# AEPS Cognitive Ergonomics

- Teaching: Rossana Actis Grosso
- The course consists in 56 hours of "frontal lessons": basic concepts of cognitive ergonomics with brief refresher of most relevant aspects in cognitive sciences (perception/memory/attention/reasoning).
- "Continuous" exercises (which means interactive lessons)

# AEPS Cognitive Ergonomics

- Due to "Covid-situation" lessons are also on-line and record of the lesson will be available on e-learning.
- Suggested time-table: break before, after...

# AEPS Cognitive Ergonomics

- IT IS NOT MANDATORY TO ATTEND THE COURSE (but is highly suggested)
- STUDENTS WHO WANT TO TAKE THE FINAL EXAM WITHOUT ATTENDING LESSONS SHOULD STUDY THE FIRST 13 CHAPTERS OF BENYON (2010). Designing Interactive system. Pearson (also available as digital resource). Reading of Norman's "Design of Everyday Things" and "Emotional Design" is recommended (for all).

# AEPS Cognitive Ergonomics

- Why attending lessons?
- DIFFERENCE BETWEEN TO KNOW AND TO KNOW HOW: Students who attend lessons could develop a project as final exam. The project should consist in a written report and a presentation showing also the comprehension of basic concepts and methodologies.

# OUR OBJECTIVES

By the end of the course, students should:

1) be aware of the implications of psychological research for improvir the design and evaluation of computer systems;
2) be able to explain the importance of user-centred design;
3) consider how technologies should be designed to support communication and collaboration, and how their design can affect these processes;
4) consider how technologies can affect user experience and how they can encourage changes in behaviour;
5) be able to apply major theories in cognitive psychology to practical case studies;
6) communicate ideas and research findings by written means;
7) group work.

# Team working and work team

To be able to work in group essentially means being able to transform possible conflicts into strengths: taking advantange of diversity so to develop new ideas.

# FINAL PROJECT

## 1) Object

The object of the final project is deliberately undefined.

You could work on a non-technological object, on an interface, on an app, on a social site, on a service ….

You can develop a new idea, or analyze a product already existing, or make a comparison between two objects/systems/ services

# FINAL PROJECT

## 2) Methods

You are asked to apply one (or more) methods of ergonomics BUT ALWAYS WITH A FOCUS ON COGNITIVE ASPECTS: apply major theories in cognitive psychology to practical case studies, using methods proper of psychological research.

# FINAL PROJECT

## 3) Practical aspects

The project consists in a written report AND a (ppt) presentation: both should be presented as you would do with a client.

However, the report should have more connections with theoretical aspects than a "company" report.

You could do the project (highly recommended) together with others (two or three students maximum)

# COVID ADDENDUM

Due to the fact that work remotely is reductive, some addendum are requested for the final exam.

1) Before the final exam. An essay on your experience with technology during this "Covid period", with a special focus on remote lessons (device, software, context, strengths and weaknesses, suggestions, errors)
2) During lessons/time. Presenting a paper of your choice.

# FINAL EXAM

Presentation of the project (20 minute)+report (including theoretical motivation for methodology/focus etc.)+"covid report"+1 or two points for the paper. Revisions of the project are recommended to have a "high" score: do not be shy, show me your "work in progress".

# Nice to meet you!

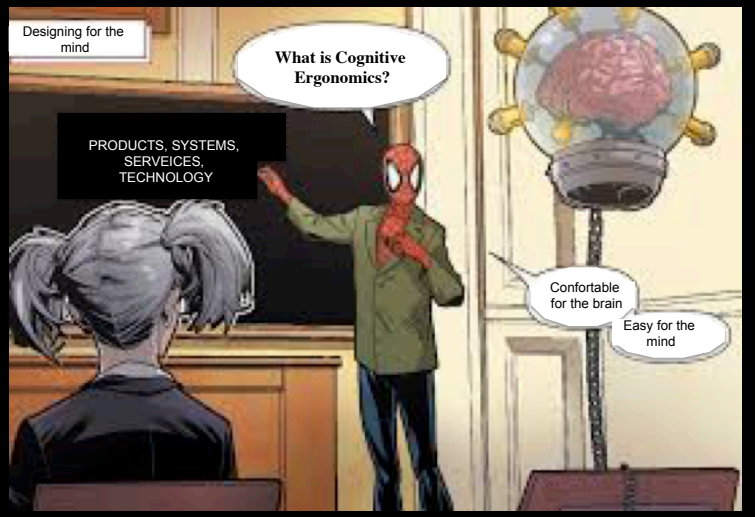
Introduce yourself: your name, your background, your interests, if there is a field that you would like to deepen and finally...

