0HV80 - Summary HTI in social context

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Summary HTI in Social Context

0HV80

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Table of Contents

Lecture 1 – Slides

Contents:

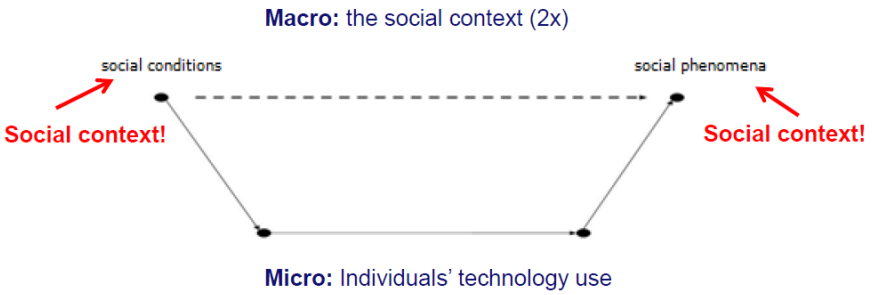
1. *What is Social Context of HTI in social context*
2. *How to integrate micro and macro*
3. *Thomas Hobbes versus the Socttisch Moral Philosphers*

Social Phenomena, has 3 fundamental questions:

1. Problem of Cohesion (social order)
    - How involved are people in a community (general)
    - Active participation (technological)
    - Peaceful interaction (general)
    - Share same values (general)
    - Willingness to share knowledge (technological)
2. Problem of Inequality (stratification)
    - Differences in earning money and why? (general)
    - Generation inequality according to modern technologies (technological)
    - Accessibility of social media for all types of people, how? (technological)
3. Rationalization problem (modernization/social change)
    - Some communities technology developed faster, why? (general)
    - Are there differences in usage of technology? How come? (technological)
    - How to retain traditions but also take up innovations? (general)
    - How do social networks speed up diffusion of innovation? (technological)

The Micro-Macro model

- Micro: Individuals
    - Micro-hypotheses help us clarify under which conditions the macro-hypothesis is true.
- Macro: The social context (groups, communities)
    - Most important to explain (since sociology questions are about societies), does not explain the 'why' question.



- Individualist theory: behavior has consequences for specific macro-phenomena.
- Collectivist theory: making statements about regularities and associations between social conditions and social phenomena without taking into account human behavior. (e.g. the E-bay reputation system example)
- Solutions to macro problems:
    - Relate characteristics of individuals to characteristics of social conditions
    - Transform global characteristics (of societies) to a combination of characteristics of its members.

Trust: the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor. (problem of trust ≈ problem of cohesion)

Classical Theory 1 – Thomas Hobbes

- Under which conditions do people live together peacefully?
- Behavioral theory about human nature
    - People have goals, needs, aversions → to achieve these goals people use: knowledge and physical strength.
- Conclusions based on the assumptions 'what will people do under what social condition'?
- (state of nature: there is no government, no laws no morals etc. → there will be a war of all against all)
- Avoid state of nature in virtual teams: Use moderation, rules, punishment/exclusion. Announce these rules (+ mailing list/chat group to communicate on group level)

Classical Theory 2 – Scottish Moral Philosophy

- When do people live together peacefully?
- Again assumptions about human nature BUT emphasize other skills of people
    - People behave to achieve goals
    - Behavior will be awarded or sanctioned
    - Reciprocity: social relations are a web of (counter) achievements
    - Interests are inter-twined: by helping myself, I help you
- Peaceful coexistence is possible without a strong central authority.
- Cooperation improves through: identifiability and long-term relationships

Lecture 1 –Ultee Chapter 2

Sociology: Socius (companion) Logos (speech) → science that specializes in investigating human societies.

