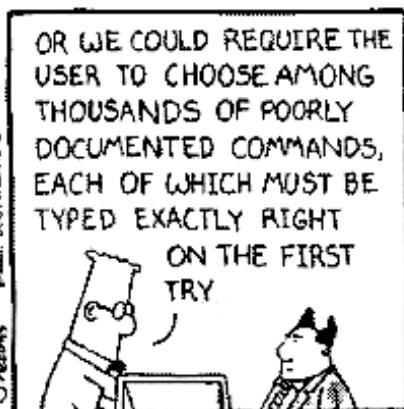
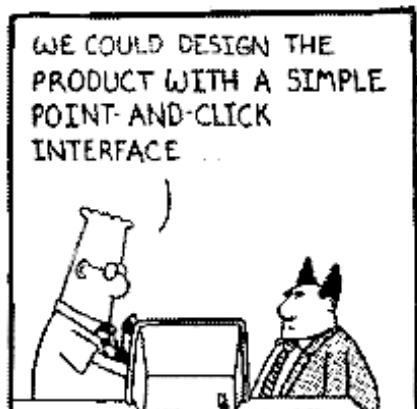


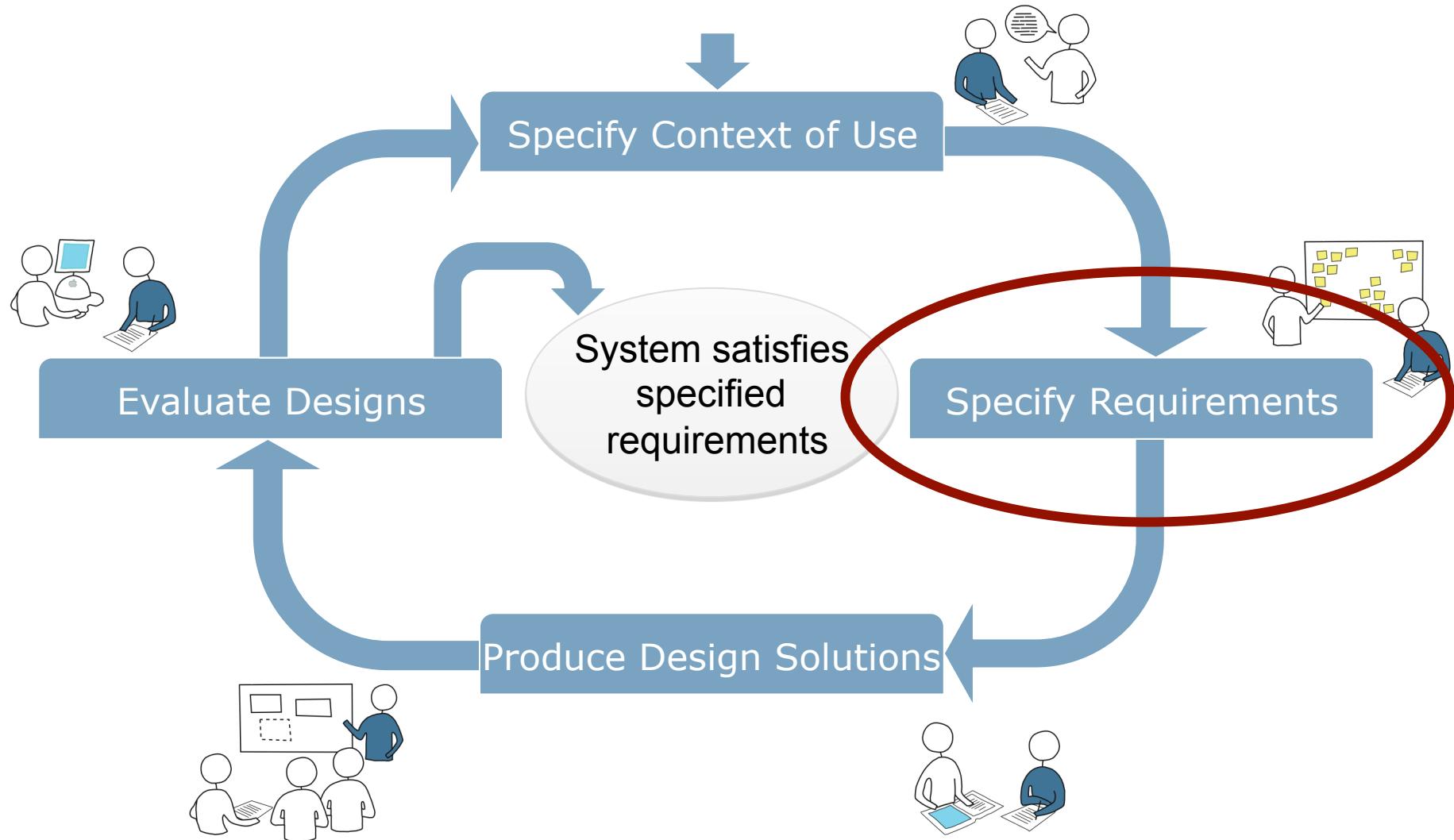
# Interactive Systems: UI Structure and Design

