

Design Research

- what is a PhD thesis -

Matthias Rauterberg
Eindhoven University of Technology
2014

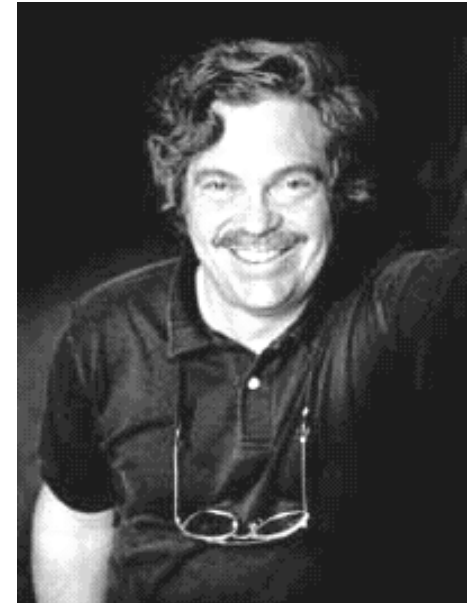
Thinker versus Tinker



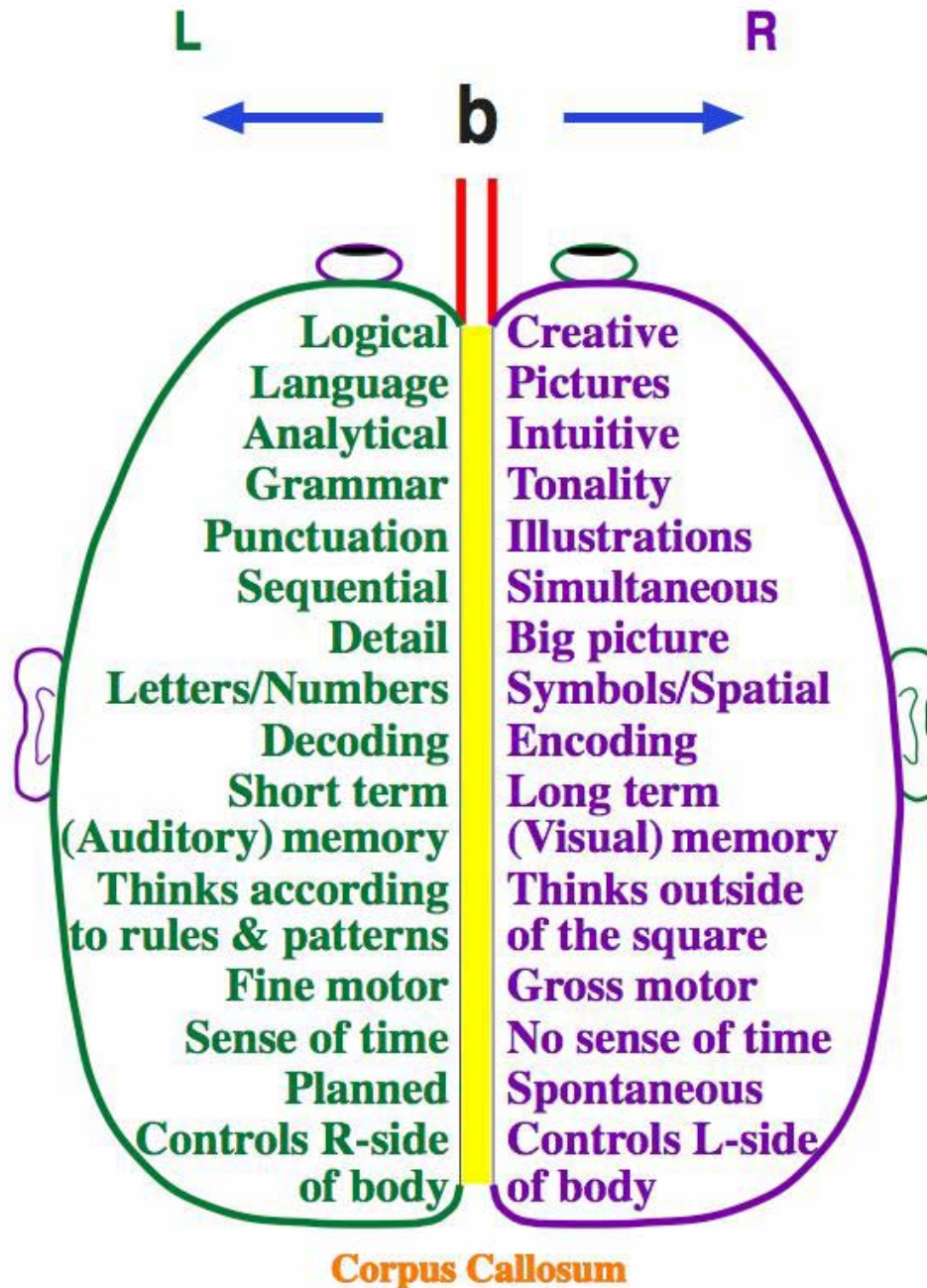
Ludwig BOLTZMANN(1884-1906)

