

Content and Form: How one manipulates the other

1

DAY 1:
INTRO
USABILITY
USER EXPERIENCE
GESTALT LAWS
INTERACTION DESIGN LAWS

HNU

Andrea Kohlhase
Neu-Ulm University of Applied Sciences
Andrea.Kohlhase@hs-neu-ulm.de

FAU

Michael Kohlhase
Friedrich-Alexander-University Nürnberg-Erlangen
Michael.Kohlhase@fau.de



Content and Form

2

FAU
HNU

visiting



Content & Form

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Days	Topics	
Mo		
Slot 1	Introduction / Introductions / Agenda	
Slot 2	Usability/ User Experience: Intro/ Gestalt Laws/ Interaction Design Laws - Theory & Practice	Eyetracking: Discourse Level Testing: All participants participate as probands in a prepared eye-tracking study the test a participant will leave the Usability Session for 10-15 mins.
Slot 3		
Slot 4		
Slot 4		
Tue		
Slot 5	HTML/CSS - Theory & Practice	
Slot 6		
Slot 7	Dynamic HTML: DOM, jQuery - Theory & Practice	
Slot 8		
Wed	Group A	Group B
Slot 9	Your first eye-tracking test as a tester: Participants develop a test plan, create a test in dynamic HTML/CSS (having usability in mind), run a pilot test, and finally run the test with probands of the other group. Each participant will be a moderator once.	Content & Form: - Using MathML (HTML for math) as an Object-to-Think-with - Knowledge Structures in technical/engineering documents; the role of context - Document Annotation & Services in HTML documents using the structure identified before (practical examples)
Slot 10		
Slot 11		
Slot 12		
Thu		
	Content & Form: - Using MathML (HTML for math) as an Object-to-Think-with	Your first eye-tracking test as a tester: Participants develop a test plan, create a test in dynamic HTML/CSS (hav

What is Eye Tracking?

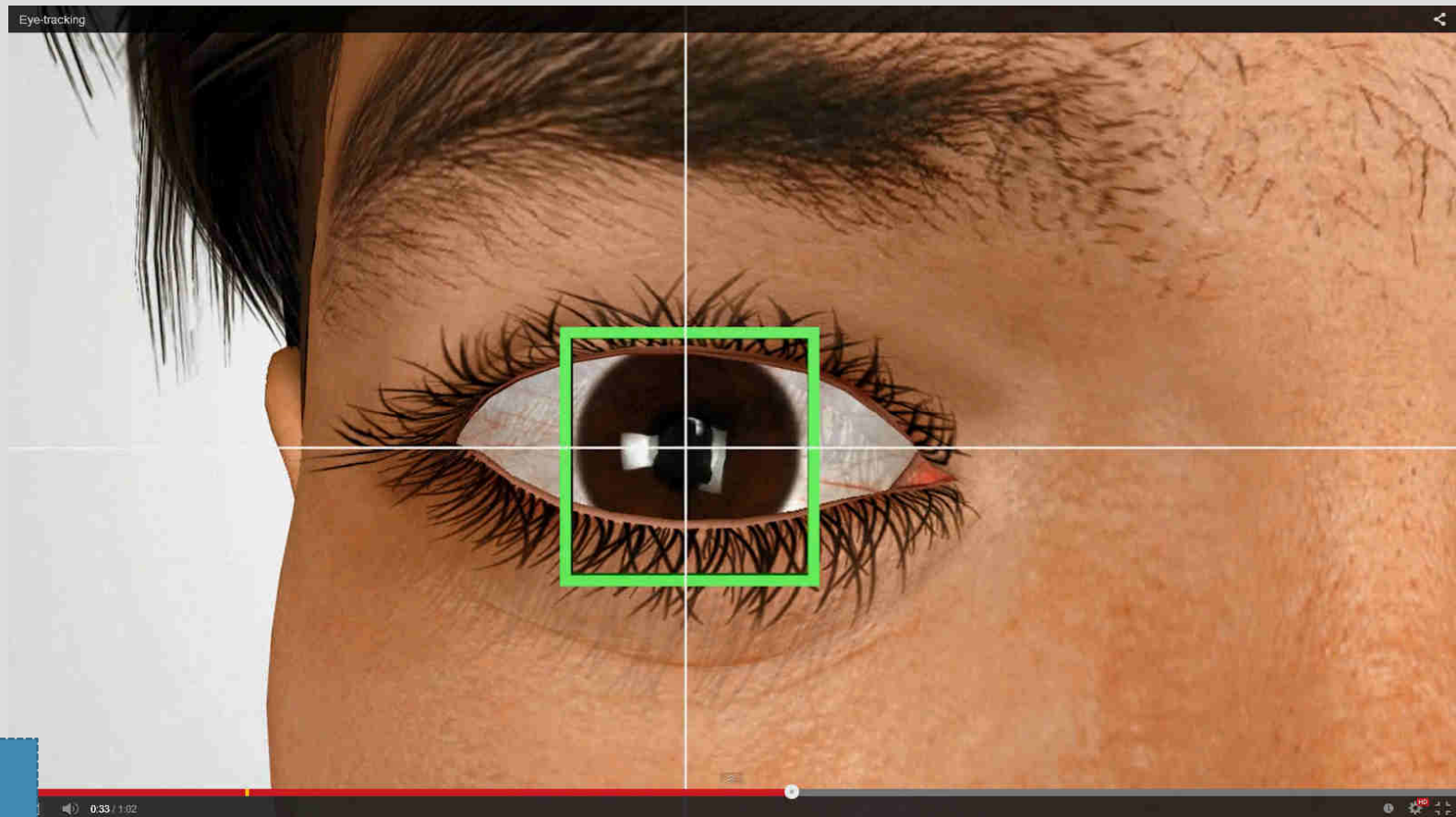
4

= Tracking of eye movements

- An observation method to learn
 - Where a person is looking (at any given time)
 - In which order a person is looking
 - How long a person is looking at one spot
- Often in combination with self-reporting techniques like „Thinking aloud“

Eye Tracking Introduction

5



Eye Tracking Example

6

Eye Tracking Cristiano Ronaldo Using the Dikablis Mobile Eye Tracker

Taken from "Ronaldo - Tested to the Limit" - Copyright 2011 Castrol



[<https://www.youtube.com/watch?v=2NcUkvIX6no>]

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USABILITY

HNU

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Neu-Ulm University of Applied Sciences
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FAU

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Michael.Kohlhase@fau.de



Discussion

8

What is a **good** User Interface (UI)?

Simple User Interface, but good?

9

Design Goal: Secure mobile phone



What is Usability?

12

*“The **extent** to which a product can be used by specified users to achieve specified **goals** with **effectiveness**, **efficiency** and **satisfaction** in a specified **context** of use.”*

[ISO 9241-11, 1998]



Standard on
“Ergonomics of Human
System Interaction”

Example for Usability as Property

13

Properties of a Hammer:

- Optimal balance between head and handle
- Not too heavy, not too light
- good ergonomics
- Easy to use, self-explanatory

→ Does it have good Usability?



Example for Usability as Property

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Use Context 1:

- Task: Driving a nail into a wall
 - Efficiency for Task: Very good
 - Effectiveness for Task: Very good
 - Satisfaction for Task: add. nice to the touch while handling
- Good Usability

Use Context 2:

- Task: Driving a screw into a wall
 - Efficiency for Task: Bad
 - Effectiveness for Task: Rather bad
 - Satisfaction for Task: add. no cognitive support
- Bad Usability

15

What is the
difference in terms
of usability?