Jutta Fortmann

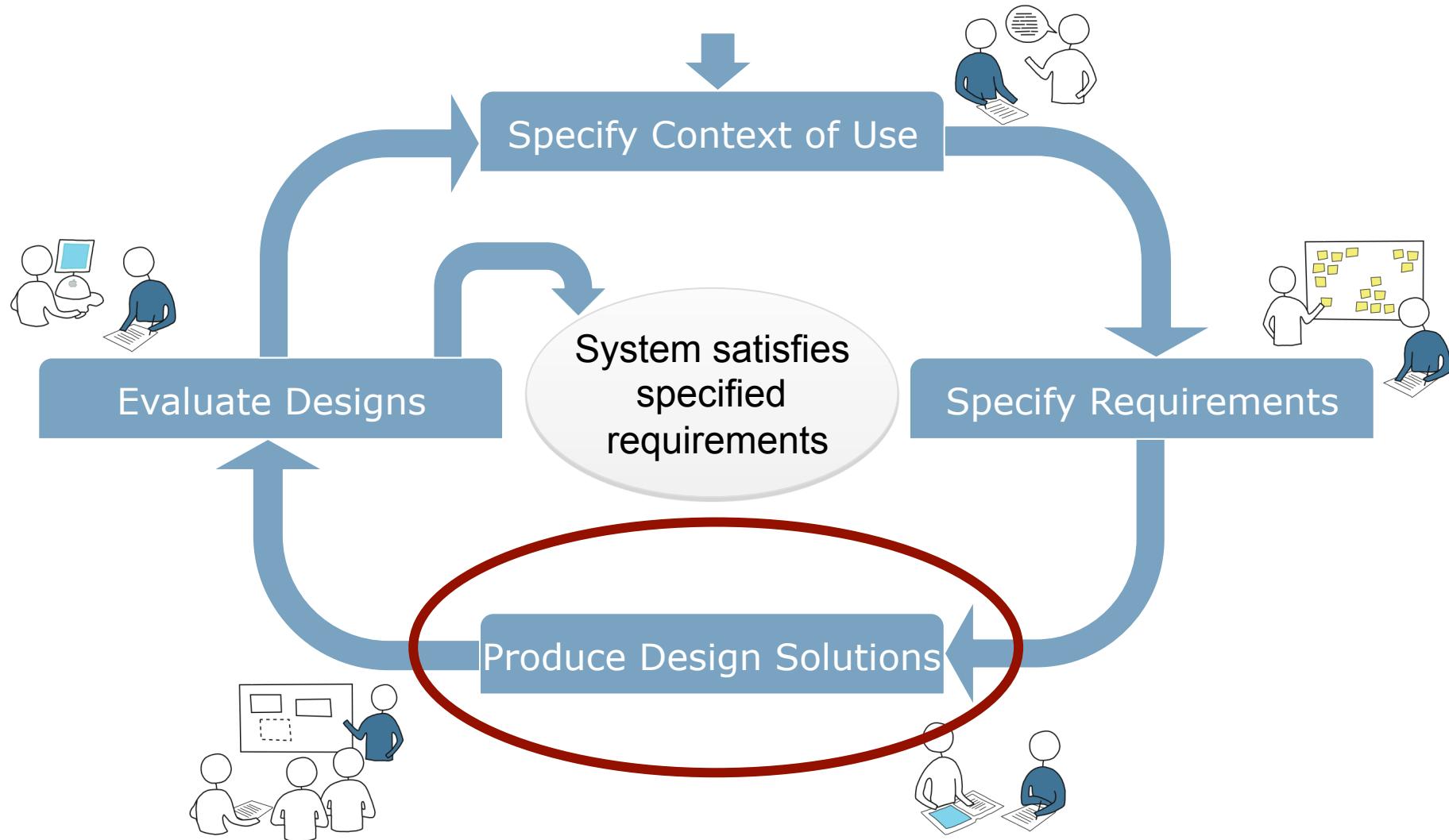
jutta.fortmann@uni-oldenburg.de



# Human-Centred Design Process



# Human-Centred Design Process



# Overview

## Motivation

### Getting started

- Target group
- Goals
- Content

### Structural design

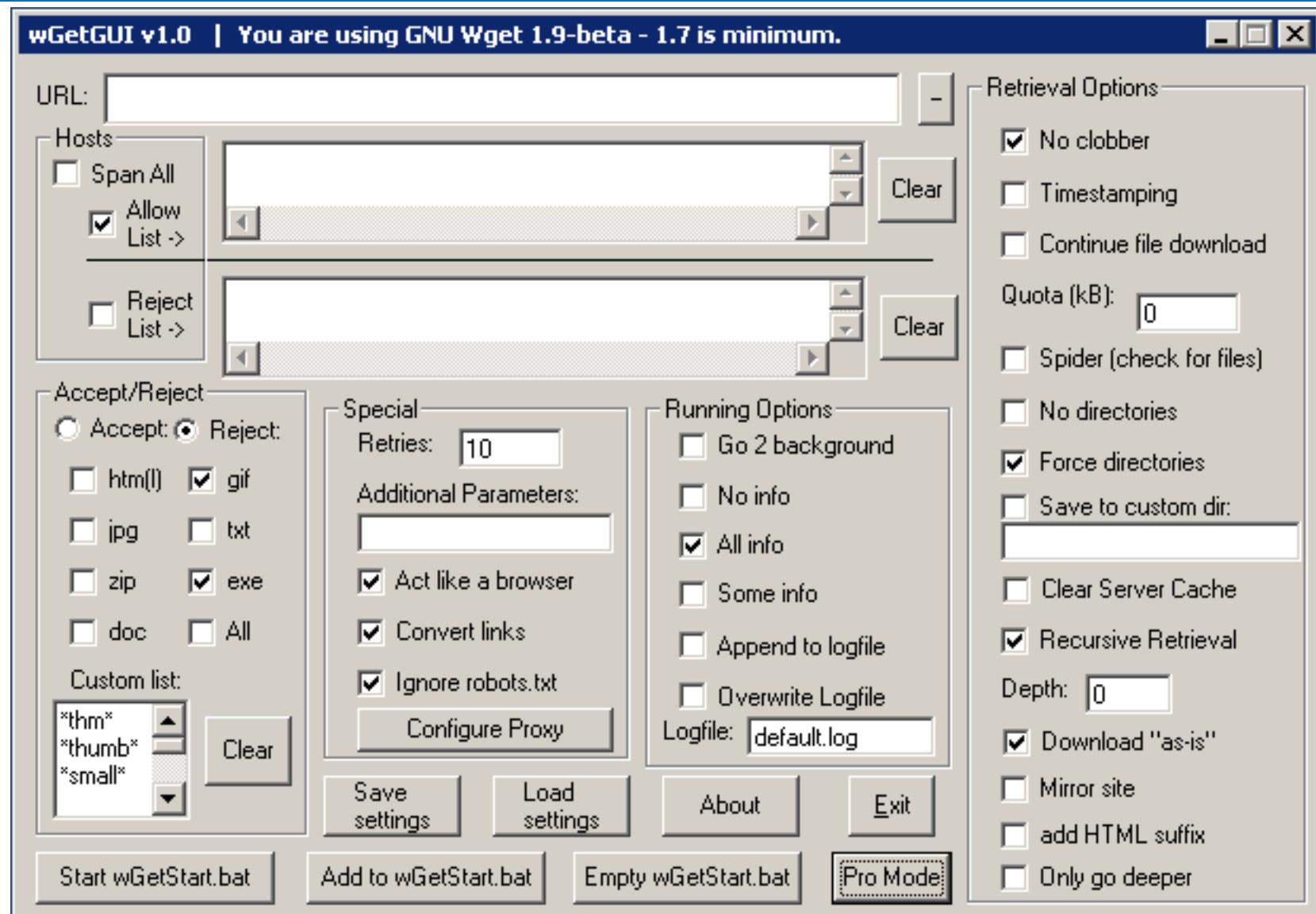
- Structure
- Orientation and navigation
- Card Sorting

