Human-Computer Interaction

Methods

Introduction to HCI Methods

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What is HCI research?

What is considered HCI research?

» Primarily *empirical* or *design-based* research (or both), but there are other, less common types of contributions

» **Empirical**: Understanding phenomena from direct and indirect observation or experience *data*

» **Design-based** (aka "design research," "research through design"): Understanding a design space by exploring it and designing (and often also developing and evaluating) solutions *designs*

Types of HCI Contributions[1]

1. Empirical contributions — data > knowledge *

2. Artifact contributions — systems, design > knowledge

3. Methodological contributions — how

4. Theoretical contributions — theoretical > empirical

5. Dataset contributions — data > new research

↓ can contribute theoretically

6. Survey contributions — synthesis of other research

review

Key Concepts in Empirical Research

Who will we study?

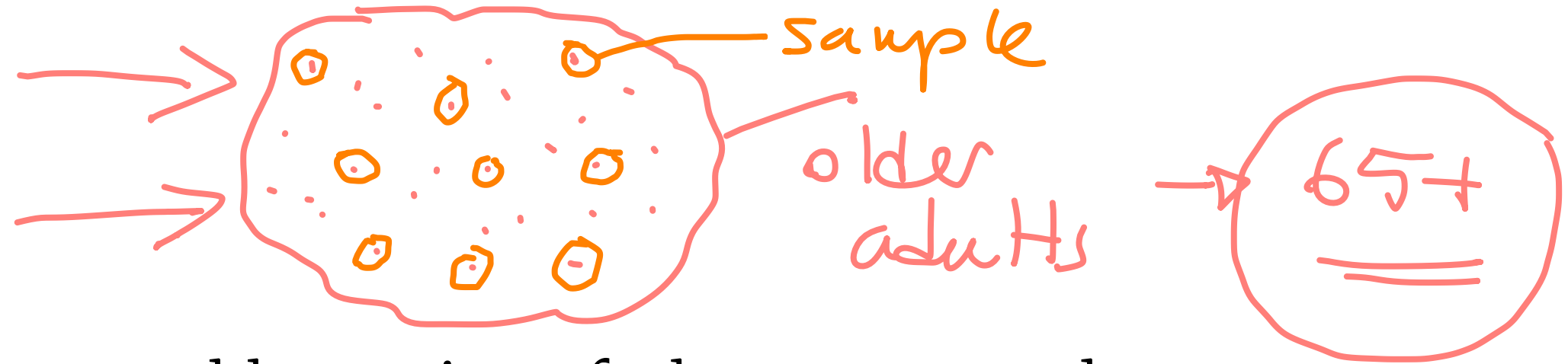» **Sample**: Which *individuals*, *groups*, and *interactions* to focus on?

How will we study them?

» **Goals**: Representation or generalization?

» **Context**: Where do we study phenomena?