Remote Control Devices for a TV



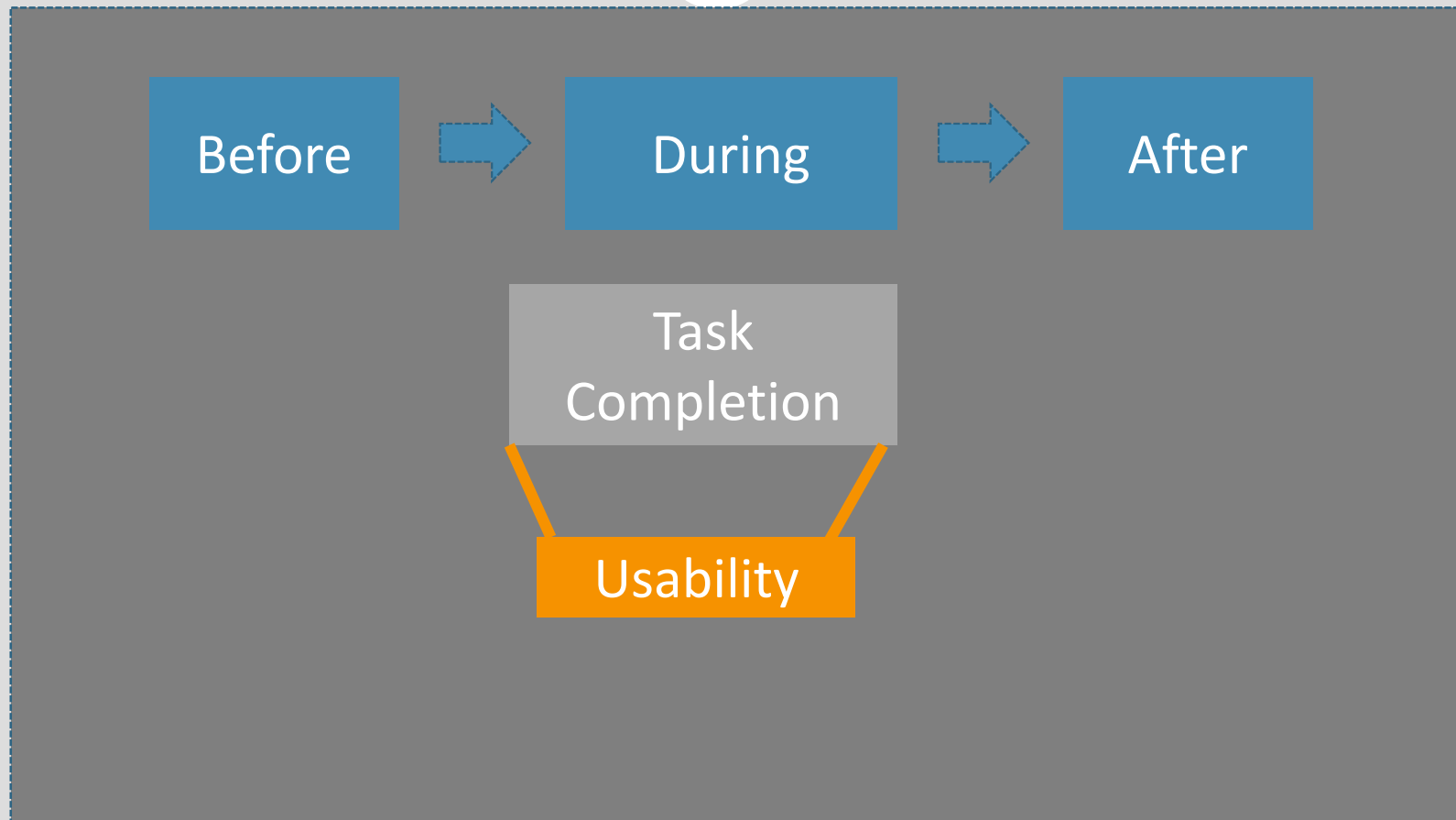
Standard



TiVo

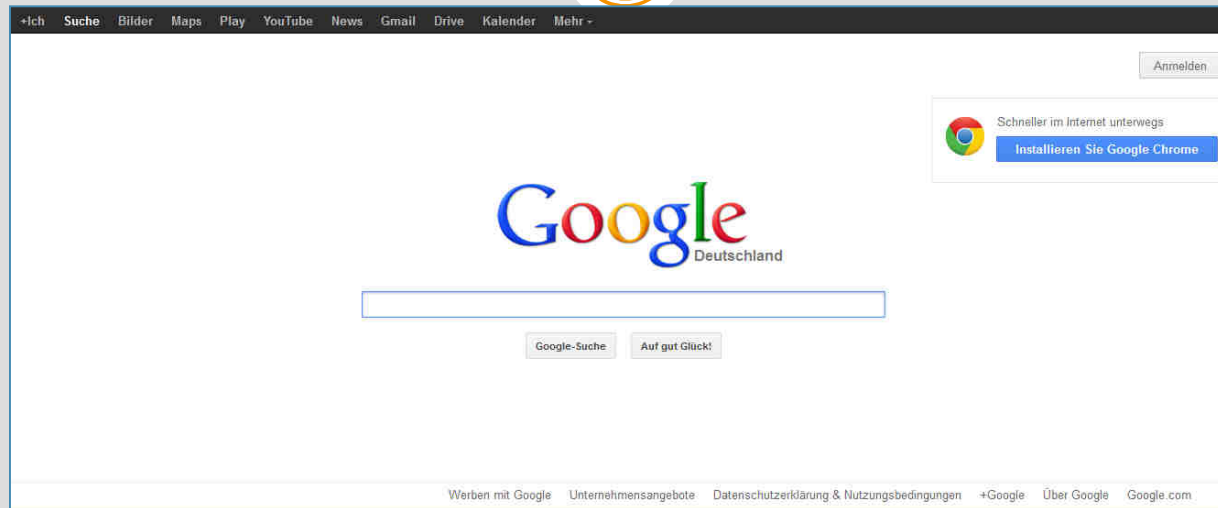
Usability

16

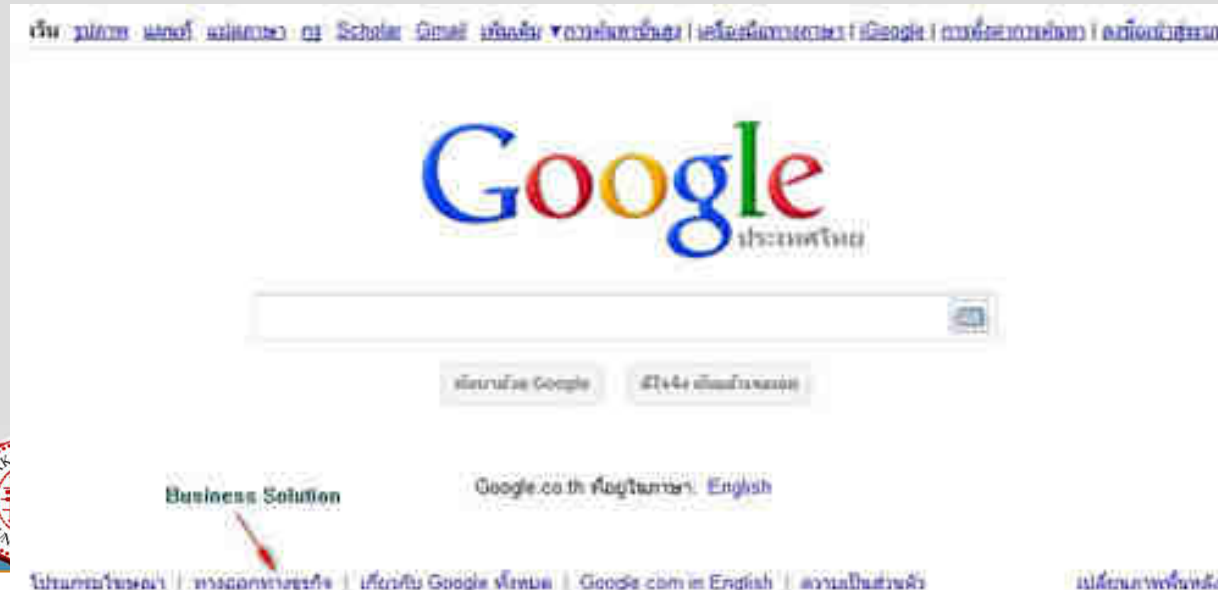


Example: Good Usability for Online Search on the Web (with a Keyboard)

17



Germany



Thailand

Here comes your
very, very first
design challenge ...

Design Challenge 1

19

In your lectures you have covered chapter 1-4 of Erwin Kreyszig's „Advanced Engineering Mathematics“ (<http://kwarc.info/teaching/SWU>) about ordinary differential equations. Imagine you write an exam tomorrow about this topic. Your teacher is so nice to allow you to bring one cheat sheet (1 page, one-sided, handwritten).

The Design Challenge: **Create a usable cheat sheet!**

Remember Usability:

- Effective
- Efficient
- Satisfactory

(wrt goal/context)

- Groups of 4 students
- 30min
- Explain in a small presentation why your design is usable

Usability Issues to be solved by Usability Testing

(20)

- If users **don't see** things that they should see
- If users **don't do** things that they should do
- If users **go** in the **wrong** direction
- If users **falsely think** they are doing the right thing
- If users **miss** out on something you considered a **rule**

Find out
what you're users particularly **liked**,
what they were **confused** about,
what they did **wrong**!

Beyond Usability? → “Space Colossus”

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<http://www.youtube.com/watch?v=gaNxaSWORh8>



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USER EXPERIENCE

HNU

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Neu-Ulm University of Applied Sciences
Andrea.Kohlhase@hs-neu-ulm.de

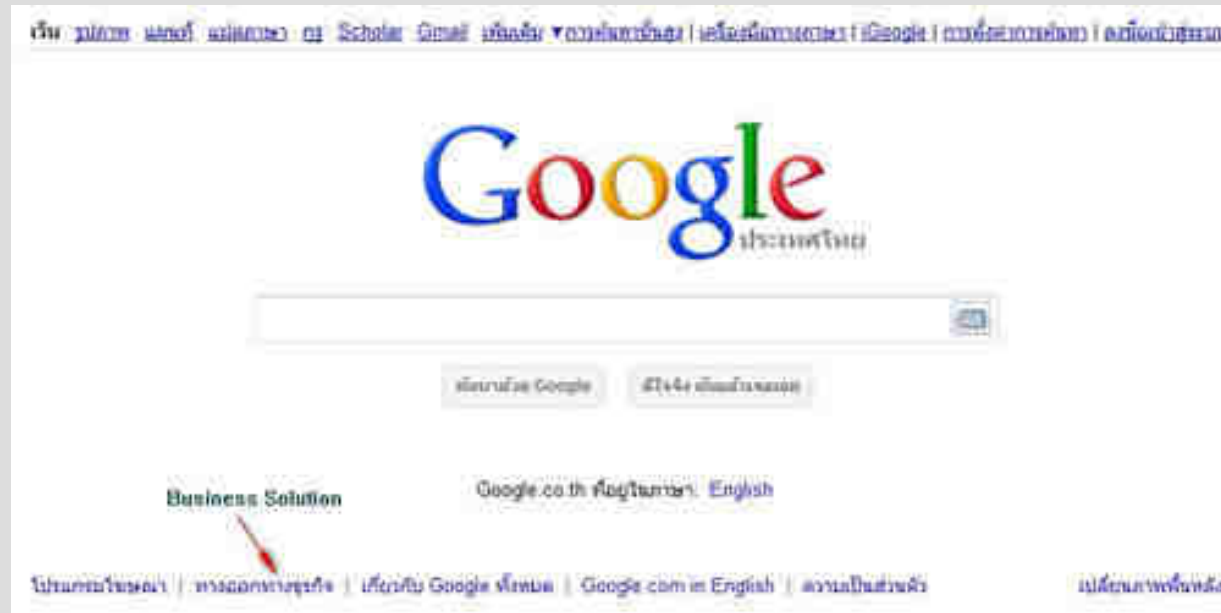
FAU

Michael Kohlhase
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Michael.Kohlhase@fau.de



Example: Creating User Experiences

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Ratchanee Sripaiwan's 86th Birthday Doodle 4 Google, Thailand Winner 2010



What about the usability of this campaign?

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What is User Experience (UX)?

25

*„A person's **perceptions** and **responses** that*

→ **All** perceptions and responses:

Emotions, preferences, physiological and psychological reactions, habits, attitudes and demands

What is User Experience (UX)?