### Screen design and layout

- Gestalt laws
- Colour
- Images, Icons
- Typography

### Keep in mind

# Motivation



# Overview

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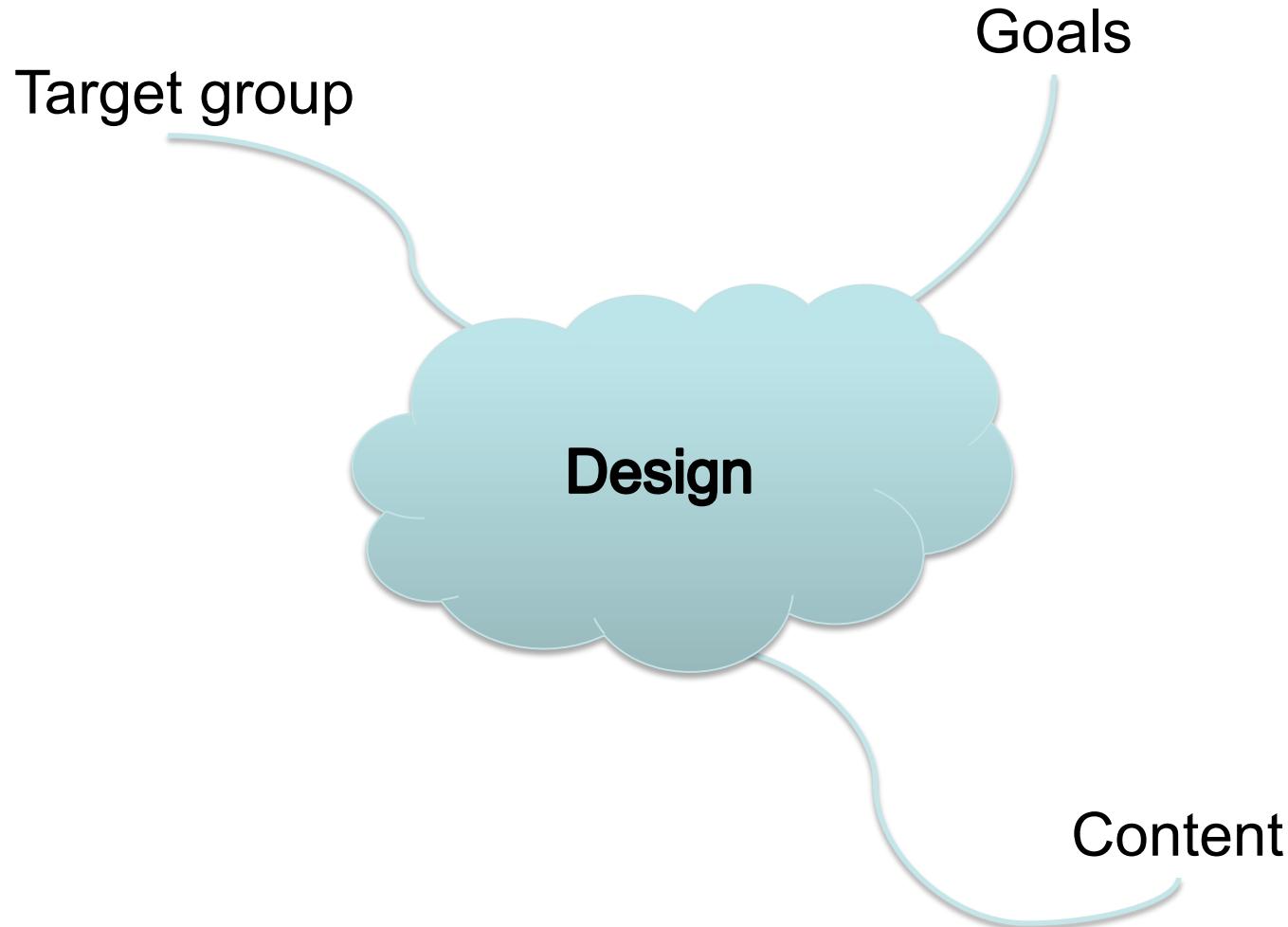
- UI Structure
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## Summary

# Getting started



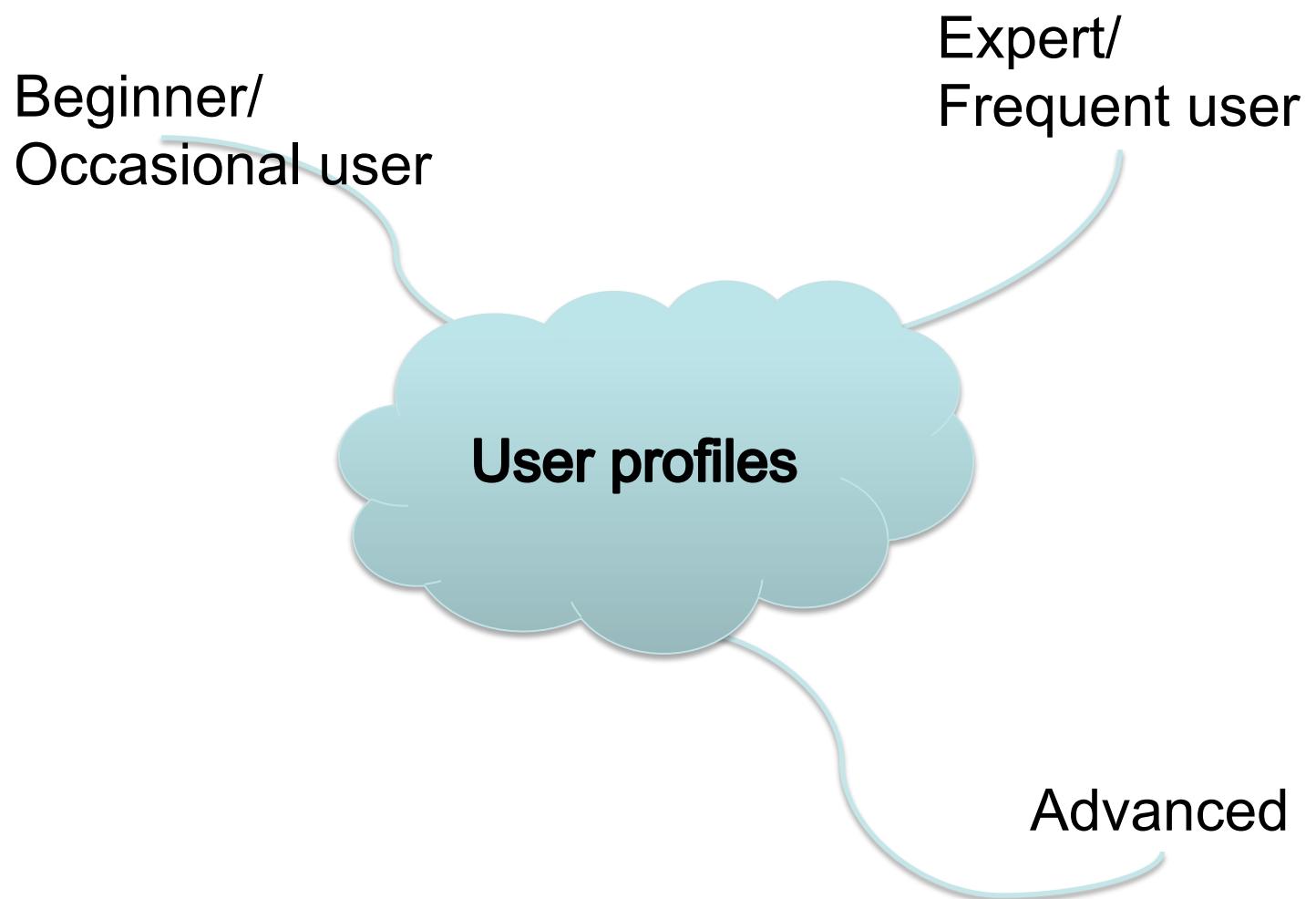
# Target group – (psycho-)demographics

Identify on the basis of

- Age
- Sex
- Location
- Education
- Profession
- Income
- Hobbies
- Technical equipment
- PC knowledge
- ...



# Target group – experience and behaviour



# Goals – Different perspectives

## Application's goals

- Entertainment
- Learning
- Office
- Management
- Communication
- Information
- ....

## User's goals

- Gain specific knowledge
- Contact a friend
- Solve a problem
- Create a document
- ...



# Content

Choose content which is necessary to achieve the goals

- Content should be needed
- Content needs to be found
- Content needs to be understood
- Content needs to be structured and designed



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- Typography

### Keep in mind

## Organisation of content

- Hierarchies are found to be the most simple structure
- Subdivide content into logical information units
- Create hierarchy of units
- Structure relationships between units on the basis of hierarchy

## Create hierarchy according to

- Importance of information
- General information, details
- User's expectations
- User's needs



# UI structure – Depth of hierarchy

## Deep hierarchies are difficult to navigate

- Balanced ratio between breadth and depth
- Generally better: broader than deeper
- Never too deep (5-6 levels)
- May also depend on user's purpose



# Orientation and navigation

## User questions to be answered

- Where am I?
- What can I do?
- Where am I going/What will happen if I do this?
- Where have I been/What have I done?
- How can I come back?