"There is nothing so practical as a good theory."

"Don't worry about what anybody else is going to do... The best way to predict the future is to invent it. Really smart people with reasonable funding can do just about anything that doesn't violate too many of Newton's Laws!"
(1971)



Alan C. KAY(1940-)



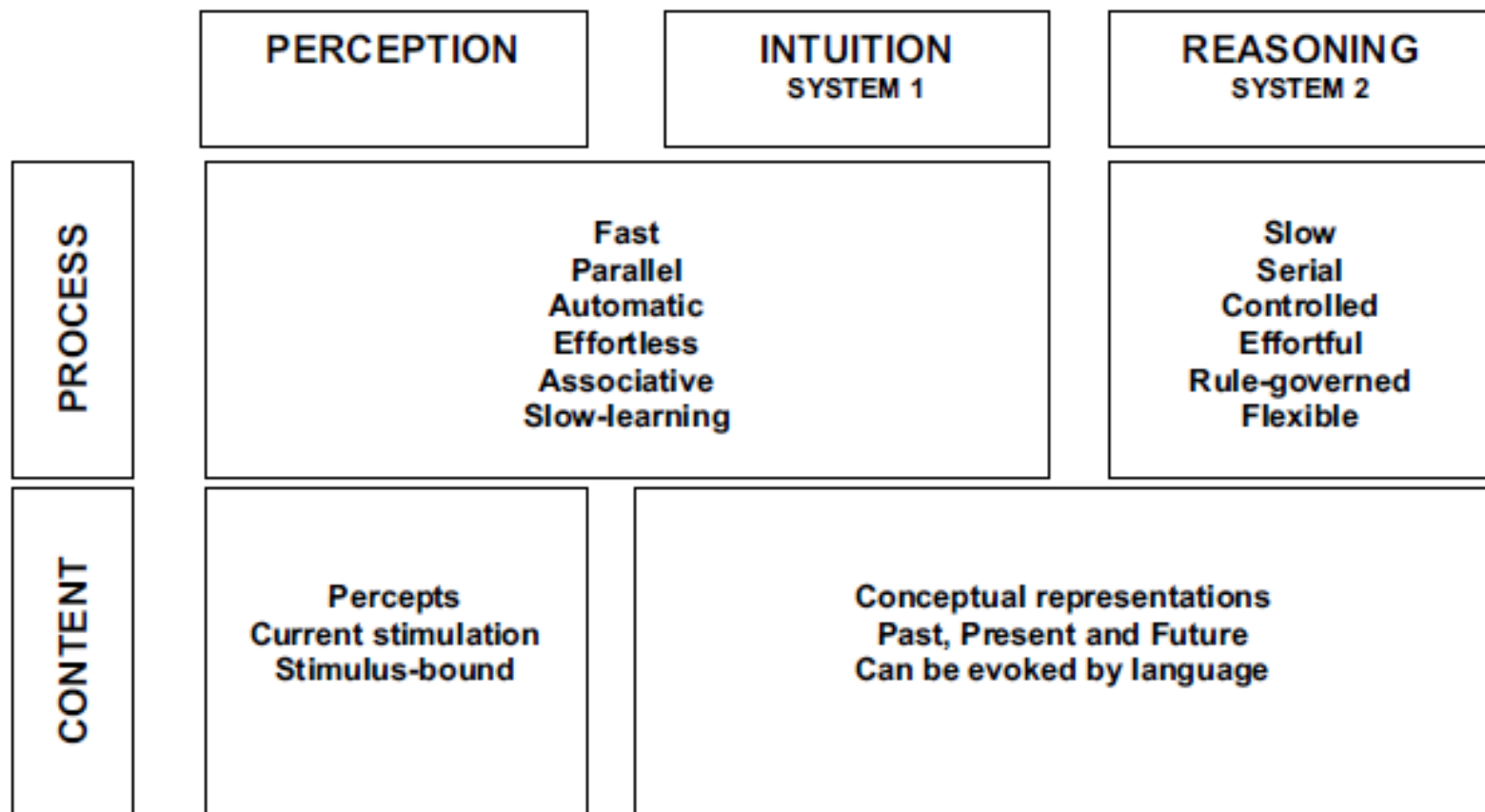
Picture source
<http://amandaonwriting.tumblr.com/post/27771405479>



