HEXMD

HUMAN EXPERIENCE & MEDIA DESIGN

AN INTRODUCTION TO :

Algorithmic Affordances

BY KOEN VAN TURNHOUT

WHO AM I

Koen van Turnhout

Professor of Human Experience and Media Design
Utrecht University of Applied Sciences

Background in:
Human Computer Interaction

Chair of Design Science Research Group & CHI Netherlands

Today:

1 Introduction to the notion of Affordances
2 Affordances & Feedforward an interaction critique
3 Towards a pattern library for Algorithmic Affordances

LINGUISTIC CONFUSION ABOUT AFFORDANCES

Academic discourse about affordance is partly fuelled by an ambiguity of the use of the word affordance in everyday language.

Guns *afford* killing people

- The term affordance is used to refer to the *utility* of certain technologies.

The trigger *affords* pulling

- The term affordance is used to refer to the *action possibilities* of artefacts.

GIBSON'S NOTION OF ECOLOGICAL PSYCHOLOGY

James J. Gibson

Ecological Psychology

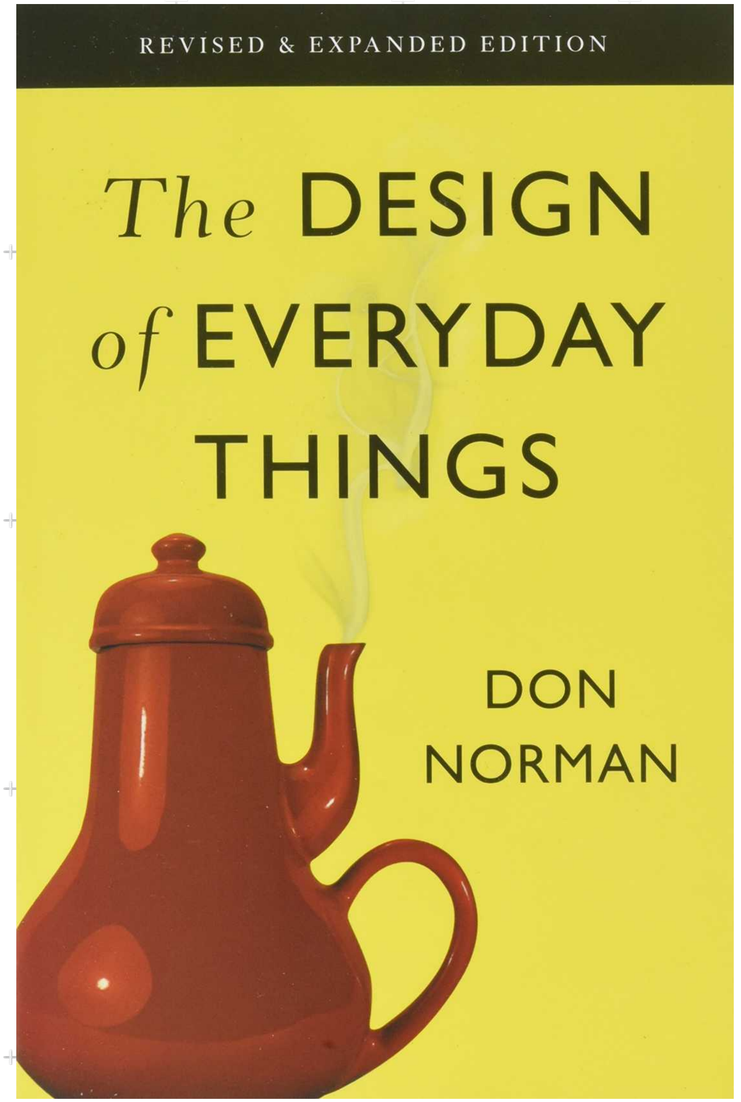
- Placed action at the basis of perception.
- Animal perception is shaped by the environment.
- Organisms evolved to perceive the world in terms of action possibilities: "perceiving affordances is perceiving ecological meaning"
- *Affordances* are (thus) perceivable action possibilities.

Critique

- Coupling between action and perception is not so simplistic.
- Focus on perception, neglects cultural meaning, human learning.

Gibson, J. J. (2014). *The ecological approach to visual perception: classic edition*. Psychology Press.

DONALD NORMAN: “DESIGNED AFFORDANCES”



Norman, D. (1988). The design of everyday things: Revised and expanded edition. Basic Books

DONALD NORMAN: “DESIGNED AFFORDANCES”

Design of everyday things

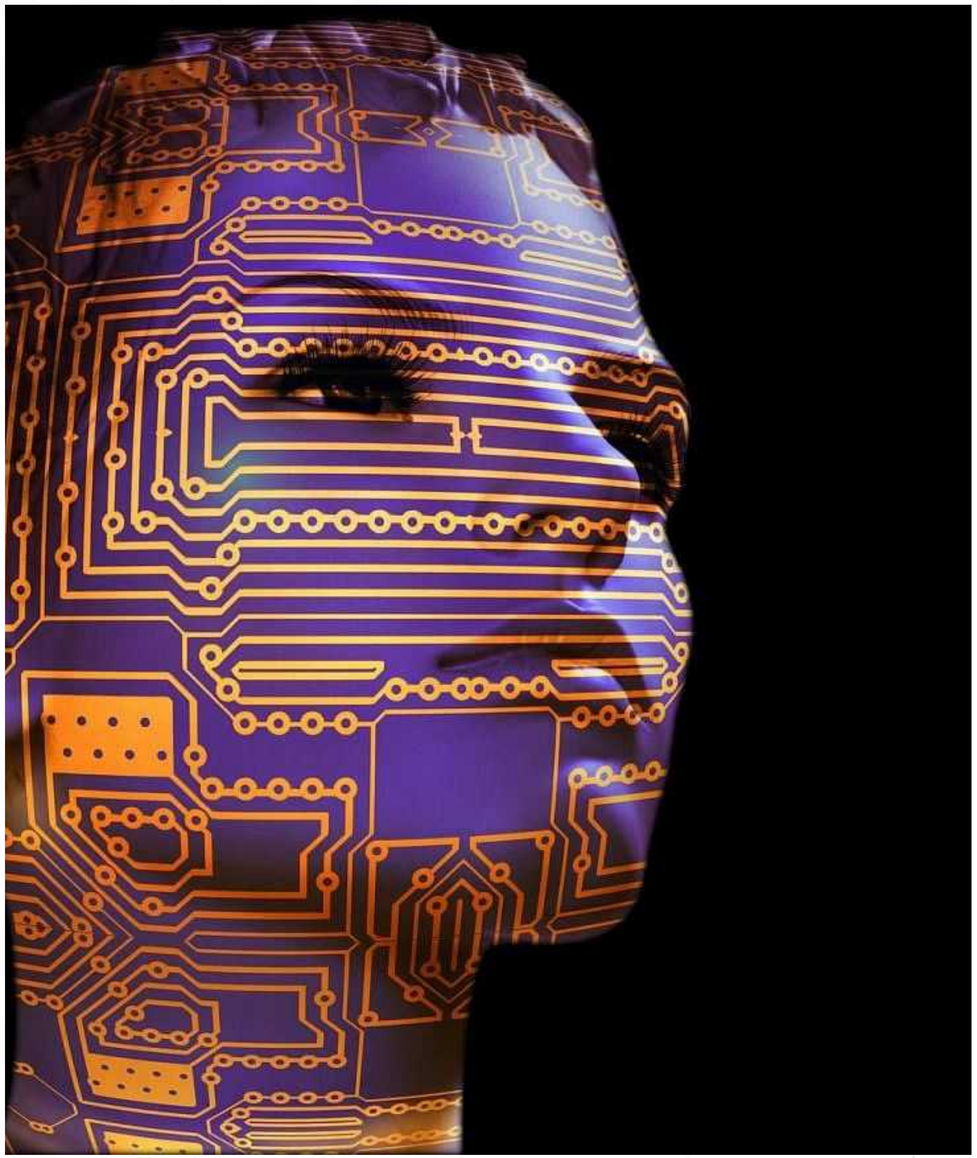
- Designers can make use of *affordances* when designing everyday things.
- For example, doorknobs afford pushing or pulling, depending on their design.
- Lack of usability is responsibility of the designer.

Critique

- Theory dilution: connection to ecological psychology got lost.
- Hard to separate affordances from cultural meaning, convention and so on.
- Are action possibilities really that relevant?

Norman, D. (1988). The design of everyday things: Revised and expanded edition. Basic Books

See Movie On.
https://www.interaction-design.org/literature/topics/affordances



ALGORITHMIC AFFORDANCES

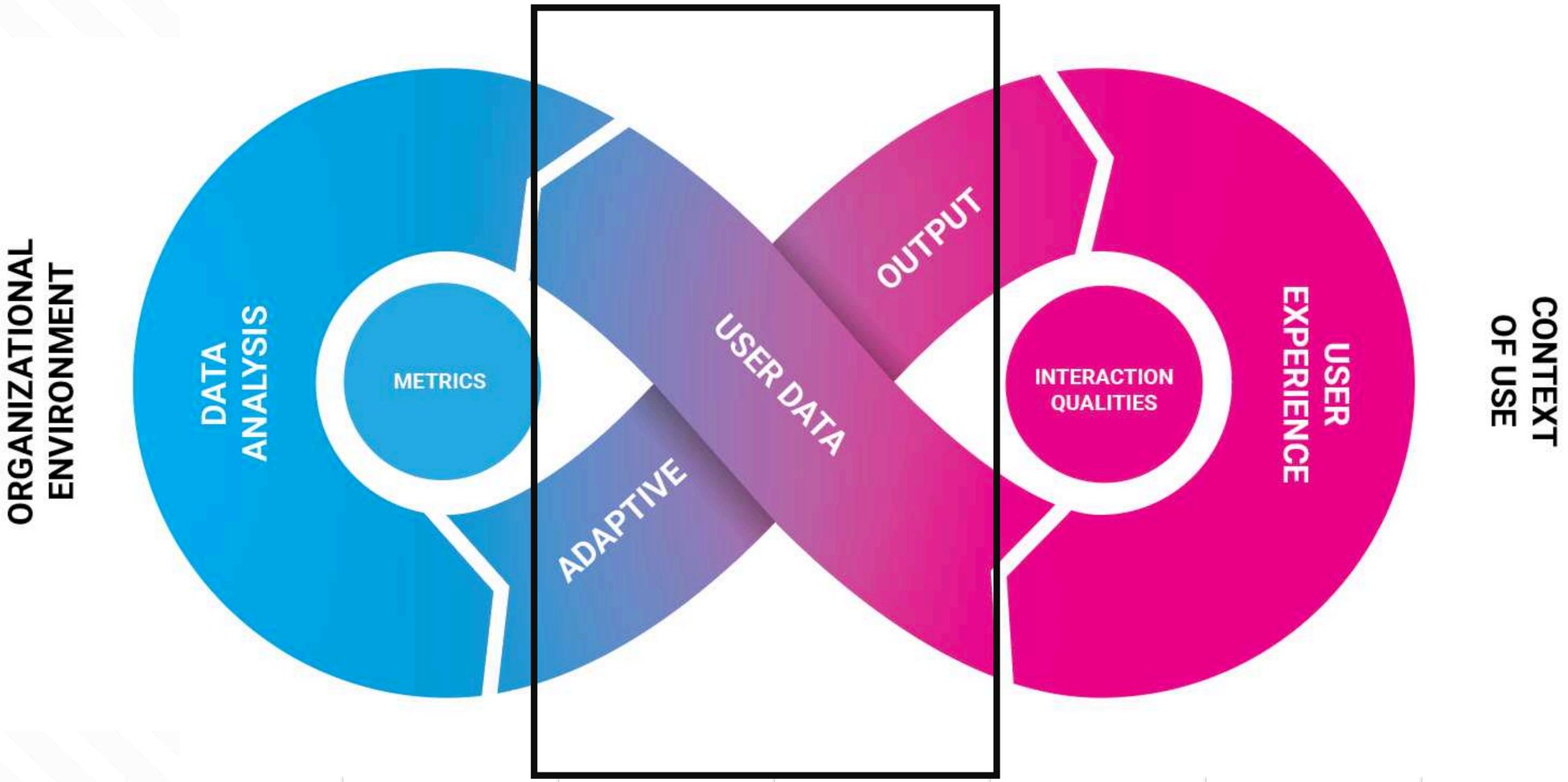
- *Designed* action possibilities for humans with algorithms.
- Answer to the question: “How can users exercise control over the output of the algorithm?”

