Some topics brought into design by the focus on UX are:

ENGAGEMENT
PLEASURE
AESTHETIC
ATTACHMENT
SENTIMENT (service design)
LIFE STYLE

Questions to think about (food for thought)

- What do we mean when we talk about environment?
- Think about possible ergonomical interventions focused on an urban environment.
- What is it meant with "virtual environment" and "real environment"?
- How virtual is a virtual environment (and how real a real environment)?
- Levels of interaction between virtual and real.

A little exercise

- Find 3 products or interactive systems.
- Let's discuss about the aspects that you like and those that you dislike.
- Think about the whole experiences (and not only to functions): is that what you want? It is funny?

The profession of ergonomist

- Several masters in HCI, UX design, Service Design… nothing specyfically focused on THE HUMAN SIDE (Psychology, Cognitive Ergonomics).
- Our course could be a good place to start focusing with EXPERIMENTAL PSYCHOLOGY on different aspects of the interaction with products, also working on individual differences (not necessarily related with groups), implicit attitudes and so on, in order to develop efficient environments and products really "human-sized".

Being a professionist…just few words

- Professionaly, an ergonomist should have a large theoretical background: technological, biomedical and psycosocial. In Europe, he/she should know the specific legislation ISOCEN-UNI (which defines the standard, technical rules defined by bodies recognized by international, european and national laws).

In the last decade there is a tentative process to define (also in Italy) a certificate to accomplish the european standard (European Ergonomist, Eur-Erg).

Criteria are not yet well defined: candidates will be evaluated by a specific commission inside the SIE. The Commission will decide whether to present them to the Centre for Registration European Ergonomists (CREE) in order to obtain the certification Eur-Erg.

Main Journals in Ergonomics and Human Factors.

- Applied ergonomics
- Applied Occupational and Environmental Hygiene
- Behaviour & Information Technology
- Cognition, Technology & Work
- Ergonomia
- Ergonomics
- Ergonomics Abstracts
- Human - Computer Interaction
- Computers in Human Behaviour
- Human factors
- International Journal of Aviation Psychology
- International Journal of Fatigue
- International Journal of Human Computers Studies
- International Journal of Human Factors in Manufacturing
- International Journal of Industrial Ergonomics
- International Journal of occupational safety and ergonomics
- Safety science
- The SIGHCI Bulletin
- Theoretical Issues in Ergonomics Science (TIES)
- Work & Stress

Table of contents of Ergonomics, 61, 2018

- The process evaluation of two alternative participatory ergonomics intervention strategies for construction companies
- Conceptual frameworks for the workplace change adoption process: elements integration from decision making and learning cycle process
- Associations of office workers' objectively assessed occupational sitting, standing and stepping time with musculoskeletal symptoms
- Association between objectively measured static standing and low back pain – a cross-sectional study among blue-collar workers
- Impact of SCBA size and fatigue from different firefighting work cycles on firefighter gait
- A comparison of economy and sagittal plane trunk movements among back-, back/front- and head-loading
- Pre-obesity and obesity impacts on passive joint range of motion
- Effects of age and body mass index on breast characteristics: a cluster analysis
- Transmission of vibration through glove materials: effects of contact force
- The effects of physical vibration on heart rate variability as a measure of drowsiness
- Driving in an urban environment, the stress response and effects of exercise
- Agency modulates interactions with automation technologies

Table of Contents: Cognition, Technology & Work, 9, 2017

1. Challenges to remote emergency decision-making for disasters or Homeland Security
2. Groups at work: lessons from research into large-scale coordination.
3. Information flow during crisis management: challenges to coordination in the emergency operations center.
4. Large-scale coordination: developing a framework to evaluate sociotechnical and collaborative issues.
5. Pre-requisites for large scale coordination.
6. Strategies for designing distributed systems: case studies in the design of an air traffic management system.

Table of Contents: Human Factors, 49, 2017

- Each title arises a possible set of problems for psychology, which could be experimentally addressed.
- If you like, I think a good exercise for you is to look inside one (or more) of these journals (especially Ergonomics, Cognition, Technology and work, Human factor, Computers in Human Behaviour), individuating possible experimental problems.
- A sort of self-made lab or, if you prefer, a research project.

Introduction to basic concepts: INTERFACE

- A good interaction between a human being and a system is due to the quality of the interface (Raskin, 2000).
- An interface is WHATEVER ALLOWS THE COMUNICATION BETWEEN DIFFERENT SYSTEMS, and is not necessarily visual (graphical interface), but could also be vocal, tactile etc.

Another little exercise

Let's describe the interface – and possible problems - of:

1)A remote control

2)A microwave

3) A lift

The Interface

Norman says that, whatever the interface is, objects should be able to give to the user indications for their use.

When an object is not eliciting the correct response, or when it necessities of labels or explanations, this means that it has been designed without taking into accounts limits and potentialities of the human cognitive system.