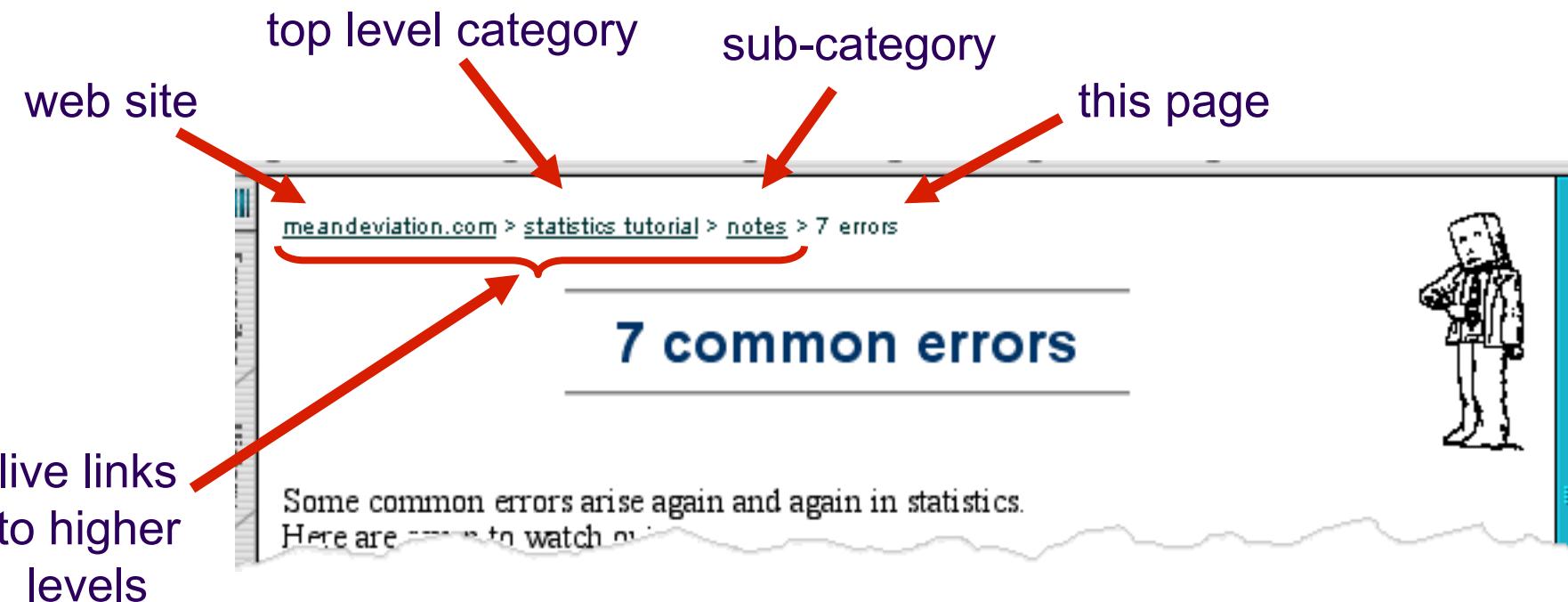


# Orientation and navigation

[Based on Dix, Finlay, Abowd, Beale: *Human-Computer Interaction*, 3rd edition]

## Where you are – breadcrumbs

- Show path through web site hierarchy

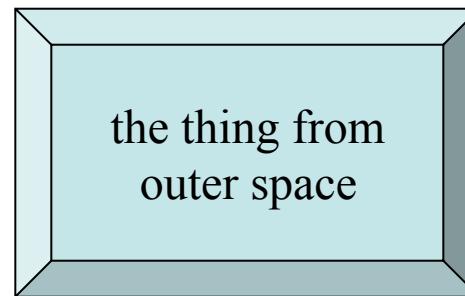
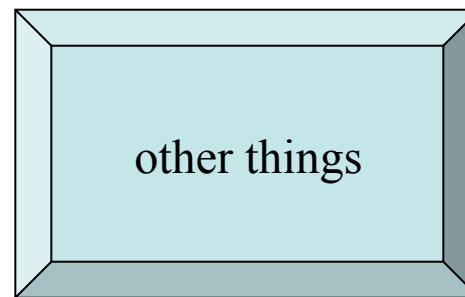
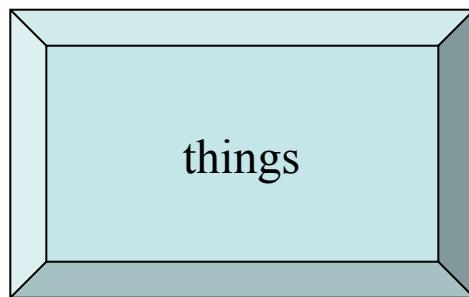


# Orientation and navigation

[Based on Dix, Finlay, Abowd, Beale: *Human-Computer Interaction*, 3rd edition]

## Where am I going? What will happen?

- Beware the big button trap



# Guidance notes

## Visual

- Colours
- Typography
- Images, Icons
- Should be plain and memorable

## Menu for navigation and orientation

## White space

- Separates information
- Can be used to highlight

# White space

[Based on Dix, Finlay, Abowd, Beale: *Human-Computer Interaction*, 3rd edition]

- to separate



- to structure



- to highlight



# Card sorting

## Ask users how to structure and name

- Method for finding patterns in how users would expect to find content or functionality
- Patterns are often referred to as the users' mental model
- Generates an overall structure for your information
- Helps create suggestions for menu categories and navigation
- Open Card Sorting discloses the users' wording