This includes

- Possibilities to train the algorithm and to feed its learning capabilities.
- Possibilities to navigate the recommendation space of the algorithm.
- Possibilities to tune the algorithm (i.e. by offering direct control over the parameters of the algorithm).

This may support different interaction qualities such as scrutinisability, transparency, efficiency, relatability

ALGORITMIC AFFORDANCES



Smits, A., Van Turnhout, K., Hekman, E., & Nguyen, D. (2020). Data-driven design. In *DS 104: Proceedings of the 22nd International Conference on Engineering and Product Design Education (E&PDE 2020).*

EXERCISE

(5 min)

1. Grab an everyday household object from your direct environment.
2. Write down its purpose (what is the object for)
3. Write down the actions needed to use the object for its purpose.
4. Write down the properties that afford those actions.
5. Write down the redundant properties.

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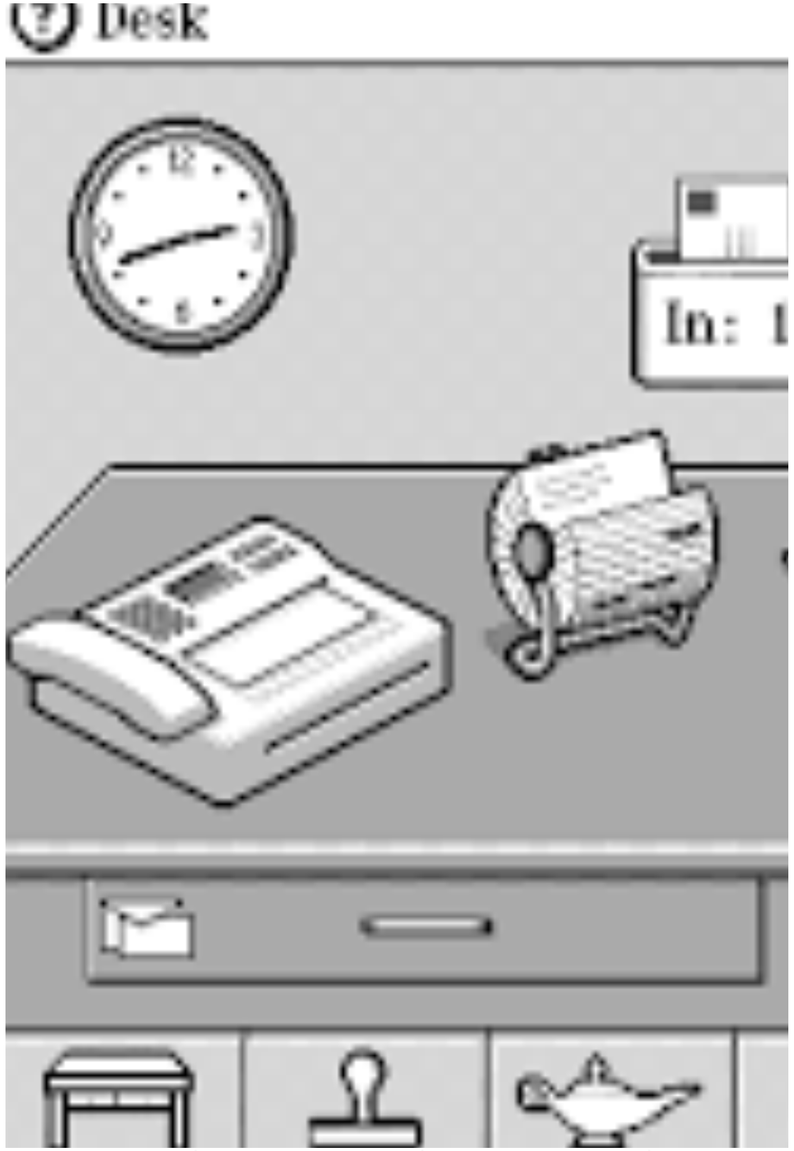
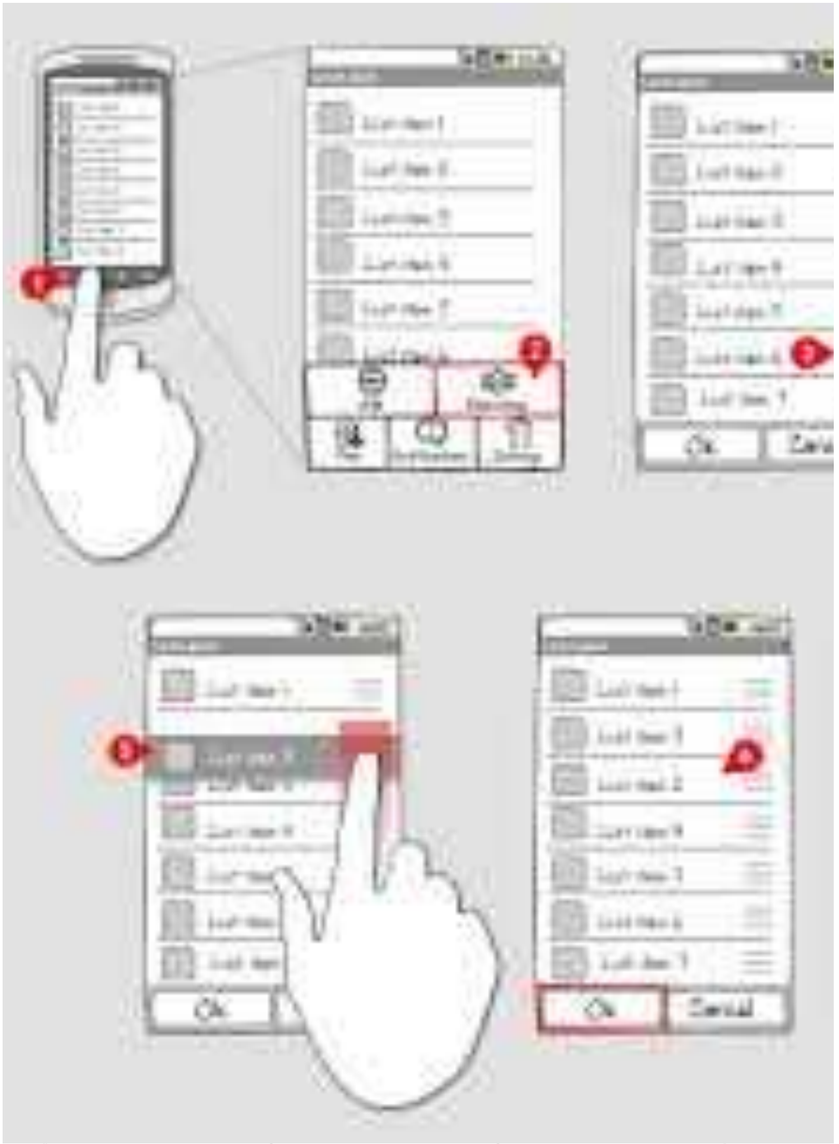
TACKLING THE PROBLEM OF ‘DIGITAL AFFORDANCES’

Skeuomorphism

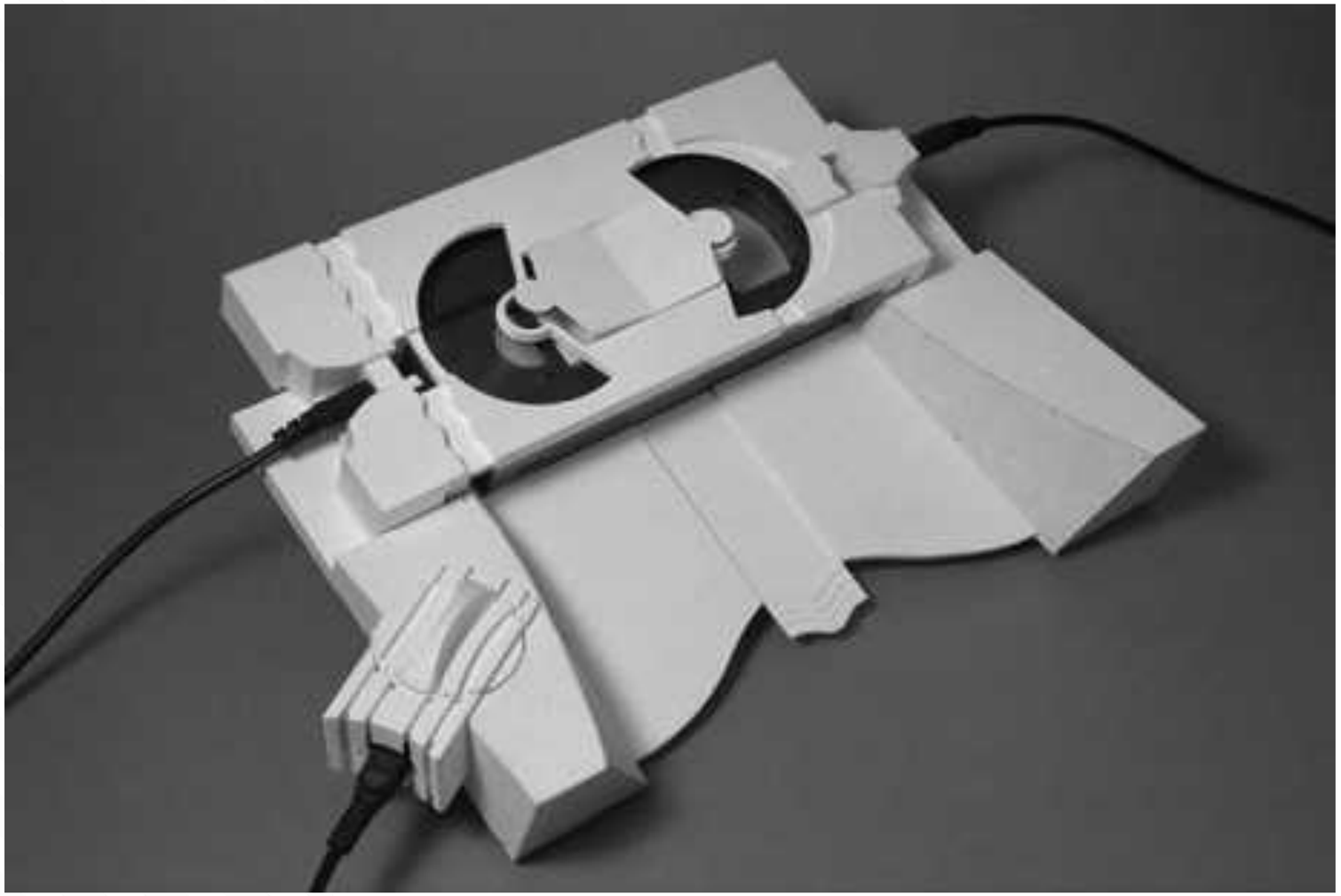


Interaction metaphors



Design patterns

TANGIBLE PRODUCTS: REDRESSING THE BALANCE BETWEEN APPEARANCE AND ACTION



1. *Builds on, and critiques the classical notion of design affordance.*

2. *Explores the relationship between action ability and functionality of interfaces. Which is a difficulty in algorithmic affordance design.*