» **Data**: What type of data should we collect?
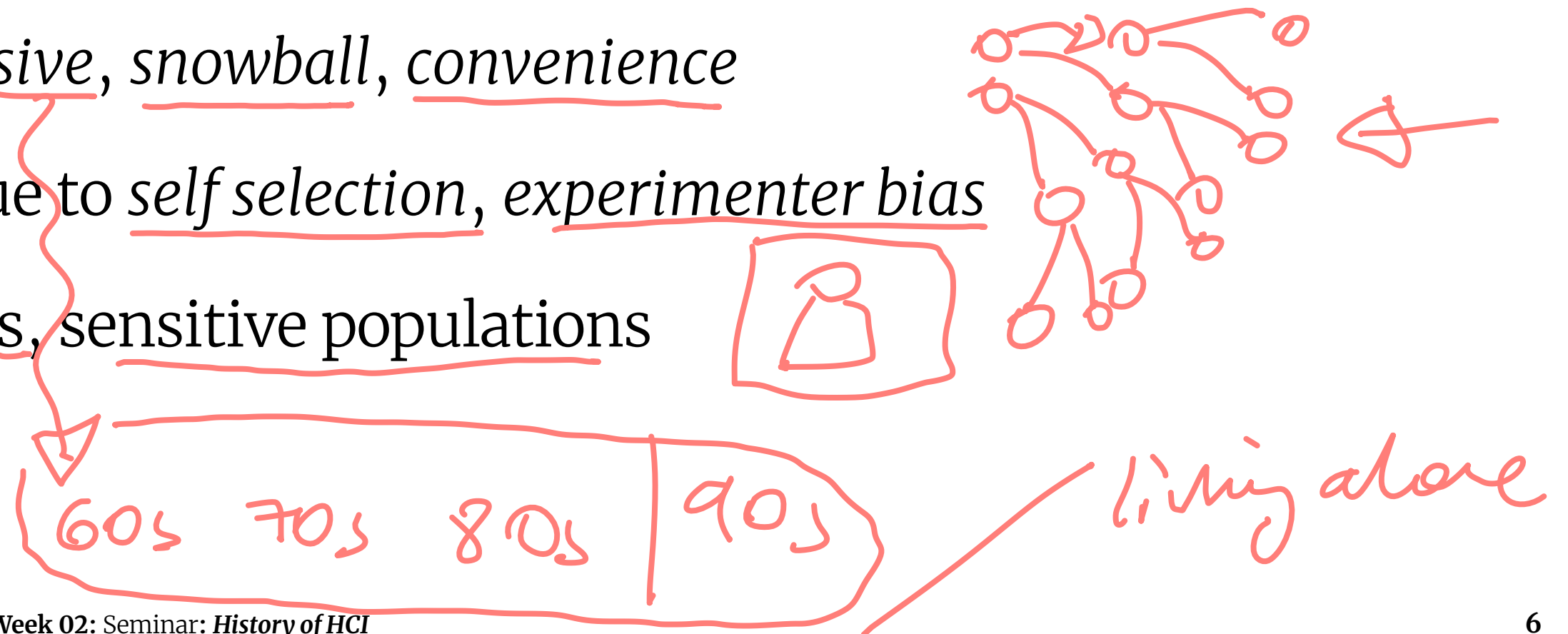
Sample

Definition: A smaller, manageable version of a larger group that represents the characteristics of a larger population.

Why do we bother with a sample? Because it is impossible to study everyone!

Types: *random*, *purposive*, *snowball*, *convenience*

Bias: Sampling bias due to *self selection*, *experimenter bias*

Issues: Research ethics, sensitive populations

Goals

What can I do with sampled data?

qualitative   quantitative

Representation: How does particular actors affect particular situations under particular circumstances?

» In-depth understanding of phenomena from *small samples* but *detailed analyses* toward *theory generation*

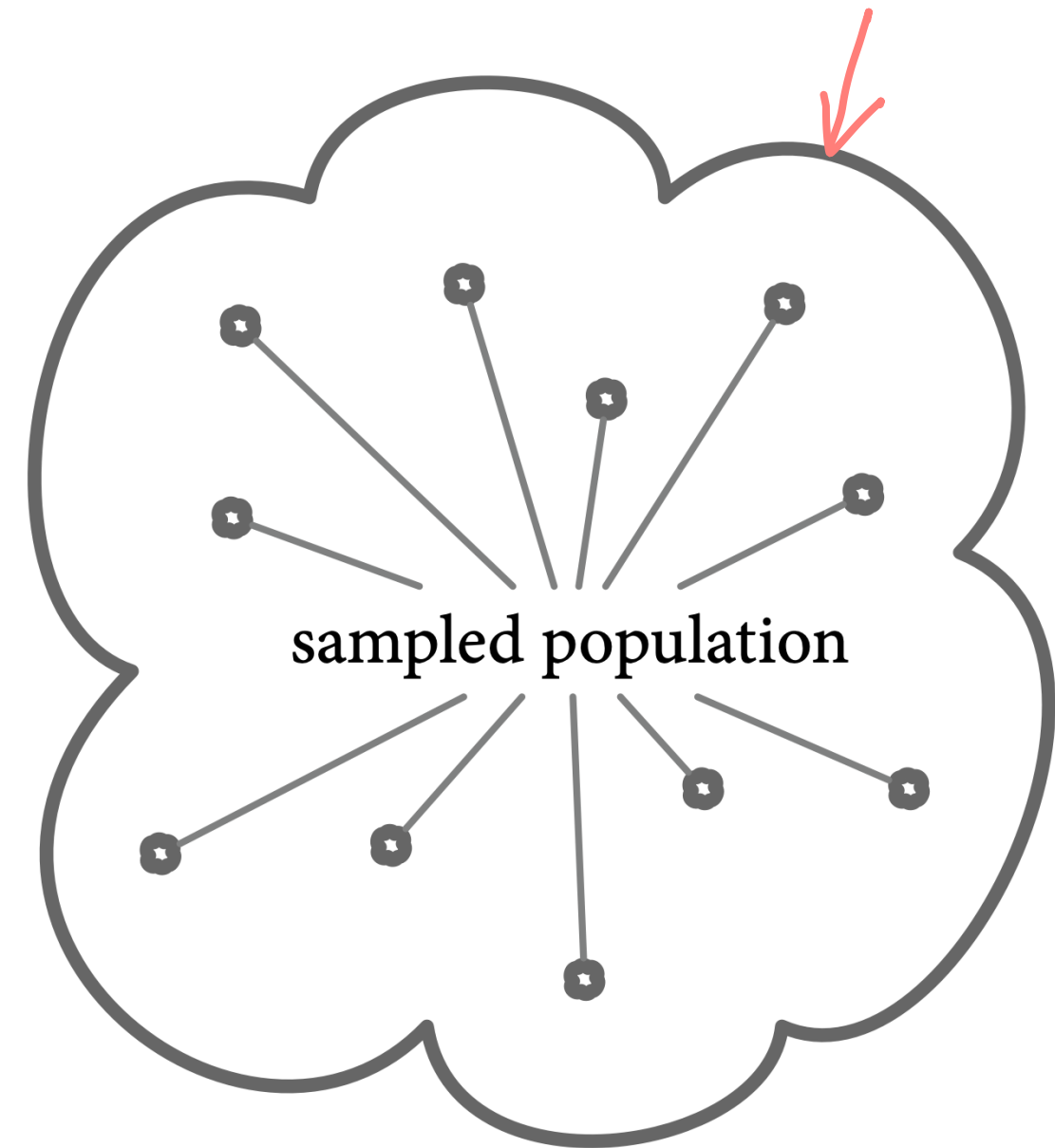**Generalization**: Are the findings from the sample applicable to the larger population?