2.1 Problem of order

- Thomas Hobbes
- How do people live peacefully together? → only a sovereign state will avert a war of all against all
  - Sovereign: no wars & no cases of violence.
- State of Nature: persons, when left to themselves, will pursue their own interests even if this is at the expense of others.
  - People are never certain of their life and are always mindful of attacks by others → life will be lonely, poor, nasty and short.
- Locke added two questions to Hobbes:
  1. Question of oppression: Is about the conditions under which a sovereign employs force against his subjects.
  2. Question of Rebellion: Is about the circumstances under which the members of society use violence against their sovereign (die/dat de meeste macht heeft).

- Locke: presence of a sovereign is not enough to bar violence from society.
- Locke: Oppression and rebellion are less probable in a situation in which the legislative tasks of a state are separated from the administration of its laws (→ wetgevende taken scheiden van administratieve taken).
- Montesquieu's separation of powers:
  - Separation of three powers increases peace on earth: the executive, judicial and legislative branches.
- Bentham penalties for crime depend on:
  - Intensity, duration, speed, chances of getting caught and probability of being found guilty

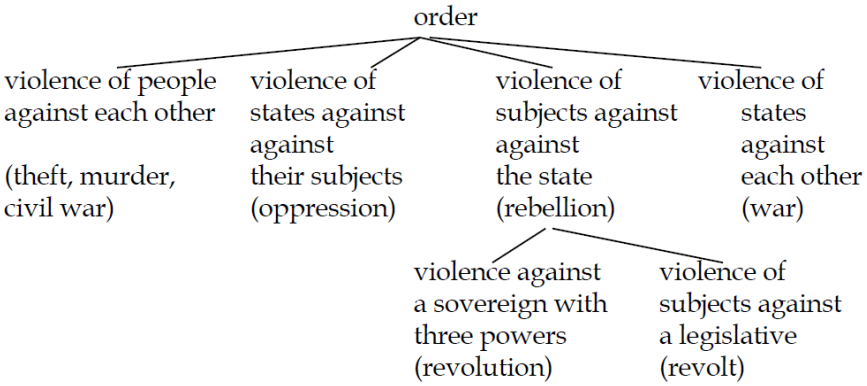


Figure 2.1. Problem of order from Hobbes to Bentham

2.4 The birth of utilitarian individualism

Individualism: Since the answer to the questions about the extent to which life in a society is peaceful involves assumptions at the micro level it is called individualism.

Utilitarian individualism: since persons maximize their utility.

Hobbes view on utilitarian Individualism:

a) Futures of society are outcomes of acts performed by its inhabitants (under certain circumstances)
b) These individuals have specific goals
c) They have a limited amount of means
d) They employ these means to get as closely as possible to their goals (maximum utility)
e) Their circumstances affect the extent to which they reach their goals (in the short run).
f) And in the long term.

Hobbes utilitarian Individualism - State of Nature and Sovereign State:

a) Feature of societies: extent to which life is peaceful or not.
b) Priorities of members: avoid death and injury, assuage hunger, quench thirst, secure wealth knowledge and honor.
c) Possess physical force.
d) Threatening others and use force against others.
e) State of nature in short run helps people realize their priorities. Persons no longer realize priorities.
f) Long run: every member dies a premature and violent death. Life is more peaceful.

Smith' view on utilitarian individualism

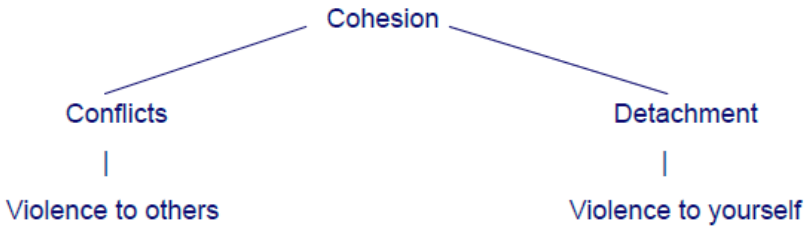
a) Feature of society is its level of prosperity
b) People first go after necessaries of life, than conveniences and finally luxuries
c) People means are instruments of production. Natural resources and labor power.
d) Acts maximize utility
e) If everyone has rights to enter any market people reach their goals as closely/cheaply as possible in short run
f) In long run people realize their ends more.