3. ***Is an example of how a 'conceptual design investigation' could work***

VALUE SENSITIVE DESIGN

Batya Friedman

Conceptual Investigations

- ***Considering values and value priorities***
- ***Relating values and value conflicts to the design***

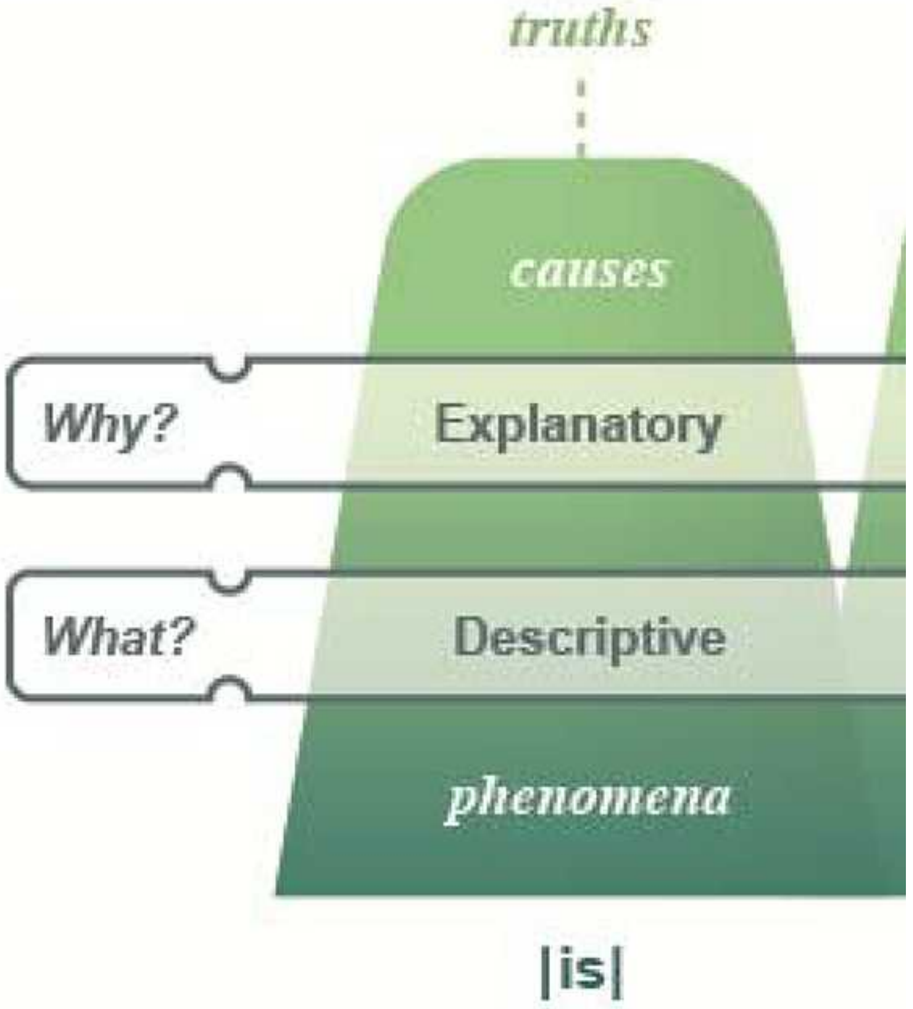
Empirical Investigations

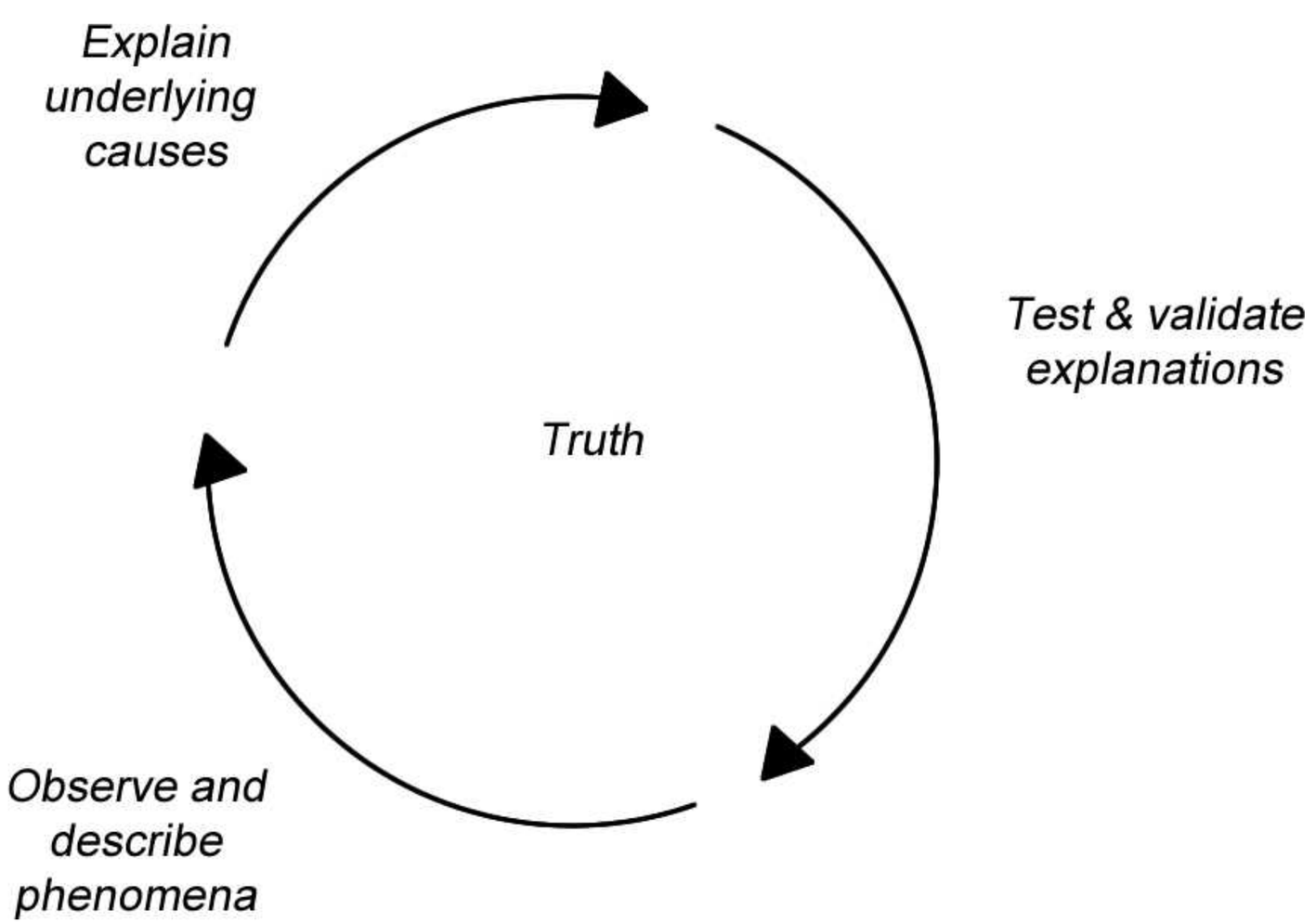
- *Investigating (value priorities) in the context of use.*
- *Investigating the (moral) effects of technologies.*

Technical Investigations

- *Investigate how technologies can support or hinder human values.*
- *Investigate how technologies can be designed to safeguard particular values.*

