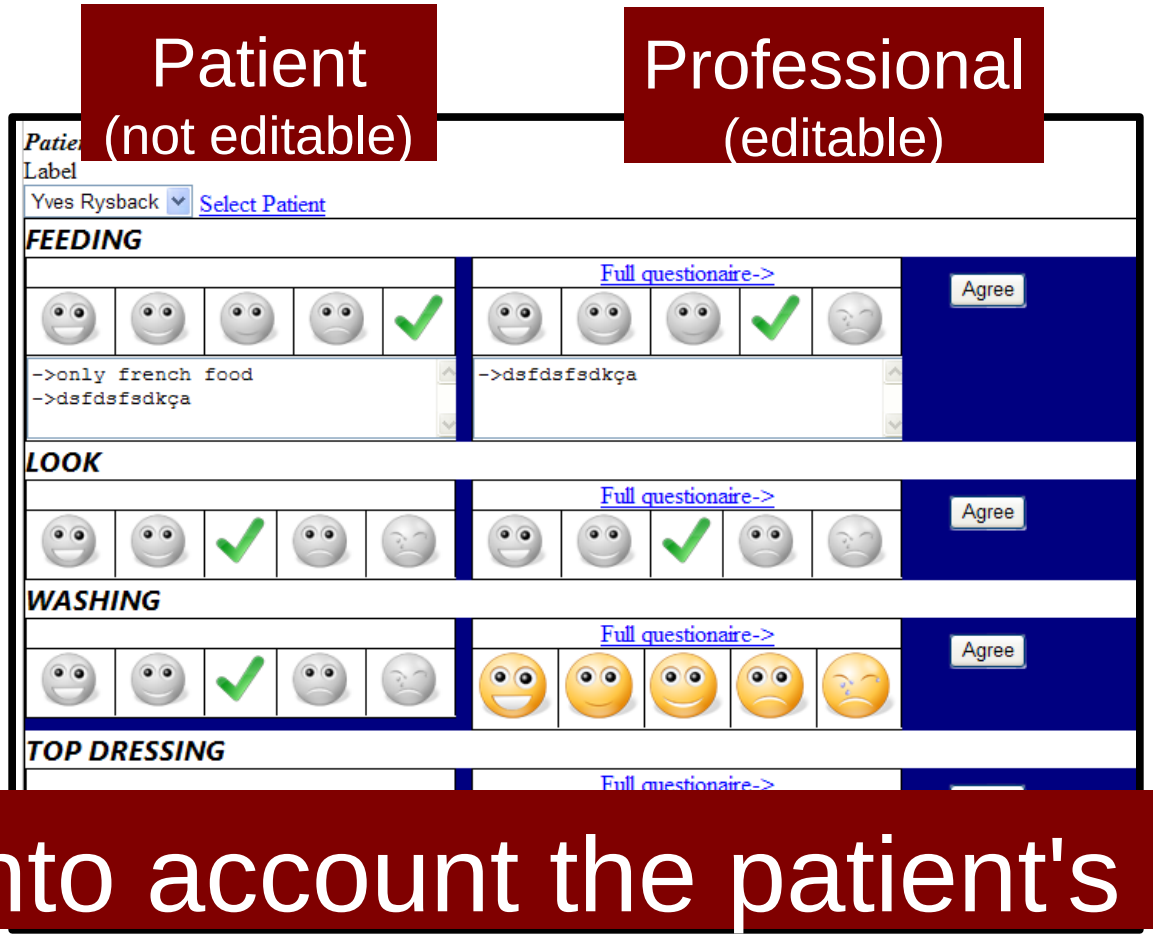
Proyecto e-ESPOIRS-Handi

- **Interface del paciente**



Proyecto e-ESPOIRS-Handi

- **Interface del médico**



Take into account the patient's opinion