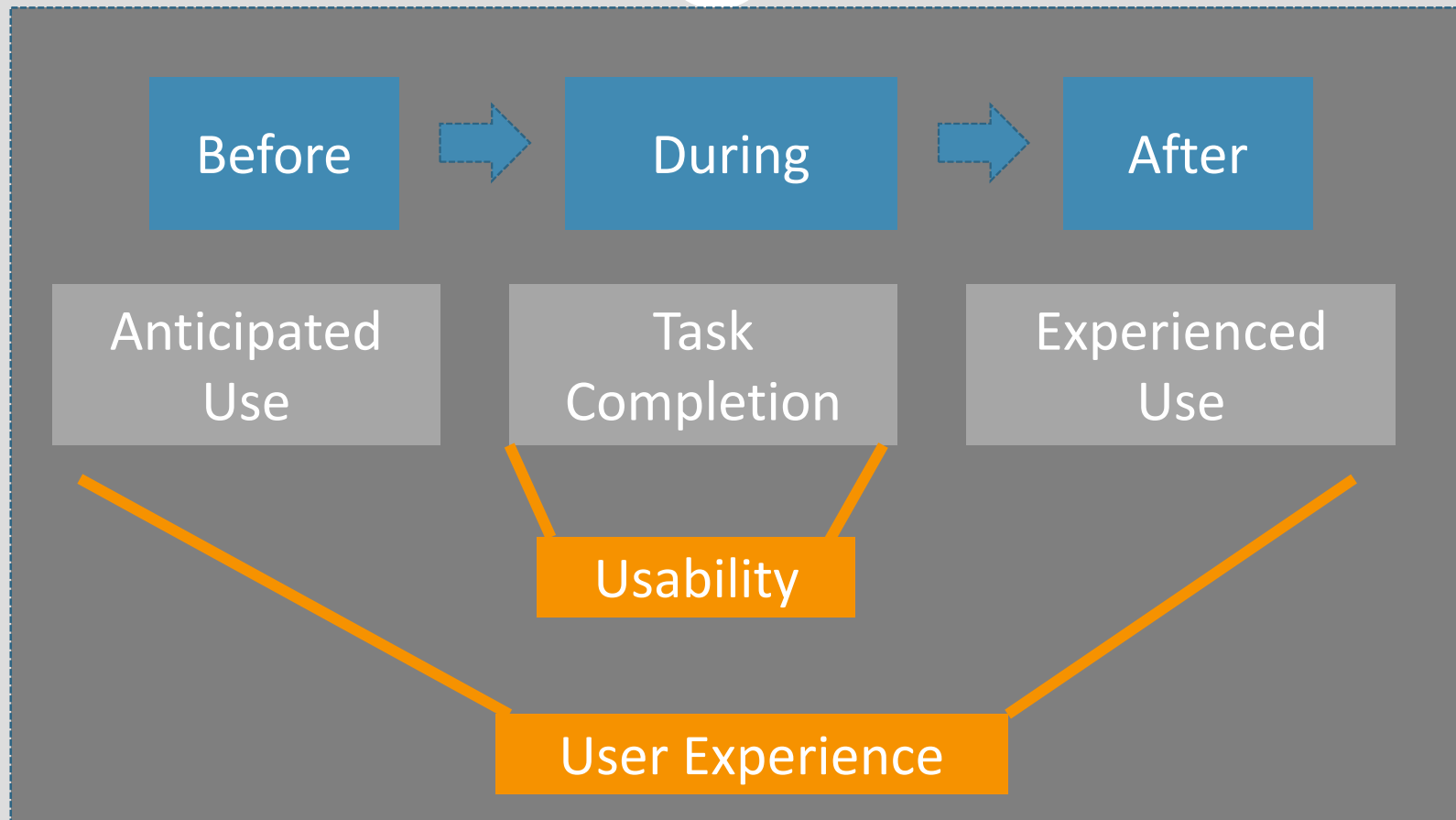
26

*„A person’s **perceptions and responses** that
result→ after use
from the use→ during use
or anticipated use→ before use
of a product, system or service.“*
[ISO 9241-210, 2009]

One cannot design a User Experience,
only design *for* a User Experience!

Usability ``versus`` UX

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Usability ``versus`` UX

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Product

Experience

(German: Erlebnis)

Experiences sell better
than products!

A Long-Distance Flight as Experience!

29

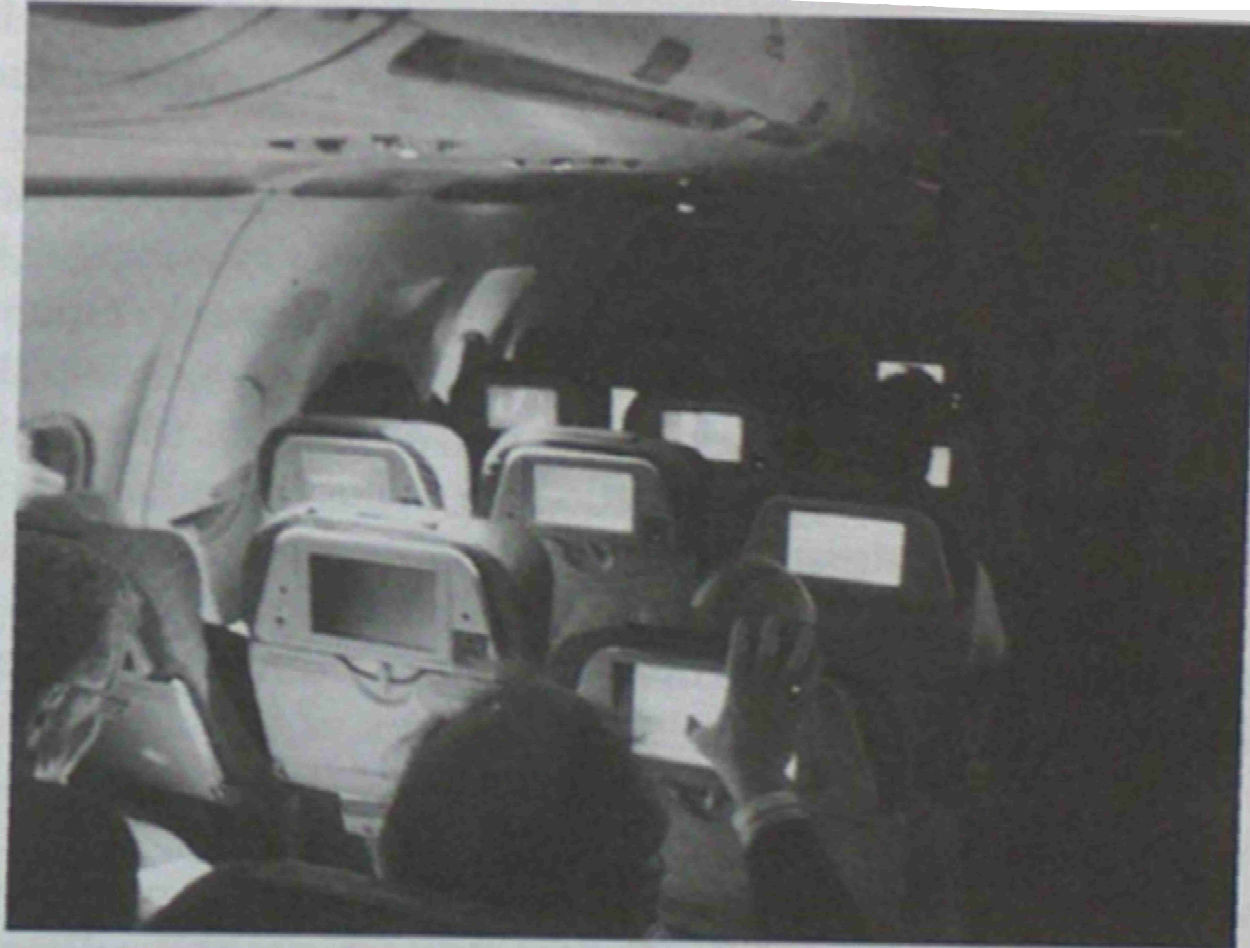


Figure 14.3 Passengers plugged into their monitor during flight

Why are experiences better?

30

Science: Spend money for experiences rather than things.

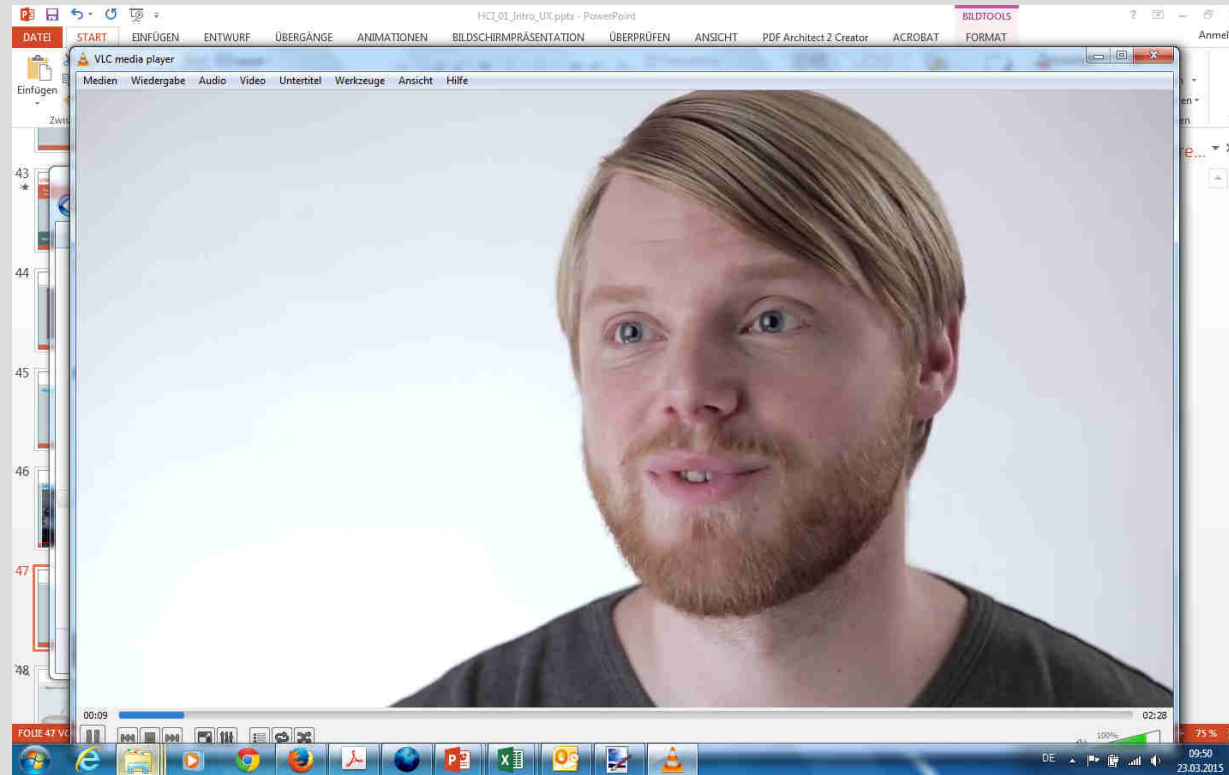
Why? Since ...