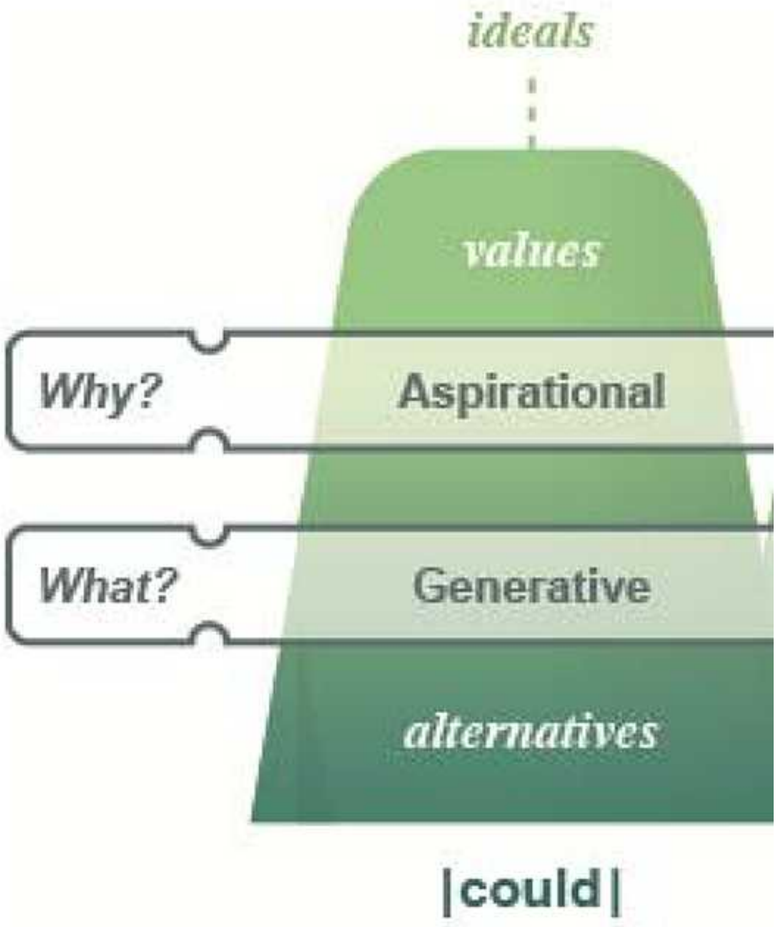
EMPIRICAL CYCLE

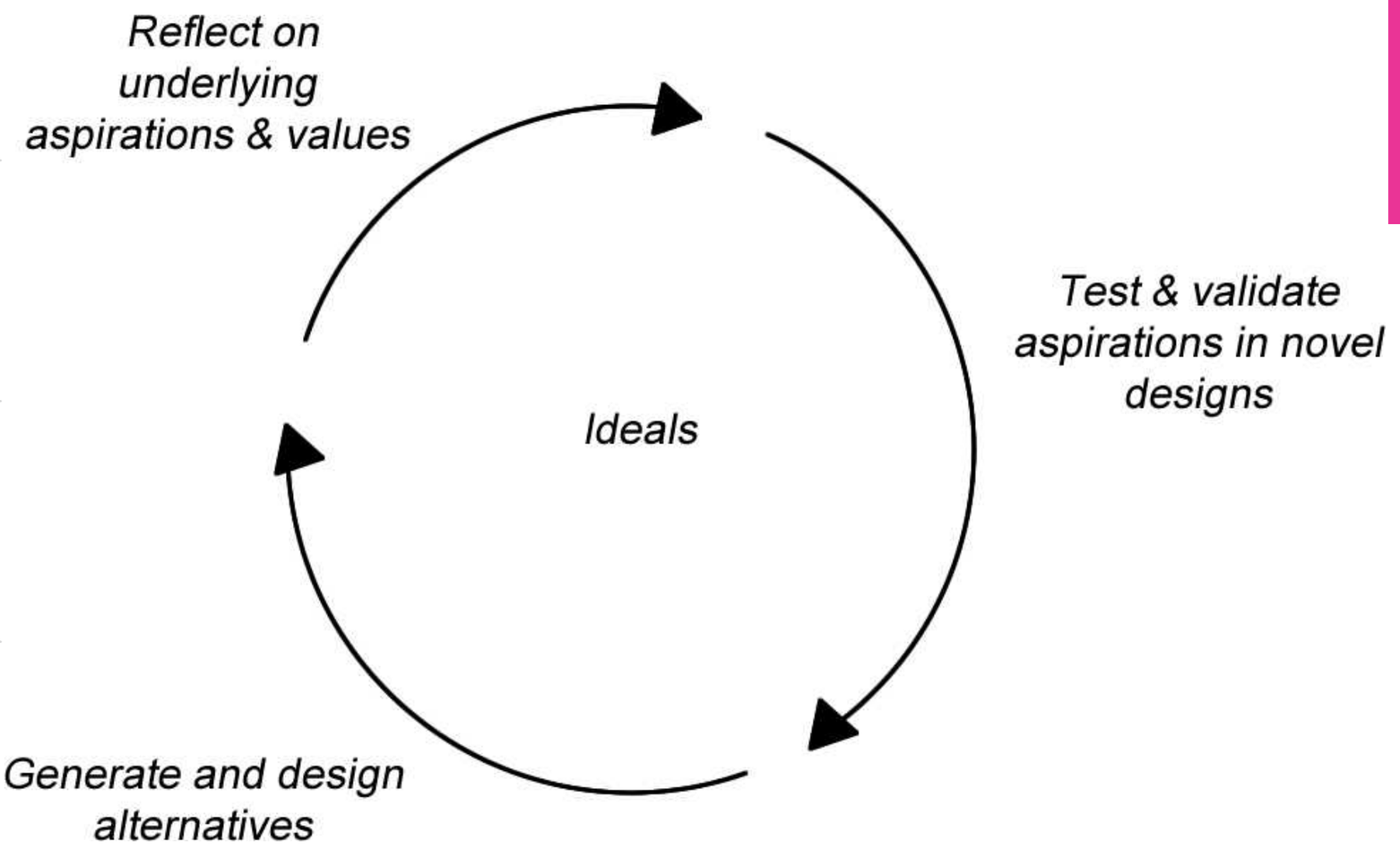




van Turnhout, K., Jacobs, M., Losse, M., van der Geest, T., & Bakker, R. (2019) A Practical Take on Theory in HCI. White Paper

RESEARCH TROUGH DESIGN CYCLE





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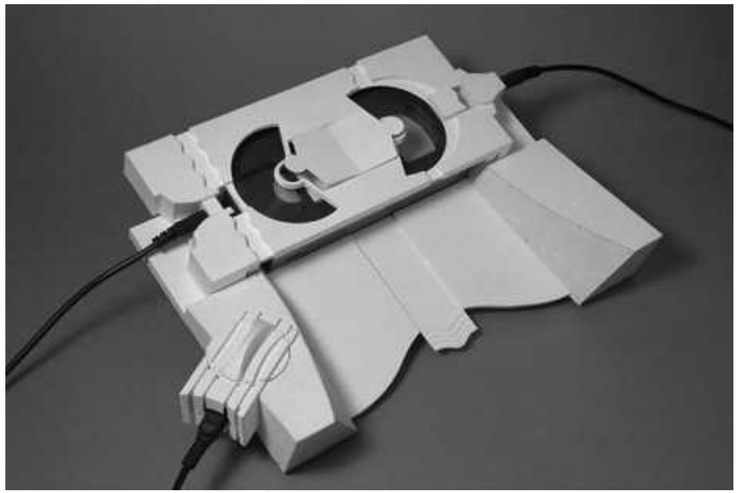
DJADINGRAD ET AL. (2004)

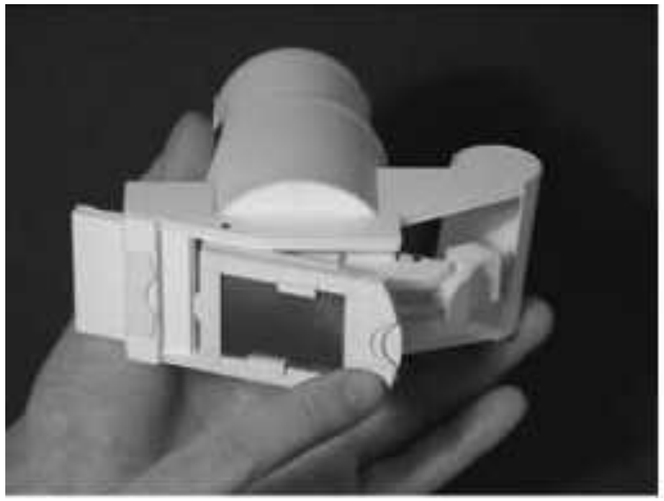
Conceptual design investigation

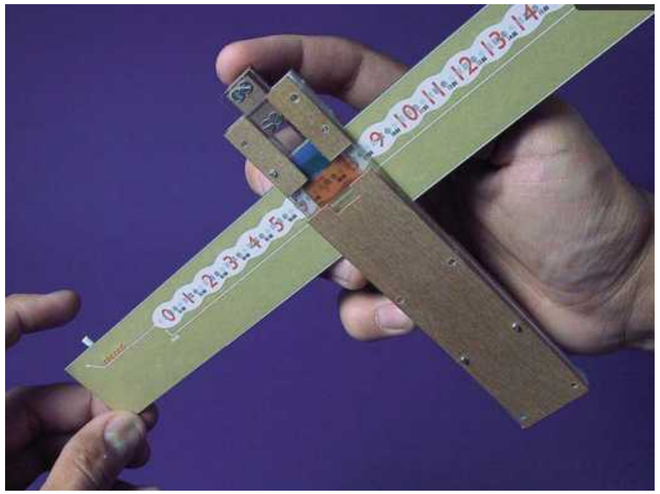
They develop a design language;

Designs are created to embody certain interaction aesthetics (meaningful interactions) (generation)

The resulting prototypes are critically reviewed in relation to the underlying values and ideals. (aspiration)







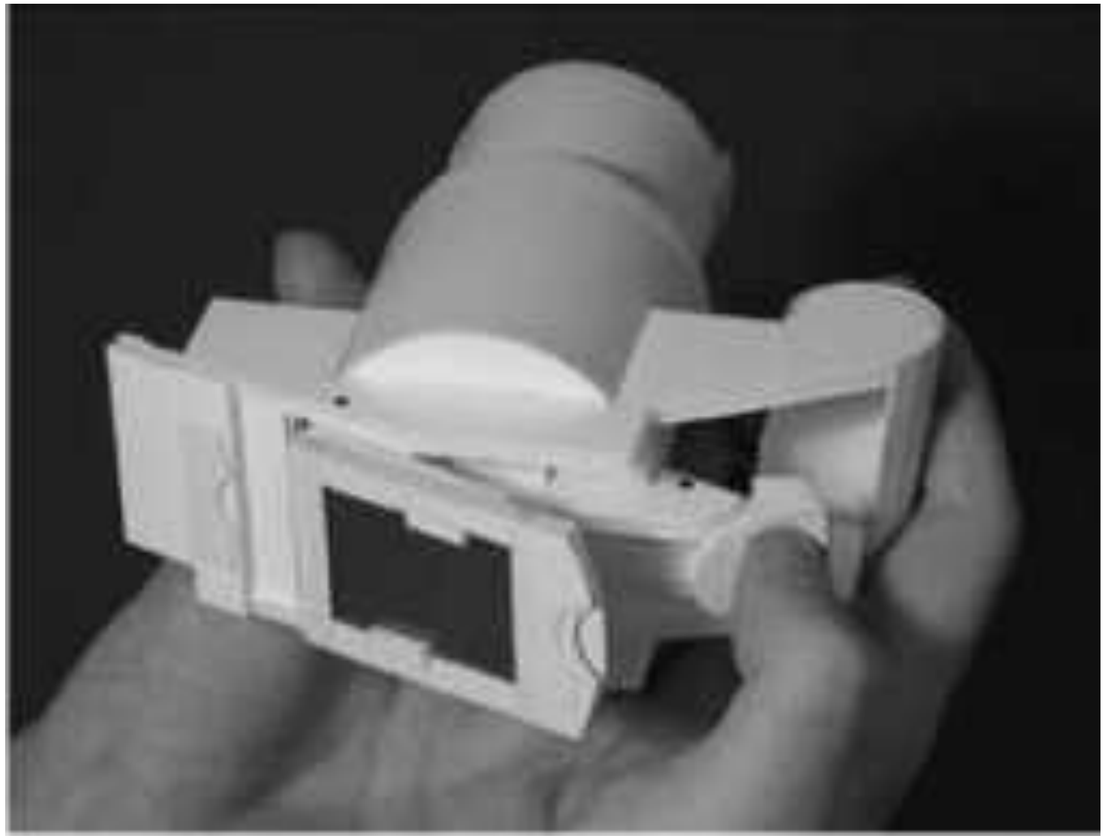
FEEDFORWARD VERSUS AFFORDANCE (I)

Affordance: push, Feedforward ???

Affordance: turn, Feedforward, disconnect powerstream

FEEDFORWARD VERSUS AFFORDANCE (II)

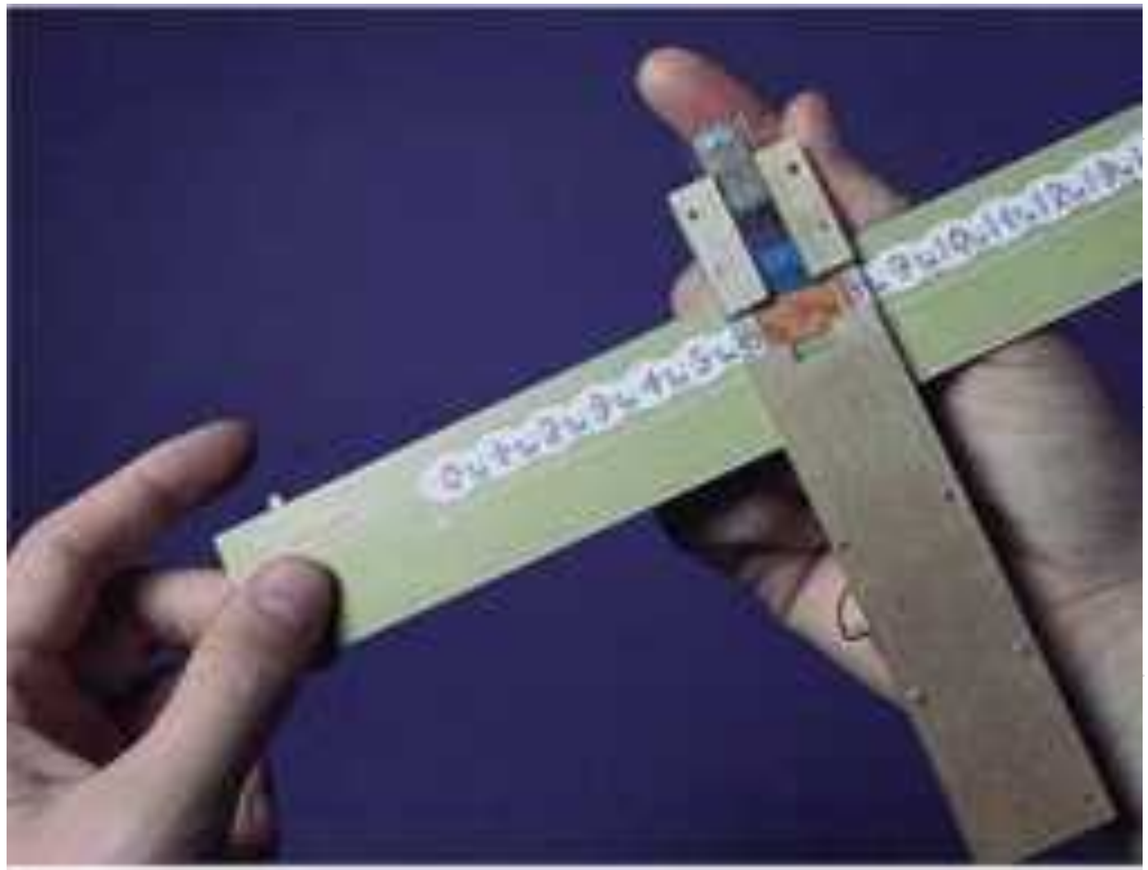
Affordance: push, Feedforward ???



