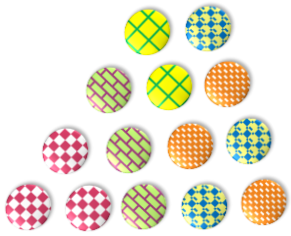

ELEC-E7810

PATTERNS IN COMMUNICATIONS ECOSYSTEMS

Kalevi Kilkki

Persons

- Kalevi Kilkki
  - University lecturer, Docent
  - Responsible teacher
  - kalevi.kilkki@aalto.fi (or matti.kilkki@aalto.fi)
    http://kilkki.net
- Benjamin Finley
  - Doctoral student
  - Responsible for Group assignments
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Background

- Combination of two earlier courses
  - Modeling Human Behavior
  - Communications Ecosystem Analysis
- Patterns in Communications Ecosystems
  - Topics and material are partly the same as in the earlier courses
  - The structure and teaching methods are totally new
    - Based on 14 patterns
  - A preliminary version
    - Outcome is uncertain – but hopefully you learn something important!
    - Feedback is appreciated

Parts

- Lectures
- Reading (important)
  - Midterm exam (4.4.)
- Small assignments
  - 4, related to some of the patterns
- Group work I
  - Analysis of articles based on the patterns
- Group work II
  - Poster + Exhibition walk (“näyttelykävely”)
- Final exam (13.5.)

Schedule

Monday	Friday
14.3. Lecture	18.3. Lecture
21.3. Lecture	(Eastern)
(Eastern)	1.4. Lecture
4.4. Midterm exam	8.4. Group work I info
11.4. (open)	15.4. (open)
18.4. (open)	22.4. Group work I results
25.4. Group work II Info	29.4. (no exam here!)
2.5. (open)	6.5. (open)
9.5. Posters	13.5. Final exam

Second exam day = 24.5.

Points & Grades

		max
» Midterm exam		20
» Assignments	4 * 5 =	20
» Group work I		15
» Group work II		15
» Final exam		30
» In total		100

- Grade based on total points

» Alternative way (not recommended)

- Final exam + extensive and laborious personal report

14 Patterns – from psychology to systems

1. The World of Mental Model
2. The Unbearable Automaticity of Being
3. The Default Mode of Mind
4. Bad is Stronger than Good
5. Fundamental Attribution Error
6. The Curse of Metrics
7. Prisoner's Dilemma
8. Mixed Strategy
9. Long Tail
10. The Butterfly Effect
11. The Silo Effect
12. Foraging
13. Beer Game
14. Autopoiesis

Material

» K. Kilkki: An Introduction of Communications Ecosystems
  - http://kilkki.net/books

» R. Hämäläinen, R. Jones, E. Saarinen, Being Better Better, Living with Systems Intelligence
  - http://sal.aalto.fi/publications/pdf-files/being_better_better_living_with_systems_intelligence.pdf

» Books addressing different kinds of pattern
  - D. Kahneman (2011): *Thinking, Fast and Slow*
  - P. Senge (1994): *The Fifth Discipline: The Art & Practice of The Learning Organization*
  - D. Meadows (2008): *Thinking in Systems: A Primer*
  - M. Chiang (2012): *Networked Life: 20 Questions and Answers*
  - E. Hunt (2007): *The Mathematics of Behavior*

  - *Etc.*

Available material

ICE = An Introduction to Communications Ecosystem
BBB = Being Better Better

1.	The World of Mental Model	B. Lipska, The Neuroscientist Who Lost Her Mind	
2.	The Unbearable Automaticity	J. Bargh, T. Chartrand, The Unbearable Automaticity of Being	+ ICE + BBB
3.	The Default Mode of Mind	Spunt et al, The Default Mode of Human Brain Function Primes the Intentional Stance	
4.	Bad is Stronger than Good	R. Baumeister et al, Bad is Stronger than Good	+ ICE
5.	Fundamental Attribution Error	psychwiki.com, Fundamental Attribution Error	
6.	The Curse of Metrics	The Problem with Metrics, T. Kastelle	+ ICE
7.	Prisoner's Dilemma	Wikipedia (+ many other web-pages)	+ ICE
8.	Mixed Strategy	Handout on Mixed Strategies by Ben Polak	+ ICE
9.	Long Tail	K. Kilkki, A practical model for analyzing long tails	+ ICE
10.	The Butterfly Effect	www.scholarpedia.org: Butterfly effect	+ ICE + BBB
11.	The Silo Effect	The New York Times, Book review: 'The Silo Effect'	
12.	Foraging	P. Pirolli, An Elementary Social Information Foraging Model	
13.	Beer Game	(Meadows, p. 51-58, I may take copies…)	+ ICE
14.	Autopoiesis	T. Hernes, Niklas Luhmann's Autopoiesis and Organization Theory	+ ICE

If you find a good free material for any pattern, please, inform me (kalevi.kilkki@aalto.fi)

Patterns

- A discernible regularity in the world or in a manmade design
- Pattern recognition is The Method used by our brain
  - General method, but to some extent tuned to the specific tasks
- Patterns can be useful both in professional and personal life
  - You can apply the same patterns in different roles!