» Hypothesis testing using *larger samples* toward *theory refinement*

Representation

Generalization

sampled population

larger population

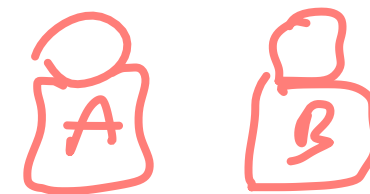sampled population
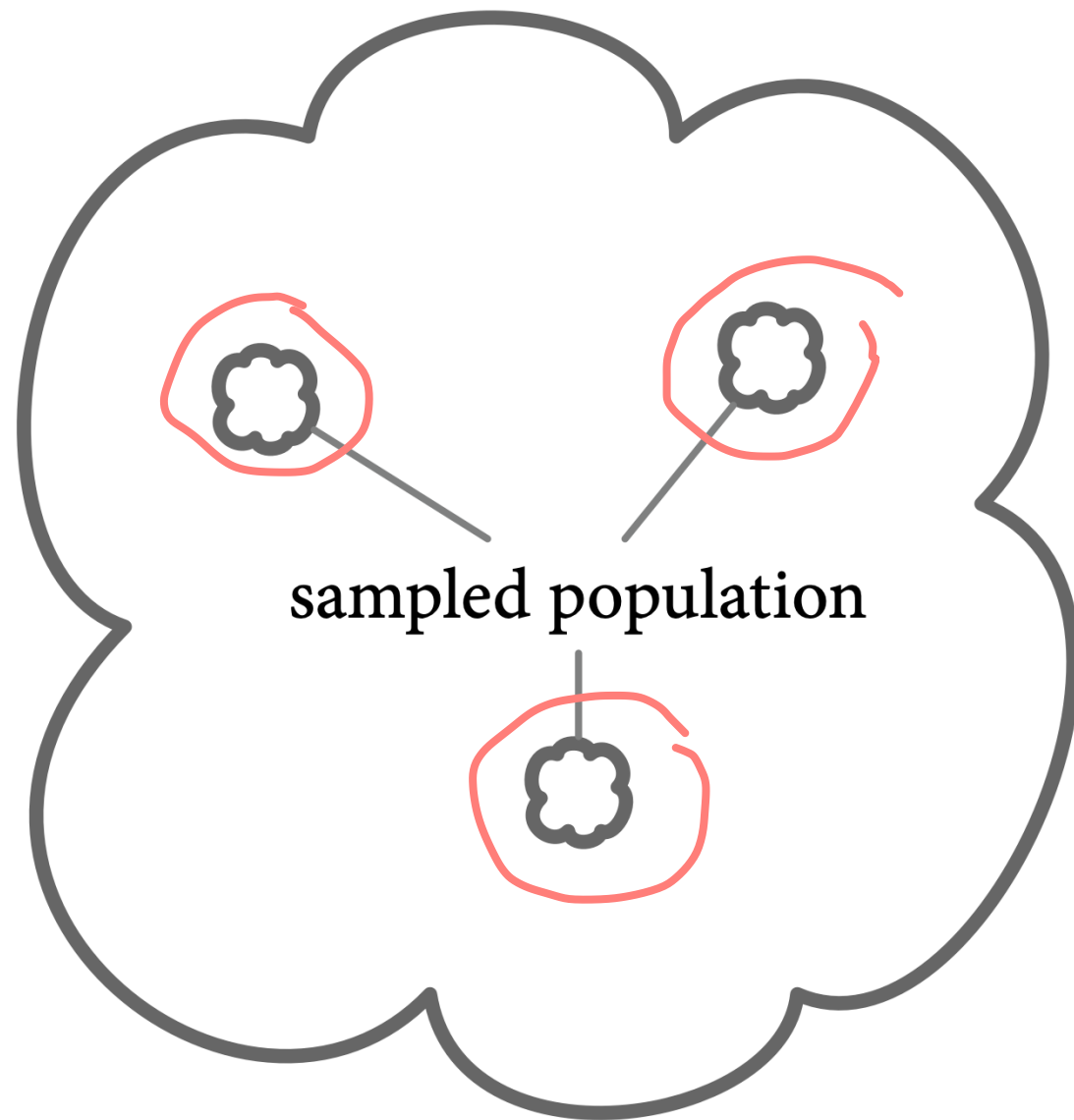
larger population

