

## Focus on the Human

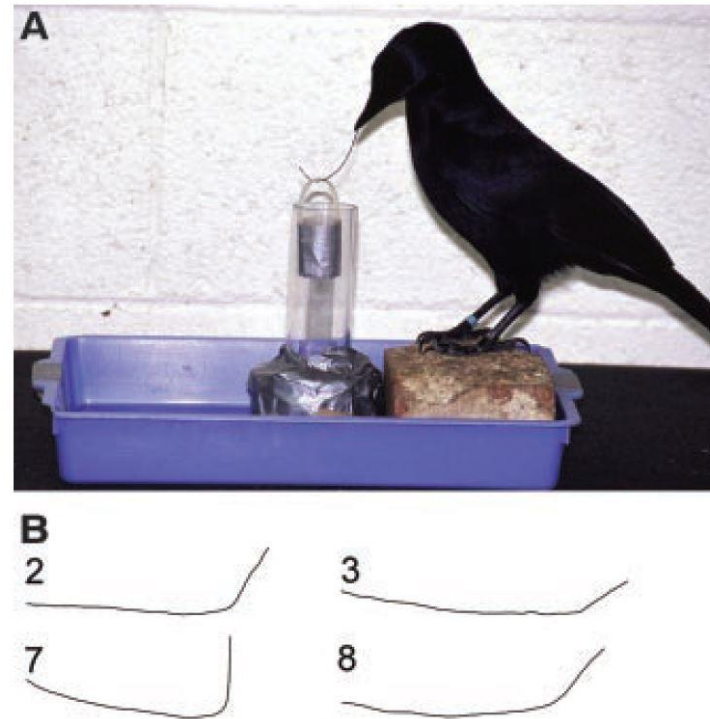
# Learning Goals

- Understand ...
  - the basic activities in a human centered design process
  - what are potential products in the design process
  - what typical design objectives are
- Be able to
  - explain design products and design objectives in the context of a real world scenario
  - explain the key principles for usable systems by Gould and Lewis
  - discuss the statement “Make Mistake Early and Recognize Them” in the context of usability

# We build tools that extend our abilities

## Tool use, intelligence, and evolution

The way humans make and use **tools** is perhaps what **sets our species apart** more than anything else. Now scientists are more and more uncovering the forces that drove our lineage to our heights of tool use — and how **tool use**, in turn, might have **influenced our evolution.**”