Lecture 2 – Slides + Ultee Chapter 5.1/5.4 & Chapter 4.2/4.4

Contents:

1. *The problem of cohesion*
2. *The problem of Inequality: offline and in ICT use*

1. The problem of Cohesion (Durkheim)



Cohesion on the Internet

- Does something like a 'community' exist online?
- How can users make sure they don't get isolated?

Durkheim: Structural Functionalism

a) Each society has a certain level of cohesion
b) Has some kind of structure
c) Shares certain norms and values
d) The more tightly integrated, the more likely to behave according to the norms/values
e) Results in increased cohesion

Durkheim's elaboration on the core statement:

a) Strong cohesion is indicated by low suicide rate
b) Intermediary groups are families, religious communities and political parties.
c) One norm: one should not commit suicide
d) The more tightly integrated, the more likely to follow the norms
e) Lowers the probability to commit suicide.

Durkheim's Theory Integration

- Two more general hypothesis can be merged to one regularity
  E.g. (2) + (3) = (1)
  - (2) The more people are integrated into a community, the lower the prob. to commit suicide.

- (3) At the end of 19th century, Catholics are more tightly integrated than protestants
- (1) Catholics (At end of 19th century) are less likely to commit suicide.

Integration with the help of ICT

- **Dystopian view:** fake community

  Online relations:
  - have diff. quality than face to face relations (weak vs strong tie)
  - Are Unstable
  - Do not have multiplexity
  - Do not have geographical boundaries.
- Social communities (common norms, attachment, trust) do exist but not as regular outcome of online interaction in groups.

Structural Functionalism changes when speaking of online communities:

- Each society has a certain level of cohesion
- Has some kind of structure
- Shares certain norms and values
- The more tightly integrated, the more likely to behave according to the norms/values.
- Results in increased cohesion. But, if the different groups follow diverging norms this leads to decreasing cohesion in society.

Social Media and Social Capital

- **Social capital:** resources available via social contacts and beneficial structure of user's overall social network.
- **Social media:** what can the individual user do to prevent detachment and isolation?

2. The problem of inequality: Offline and in ICT

Historical materialism: changes in the division of material resources shape the development of societies.

The core (uses vague terms) of Historical Materialism as solution to problem of inequality:

a) Whatever mode of production prevails (overhand krijgen) in society
b) Every inequality in that society
c) Rests on some form of compulsion (dwang) from this mode of production
d) This compulsion leas to a type of strife
e) This strife results in removal of the old mode → disappearance of old inequalities
f) And under certain circumstances in the coming of equality.

Classic Historical Materialism: The elaboration of the core of historical materialism by Marx and Engels

a) In societies with capital goods as most important means of production and universal freedom of property and of labor (capitalist societies).
b) Law of capitalist accumulation: Wages of workers fall and profits of capitalist rise
c) Because of the threat that capitalists dismiss workers and replace them by machines.
d) Results in violence by workers against capitalists.
e) Workers become conscious of this compulsion and unite → they win and abolish private ownership
f) Production becomes common property → consumer goods among inhabitants proceed according to their needs.

Accumulation: replacement of labor through machines because of centralization hypothesis:

- In capital societies
- Growing amount of capital in hands of fewer capitalists
- Owners of small amounts of capital go bankrupt in the wake of owners of large amounts of capital.

Thus: capitalist became richer and workers poorer because of centralization hypothesis which leads to accumulation.

Revisionist historical materialism - Bernstein:

- Societies without a constitution
- Workers do not become poorer, but become less well of in a relative sense
- Substitution of labor by machines goes together with an increase in the skills of workers
- Focus on extension of political rights
- The more workers unite into unions, the more they gain in social rights
- Extension of social rights → disparities between workers and capitalists will narrow.