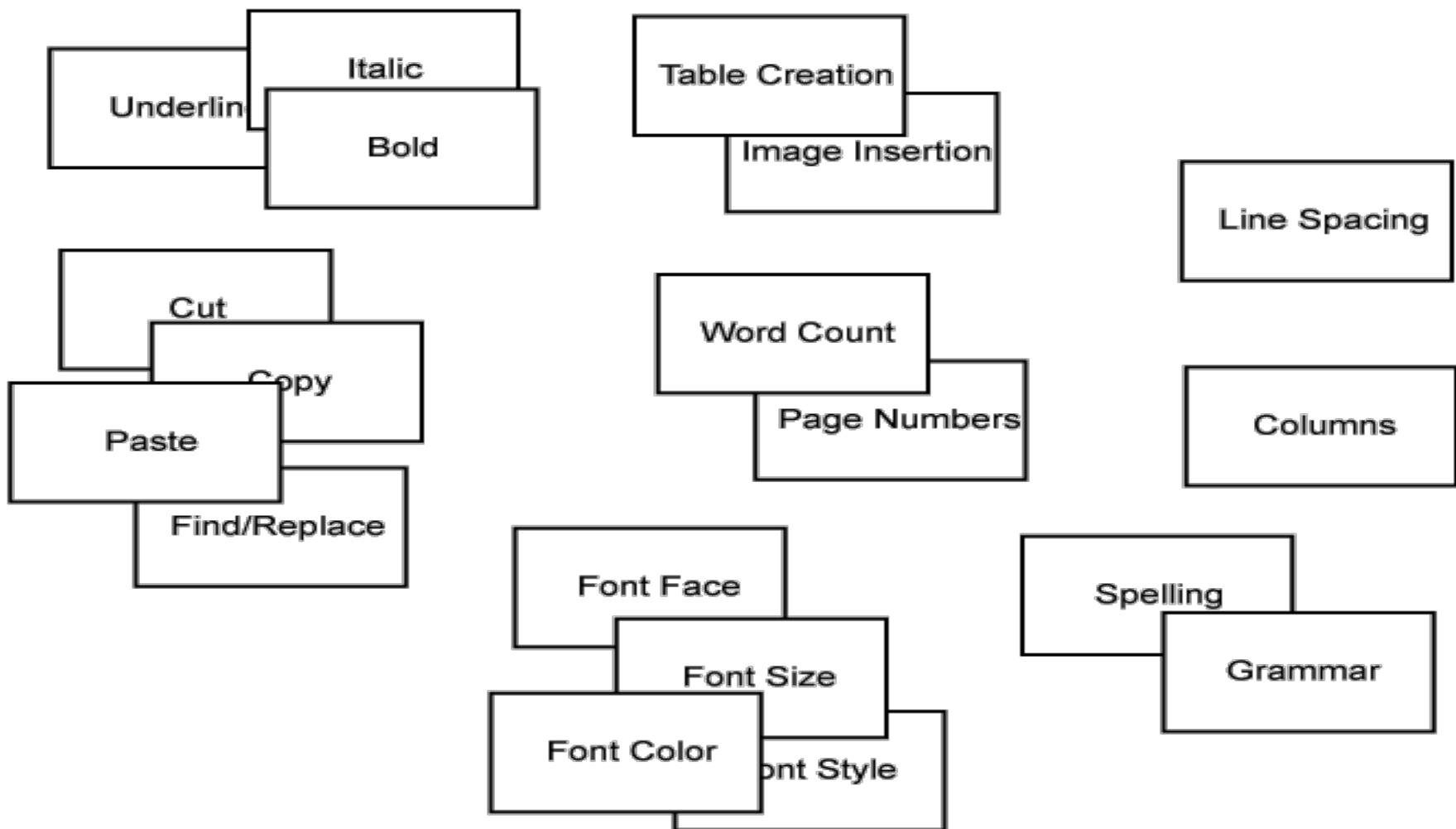
## Best Used for

- Designing new menu, website or application
- Redesigning a website or application

# Card sorting in action



# Result of a card sort



# Card sorting: Method

[Further reading: article by Donna Spencer, [http://www.boxesandarrows.com/view/card\\_sorting\\_a\\_definitive\\_guide](http://www.boxesandarrows.com/view/card_sorting_a_definitive_guide)]

## Select content

- Choose content that is at the same level (granularity)
- Don't be too general or too detailed
- Content should have enough similarity to allow natural groupings to be formed
- ~30 cards is a good number

## Prepare Cards

- Short enough that participants can quickly read the card
- Detailed enough that participants can understand what the content is
- Don't bias: use synonyms and non-parallel structures
- Can be supplemented with a short description or image
- Include blank cards both for adding missed topics and for writing the heading cards

# Card sorting: Running and Facilitating

## Select Participants

- Should be representative of your user group(s)
- Can be done individually (15-30 suggested)
- Or in groups (five groups of three participants each)

## Place on the table

- The shuffled cards
- A stack of blank cards/labels
- A pen
- Rubber bands, paper clips, glue

## Give an introduction with some basic instructions

During the exercise, your main job is to observe and listen

# Card sorting: Analysis

## See patterns by

- Laying the groups out on a table
- Taping them on a whiteboard
- See patterns through similar groupings and labeling
- Patterns emerge that are sensible for the actual users

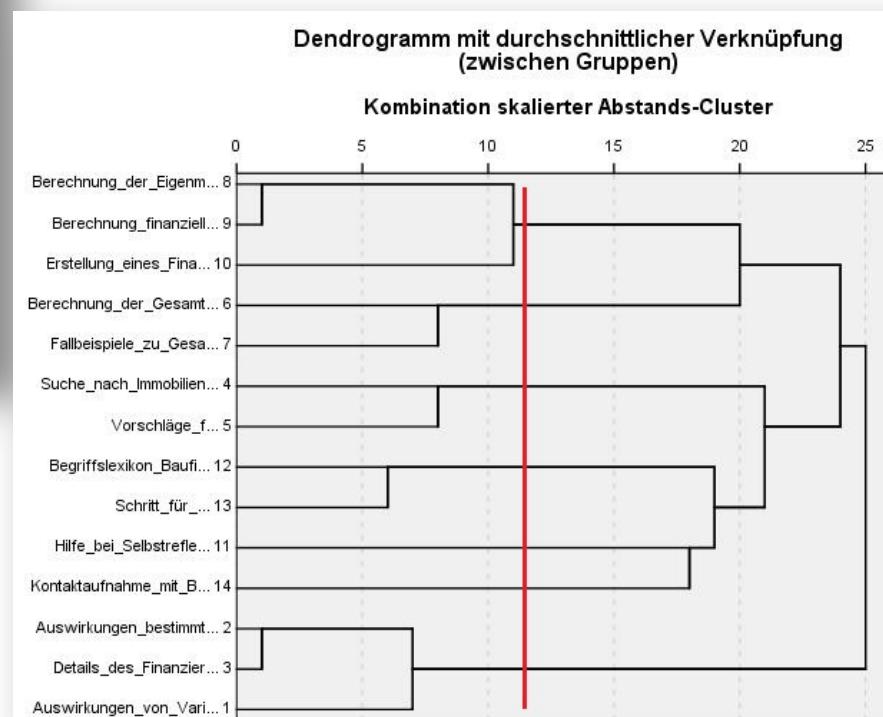
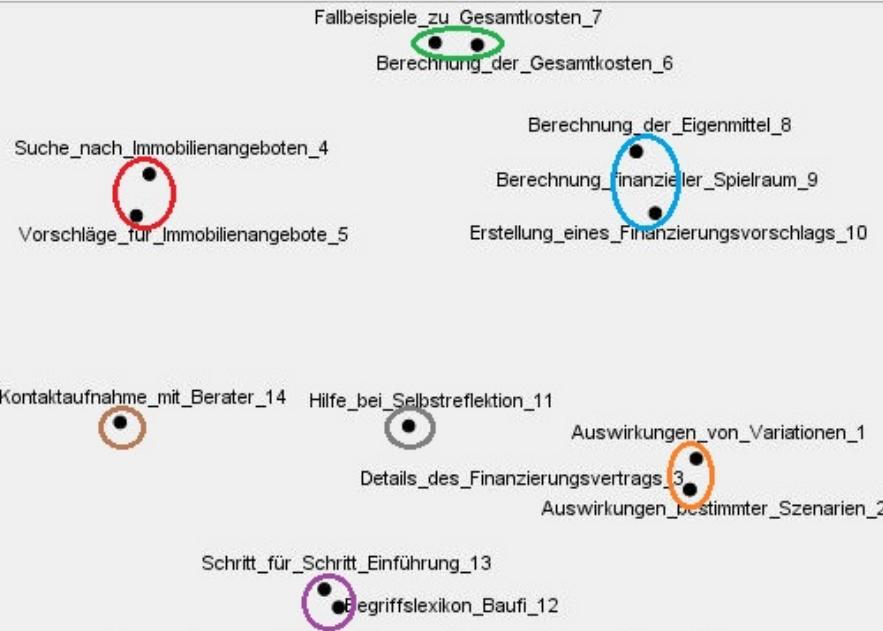
## Areas of difference also provide useful insights

- Content that participants haven't understood well
- Content that could belong to more than one area
- Alternative paths to content
- How different types of participants see information

# Card Sorting: Statistical Analysis

[See also Tullis & Albert (2008) : *Measuring The User Experience: Collecting, Analyzing, and Presenting Usability Metrics*]

## Multidimensional Scaling, Hierarchical Cluster Analysis



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- Typography

## Keep in mind

# Perception

[Based on DIS course of the Media Computing Group at RWTH Aachen University]

Our brains are wired to make sense of what we perceive



# Gestalt Theory

[Based on DIS course of the Media Computing Group at RWTH Aachen University]

Köhler, Koffka, Wertheimer (Berliner Schule):  
“Gestaltpsychologie”, 1912

What do humans perceive as belonging together spatially or temporally?