Daniel KAHNEMAN

Map of Bounded Rationality: A Perspective on Intuitive Judgement and Choice .

Nobel Prize Lecture, 8 December 2002



Analysis & Synthesis, Deduction & Induction

Analysis (reduction): Separating of any material or abstract entity into its constituent elements.

Synthesis: Combining of the constituent elements or separate material or abstract entities into a single or unified entity.

Deduction: A form of inference; if the premises are true, the conclusion must be true, i.e., deduction preserves the truth (equivalent to analysis).

Scientific induction: a form of inference in which the conclusion, though supported by the premises, does not follow from them necessarily, i.e., induction does not necessarily preserve the truth (equivalent to synthesis).

“Other reasoning patterns” especially traditional science > analytic thought	Deduction	what + how > (<i>result</i>)	Known: what is observed + how it works > makes predictions of results possible
	Induction	what + (<i>how</i>) > observation	Known: what is observed + unknown: how does it work? > known: changes observed > leads to theorising, hypothesising; explaining observations
Design thinking designers > creative thought	Abduction 1	(<i>what</i>) + how > value	Known: value to create + how this can be done > unknown: what is needed?
	Abduction 2	(<i>what</i>) + (<i>how</i>) > value	Known: value to create < unknown: what is needed? + how to get there?



Kees DORST
Deduction-Induction-Abduction

Positivistic sciences

- An assumption of linear causality; there are no effects without causes and no causes without effects. [**Causality**]
- A single, tangible reality "out there" that can be broken apart into pieces capable of being studied independently. [**Reductionism**]
- The separation of the observer from the observed. [**Objectivity**]
 - So that the results of an inquiry are essentially free from beliefs, interpretations, etc.
- What is true at one time and place will also be true at another time and place. [**Universality**]

Science

Design

- | | | |
|----------------------------------|-------|----------------|
| • [<i>Causality</i>] | 1-2 C | 4 Causes |
| • [<i>Reductionism</i>] | yes | no, holistic |
| • [<i>Objectivity</i>] | yes | no, subjective |
| • [<i>Universality</i>] | yes | no, contextual |

Scientific methods

Nomothetic research (in natural sciences and engineering): the aim is to find general causal laws to explain phenomena, theories are usually axiomatic (deductive) systems or sets of models.

Constructive research (in engineering and design): the solution of the problem is not only shown to exist but it is also constructed.

Idiographic (ideographic) research trying to provide all possible explanations of a particular case, for example in history.

Scientific methods (cont'd)

Action research (in design sciences): the problem is solved by certain actions whose consequences are evaluated and new actions are specified (iterative improvement, trial and error).

Case study (in design sciences): an in-depth, longitudinal examination of a single instance or event, which is called a case.

Questionnaire study (in social sciences): a series of questions are used for the purpose of gathering information, which is usually analyzed statistically.