Affordance: push, Feedforward: (decide about) picture

FEEDFORWARD VERSUS AFFORDANCE (III)

Affordance: push, Feedforward ???



Affordance: push,
Feedforward: change temperature / time conjunction

AFFORDANCES

Meaningful tangible interactions go beyond (classical) affordances

Affordances: are guessable action possibilities of products

Feedforward (deep affordance) relates to guessable operations (action + function)

Relevance to Algorithmic Affordances
Interaction metaphors, flow and embodiment can make complex interactions less symbolic and more natural.

Algorithmic affordances need to be meaningful in the sense of Djajadinigrat et al. because algorithmic operations are complex and hidden from the user.

EXERCISE

(5 min)

1. Build on the affordances you wrote down earlier.
2. What are the conventional ‘functions’ that those actions relate to.
3. *Relabel* those functions in the context of a recommender system. If you’d use the device as a control in a music recommender what types of functions could be supported with the actions that you performed with the everyday object.
4. What other changes would you need to make that action meaningful in the Djajadinigrad et. al (2004) sense of the word??

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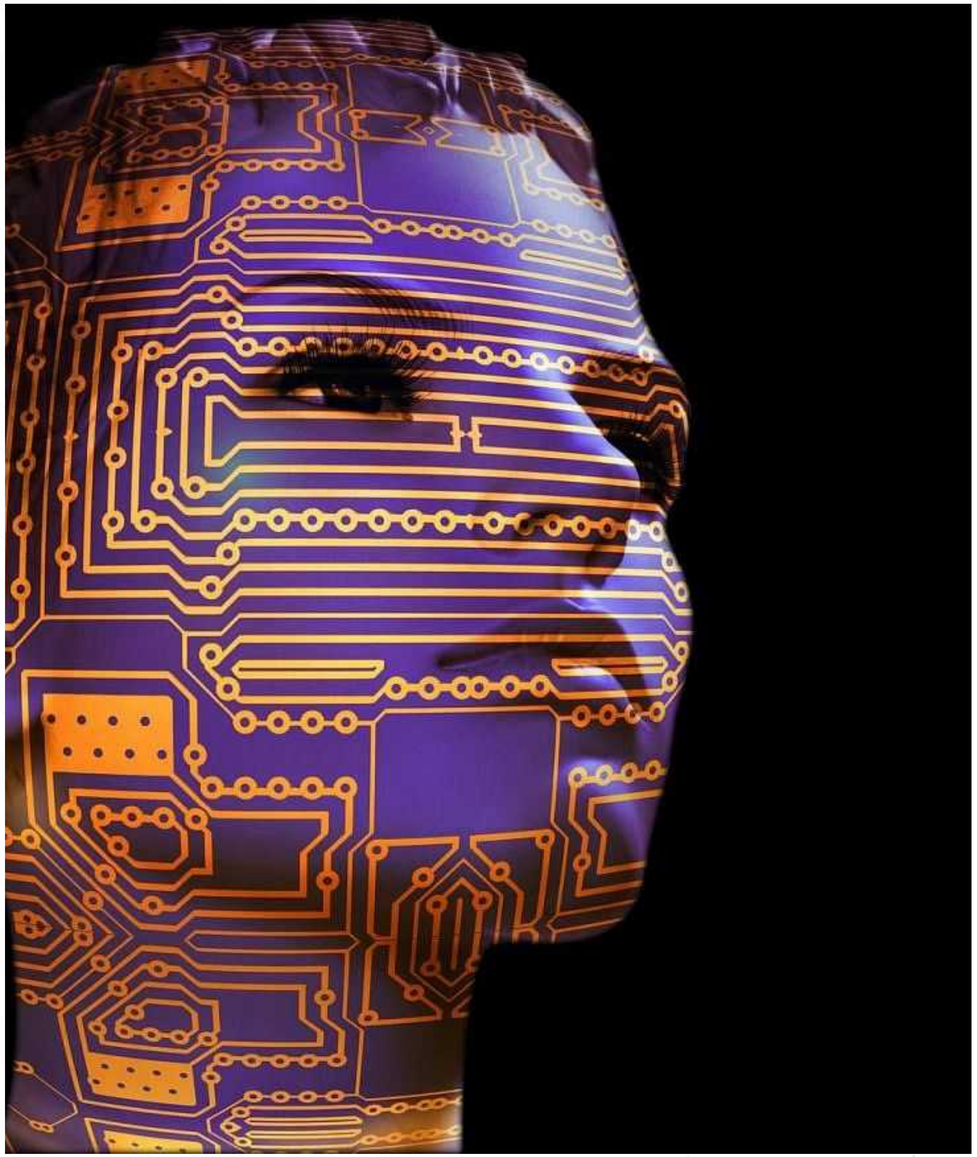
ALGORITHMIC AFFORDANCES



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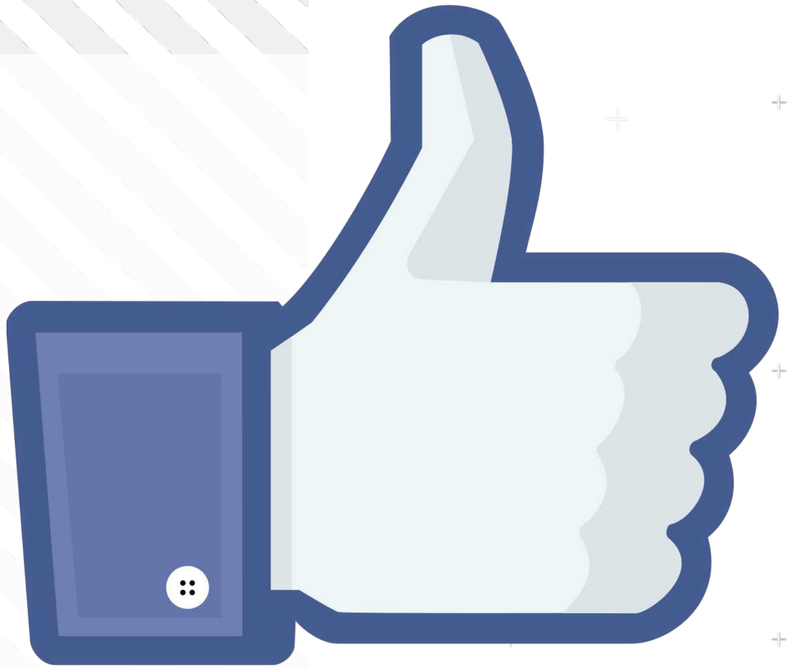
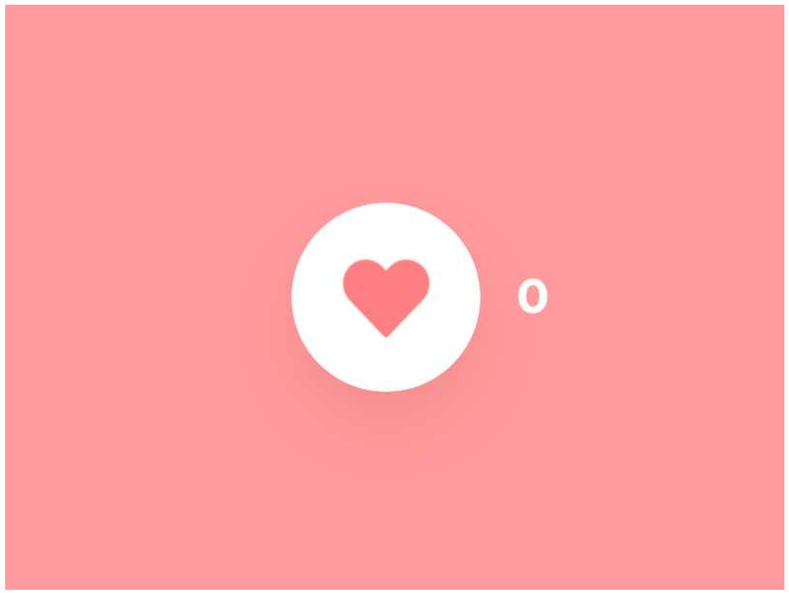
ALGORITHMS ARE DESIGNED AS BLACK BOXES

ALGORITHMS ARE OFTEN DESIGNED FROM AN AUTOMATION MINDSET…

BUT WE SHOULD DESIGN THEM AS LUXURY PRODUCTS

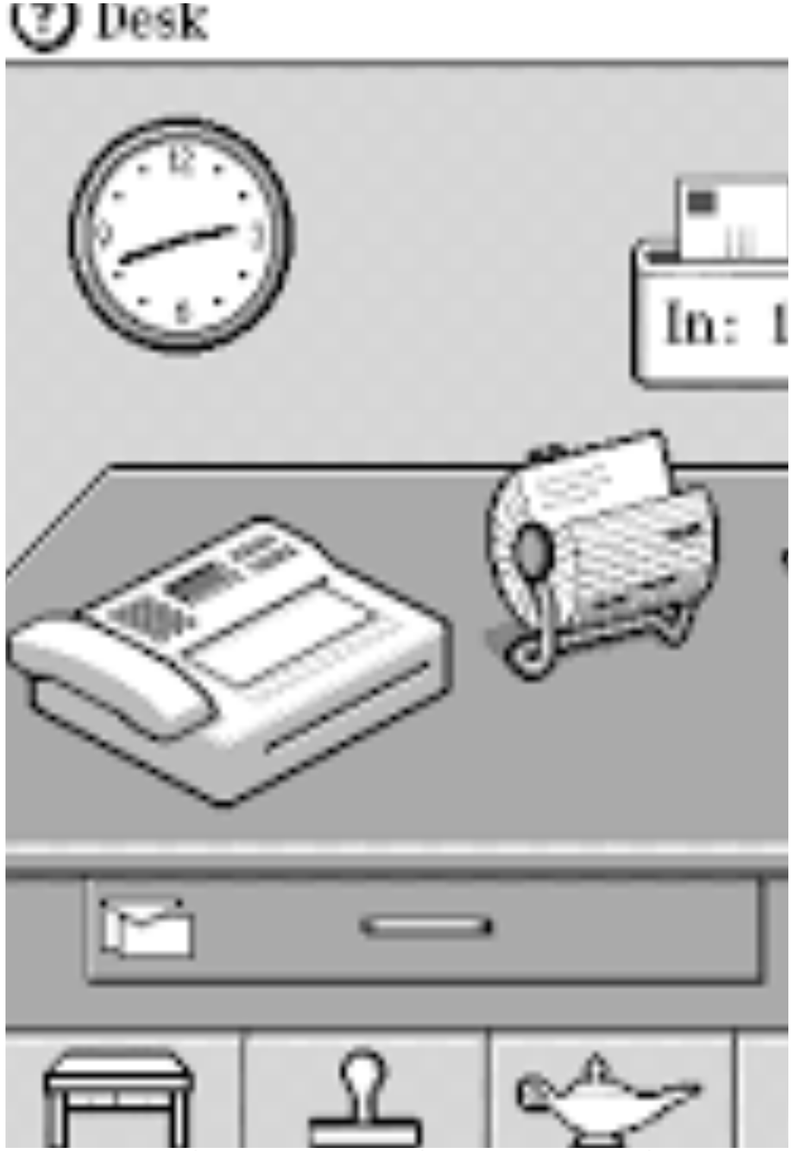
STATE OF THE ART OF ALGORITHMIC CONTROLS….