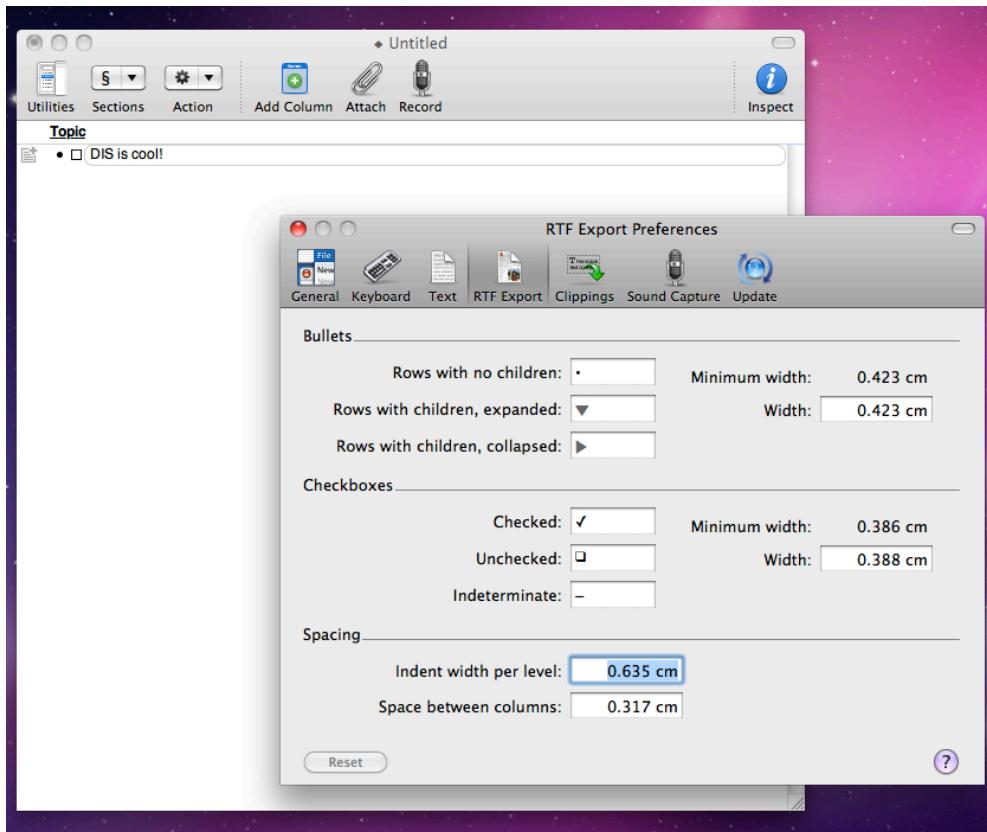
Basis of order in perception, movement, memory, thinking, learning, and acting

Overall 100+ Gestalt laws

# Why should I care?

[Based on DIS course of the Media Computing Group at RWTH Aachen University]

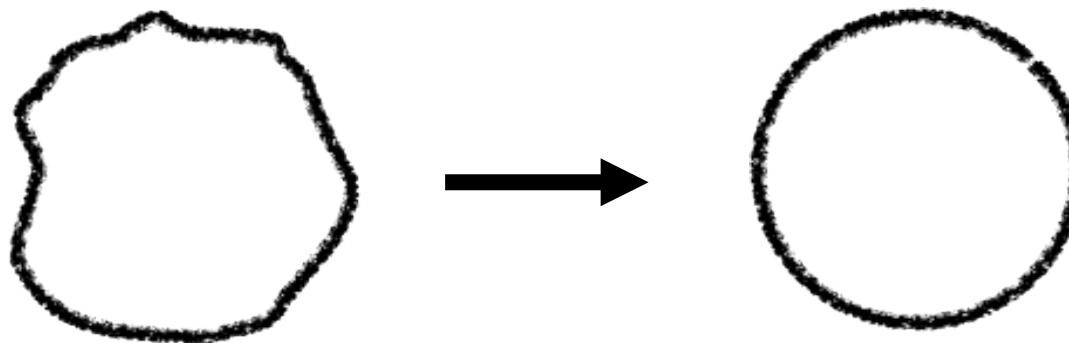
- Simple rules for visual (and auditory) UI design
- Hints how users will react to spatial and temporal order
- Good UIs respect and use Gestalt laws for understandability and intuitiveness



# Gestalt laws: Law 1

[Based on DIS course of the Media Computing Group at RWTH Aachen University]

## Good Shape (Prägnanz)

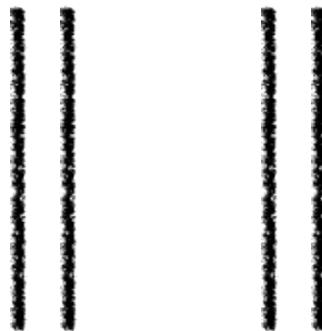


- Perception has tendency towards remembering things as “good” / clear / simple shapes
- “Cognitive compression algorithm”!
- Easier shape ⇒ easier to remember

# Gestalt laws: Law 2

[Based on DIS course of the Media Computing Group at RWTH Aachen University]

## Proximity (Nähe)

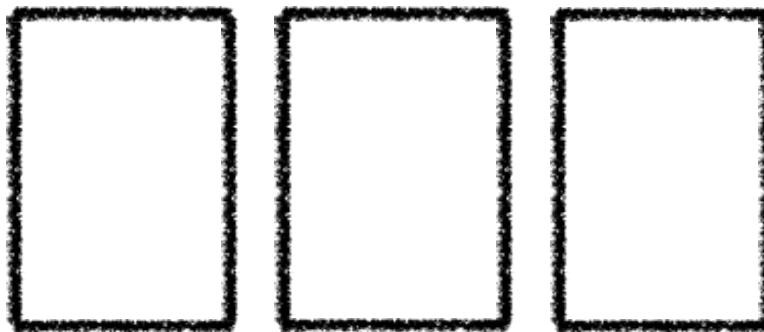


- Spatially (or temporally) close objects (events) are perceived as belonging together.
- Advantage: allows for order by position only, without other aides
- Helps to keep the interface simple

# Gestalt laws: Law 3

[Based on DIS course of the Media Computing Group at RWTH Aachen University]

## Closure (Geschlossenheit)



- Closed shapes appear as belonging together
- Foundation of window metaphor
- But: Don't overdo it.

The image shows a user interface example illustrating the Gestalt law of Closure. It consists of two main sections: 'Contact Info' and 'Assets'.