“But life is short, and truth works far and lives long...” Schopenhauer



“Time Saving Truth from Falsehood and Envy”
François Lemoyne, 1737

Ontological Reference

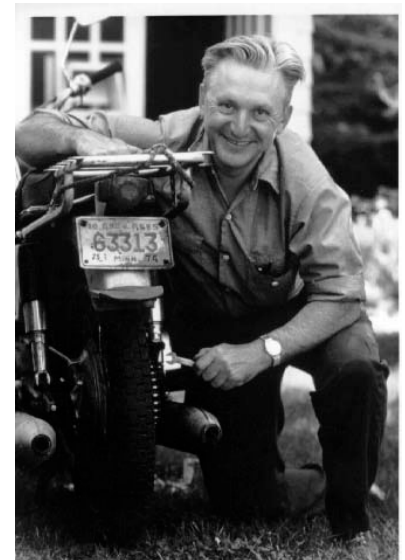
	Real Being	Formal Being	Ideal Being
Epistemological Method	Observation of Reality	Formal proof	Belief based on intuition
Inference Concept	Inductive logic	Deductive logic	Value system
Academic Paradigm	Natural Sciences	Mathematics	Humane Sciences

Thank you for your attention...

“Traditional scientific method has always been at the very best 20-20 hindsight. It’s good for seeing where you’ve been. It’s good for testing the truth of what you think you know, **but** it can’t tell you where you ought to go.”

Robert Pirsig, 1974

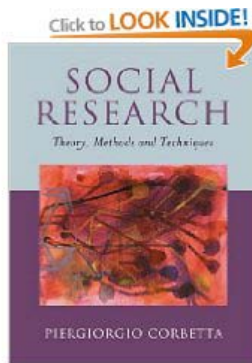
“Zen and the art of motorcycle maintenance”



References



Design Research: Methods and Perspectives.
by Brenda Laurel (Editor), Peter Lunenfeld (Preface)
Hardcover: 334 pages
Publisher: The MIT Press (October 1, 2003)
Language: English
ISBN-10: 0262122634
ISBN-13: 978-0262122634

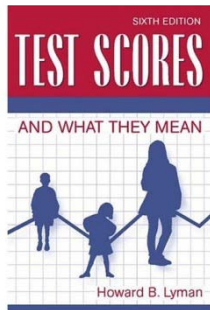


Social Research: Theory, Methods and Techniques.
by Piergiorgio Corbetta (Author)
Hardcover: 336 pages
Publisher: Sage Publications Ltd (May 2, 2003)
Language: English
ISBN-10: 0761972528
ISBN-13: 978-0761972525

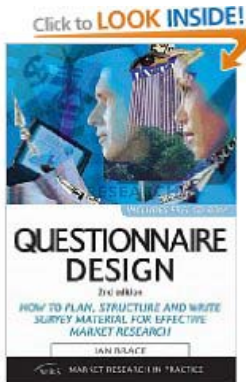


Research Methodology: A Step-By-Step for Beginners.
by Ranjit Kumar (Author)
Paperback: 332 pagina's
Publisher: Sage Publications; 2de Edition; mei 2005
ISBN10 141291194X
ISBN13 9781412911948

References (cont'd)



Test Scores and What They Mean.
by Howard B. Lyman (Author)
Paperback: 190 pages
Publisher: Allyn & Bacon; 6 edition (November 6, 1997)
Language: English
ISBN-10: 0205175392
ISBN-13: 978-0205175390



Questionnaire Design: How to Plan, Structure and Write Survey Material for Effective Market Research (Market Research in Practice).
by Ian Brace (Author)
Paperback: 304 pages
Publisher: Kogan Page; 2nd edition (September 28, 2008)
Language: English
ISBN-10: 0749450282
ISBN-13: 978-0749450281



Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory.
by Anselm C. Strauss (Author), Juliet Corbin (Author)
Paperback: 336 pages
Publisher: Sage Publications, Inc; 2nd edition (September 22, 1998)
Language: English
ISBN-10: 0803959400
ISBN-13: 978-0803959408