1. We get used to things very fast,
2. An experience stays longer in long term memory and
3. We share experiences often, but not things.

From Usability to User Experience:

The BookBook

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<https://www.youtube.com/watch?v=MOXQo7nURs0>

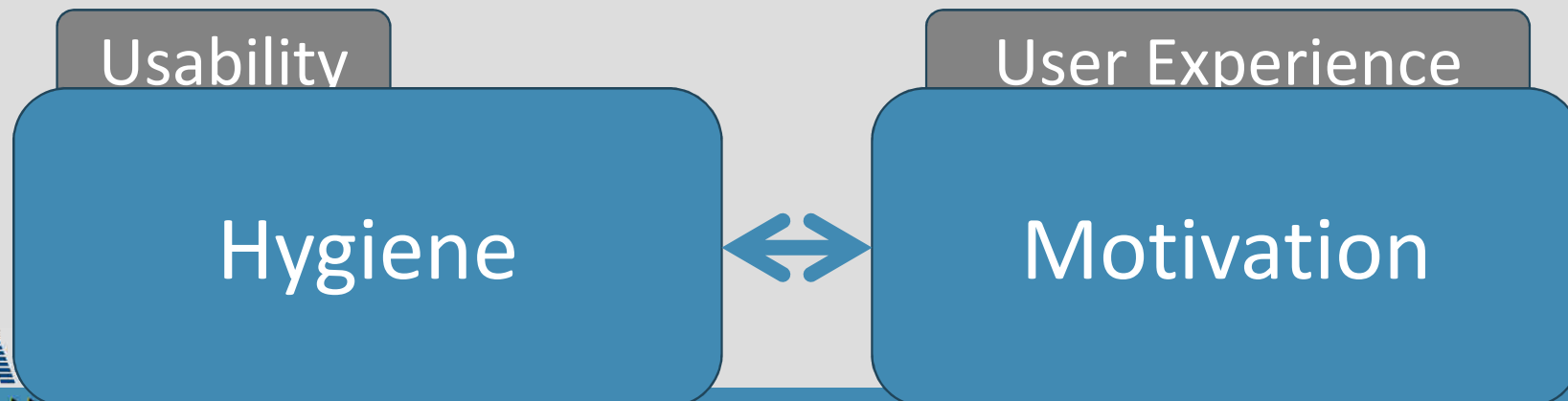
Usability ``versus`` UX

32

Herzberg's Model

- Which factors lead to higher job satisfaction?
 - **Hygiene Factors** → Cause dissatisfaction if not present
 - **Motivators** → Strengthen performance and satisfaction

acc. to [Boy: „Human-Machine Interaction“, p. 307]



From Usability to User Experience : The Fun Coke Machine

33



Design Sketch Prototypes

34

Idea: Drawings replace future systems

→ Increased understanding of application and Gestalt

Travel Organizer 23 August

WELCOME HELEN

Where do you want to go? YORK

What date do you want to travel? 16 Sept

Which form of transport do you want? TRAIN

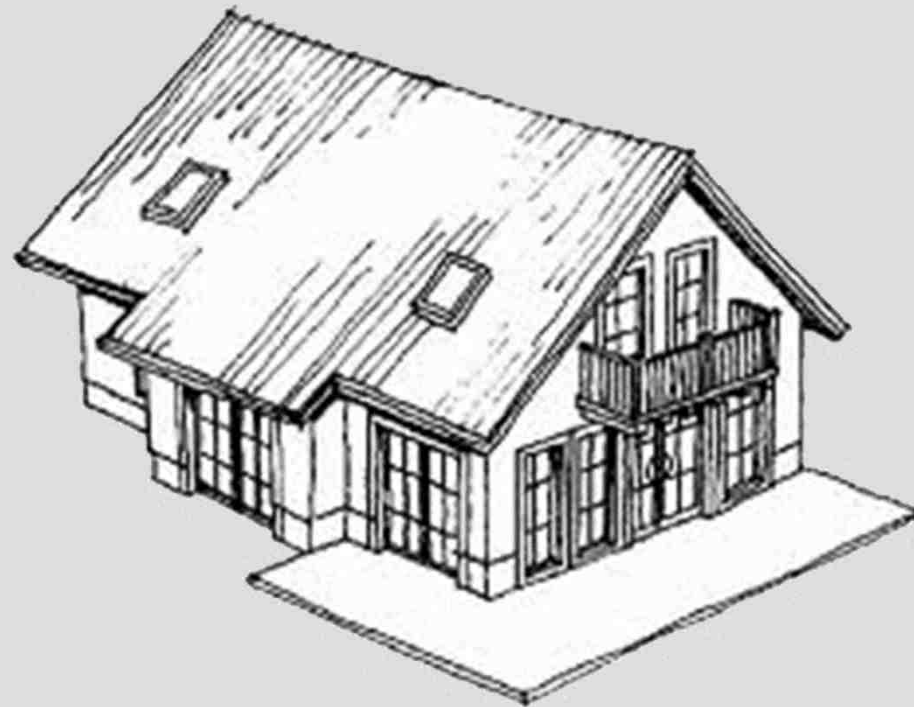
Do you need accommodation? YES

Travel Organizer 23 August

Train timetable from Milton Keynes Central to York on 16 Sept

Depart	09:09	10:09	same	22:09
Arrive	12:30	13:30	14:30	01:30

Accommodation Hotel B & B
£40 to £150 £20 to £60



Design Challenge 2

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Now you have a usable cheat sheet about ordinary differential equations:

How can you extend your design so that it provides a great user experience?

Make a list with 3 suggestions!

Remember:

User Experience:

„A person's perceptions and responses that result from the use or anticipated use of a product, system or service.“

- Groups of 4 students
- 10min

Content & Form

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GESTALT LAWS

HNU

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FAU

Michael Kohlhase
Friedrich-Alexander-University Nürnberg-Erlangen
Michael.Kohlhase@fau.de



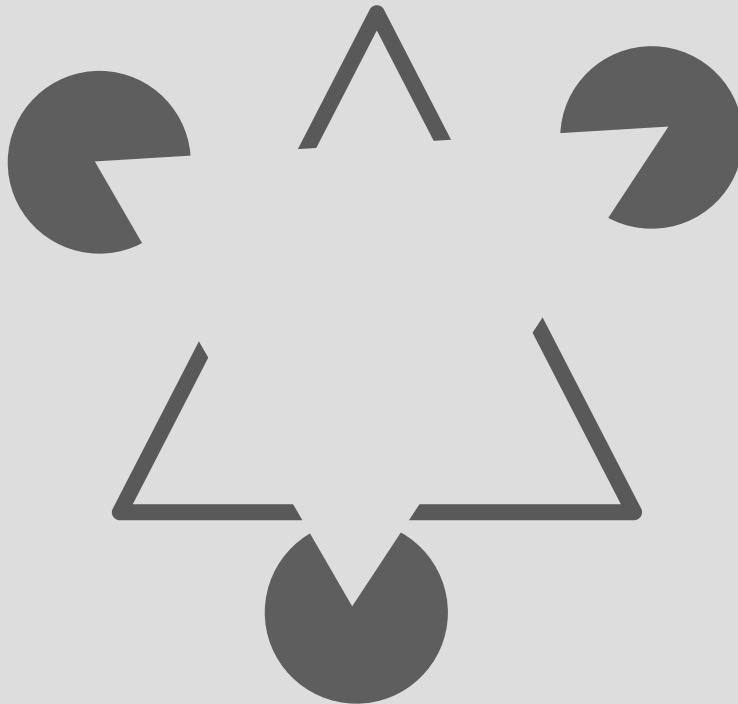
Gestalt Psychology

38

- Gestalt [German] = a unified form, shape
- Gestalt psychology started in the 1920s:
 - Humans are naturally capable of perceiving objects as orderly and organized forms and patterns
 - A group is one chunk of information, so we can keep more information in short-term memory!
 - Making sense of a situation can be done much more efficiently if there are fewer chunks of information to understand and keep in mind.
 - Gestalt Laws = Principles of Groupings

Gestalt Laws: Closure

40



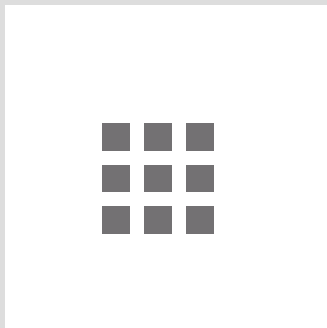
Law of Closure

a Gestalt principle of organization holding that there is an innate tendency to perceive incomplete objects as complete and to close or fill gaps and to perceive asymmetric stimuli as symmetric

<http://www.thefreedictionary.com/law+of+closure>

Gestalt Laws: Closure

41



Law of Closure

a Gestalt principle of organization holding that there is an innate tendency to perceive incomplete objects as complete and to close or fill gaps and to perceive asymmetric stimuli as symmetric

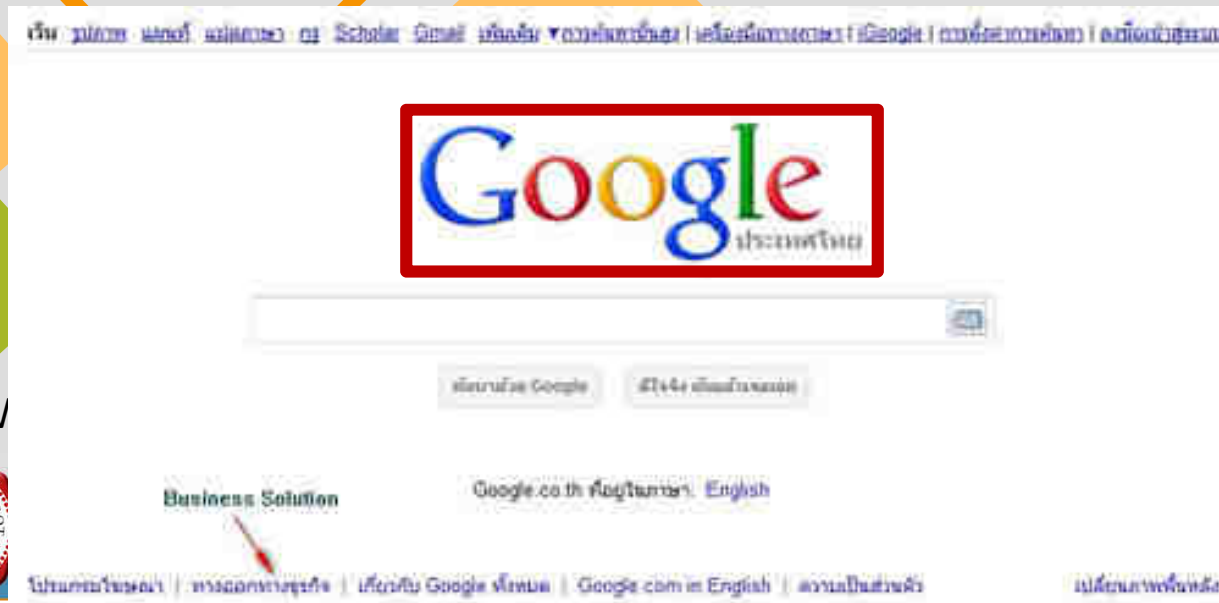
<http://www.thefreedictionary.com/law+of+closure>

Gestalt Laws: Simplicity

42

Law of Simplicity

Reality is organized or reduced to the simplest form possible



Gestalt Laws: Symmetry

43

Law of Symmetry

The law of symmetry states that the mind perceives objects as being symmetrical and forming around a center point.