Training hypothesis:

- In capital societies
- Number of small capitalists increases
- Growing demand for consumer goods, rise of new sectors of production, large capitalists in old sectors offering little competition to small capitalists in new sectors.

Digital skills:

- Operational
- Formal
- Informational
- Communication
- Content creation

- Strategic

Question about inequality:

1. Question of skewness
    - Relative differences: specific differences (e.g. proportion of income of poorest 10% of Dutch population during past 10 years)
    - Absolute differences: general differences (e.g. do elderly hardly use Facebook?)
2. Question of mobility
    - Intergenerational mobility: different generations (e.g. to what extent does the next generation have more digital skills)
    - Intragenerational mobility: same generation (e.g. how many people earn now more than 5 years ago?)

Conclusion on internet use inequality:

- Internet reduces barriers to information but strengthens inequality

Lecture 2 – Ultee Chapter 4.7,4.9 & Chapter 5.5/5.7 + Article Van Deursen & Van Dijk

4.7 Sombarts's mobility hypothesis:

- In capitalist societies
- All inhabitants with respect to freedom of labor are equal before the law.
- This is the case since established captitalist corner newcomers

De jure: according to the law
De facto: in actual fact

- e.g. feudal societies (societies of the type that in Europe preceded capitalism, were both de jure and de facto closed.
- De jure open: recognition of universal freedoms such as those of enterprise, occupation and property. If you want to open a shop you do not need permission from guilds.
- De facto closed: class of capitalists became more and more closed to persons from working class.

4.9 Mobility as sub question of inequality

- Do persons during their life belong to one class or do they shift between these classes?

5.5 Parsons's socialization and internalization hypothesis

5.6 **Durkheim's theory of anomie**

- Anomie: Sometimes societies lack a culture which makes the goals held up to its members agree with the means they should employ. A lack of such norms makes persons aim for thing far beyond their means, which in the long run makes for higher chances of suicide.
- Anomie: lack of norms and values that ensure a fit between desired goals and available means.
- Economic Anomie: the lack of norms which adapt the wishes of people with respect to their standard of living to their possibilities. (and extension of free markets)
    - Especially raises the chances of suicide for entrepreneurs in commerce and industry.
- Domestic anomie: The higher suicide rate of widowed men compared with married man.
- Conjugal anomie (echtelijk): The higher suicide rate of divorced man compared with married man.

Van Deursen & Van Dijk 2009

Purpose of study: performance test are administered on a representative sample of the Dutch population.

Research questions:

1. What individual skill-related problems do users experience when using the internet, and how often do these problems occur?
2. Are there differences in the individual skill related problems experienced between users with different gender, age, educational attainment, internet experience, amount of time spent on the internet, social support, primary location of Internet use and social position.

Operational skills

- Operating an internet browser
- Operating internet-based search engines
- Operating internet-based forms

Formal internet skills

- Navigating on the internet
- Maintaining a sense of location while navigating on the internet

Information Internet skills

- Being able to locate required information

Strategic Internet skills

- Taking advantage of the internet (goal reaching)

Results:

Operational skills

- 5% of subjects had problems using the address bar
- 37% had problems saving a file on the hard disk
- 40% had trouble saving a PDF file
- 90 % was able to add a website to favorites

Formal internet skills

- 28 % had trouble orienting on a website
- 21 % lost their orientation when a new browser was opened
- 33 % had trouble lost orientation when navigating search results

Information Internet skills

- 56% performed search operations using search queries that did not fit the information problem
- 95% did not use Booleans when searching (AND, “”)
- 56% opened sponsored or commercial results
- 36% did not go beyond the first three search results
- 20% selected irrelevant information

Strategic Internet skills

- 4% got distracted by irrelevant stimuli (e.g. banners)
- 49% did not have a clue how to start the strategic assignments.
- 71% worked in an unstructured way in any of the two strategic assignments.
- 63% based their decisions on incomplete information.