Context

Where do we study phenomena?

Natural settings: In the natural environment where phenomena occurs

» *Observational studies* involve *no control*

» *Field experiments* involve *limited control*

Simulated settings: In laboratory settings by simulating the circumstances that elicit phenomena

» *Controlled experiments* involve *high level of control*

that is targeted

week1 week2

Data

What data should we collect?

Qualitative: Rich, textual/multimedia data from observations, interviews

» *Data:* Fly-on-the-wall/participant observations, interviews

» *Analysis:* Qualitative coding, modeling, comparative analysis

Quantitative: Numerical data from surveys, task measurements, biometrics

» *Data:* Objective, subjective, behavioral measurements

» *Analysis:* Statistical methods
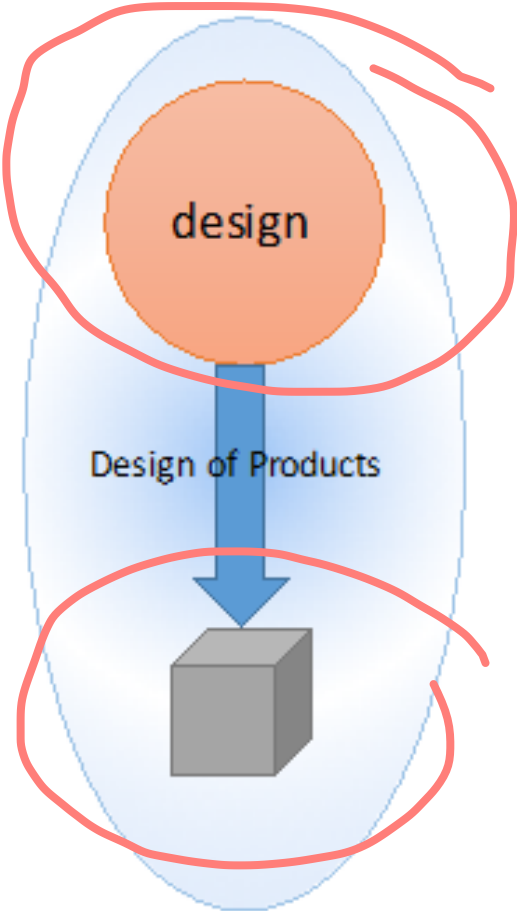
Key Concepts in Design-Based Research