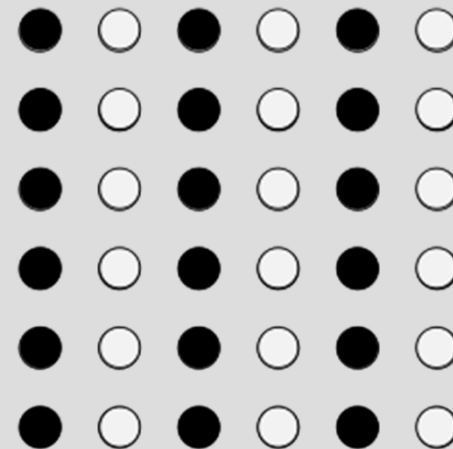
Which objects belong together?

Gestalt Laws: Similarity

44

Law of Similarity

The law of similarity holds that a person can normally recognize stimuli that have physical resemblance at some degree as part of the same object.

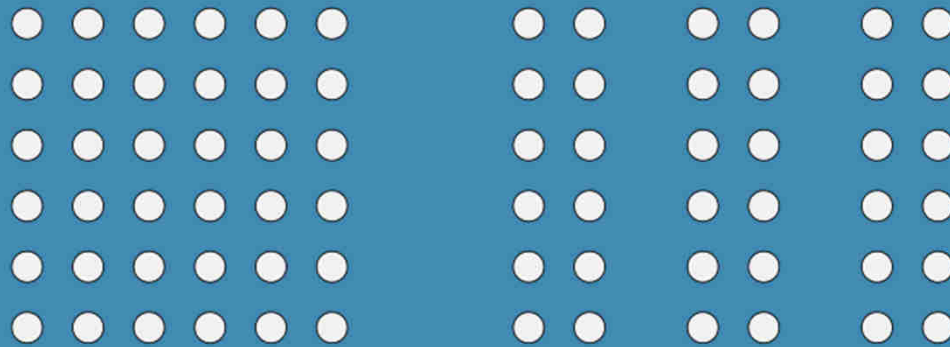


[Public Domain, <https://commons.wikimedia.org/w/index.php?curid=3960876>]

Gestalt Laws: Proximity

45

Law of Proximity



The law of proximity states that humans perceive stimuli that are close to each other by grouping them and recognizing them as part of the same object.

[Public Domain,
<https://commons.wikimedia.org/w/index.php?curid=3961100>]

Gestalt Laws: Good Gestalt

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Law of Good Gestalt

Lines are seen as
following the
smoothest path



The Plough

Gestalt Laws: Good Gestalt

47

Law of Good Gestalt

Lines are seen as
following the
smoothest path

Good Gestalt? Two lines

Houses and People

Each spot each spot kindles an image...
the seashore the plain the top of a mountain
the rice field the roadside the bleak grey twilight
there, then here, the light is tended...

...

...

POET

Angkarn Chanthathip

LITERAL TRANSLATORS

Tracey Martin

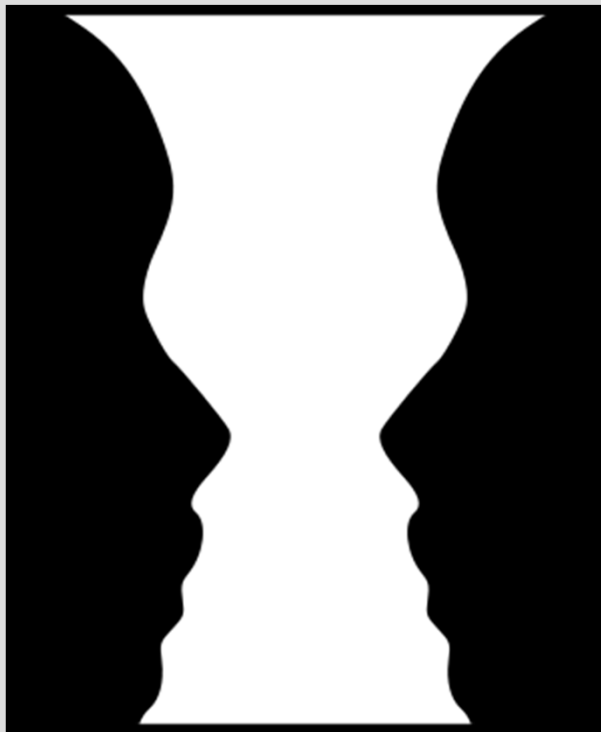
FINAL TRANSLATOR

The Poetry Translation Workshop

<http://www.poetrytranslation.org/poems/houses-and-people>

The Figure-Ground Principle

48

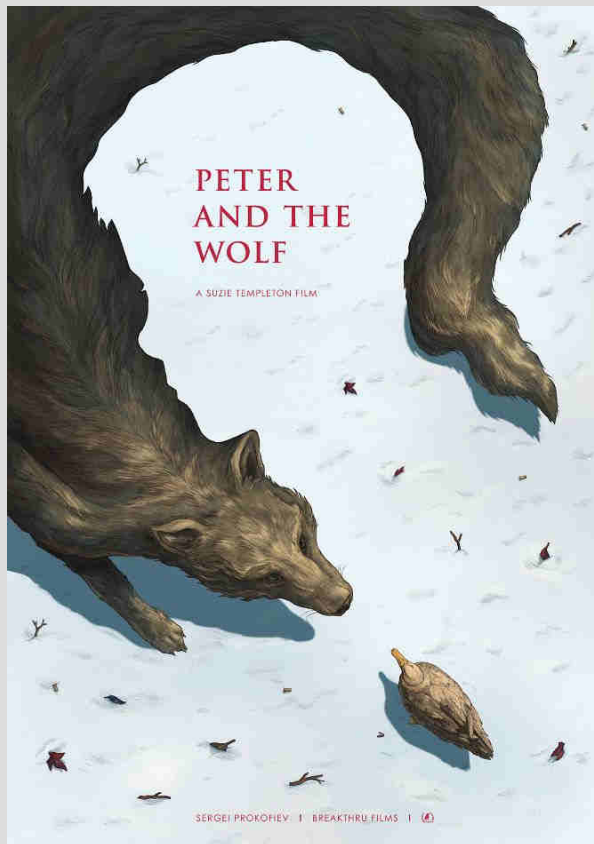


Humans group visual information into figure and ground. The **figure** is the element in focus, the **ground** is the background behind the figure.

Edgar Rubin: Profiles or Vase?

The Figure-Ground Principle

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Humans group visual information into figure and ground. The **figure** is the element in focus, the **ground** is the background behind the figure.

How can we trigger figure vs. ground?

Area: The mind often perceives the smallest object in the composition as the figure, and the larger as the ground.

Convexity: Convex elements are associated with figures more often than concave.

The Figure-Ground Principle

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How do we know what is figure, what is ground?



The Figure-Ground Principle

51

How do we know what is figure, what is ground?



The Gestalt Laws (as used in UI Design)