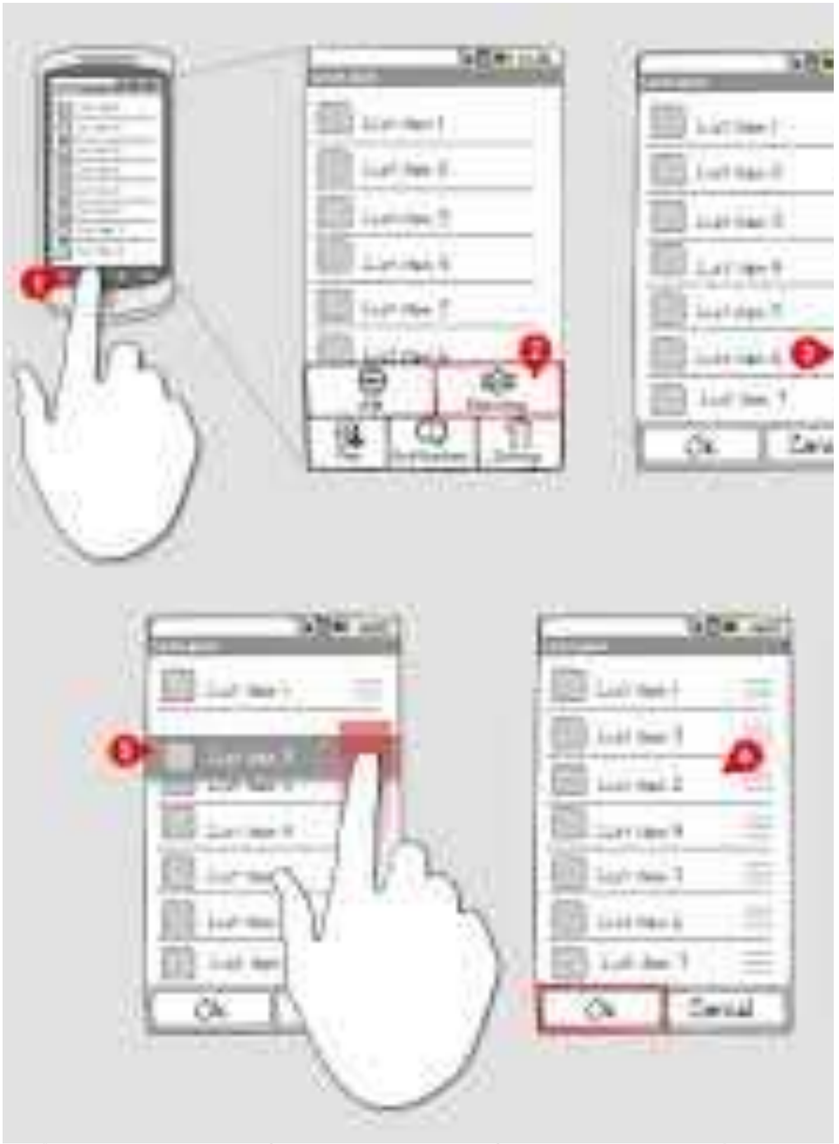


OPENING THE BACK BOX OF ‘DIGITAL AFFORDANCES’

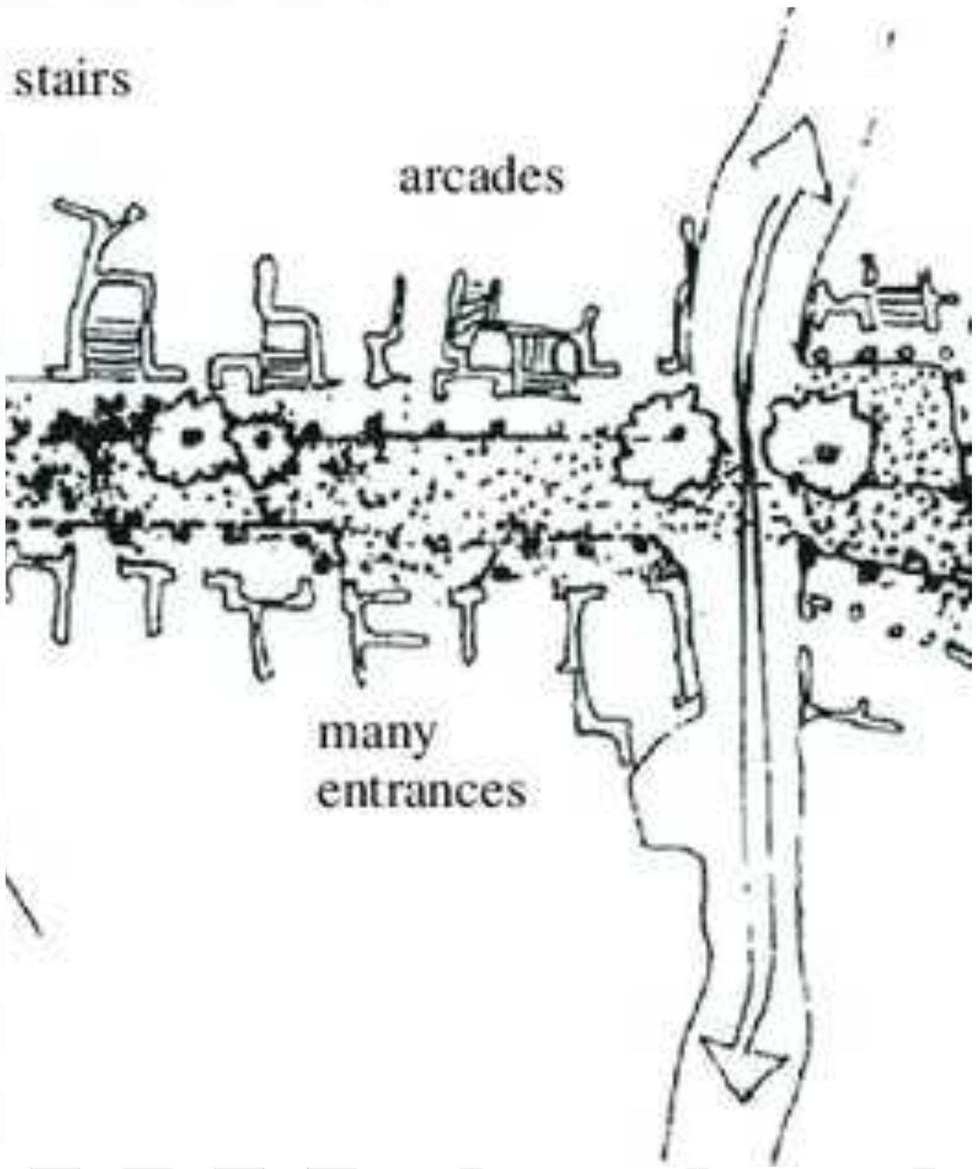
Skeuomorphism



Interaction metaphors



Design patterns



PATTERN LIBRARY

Pattern

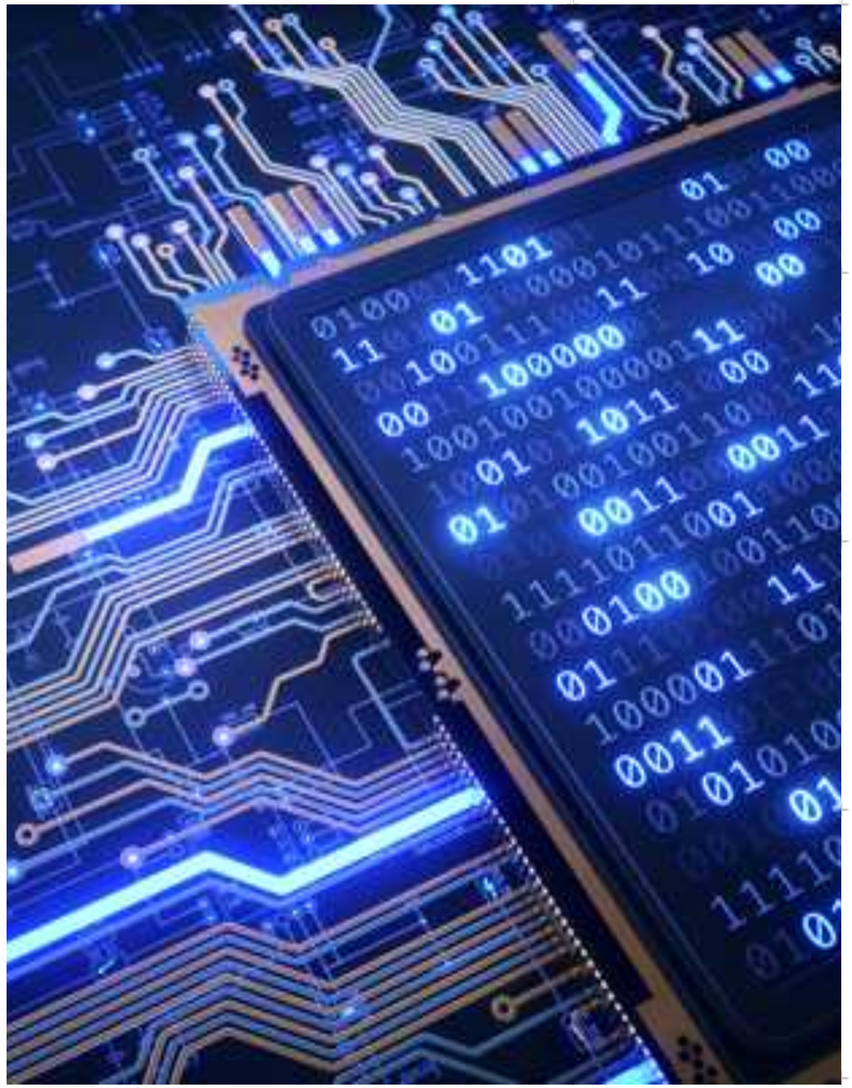
- Proven solution to a particular problem in a particular context.
- Restricted to the (invariant) core of the solution, can be implemented in different ways.

Pattern languages

- Collections of patterns, that can be appropriated and combined at will, acting as a design language.
- Pioneered by Christopher Alexander in the 1970ies, for Architecture.
- Still widely in use in Software, Education and Interaction Design

Alexander, C. (1979). *The timeless way of building* (Vol. 1). New York: Oxford University Press.