Research *for* design: Carrying out research to inform the design of a product or service.
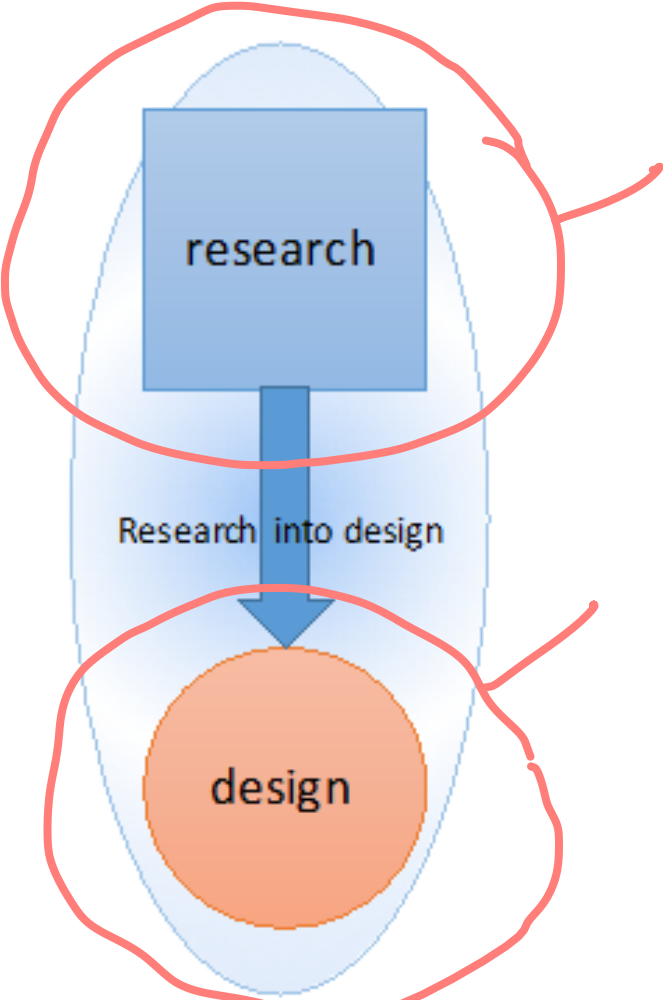
research → design

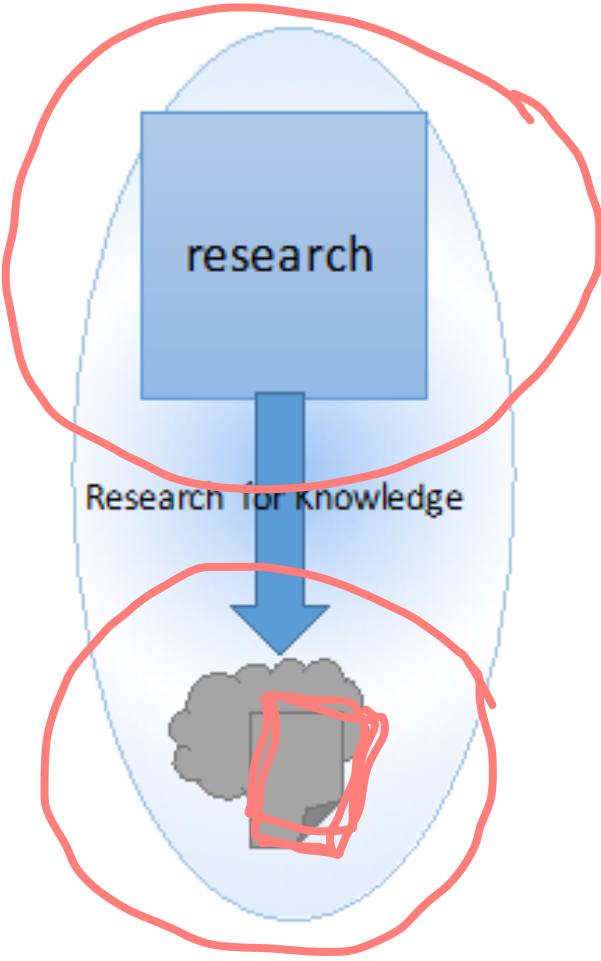**Research *through* design**: Carrying out design to create knowledge about phenomena.