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- Law of Closure



- Law of Simplicity



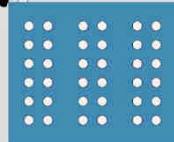
- Law of Symmetry



- Law of Similarity



- Law of Proximity



- Law of Good Gestalt



- The Figure-Ground Principle

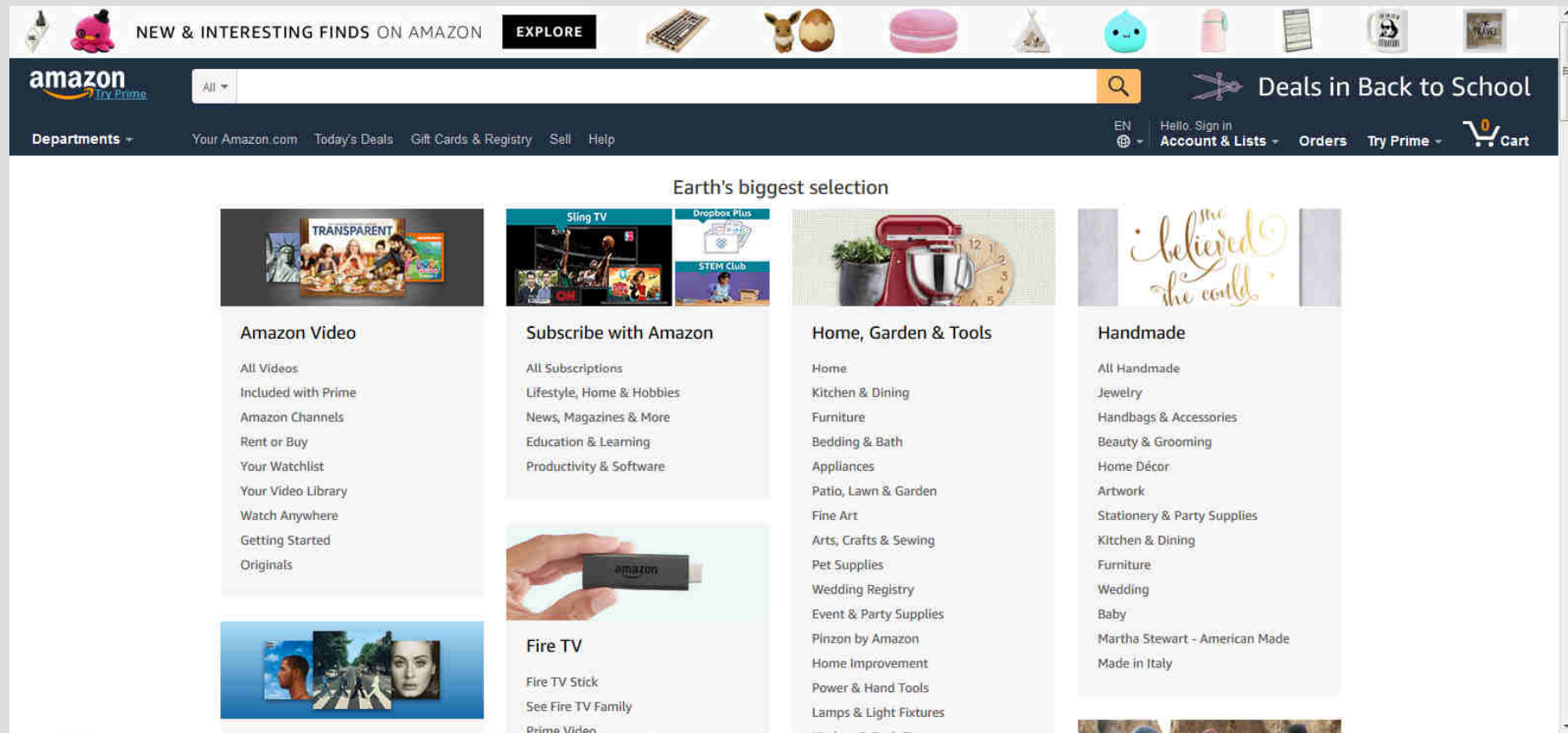


See more examples e.g. at
[<https://designschool.canva.com/blog/gestalt-theory/>]

This is crowded! Why is it still ok?

53

https://www.amazon.com/gp/site-directory/ref=nav_shopall_btn



Design Challenge 1

Review:
Can you create an even more usable cheat sheet now?

In your lectures you have covered chapter 1-4 of Erwin Kreyszig's „Advanced Engineering Mathematics“ about ordinary differential equations. Imagine you write an exam tomorrow about this topic. Your teacher is so nice to allow you to bring one cheat sheet (1 page, one-sided, handwritten).

The Design Challenge: **Create a usable cheat sheet!**

Remember Usability:

- Effective
- Efficient
- Satisfactory

(wrt goal/context)

Design Challenge 3

55

- Design a webpage credit card payment form having the Gestalt laws in mind!
- In groups of 2 students use paper and pen to draw a sketch!

front



back



Design Challenge 3

56

- Design a webpage credit card payment form having the Gestalt laws in mind!
- In groups of 2 students use paper and pen to draw a sketch!



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INTERACTION DESIGN LAWS

HNU

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Neu-Ulm University of Applied Sciences
Andrea.Kohlhase@hs-neu-ulm.de

FAU

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Friedrich-Alexander-University Nürnberg-Erlangen
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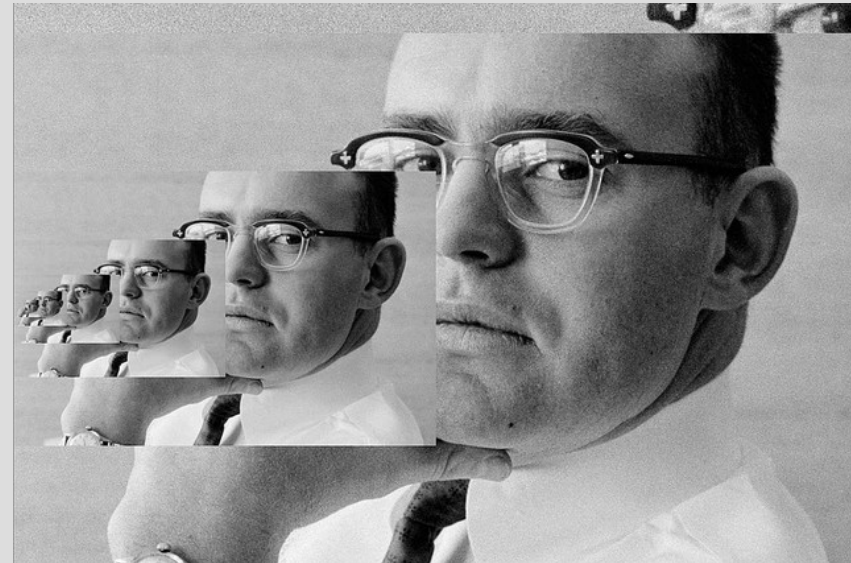


Moore's Law (~ Observation)

59

Gordon Moore (1965)

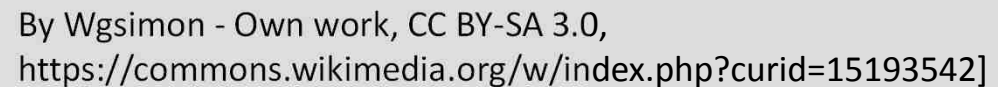
„Over the history of computing hardware, the number of transistors on integrated circuits doubles approximately every **two** years.“



[Steve Jurvetson/Flickr CC BY]

[wikipedia, „Moore's Law“]

60



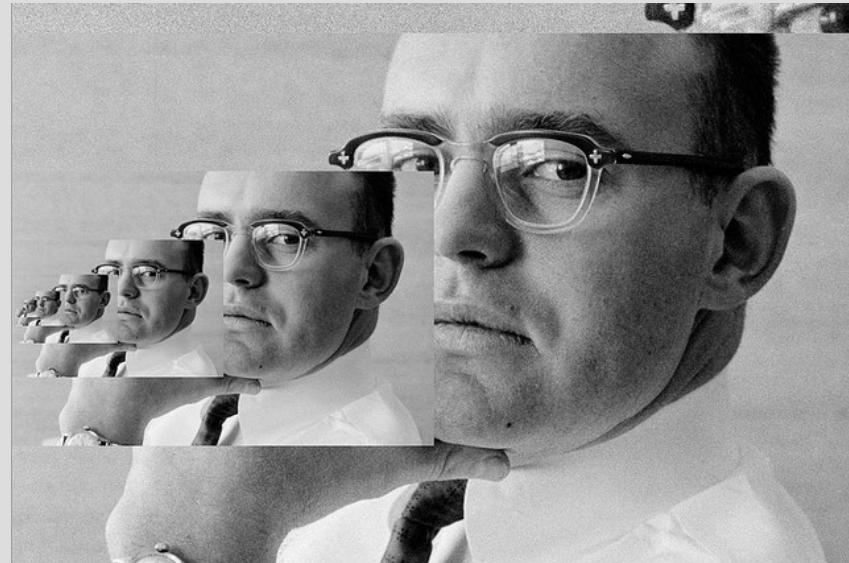
Moore's Law Revisited 2013

International Technology Roadmap for Semiconductors

61

Gordon Moore (1965)

„Over the history of computing hardware, the number of transistors on integrated circuits doubles approximately every **three** years.“



[Steve Jurvetson/Flickr CC BY]

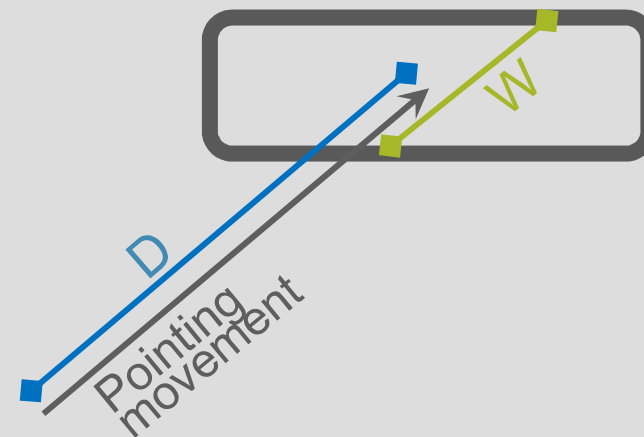
[wikipedia, „Moore's Law“]

Fitts's Law

62

Paul Fitts (1954)

„ the time required to rapidly move to a target area is a function of the **distance** to the target and the **size** of the target “



„The **bigger** and **closer** the target, the easier it is to hit. “

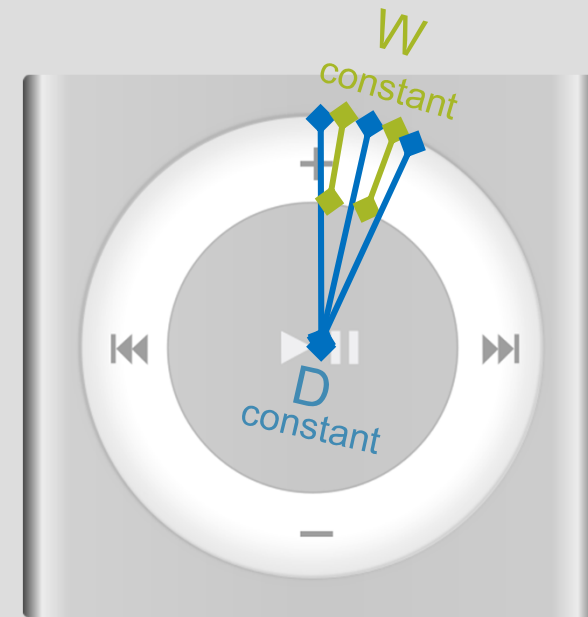
[wikipedia, „Fitts's Law“]

Fitts's Law

63

Paul Fitts (1954)

„the time required to rapidly move to a target area is a function of the **distance** to the target and the **size** of the target “



[© Eduardo López, CC-BY-SA-3.0,
via Wikimedia Commons]

„The **bigger** and **closer** the target,
the easier it is to hit. “

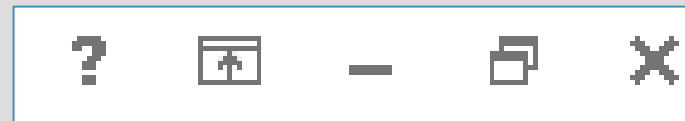
[wikipedia, „Fitts's Law“]

Fitts's Law

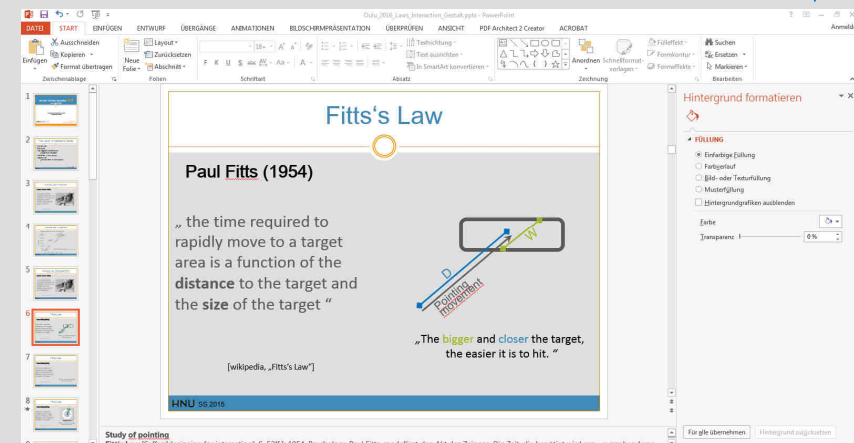
64

Paul Fitts (1954)

„ the time required to rapidly move to a target area is a function of the **distance** to the target and the **size** of the target “



Menu?