The interface

Those aspects are important because the interface is all those parts of the system with which people come into contact, physically, perceptually and conceptually.

1. Physically we might interact with a device by pressing buttons or moving levers and the device might respond by providing feedback through the pressure of the button or lever.

The interface

2) Perceptually the device displays things on a screen which we can see, or make noises which we can hear, where perception is at a higher level than sensation.

3) Conceptually we interact with a device by trying to work out what it does and what we should be doing. The device provides messages and other displays which are designed to help us to do this.

The interface

- The interface to an interactive system needs to provide some mechanisms so that people can provide instructions and enter data into the system: “input”.
- It also needs to provide some mechanisms for the system to tell people what is happening by providing feedback and mechanisms for displaying the content: “output”. This content might be in the form of information, pictures, movies, animations and so on.

The Interface

To this aim, Norman identifies three different kinds of model which take part during the interaction with technological devices:

1) User's mental model
2) System Image
3) Designer's conceptual model.

The user's mental model is a mental representation that user develops through interacting with the system (necessary to the user for planning actions to do on the system) and it is based on the system image, which is in turn based on all the elements of the system: physical aspects, interaction style, form and content of the information (input and output).

System conception (designers' mental model) is the model that the designer made to create and implement the system.

This implies that a good model should be based on a conception derived by an analysis of the user and of the tasks he/she will be perform.

- The spatial disposition of elements in the graphical interface is a good challenge for verifying if this is true: a disposition that fits user's expectations (and way of reasoning) could facilitate the interaction.
- For example, a well done interface should facilitate visual search strategies to find relevant elements for a given task.

- In other words, the representational structure chosen to present information has a crucial influence on users' performance in a given cognitive task

The cognitive artifact

- A central notion is that of Cognitive Artifact: an object made by humans with the aim of facilitating and improving cognitive processes.
- A distinction could be made between superficial artifacts (as a sign) where the representational content is completely visible, and internal artifacts, where part of relevant information is represented inside the artifact.
- In the last case we need some means to transform hidden information in usable superficial information.

The cognitive artifact

Unfortunately, no theory or model is good enough to tell us how to create a "good" artifact in a non-critical way.

There are no deterministic laws: every law accepts exceptions.

In other words, no methods is neutral.

Thus, the methods for investigation (or research methods) in Cognitive Ergonomics should:

- Identify relevant variables in the interaction between an individual and the system (description);
- Identify relations between variables, so to discover real (or potential) inconsistencies (problem);
- Foresee the "side conditions", that is when and if a problem will come out (predictions);
- Verify if the implemented solution is efficient (evaluation).

- Obviously, what we want is that our analysis results in a stable structure, that do not change with different users or with a larger sample, and that could thus be used to realize an interface whose value could be generalizable to all the population (target/prospect/stakeholders).
- To this aim it is also necessary to understand all the phenomena connected with mental (work)load.
- To optimize the allocation of mental load could reduce the possibility of human **error** and increment the safety, productivity and satisfaction of people (workers).

Introduction to basic concepts: errors and their measurement

The concept of error is crucial for both Cognitive Ergonomics and HCI. Generally, it is crucial for UCD.

Machines are never wrong (they do not do any error).
If a machine makes a mistake/error, this is due to (a) malfunction/breakdown; (b) a defective implementation/construction, or (c) a design error (human error).

Who is better: man or machines?

Machines are never wrong because their nature is deterministic: to a given input there is always a given output.

Machines can do the same operation an infinite number of times, and always with the same rigour.

Humans instead could be wrong, are not constant, they easily get tired, and are easily distracted….

Machine centered design

Machines	Humans
Precise Tidy Non-distractable Non-Emotional Logical and rationale	Sloppy and Sketchy Untidy and Disorganized Subjects to multiple distractions Emotional (Often) non-logical and non-rationale

Human Centered Design

Macchine	Uomini
Predictable Rigid Unsensible to change Unable to put things in context Without imagination	Creative Tolerant Sensible to change Easily adaptable Full of resources

Adaptated from Norman, 1993.

The dream of IA is to create machines who could reason, take decision and create an image of the world similar to ours.

The problem is that flexibility means also approximation, with the possibility of being wrong (and making mistakes).

Is a machine like that useful? What benefits we could have from a “creative” machine which is also imprecise?

What we really want is to implement the capacity of understanding changes (and to consequently adapting in a flexible way), BUT WITHOUT ERRORS.

Machines complement humans and are at our service, not the other way round. They guarantee precision.

The solution is to design machines easy to use and human sized.

Machines not designed for sobstituting people, but to complement humans so to expand our capacities.

Having “intelligent” machines (but affordable and precise) means NOT to mimic human behaviour.

Do we really want a machine working as our brain?

AFFECTIVE COMPUTING

What do you know

What do you think