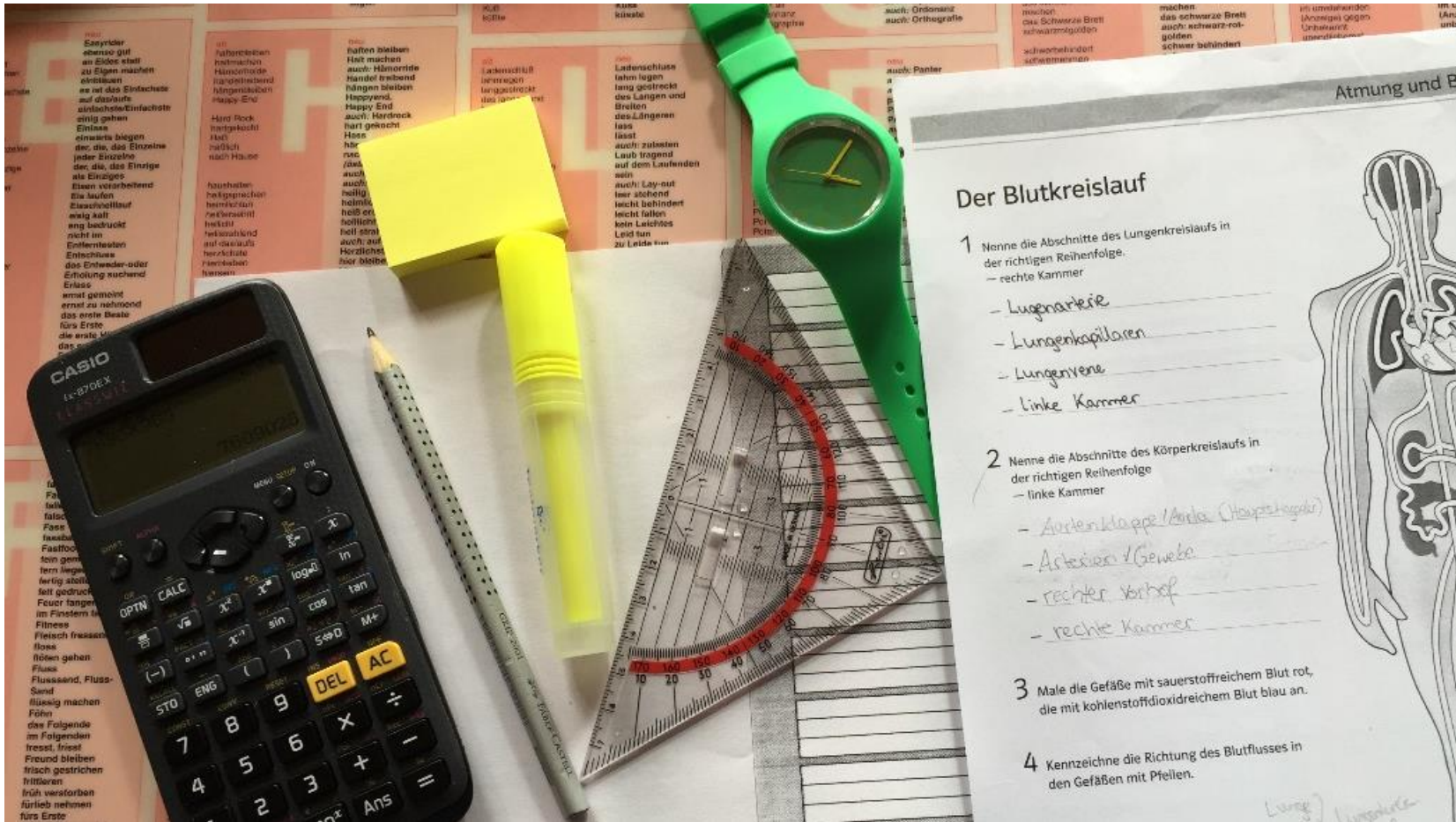
Charles Q. Choi. 2009. Human Evolution: The Origin of Tool Use Live Science, November 11, 2009.

Weir, A.A., Chappell, J. and Kacelnik, A., 2002. Shaping of hooks in New Caledonian crows. *Science*, 297(5583), pp.981-981.



# Tools to Augment Cognition

Tool use, intelligence, and evolution



# It is not Simple to Make Good Interactive Products!

Examples are all around us..., some basic misconceptions

- If I (the developer) can use it, everyone can use it
- If our non-technical staff can use it, everyone can use it
- Good designs/user interfaces are applied common sense
- A system is usable if all norms and style guidelines are met

That is why a process is required.

# How it does NOT work

## .... Don't fall for this

- Usability tests at the end when the product is ready and needs to be shipped
- Designing a new and pretty skin or look & feel to a product
- Introducing HCI issues after the system architecture and the foundations are completed
- Have the developers and testers test the usability of the system

# Creating Interactive Systems

## Structured process along the development cycle

- An interior designer can not make a great house if the architect and engineers forgot windows, set the doors at the wrong locations, and created an unsuitable room layout.
- Creating the user interface at the end of the project will not work – it has been considered from the very beginning.



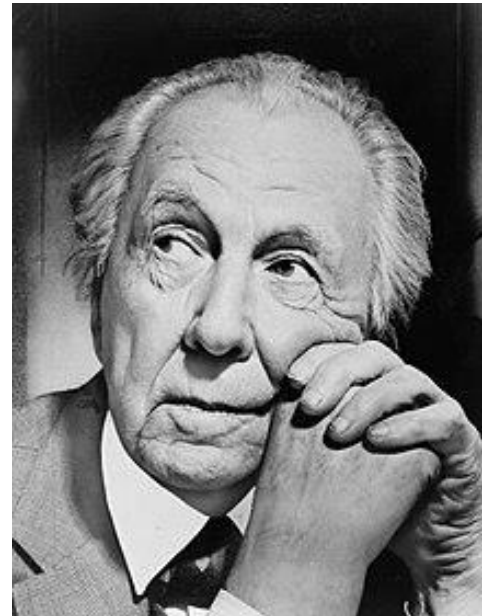


# Make Mistake Early and Recognize Them!

Early involvement is key

Frank Lloyd Wright

“You can use an eraser on the drafting table or a sledgehammer on the construction site.”