Targets on the **edges** of a screen become **huge** because the user cannot overshoot the target!

[wikipedia, „Fitts's Law“]

The Magical Number 7

65

George Miller (1956)

„7(± 2) chunks of information can be held by short term memory at any one time“

New Results: 4 (± 1)



„Don't cognitively overload your user's memory!“

Consequences of the Magical Number?

66

7

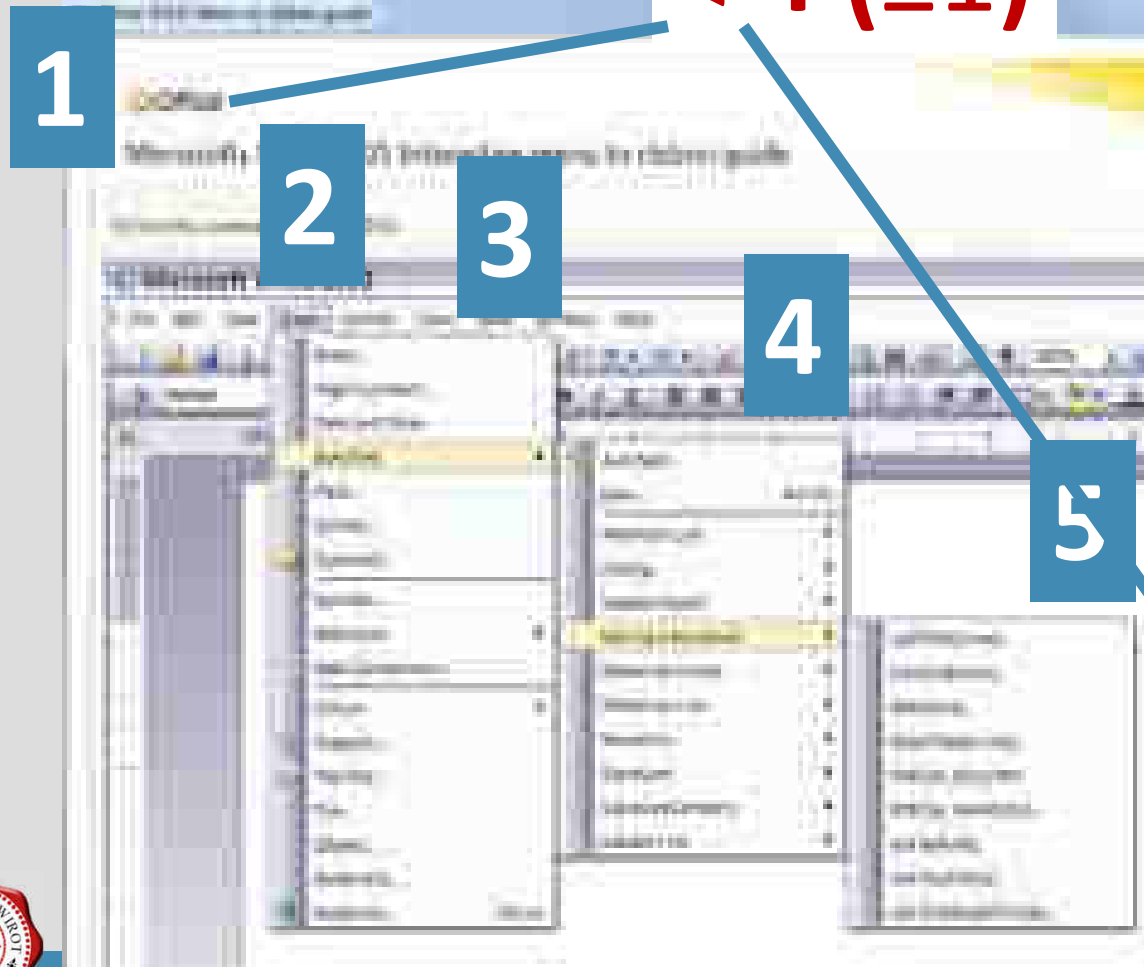


This is NOT recall!

Consequences of the Magical Number?

67

< 4 (± 1)



Hick's Law

68

William E. Hick (1952)



[<http://de.wikihow.com/Auf-der-Arbeit-auf-eine-unh%C3%B6fliche-Email-antworten#/Bild:Respond-to-Rude-Email-at-Work-Step-3.jpg>]

is concerned with

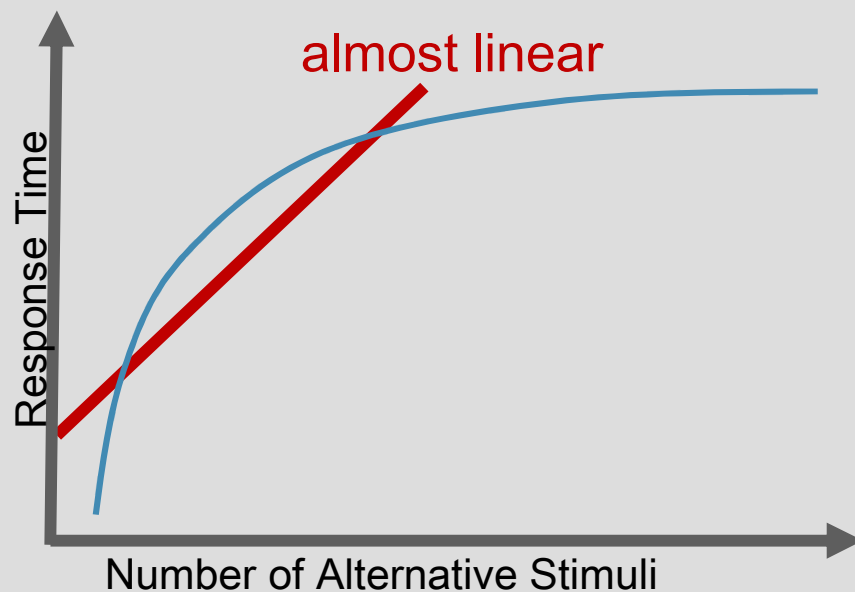
“the time it takes for a person to make a decision as a result of the possible choices he or she has”

see [wikipedia, „Hick's Law“]

Hick's Law

69

William E. Hick (1952)

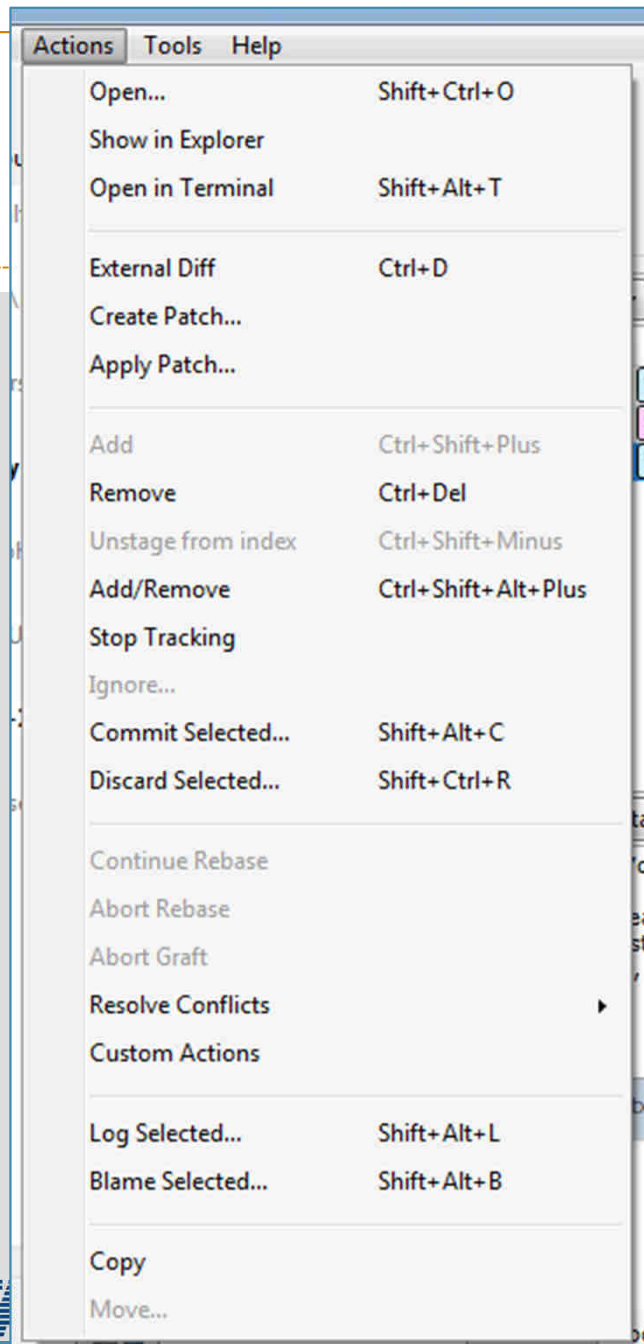


is concerned with

“the time it takes for a person to make a decision as a result of the possible choices he or she has”

„Less is more!”

see [wikipedia, „Hick's Law"]



Hick's Law

72

→ 23 choices?

is concerned with

“the time it takes for a person to make a decision as a result of the possible choices he or she has”

[snapshot of SourceTree-UI]

see [wikipedia, „Hick's Law“]