ALGORITMIC AFFORDANCE PATTERN LIBRARY V0.1



Approach

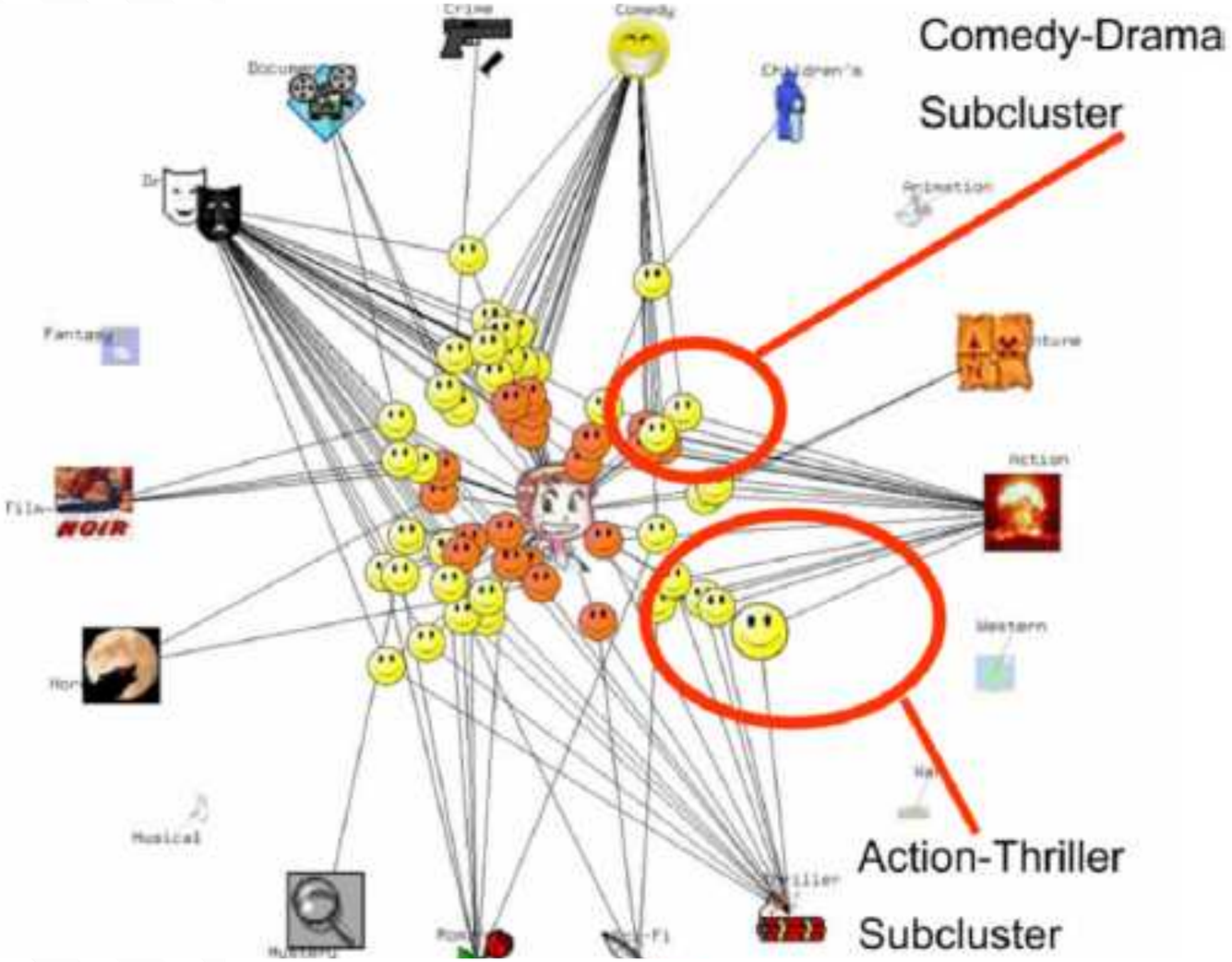
- Investigation in ‘the wild’ of algorithmic controls.
- Investigation of proposals in academic papers.
- Design projects with students.
- (Using library in projects to obtain feedback and improve)

Current status.

- Contains 17 patterns in 4 different categories.
- Bluntly incomplete. Should spark new ideas and instigate in the wild sightings. We are open for suggestions!

- Follow up research will back-up patterns with relevant knowledge base

INTERACTIVE RECOMMENDER SYSTEMS: A SURVEY OF THE STATE OF THE ART AND FUTURE RESEARCH CHALLENGES AND OPPORTUNITIES



1. Survey's existing (academic) work on interactive recommender systems.

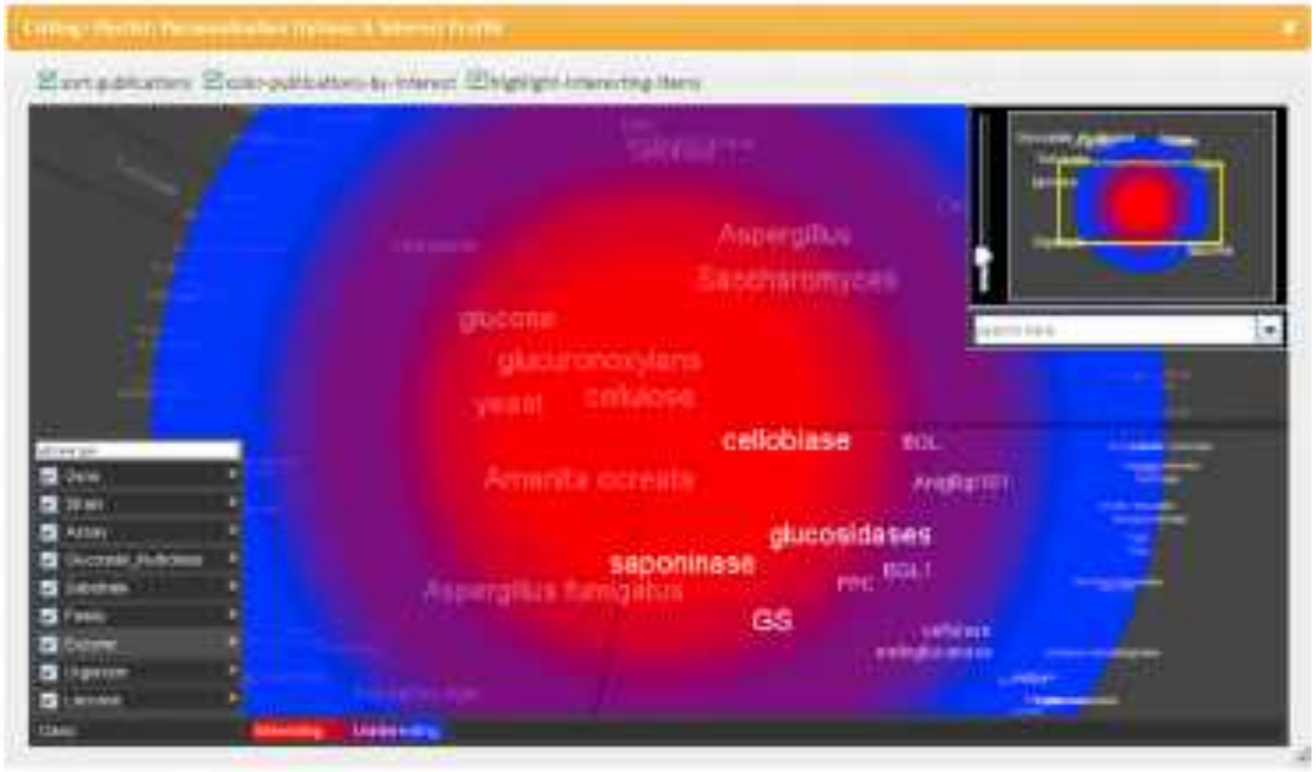
2. Discusses how these systems relate to certain interaction qualities such as transparency, justification, diversity, controllability, context sensitivity.

3. Highlights an agenda for future recommender systems.

Note the similarities with Djajadinigrad et al. (2004). Ideas are refreshing, but (sometimes) impractical.

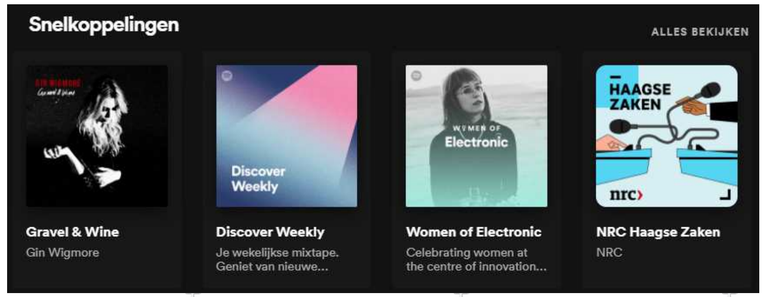
NAVIGATION OF THE RECOMMENDATION SPACE

Design *choice architectures* that allow users to: oversee and understand different outcomes of a recommendation system, navigate this recommendation space, and make sensible choices within it.



Pattern 15: Recommendation-scapes

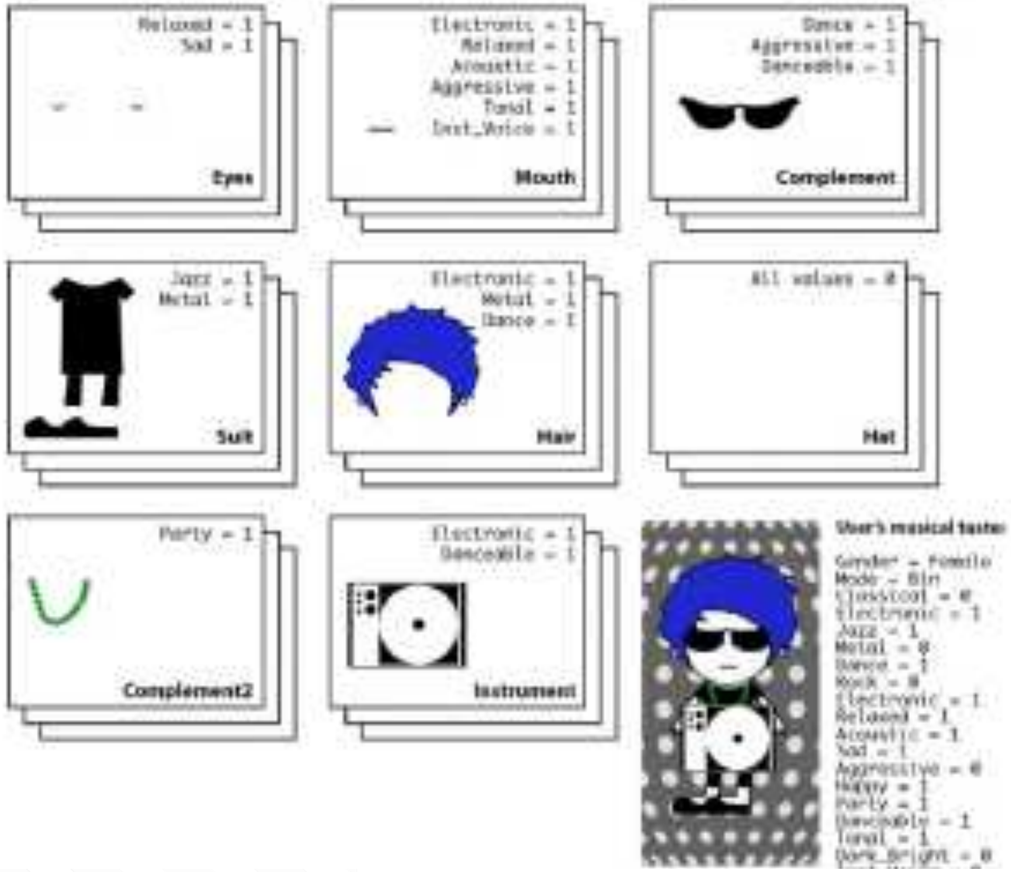
Pattern 4: Social context



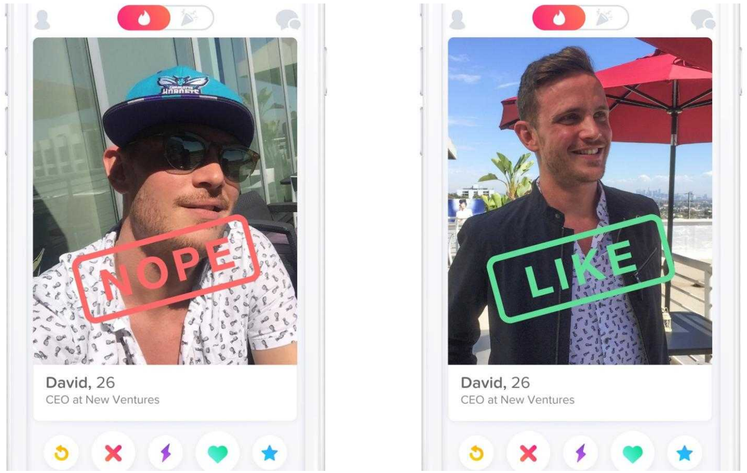
Pattern 4: Ordered lists

FEEDING THE ALGORITM

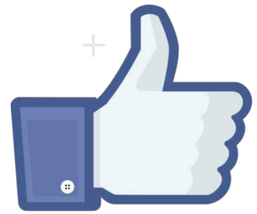
Design tools allowing users to provide the algorithm with relevant information, knowingly and on a voluntary basis.