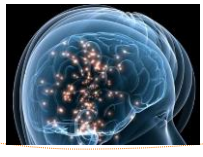
A note about pattern recognition

Across Google we use what we call Tool AI or Deep Learning Networks for fraud detection, spam detection, hand writing recognition, image search, speech recognition, Street View detection, translation.

Sixty handcrafted rule-based systems have now been replaced with deep learning based networks.

http://www.techworld.com/personal-tech/google-deepmind-what-is-it-how-it-works-should-you-be-scared-3615354/

1. The World of Mental Model

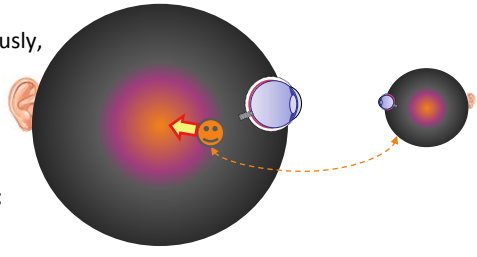


» You can only be aware of your own mental model, you cannot ever be aware of the reality itself

- the impression created by my mental model:
  Mental model is self-aware; there is no separate entity perceiving the multi-sensory information created by the mental model

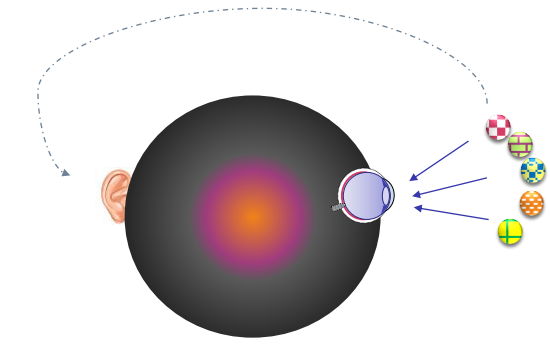
» Implications

- Do not take your opinions too seriously, accept alternative world views
- You do not know any person, you only know your own mental model of the person
- Mental model is a dynamic process; so are your memories and opinions



The self is not a thing but a process (T. Metzinger)

Important note!



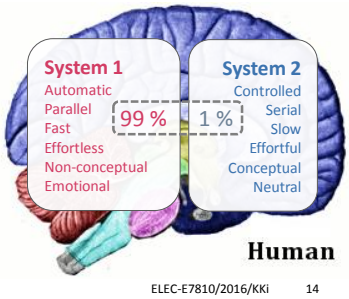
A pattern is useful only as an active part of your mental model!

This course

Process:
A) Understand every pattern
B) Internalize each of them as a part of your mental model
C) Start to use some of them, so that they become automated
D) Those not used will dissolve from your (active) mental model

2. The Unbearable Automaticity of Being

- Almost everything what we do in everyday life is automatic and unconscious; conscious deliberation is a rare exception
  - "It is profoundly erroneous truism … that we should cultivate the habit of thinking what we are doing. The precise opposite is the case. Civilization advances by extending the number of operations which we can perform without thinking about them." A. N. Whitehead, 1911
- Implications
  - Human brain is an extremely efficient automatic information processing unit
  - Spend your conscious effort to develop your attitudes and habits
    - instead of making a huge number of correct individual decisions



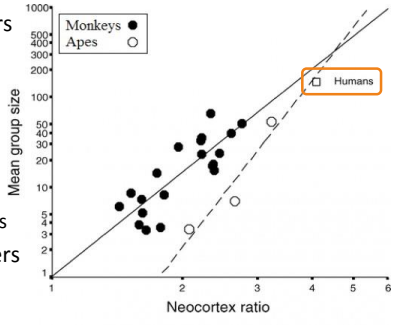
Names!

- Without a proper name it is hard to recall any idea, even harder to communicate it
  - Figures may also be useful!

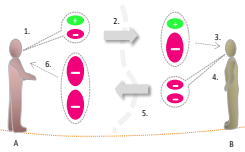
- Example
  - ”Shadow banking”
    - The name was invented after the last economic crash (2007)
    - Without a name economists were not able to discuss about the enormous area of strange financial instruments circulating huge amount of money
- We need memorable names for the patterns
  - Good proposals are highly appreciated!