**Contact Info**

- Name
  - First: John
  - Last: Abercrombe
- Address
  - Number: 123
  - Street: Pleasant St.
  - City: Cleveland
  - State: OH
  - Zip Code: 12345

**Assets**

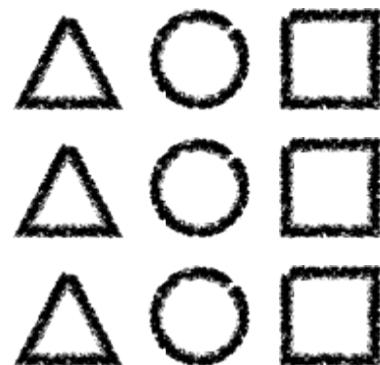
- Salary
  - <=20K
  - >20-40K
  - >40-60K (selected)
  - >60-80K
  - >80K
- Real Estate
  - Home
  - Rental
  - Farm
  - Other
- Bank
  - Name: Bank of the West
  - Accounts
    - Checking: \$2500.24
    - Savings: \$52,465.37

Too many boxes. (From Johnson: *GUI Bloopers*)

# Gestalt laws: Law 4

[Based on DIS course of the Media Computing Group at RWTH Aachen University]

## Similarity (Ähnlichkeit)



- Similar shapes appear as belonging together
- Different objects have higher information content  
(i.e., cognitive effort)

# Bad button design in xrn

[Based on DIS course of the Media Computing Group at RWTH Aachen University]

Unread news in rec.humor.funny	1 article	+	5 old
Unread news in rec.humor.funny.reruns	1 article	+	5 old
Unread news in clari.living.columns.miss_manners	1 article	+	1 old
Unread news in misc.taxes.moderated	98 articles	+	383 old
Unread news in comp.dcom.telecom	35 articles	+	74 old
Unread news in comp.dcom.modems	240 articles	+	969 old
Unread news in alt.security	18 articles	+	91 old
Unread news in comp.os.linux.announce	9 articles	+	24 old
Unread news in comp.os.linux.development.apps	92 articles	+	175 old
Unread news in comp.os.linux.development.system	115 articles	+	187 old
Unread news in comp.os.linux.misc	400 articles	+	924 old
Unread news in comp.os.linux.networking	301 articles	+	560 old
Unread news in comp.os.linux.setup	264 articles	+	1711 old
Unread news in comp.periphs.printers	5 articles	+	839 old
Unread news in comp.protocols.kerberos	16 articles	+	29 old
Unread news in comp.security.announce	2 articles	+	0 old
Unread news in comp.security.gss-api	2 articles	+	2 old
Unread news in comp.security.misc	36 articles	+	60 old
Unread news in comp.security.unix	94 articles	+	105 old
Unread news in comp.windows.x.announce	2 articles	+	2 old
Unread news in comp.windows.x.apps	4 articles	+	22 old
Unread news in gnu.emacs.bug	15 articles	+	31 old
Unread news in news.announce.newgroups	18 articles	+	5 old
Unread news in news.software.b	2 articles	+	7 old
Unread news in news.software.nntp	90 articles	+	90 old
Unread news in news.software.readers	42 articles	+	163 old
Unread news in shore.sys	1 article	+	5 old
Unread news in shore.news	1 article	+	2 old
Unread news in alt.sources	1 article	+	5 old
Unread news in alt.source-code	1 article	+	1 old

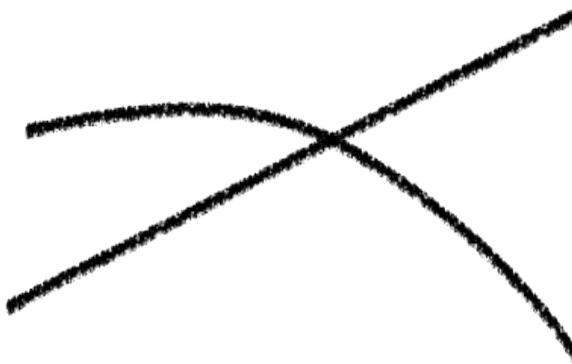
Operations apply to current selection or cursor position

Quit	Read	Next	Prev	Catch up	Subscribe	Unsubscribe	Goto group	All groups
Rescan	Prev group	List old	Select groups	Move	Exit	Checkpoint	Gripe	Post
Post & Mail								

# Gestalt laws: Law 5

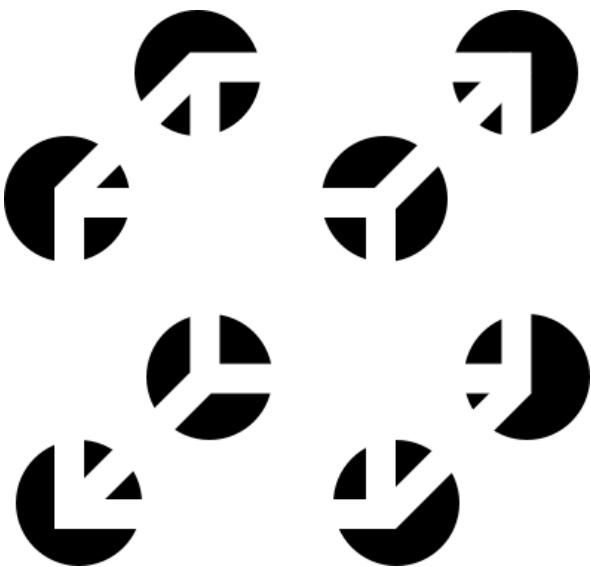
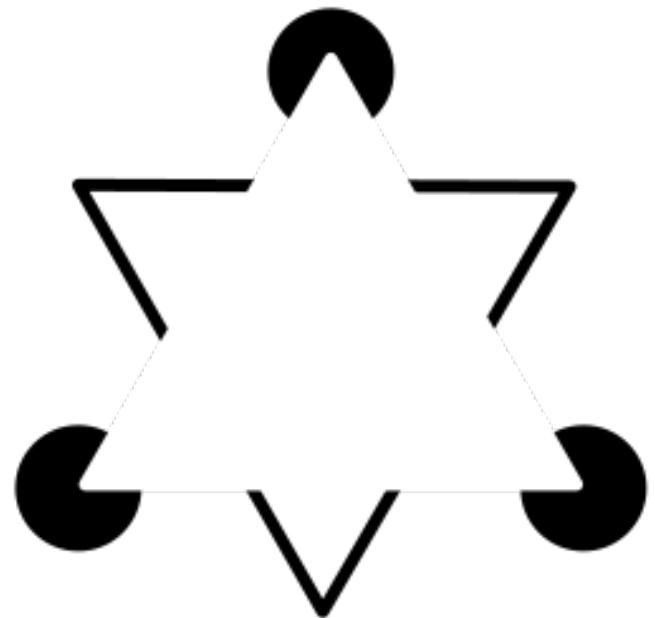
[Based on DIS course of the Media Computing Group at RWTH Aachen University]

## Continuity (gute Fortsetzung)



- “Law of the Good Curve”
- Continuous shapes appear as belonging together

# Gestalt laws: Law 5



# Gestalt laws: Law 6

[Based on DIS course of the Media Computing Group at RWTH Aachen University]

## Experience (Erfahrung)

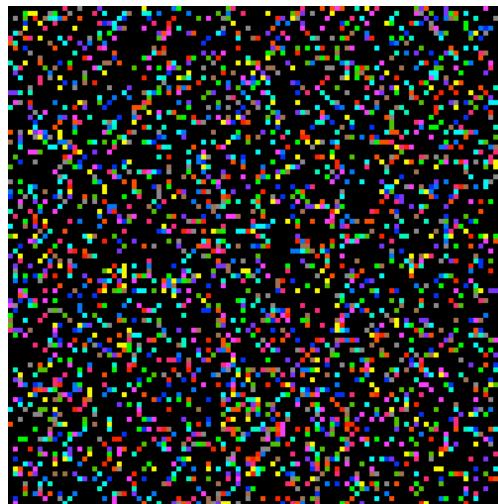


- We tend to “file” new things into categories we already know
- Using existing knowledge, thereby saving learning effort and memory
- Foundation for the success of metaphors in UI design
  - Analog to real-world models
  - E.g. desktop metaphor, trash can