What is ergonomics?

# What is ergonomics?

Is the science that helps designers in developing confortable products.

Is the science of WORK (ergon).




# What is (cognitive) ergonomics?

Exam textbooks are representative of the developements made by the discipline: initially focused on the efficiency of the worker, then moving the focus on the product….

# Ergonomics

It has been founded as the science of work (ergon): at the begininning the focus on human being was essentially on "the worker", with the purpouse of increasing the production of each worker (assembly lines, errors, work places): in a pleasant environment the worker produces more (and better).

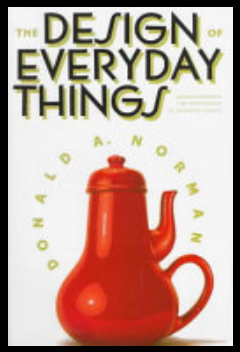
Thus, at its origin, Ergonomics has been developed with the aim of optimizing productivity of human work.

Slowly, the focus moved from the human being as a worker to the human being as a buyer/ customer.

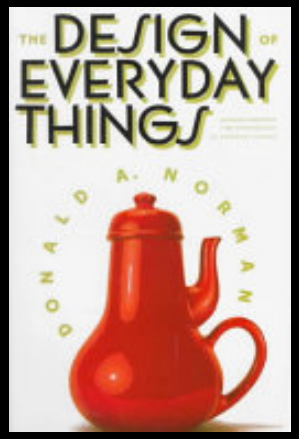
Soon, researchers realized that what ensures the fortune of a product is not necessarily its "goodness": customers chose on other basis.

Which ones?

## The "first" Norman: the design of everyday things




In 1988 Norman published a breakout book. In his book Norman underlines that everyday objects are designed without considering human cognitive constraints and natural/cultural biases.




He wanted to found the Psychopathology of Everyday Things (PET): as Freud, to start from "little thingds" to put in evidence big problems.

## What about you?

Try to think about some "everyday thing" that is problematic for you.

## Difficult?

More difficult than expected...This happens because we always blame ourself: “the problem is not related to object or technology (and their bad design), the problem is ME, I did not understand how they work” (now I do it and I do not have any problem).

## Learned helplessness

This is one of the key concept in cognitive ergonomics: learned helplessness (originally clinical), when we blame ourself when instead we should realize that objects should be designed to make our life easier (and thus we should not waste our time to understand them..)

## Examples...

Washing hands in a public toilet

Coffe at vending machines

Doors...

- PSYCHOANALYSIS: starts from little and meaningless manifestations as dreams, tic, lapsus, mishaps

- PET: starts from little and meaningless manifestations as opening a door, washing hands, switching a light…

## User Centered Design

In those years, USER CENTERED DESIGN has been founded: conquered by Norman's ideas, several designers decided to move the focus of design (both in its theoretical conception and in the final implementation) from the product (object) to the user (human). They realized that to this aim they need an expert of human being in their team.

- Machines should be human-sized: the term "human/machine interaction" became more and more common and in this perspective the "technician" (engineer, computer scientist, designer) is the expert of the machine, while the psychologist/ergonomist is the expert of the human being.

Consequently, Ergonomics has developed with the aim of building a bridge between the designer and the user.

The designer has the goal to project the environment (in its multiple meanings: an airport, a computer, a bag…), whereas the user not only obviously uses it, but more importantly is PART OF THE ENVIRONMENT/interaction.

## User centered design and usability

In those years the concept of usability becomes crucial: the focus of design is now on the interaction.