3. The Default Mode of Mind

- Mind is never idle
  - In the absence of focused, goal directed tasks, mind immediately starts to ponder social world and the intentions of others
- Relative size of brain depends on the size of social group (150 for humans)
  - Big brain used to understand
    - social relations and intentions of others
- Implications
  - We are vastly better in analyzing social relations than in rational thinking
  - We need to utilize social mind, instead of suppressing it
    - But be careful with emotions and intentions
  - Best way to learn is to explain ideas to others

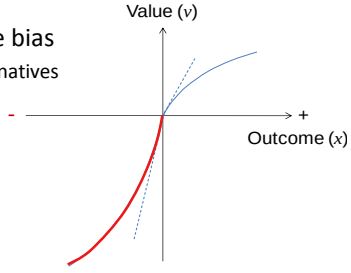


4. Bad is Stronger than Good

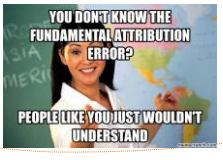


- Bad events produce larger and more persistent psychological effects than good events
  - Good is desirable, beneficial, or pleasant
    Bad is undesirable, harmful, or unpleasant
  - = result of evolution: bad is more critical than good (for survival)

- Implications
  - Analytical models must take into account the bias
    - **Prospect theory** describes decisions between alternatives that involve risk where the probabilities are known
  - To compensate negative feedback, 3 or even 5 times more positive feedback is needed (relationships!)



5. Fundamental Attribution Error



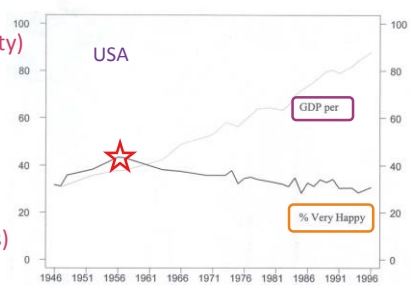
- Tendency to place an undue emphasis on internal characteristics to explain someone else's behavior in a given situation rather than considering the situation's external factors
  - if I am rich, it just shows that I am good;
    if an other person is richer, he is either lucky or greedy
- Implications
  - We always are biased both as a person and as a member of group
    - Even when we know this fact!
  - We need to develop a habit to detect this bias
    - to enable fruitful communication

	Success	Failure
I (or we)	I am (we are) good	Because of bad luck or other external reasons
Others	Conditions were favorable for them	They are bad

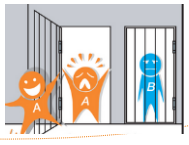
6. The Curse of Metrics

» Metric
- a standard of measurement by which the most essential result of an action can be assessed
- Metrics are very useful when used considerately, but very risky when treated as an end (= ultimate goal)

» Implications
- Society: productivity & GDP (⇒ inequality)
  - The real goal of society = ?
- Firm: profit & dividend (⇒ layoffs)
  - The real goal of a firm = ?
- Technology: performance (⇒ ?)
  - The real goal of technology = ?
- Marriage: own happiness (⇒ divorces)
  - The real goal of marriage = ?



7. Prisoner's Dilemma

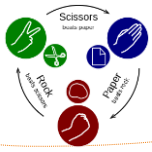


» A game-theoretical situation in which
- the highest combined payoff occurs if both players behave cooperatively, but
- each player has an individual motive to behave non-cooperatively

» Implications
- Calculated selfish behavior seems to prove your cleverness
  - But does it?
  - Fundamental Attribution Error is adopted when the outcome turns out to be damaging
- Co-operation leads to better outcome
  - Only clever people grasp this!

	Prisoner B stays silent	Prisoner B betrays
Prisoner A stays silent	A: 6 months B: 6 months	A: 10 years B: goes free
Prisoner A betrays	A: goes free B: 10 years	A: 6 years B: 6 years

8. Mixed Strategy



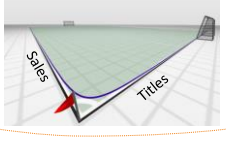
» A method of playing a game in which the player attaches a weight to each option and then chooses among the options with probabilities proportional to the corresponding weights
  - In zero-sum games random (but systematic) behavior is optimal

» Implications
  - We can calculate optimal systematically random behavior
    - A kind opposite to Prisoner's dilemma
  - Zero-sum games lead to unpredictability
    - Stock market!

A \ B	Scissors	Paper	Rock
Scissors	0 \ 0	2 \ -2	-1 \ 1
Paper	-2 \ 2	0 \ 0	1 \ -1
Rock	1 \ -1	-1 \ 1	0 \ 0

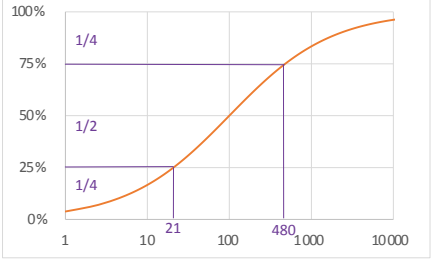
What is optimal now?