design ≈ research

How should we think about design and research?[2]

design

Design of Products
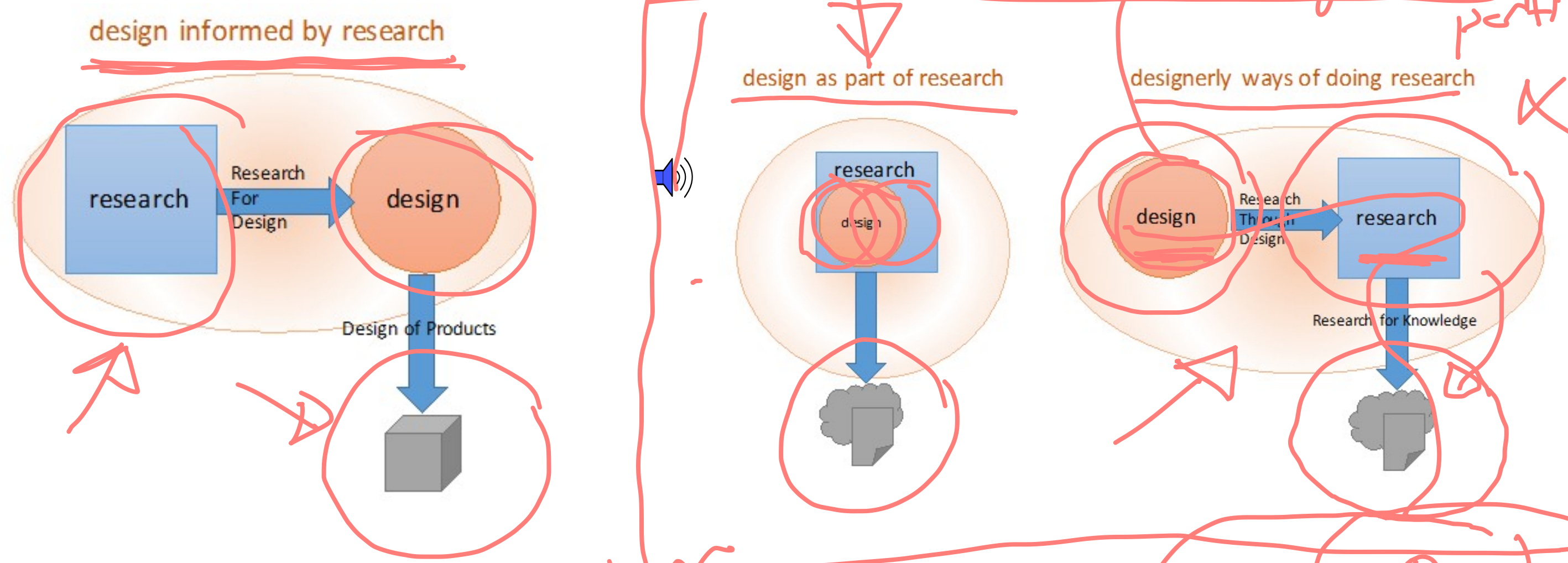
conventional design creating products

research

Research into design

design

research about design methods

research

Research for knowledge

conventional research creating knowledge

What is the relationship between design and research?[2]

design informed by research

research → Research For Design → design

Design of Products

design as part of research

research / design

designerly ways of doing research

design → Research Through Design → research

Research for Knowledge
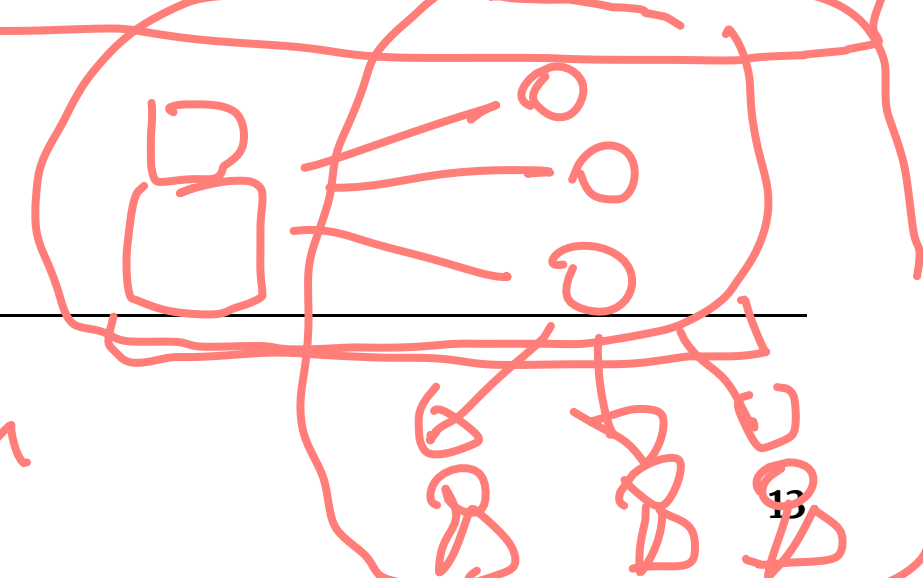
[2] Stappers & Giaccardi, 2014