It is on this background that cognitive ergonomics has been developed.

*Cognitive* because it reminds to designers limitations and strengths of different human cognitive areas: perception, memory, attention…why?

- However, in doing this Cognitive Ergonomics left out some important aspects of human behaviour: emotions, instinct and "beautiful things" (aesthetics).
- Soon designers and reasearchers became aware that is also – and sometimes exclusively – on these basis that people chose with which items (and "machines") surround themselves.

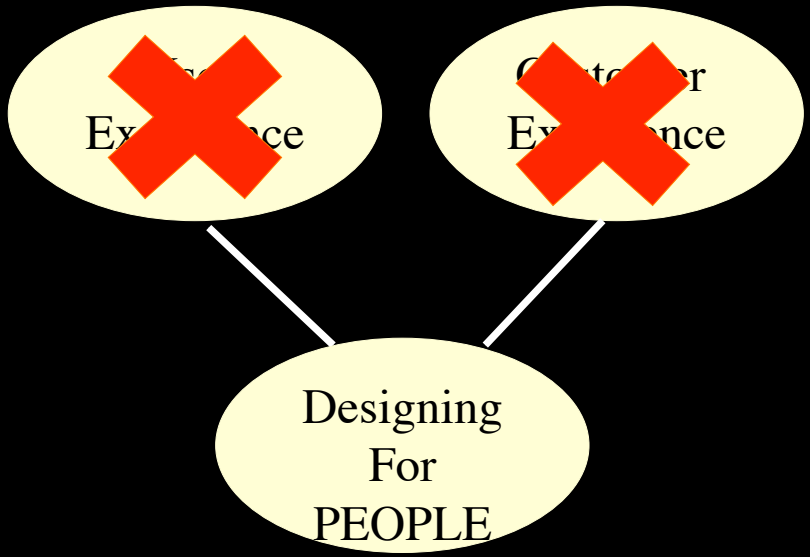
## The "second" Norman: emotional design


In this book Norman aknowledges that his previous ideas, based on functionality and usability, were limitate and limitative: one cannot ignore the pleasure that every day objects give us (or DO NOT give us). What we are (our identity) is also determined by what we use: we chose and like our "things" not only for their function, but also for the sensations they give us.

- After this book, we no longer talk simply about usability.
- USER EXPERIENCE is the term more frequently used to indicate the real objective of each designer.
- This means that now Cognitive Ergonomics deals with two different areas of interest

1) The first one is still related with work, and is mainly focused on health and safety at work, job security, efficacy and efficiency, psychosocial risk and stress, work- and mental-load
2) The second one is more similar to HCI: designing for the interaction with a focus on the cognitive processes of humans

- We will focus on HCI because is my field of expertise (not because is more important) but the reason why we still call it Cognitive Ergonomics is because I would like to stress the role of the psychologist in designing things and systems FOR HUMANS.



# Cognitive ergonomics: Introduction to basic concepts

Ergonomics could be conceived as the body of law that rules an interaction (which is no longer limitated to work) between different systems.

Actually, the term today denotes

the discipline that study the best way to integrate human activity, artifacts or device and the environment where the interaction takes place.

# Cognitive Ergonomics

With the word "cognitive" we usually (but not necessarily) refer to the role of that processes working at a conscious level and usually part of our knowledge (perception, attention, memory, thinking and reasoning, etc.)

# Cognitive Ergonomics

This implies that with the term Cognitive Ergonomics we could mean two different things (even if we remain in our "HCI" domain):

1) Profession. The design of human-machine interfaces that takes into account user's cognitive processes, also in relation to the environmental conditions into which the interaction will take place;

2) Research. The study of cognitive processes involved into the interaction, both in terms of cognitive bias and of possible inhibition/facilitation (or more in general change/modulation after- or during - the interaction).

# Cognitive Ergonomics

More recently, both the approaches are also addressing the interaction in a social perspective, both in terms of professionality (i.e. how the social environment possibly change the interaction) and of research (i.e. how the interaction change the social environment, or is implicitily influenced by it)

EXAMPLES?