Slide Adapted from Lewis Chuang



# Focus on Technology or User?

## Cylinder or Disk?



- Thomas Alva Edison (1880)



- Emile Berliner (1887)

# Focus on Technology or User?

## Cylinder or Disk?

### Benefits of the disc

- mass-production
- less storage space
- easier shipping
- allow double-sided recordings
- better marketing (famous artistes)

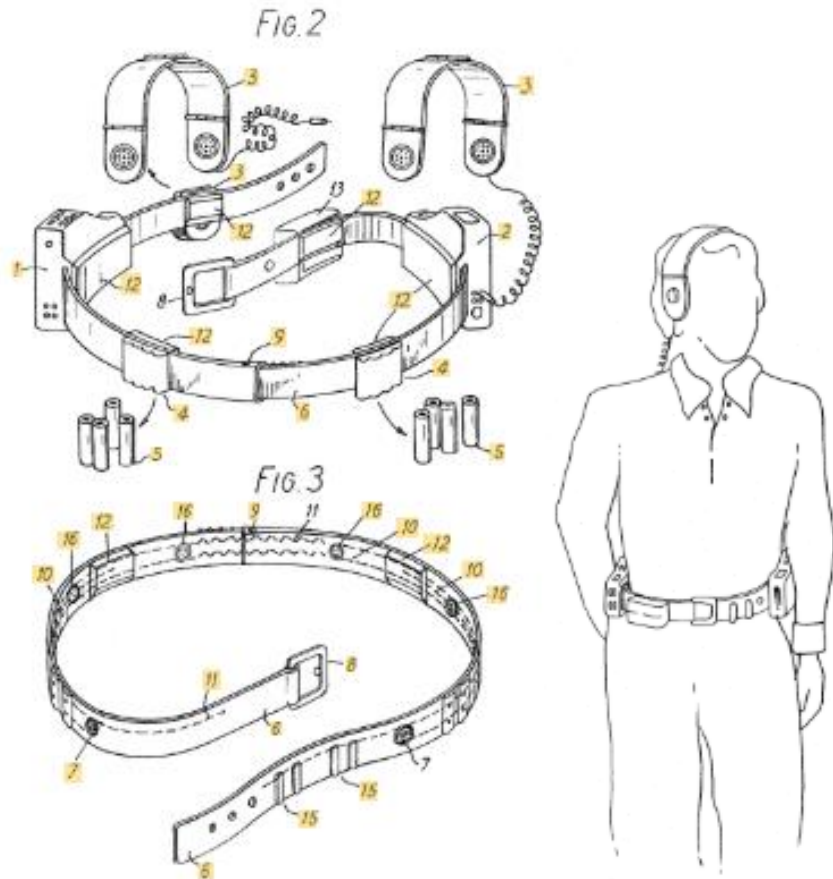


- Emile Berliner (1887)

# Personal and Mobile Stereo Music Players

## Mini-Exercise: Stereo-Belt vs. Walkman

U.S. Patent Oct. 25, 1983 Sheet 2 of 3 4,412,106



Sony TPS-L2 (1979) by Binarysequence  
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Slide Adapted from Lewis Chuang



# Design products

- Interfaces
- interactions
- environments
- tasks and processes
- user experience
- organizational structures
- society
- needs





# Why to design?

## Design objectives

- create new products, systems, & experiences
- improve existing products
- ensure safety: features and training
- develop performance support
- develop methods for training and assessment
- guide team and organization formation



# Designing for Usability

## Key Principles by Gould and Lewis, 1985

- “Any system designed for people to use should be **easy to learn** (and remember], **useful**, that is, contain functions **people really need** in their work, and be **easy and pleasant to use**.”
- “...three principles of system design which we believe must be followed to produce a useful and easy to use computer system [...]
  - Early Focus on Users and Tasks
  - Empirical Measurement
  - Iterative Design”

Gould, J. D., & Lewis, C. (1985). Designing for usability: key principles and what designers think. *Communications of the ACM*, 28(3), 300-311.