Pattern 5: Cold start



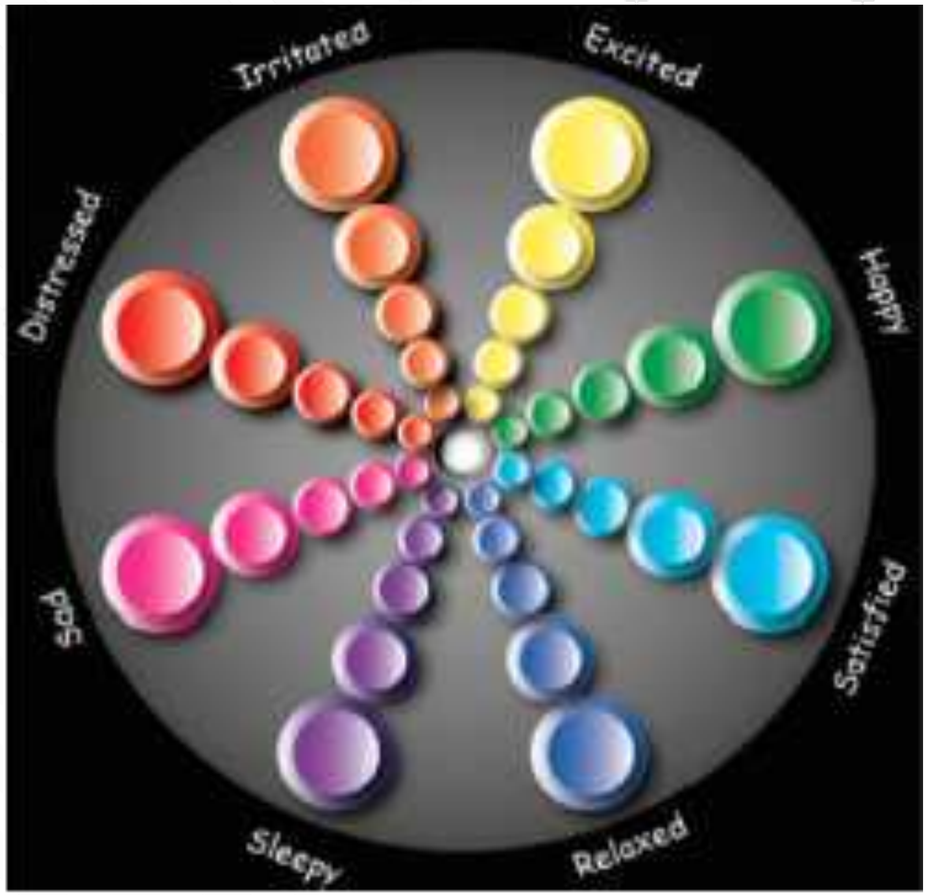
Pattern 3: Curated lists



Pattern 1: Liking items

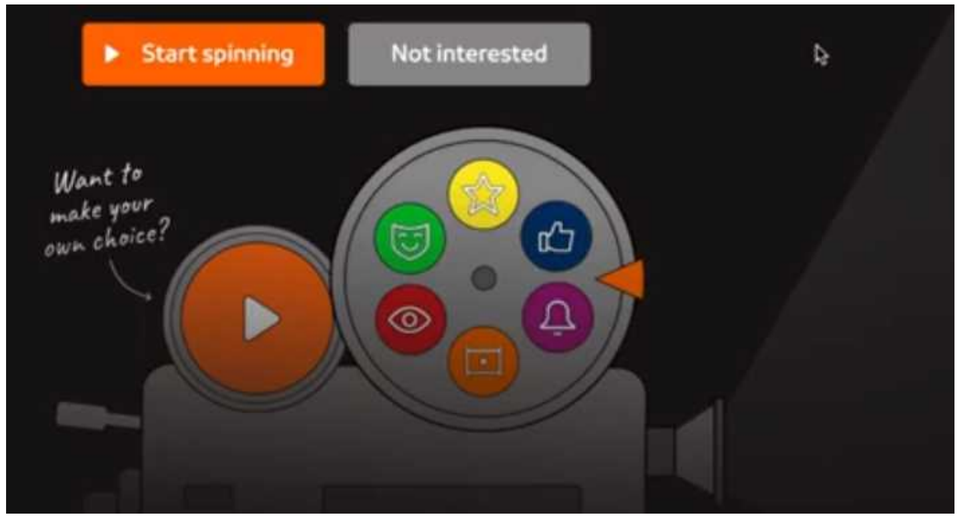
ACTIVATING RECOMMENDATION CONTEXTS

Allow users to specify their context so they can help the algorithm interpret user input and to give contextually relevant recommendation's.



Pattern 11: Multiple profiles

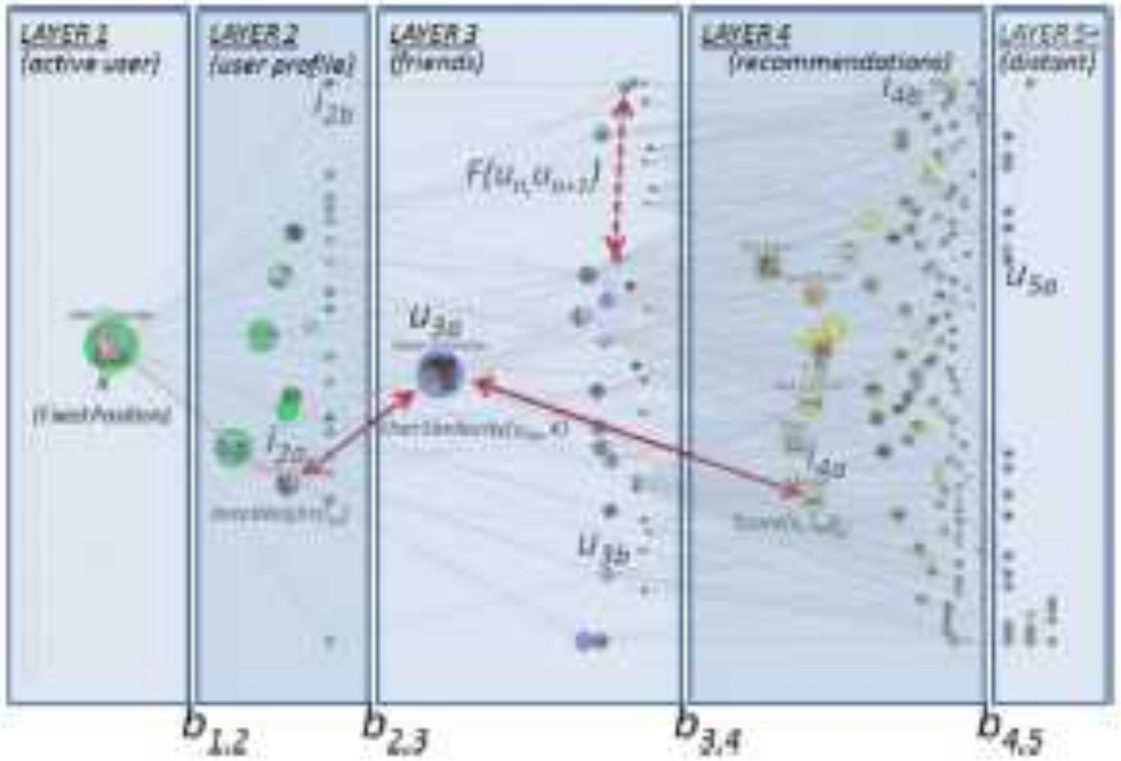
Pattern 10: Incognito



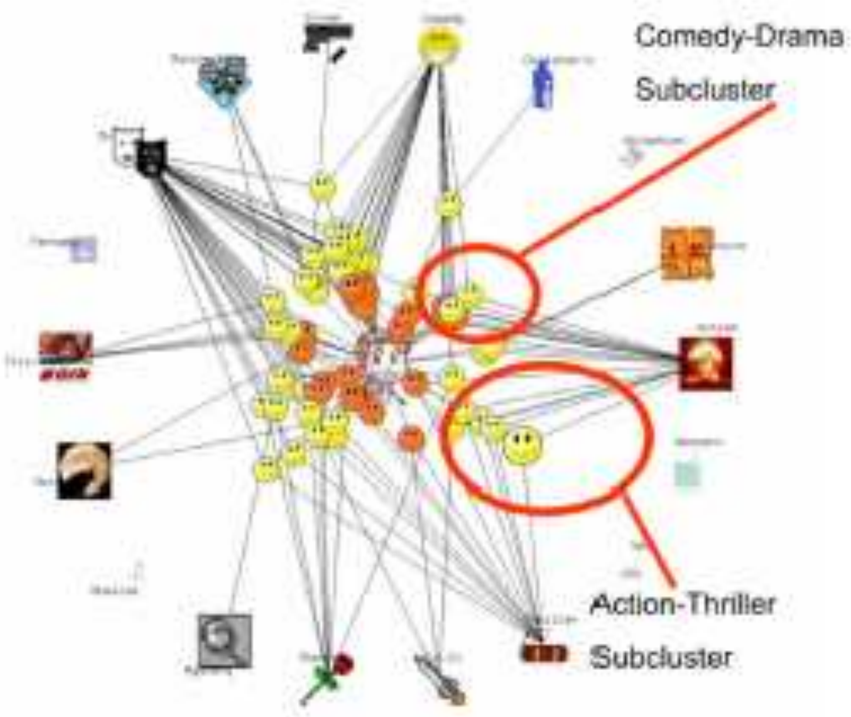
Pattern 10: Incognito

TUNING ALGORITHMIC PARAMETERS

Give users direct control over the parameters of the algorithm so they can explore alternative recommendations and understand what recommendations are based on.



Pattern 12: Descision paths



Pattern 12: Peer Picks

HOW TO USE THE PATTERN LIBRARY

Find the pattern library at: https://aapatternlibrary.wordpress.com/

1. Browse for inspiration
2. Try to understand the **categories**
3. **Challenge** the patterns.

    Find new implementations

    Find dissenting implementations that could form a new pattern.
4. **Contribute** to the *library* - using the comment function

    Point out errors and unclarities in the explanations

    Report in the wild spottings or rellevant literature

    Suggest new patterns

DESIGN & TECHNOLOGY….

Human: Needs, expectations, understanding, values

Design: Action possibilities

Technology: algorithms, parameters,

Data: existing and generated

CONTACT

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HUMAN EXPERIENCE
MEDIA DESIGN