# Gestalt laws: Law 7

[Based on DIS course of the Media Computing Group at RWTH Aachen University]

## Common fate (gemeinsame Bewegung)



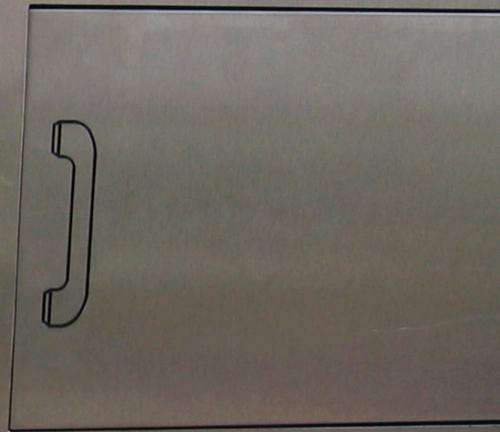
- “Law of Common Movement”
- Animated objects within a static environment appear as a group
- By-Law: Animation has a very strong effect in UI design
  - Here: Blinking in sync groups the items





99

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# Colour

## Colours

- are never neutral
- can persuade so. of sth.
- can provoke emotions
- are often perceived unconsciously

## Influences on colour perception

- biological (e.g. red esp. intensively)
- cultural (e.g. black: death or reincarnation)
- individual

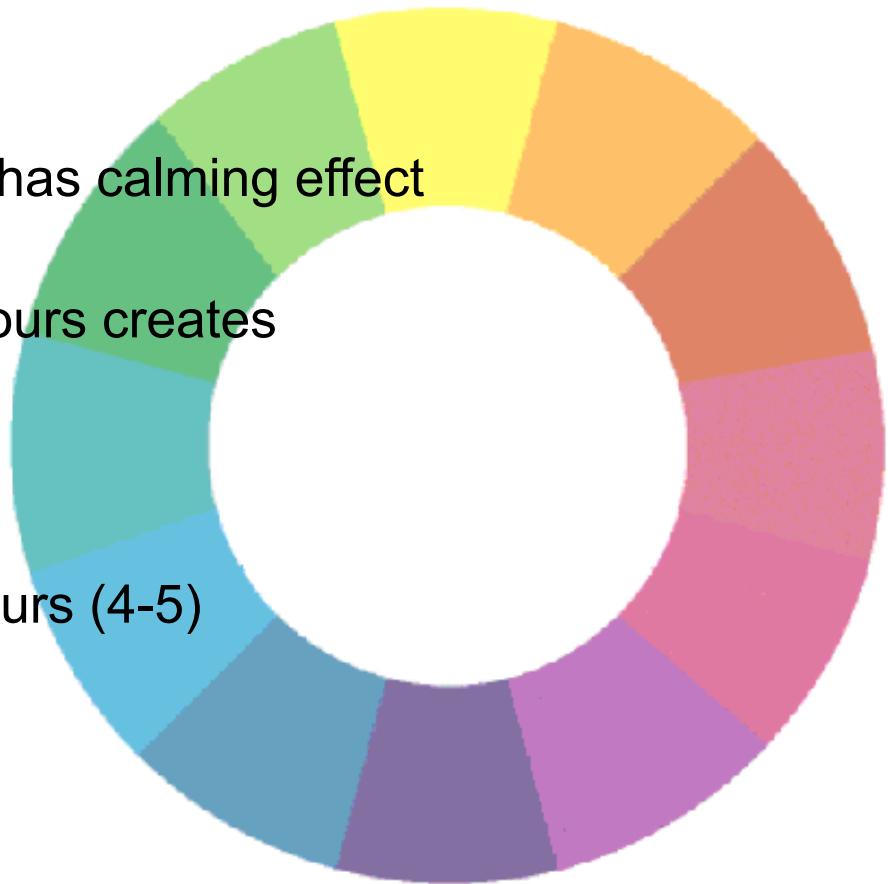


Important: Colour perception of target group

# Colour

## Targeted use of colours

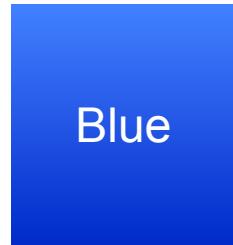
- Combination of contiguous colours has calming effect (e.g. green and blue)
- Combination of complementary colours creates suspense (e.g. red and blue)
- Use limited number of different colours (4-5)
- Use colours consistently



# Colour - Associations



Red



Blue



Green



Yellow



Orange

Activity,  
Dynamics,  
Vitality, Energy,  
Determination  
Love, Passion,  
Strength,  
Temperament,  
Heat, Fire,  
Danger, Warning  
Anger, Blood

Sky, Sea,  
Infinity,  
Expanse, Freshness,  
Harmony,  
Intuition,  
Balance,  
Credibility,  
Coolness/Chill,  
Passivity,  
Physical Inactivity

Freshness,  
Harmony,  
Rest/Silence,  
Balance,  
Naturalness,  
Growth,  
Richness,  
Relaxation,  
Hope, Poison

Vitality,  
Movement,  
Sun, Heat,  
Happiness, Joy,  
Vivacity,  
Brightness,  
Playfulness,  
Optimism  
Kindness,  
Gold, Worth

Heat,  
Vivacity,  
Exuberance,  
Activity,  
Attention,  
Courage, Fun,  
Happiness

# Images, Icons

## Illustration

- Support or complete a statement



## Decoration

- Framing, aesthetics
- Motivation
- Recognition/Identification

Facebook helps you connect and share with the people in your life.



## Structure

- Visualise structures
- Orientation guide
- Navigation items
- Save space



# Images, Icons

## Advantages

- Save space
- Can be recognised quickly
- Are language independent
- Are easy to remember
- Reach into subconscious level

## Good images and icons

- Only show the essential things
- Combine familiar with new things
- Address emotions of target group
- Form depth (foreground, middle ground, background)
- Consciously position subject matter

Beware: interpretation depends on context, culture, experiences



Übersicht



Profil



Entdecken



Hangouts



Fotos



# Typographic design

## Use to

- Structure, support orientation
- Highlight
- Indicate (in)active elements

## Change typographic design by

- Typeface
- Font weight
- Font style
- Font size
- Font colour
- Underline
- Flashing

The quick brown fox jumps over

The quick brown fox jumps over

The quick ~~brown fox~~ jumps over

The quick ▶brown fox◀ jumps over

The quick [brown fox] jumps over

Gooooooooooooogle >

1 2 3 4 5 6 7 8 9 10 Weiter  
1 2 3 4 5 6 7 8 9 10 Weiter

# Typographic design for the screen

## Font

- Sans-serif
- No majuscule font (only capitals)
- Font size should be big enough (min. 12p)

## Text columns

- Ideal: 30-60 characters
- Wider columns appear more balanced
- Narrow columns are easier to comprehend
- Justification: calm

## Follow reading direction

- Left-aligned: easy to grasp
- Centre justified: traditional, dignified

Blockssatz

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Flattersatz

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Rauhsatz

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# Keep in mind

## Think from a user's perspective

- When, where and how will they use the system?
- What are their characteristics?
- Are they handicapped?
- What do they expect?
- What are they accustomed to?
- What do they like?

## Design for the actual users