9. Long Tail



» A distribution of items in significance order in which a considerable amount of significance is created both by a few top items and by the long tail of marginal items

» Implications
  - Attention goes to the few while the great majority gets almost nothing
    - consider performers in any field of art
  - Digitalization boosts the Long tail
    - The most popular become even more popular (global markets)
    - Better business potential for the thin tail (Amazon & self publishing)

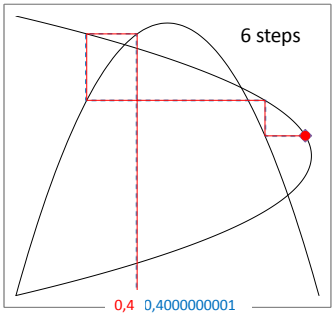


10. The Butterfly Effect

» A condition in which a small change at one place in a nonlinear system can result in large differences in a later state
  - Butterfly effect (name!) is a metaphor used in weather prediction

» Implications
  - When short term predictions are accurate, we tend to assume that long term predictions also are possible by just improving the models
  - But they are not because in long term system behavior is too sensitive to initial conditions
  - What if speculations are useless, because initial conditions are so critical
  - As to success, luck is much more essential than thought (FAE, long tail!)

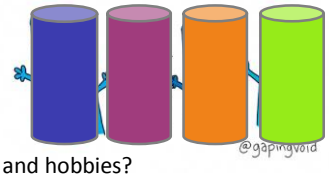
$$x_{i+1} = 3{,}9x_i(1 - x_i)$$



11. The Silo Effect

» The lack of communication and cross-unit support
  - Teams work on their own goals ignoring the needs of others, while critical information get lost in the middle (⇒ autopoiesis)
  - But specialization is absolutely necessary in modern society

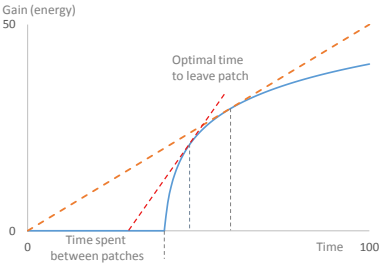
» Implications
  - The larger the firm or organization, the stronger silos
  - Silos are observed during a crisis
    - Quick solutions are sought
  - During better times silos tend to strengthen again (why?)
    - Nokia?



» Silos in personal life?
  - Is it good to build silos for family, profession and hobbies?

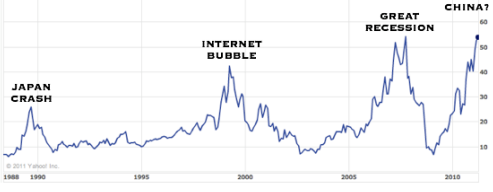
12. Foraging

- Searching for wild food resources
  - Pattern = systematic decision made between searching new patches and eating within a patch
    - the optimum strategy is to find a balance between searching and eating
    - Efficient strategies persists (and become automated)
- Implications
  - Research: a) searching sources of information b) reading and learning
    - What is the effect of Internet, WWW and Google to optimal behavior?
  - Personal life?
    - Should we use foraging models to optimize our relationships?

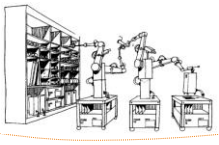


13. Beer Game

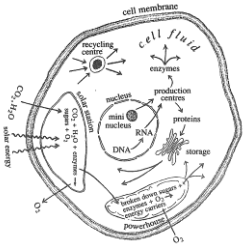
- A system in which delayed, positive feedback creates large oscillations in the outcome in a seemingly innocuous situation
  - Financial bubbles: stock, real estate, tulips, art (below!)
  - "Beer game" is an example that can be easily tested!
  - The result (excessive variations) is always the same
- Implications
  - In systems with positive feedback (like stock market) occasional bubbles are inevitab
  - Culprit is not the individual but the system in general (FAE!)
  - "Clever" reactions tend to worsen the symptoms



14. Autopoiesis



- A process whereby a system produces and replaces its own components and distinguishes itself from its environment
  - "New York lawyers have shared norms that let them thrive as a group within their local ecosystem … cooperation defines competitive interactions with the rest of society" (A. Pentland)
  - Natural process, independent of the properties of individuals (FAE!)
- Implications
  - A social system consists of the boundary with environment, interactions with others and autopoiesis
    - No organization can survive without autopoiesis (family?)
  - Autopoiesis may lead to silos and prisoner's dilemma type of games with other systems



What next?

- 18.3., 21.3., 1.4.
  - Brief "ordinary" lectures about the 14 patterns
  - Please, read yourself some of the material to get familiar with the patterns before the group works start and before
- Midterm exam 4.4.
  - = additional motivation to read
- Objective = to learn (several) patterns in a way that they can be utilized in reality
  - All activities are designed for this objective