Engineers

technical opportunities

technology

research/practice barrier

Anthropologists

field data

Interaction Designers

HCI Practitioners

HCI Practitioners

models

theory

unanticipated effects

research artifacts

HCI Practitioners

Behavioral Scientists

theory/model gaps

HCI Research Community

HCI Practice Community
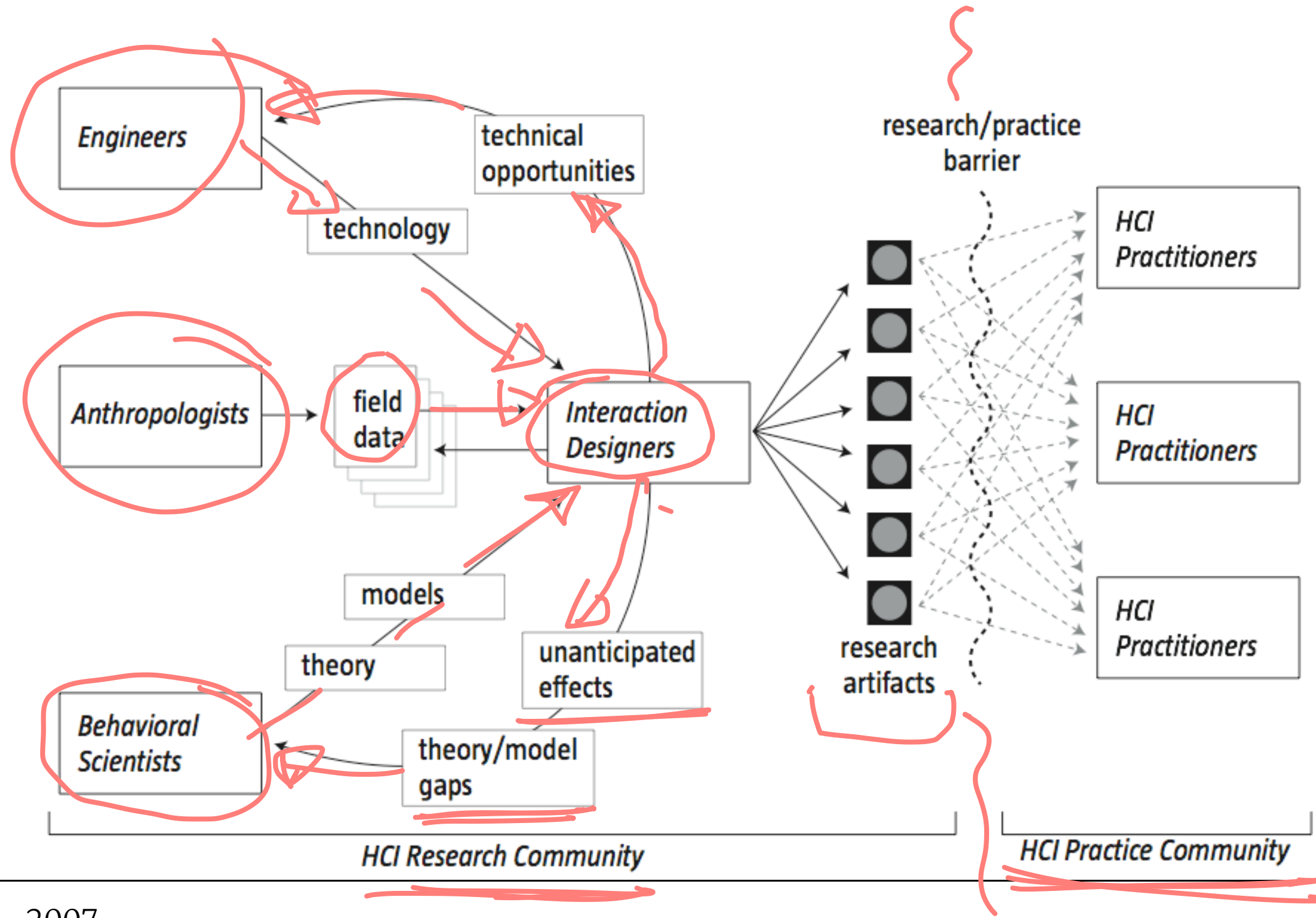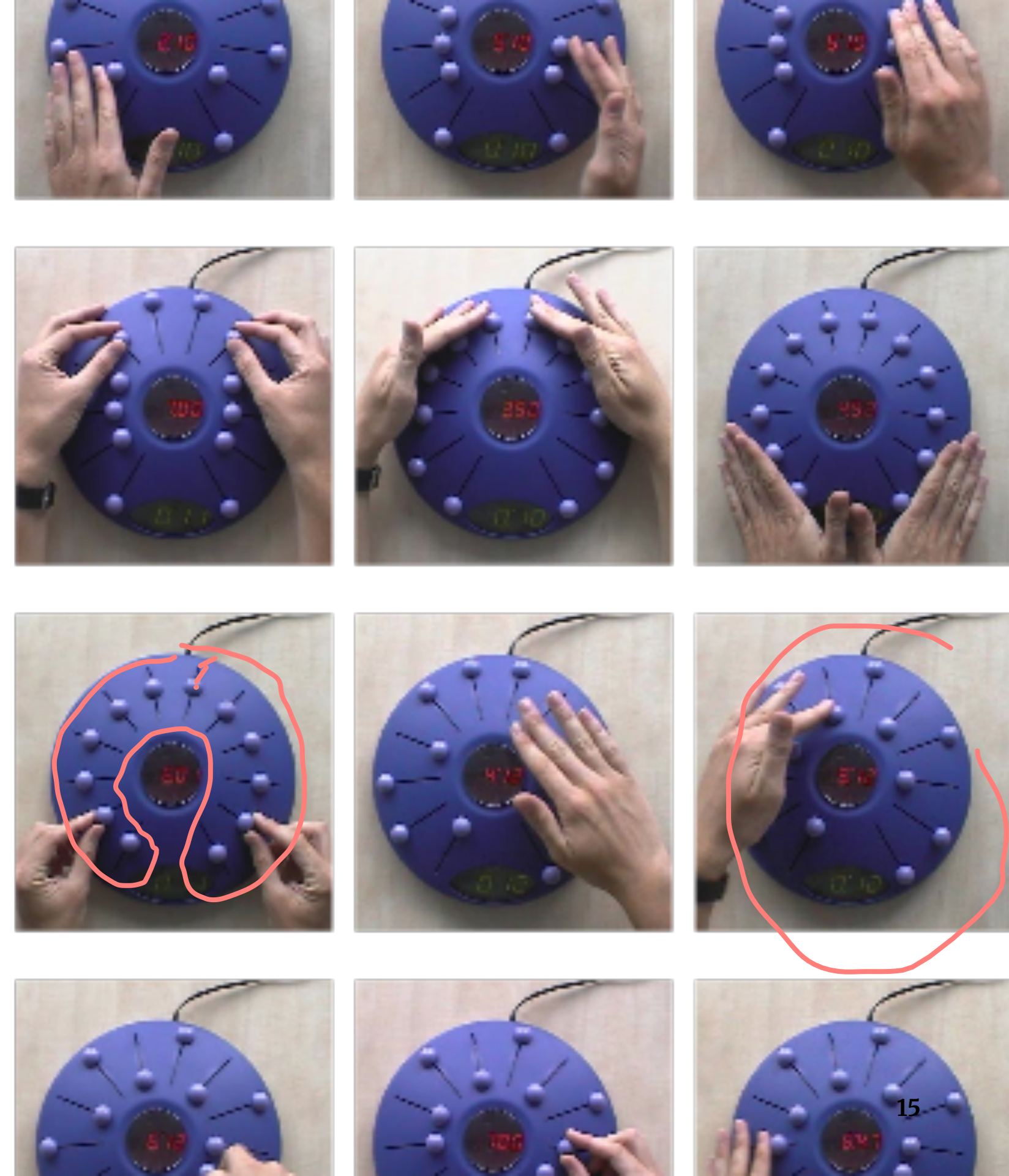
[3] Zimmerman et al., 2007

An Example[4]

How can products get information about how we feel from the way we interact with them?

<u>Wensveen (2005)</u> designed/prototyped an alarm clock with sliders that a user could move with two hands to set a *mood* for the alarm.

Generated knowledge about how emotion can be expressed through tangible interaction.

[4] <u>Image source</u>

Hands-on Activity

HCI Research in 60 Minutes