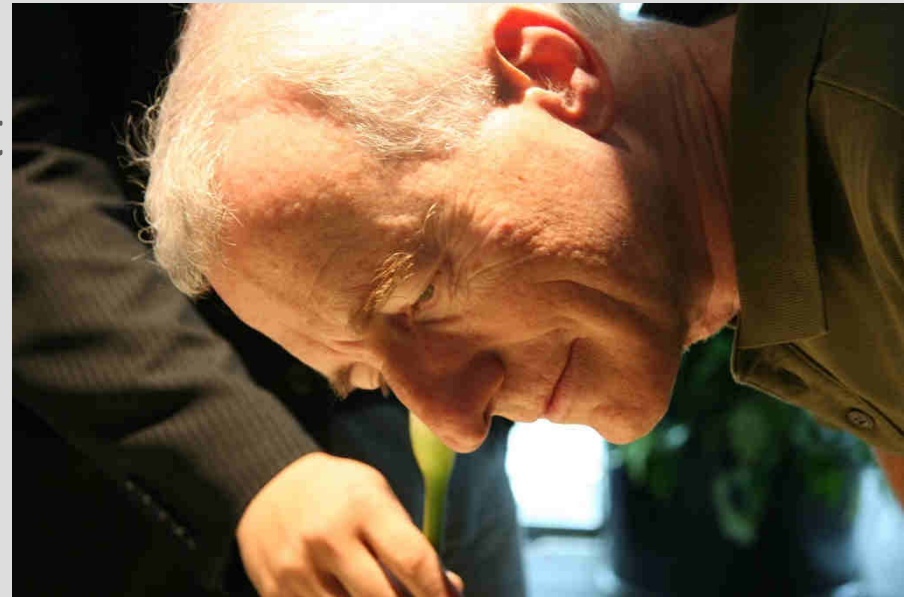
Tesler's Law

(Law of Conservation of Complexity)

73

Larry Tesler (1956)

„There are complexities that cannot be resolved.“



[By Yahoo! Blog from Sunnyvale, California, USA (Larry Tesler and Whisper) [CC BY 2.0]via Wikimedia Commons]

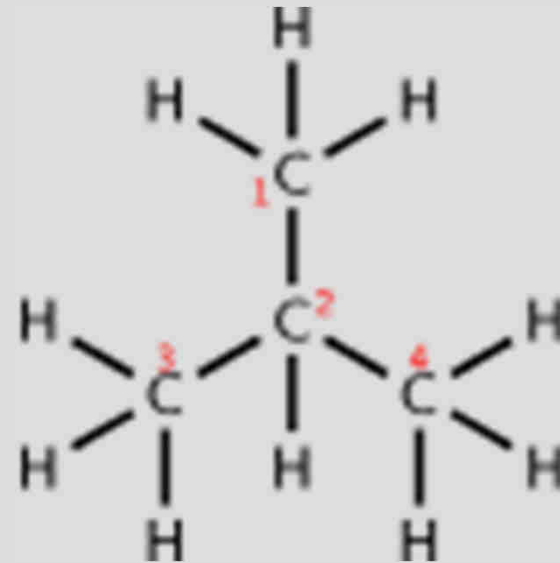
Tesler's Law

(Law of Conservation of Complexity)

74

Larry Tesler (1956)

„There are complexities that cannot be resolved.“



[https://commons.wikimedia.org/wiki/File%3AIsobutane_numbered_2D.svg
By Rubber Duck (☺ • ✎) (Own work) [Public domain], via Wikimedia Commons]

Tesler's Law

(Law of Conservation of Complexity)

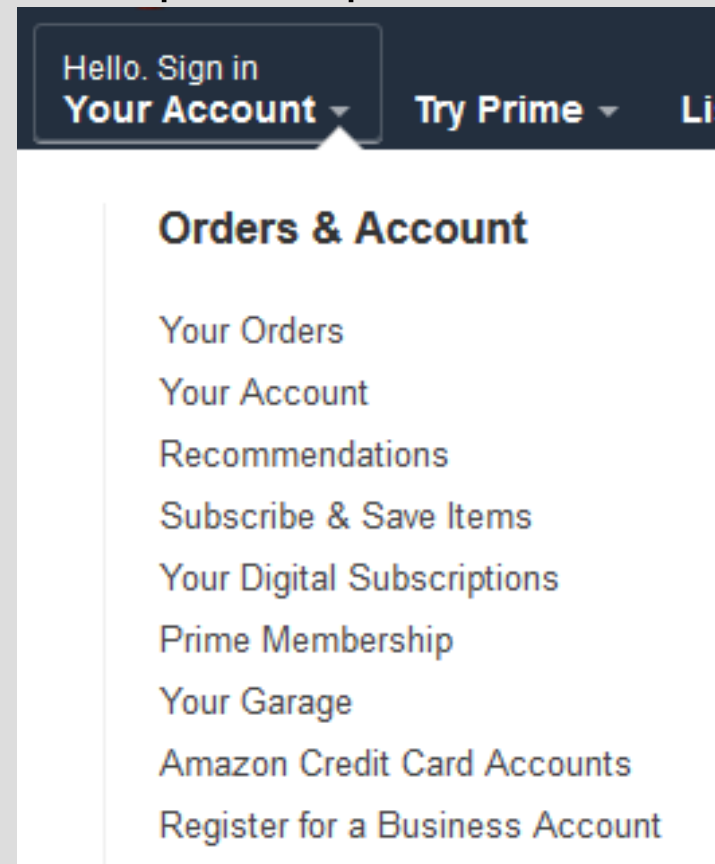
75

Larry Tesler (1956)

„There are complexities that cannot be resolved.“

„Instead, it must be dealt with, either in product development or in user interaction “

Example: Drop-Down Menu



[snapshot amazon.com, 1.4.2016]

The „Laws“ of Interaction Design

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- Moore's Law



- Fitts's Law



- The Magical Number Seven („Cognitive Overload“)

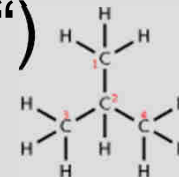


- Hick's Law



- Tesler's Law

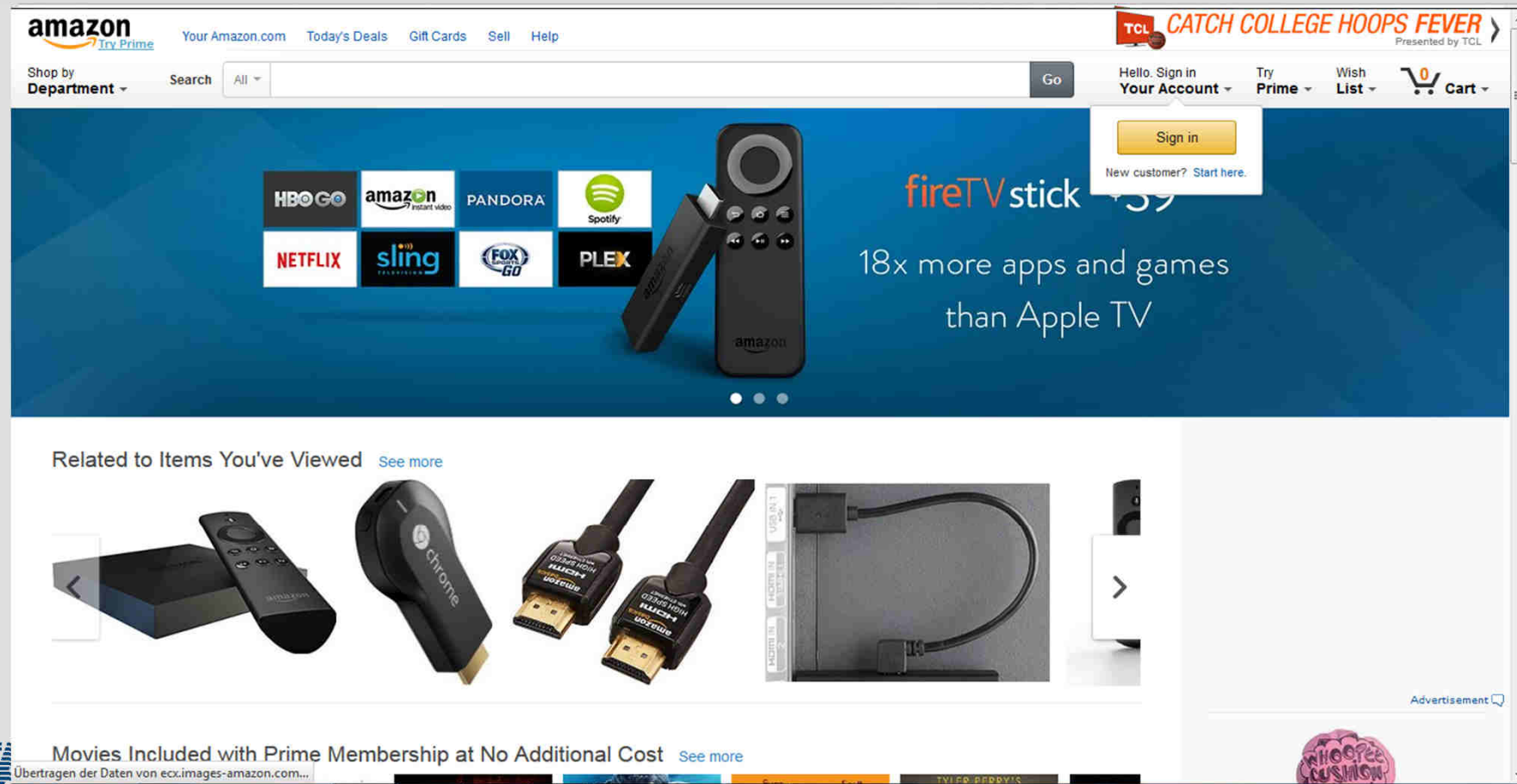
(„Conservation of Complexity“)



Content & Form Analysis with Interaction Design Laws!

77

www.amazon.com



Content & Form Analysis with Interaction Design Laws and Gestalt Laws!

78

- Open the webpage
https://en.wikipedia.org/wiki/Ordinary_differential_equation
- Do a content & form analysis of this page (min. 8 distinct laws) in groups of 4 students with respect to the
 - Interaction Design Laws
 - Gestalt Lawspresented in the last lecture.
- Present your findings (refer to each law and tell us, how and why this law was made use of by the user)