### RESEARCH CONTRIBUTIONS

Human Aspects  
of Computing

Henry Ledgard  
Editor

## Designing for Usability: Key Principles and What Designers Think

JOHN D. GOULD and CLAYTON LEWIS

**ABSTRACT:** This article is both theoretical and empirical. Theoretically, it describes three principles of system design which we believe must be followed to produce a useful and easy to use computer system. These principles are: early and continual focus on users; empirical measurement of usage; and iterative design whereby the system (simulated, prototype, and real) is modified, tested, modified again, tested again, and the cycle is repeated again and again. This approach is contrasted to other principled design approaches, for example, get it right the first time, reliance on design guidelines. Empirically, the article presents data which show that our design principles are not always intuitive to designers; identifies the arguments which designers often offer for not using these principles—and answers them; and provides an example in which our principles have been used successfully.

Any system designed for people to use should be easy to learn (and remember), useful, that is, contain functions people really need in their work, and be easy and pleasant to use. This article is written for people who have the responsibility and/or interest in creating computer systems (or any other systems) with these characteristics. In the first section of this article we briefly mention three principles for system design which we believe can be used to attain these goals. Our principles may seem intuitive, but system designers do not generally recommend them, as results of surveys reported in Section 2 show. The recommendations of actual designers suggest that they may sometimes think they are doing what we recommend when in fact they are not. In Section 3 we contrast some of their responses with what we have in mind to provide a fuller and clearer description of our principles. In Section 4 we consider why designers might not actually be using our design

principles. In Section 5 we elaborate on the three principles, showing how they form the basis for a general methodology of design. In Section 6 we describe a successful example of using our recommended methodology in actual system design. IBM's Audio Distribution System (ADS), and the advantages that accrued as a result.

### 1. THE PRINCIPLES

We recommend three principles of design.

#### Early Focus on Users and Tasks

First, designers must understand who the users will be. This understanding is arrived at in part by directly studying their cognitive, behavioral, anthropometric, and attitudinal characteristics, and in part by studying the nature of the work expected to be accomplished.

#### Empirical Measurement

Second, early in the development process, intended users should actually use simulations and prototypes to carry out real work, and their performance and reactions should be observed, recorded, and analyzed.

#### Iterative Design

Third, when problems are found in user testing, as they will be, they must be fixed. This means design must be iterative: There must be a cycle of design, test and measure, and redesign, repeated as often as necessary.

### 2. WHAT SYSTEM DESIGNERS AND PROGRAMMERS ACTUALLY SAY

We began recommending these principles in the 1970's. Often the reaction is that they are obvious. Nevertheless, they are not usually employed in system design. Why? We wondered whether or not these principles were really obvious, or whether or not they just

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# Designing for Usability

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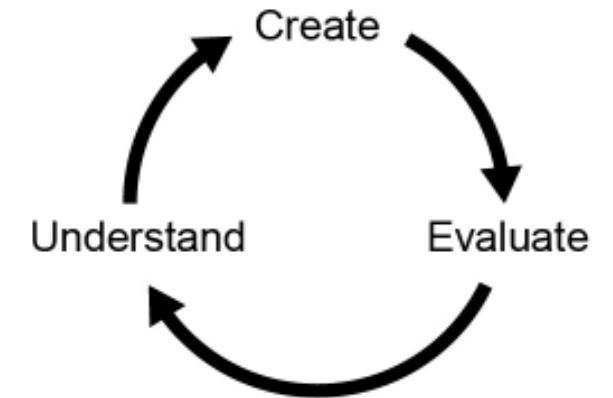
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# Four basic activities of interaction design

- **Identifying needs** and establishing requirements for the user experience
- **Developing alternative designs** that meet those requirements
- **Building interactive versions** of the designs
- **Evaluating** what is being built throughout the process and the user experience it offers







# Did you understand this block?

Can you answer these questions?

- Name the key principles for usable systems according to Gould and Lewis
- Give an example of an interactive systems design, that shows the importance of the statement “Make Mistake Early and Recognize Them”
- Describe typical design products and design objectives.
- What is the difference between design objectives and design products?
- What are the basic activities in a human centered design process?

# References

- Pavel, A. (1983). U.S. Patent No. 4,412,106. Washington, DC: U.S. Patent and Trademark Office.  
<http://www.google.com/patents/US4412106>
- Gould, J. D., & Lewis, C. (1985). Designing for usability: key principles and what designers think. Communications of the ACM, 28(3), 300-311.

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