Lecture 3 – Slides

In science: theories should be as general as possible

Online Reputation Systems elements

- Quantitative: leading to feedback score
- Qualitative: leading to feedback textual comments
    - Affects consumer decisions
    - Reduces/increases consumers trust in sellers/shops

P-T-R cycle

- Consider a clearly delineated problem (P)
- Formulate a theory about the answer to this problem (T)
- Perform a research and critically evaluate this answer (R)
- Never clear when the cycle stops, after a R a new PTR cycle can occur
- A good theory gives a solution to more than just the original problem

Accusations

1. Morality based trust violation (e.g. EBayer was untrusthworty, product was broken)
2. Competence-based trust violation (e.g. Incompetent Ebayer, product was broken since it was wrongly wrapped).

Reactions

1. Apology
2. Denial

Morality based: Denial > apology
Competence based: apology> denial

Ebay experiment findings

- Seller's apology leads to higher trustworthiness (for both types of accusations)
- Seller's denial does not re-build trust

Lecture 3 – Article Utz, Matzat, Snijders (2009)

Trust can be influenced by:

- Disposition toward trust

- Perceived trustworthiness

Reputation systems: regarded as a key solution to the on-line trust problem. These sytems collect and display information about the past behavior of an actor that can be used to judge his or her trustworthiness.

Noise: differences between actual and intended outcomes due to unintended errors (e.g. mails end up in spam filters).

Reparation of Trust

- Communication plays important role
- 2 strategies:
  - Apologies
  - Denial
- Morality based (most important in on-line markets such as Ebay) and competence based (since packaging and shipping does not require very sophisticated skills).

Findings of research:

- People who had denied their responsibility were judged as less trustworthy than people who had apologized.
- An apology is more successful than denial in trust-repairing.
- The effectiveness of a reaction was not moderated by type of trust violation
- Type of apology can play a role. A short plain apology gained less trust than apologies with an explanation. High trusters seemed to be more willing to believe these explanations than low trusters.
- A morality based trust violation decreased trustworthiness more than a competence based trust violation.
- Plain apologies were always more successful in rebuilding trust than denials, regardless of the type of trust violation.
- The believability of a reaction turned out to be a strong predictor of trustworthiness.

Lecture 4 – Slides

Contents:

1. *Theory of rational choice*
2. *Individual and collective goods*
3. *The Prisoners' dilemma and free riding in groups*
4. *The Coleman boat elaborated: bridge assumptions and transformation rules*

Rational Choice Theory

- Framework for understanding and often formally modeling social and economic behavior.
- The basic premise of rational choice theory is that aggregate social behavior results from the behavior of individual actors, each of whom is making their individual decisions.
- Behavioral theory
- Theory should be 'as simple as possible' so that we can take into account social conditions as causal factors.

Coleman boat

- **Social phenomena:** highly active online community
- **Social conditions:** identifiability of members in the system, long-term membership

Individual good

- Exclusiveness of property rights
- Rivalry of consumption
- E.g. apple, bread, shoes, cars, money

Collective good

- No exclusive use possible
- No rivalry of use
- E.g. clean environment, peace, group rewards, a highway, air pollution

Inter-dependency: For an individual the eventual result for himself is dependent on the behavior of others.

The Prisoner's dilemma

- Two man have committed a murder → get arrested, but not enough evidence → police wants a confession:
    - A) when bot confess, they both get 10 years in prison

- B) when both do not confess, they each get 2 years in prison
- When one of the two confesses and the other denies, then the one who confesses is free to go and the denying person gets 20 years in prison
- Result: Both confess (this is rational behavior)
- This probably wouldn't increase when they could elaborated on beforehand since their promises are not credible.
- Possible solution: get a third party involved
- Applications: cooperation on a joint assignment in class (there is a joint interest in getting the collective good done, contribution is costly) or advertising of two competing firms (two parties making decisions without knowing the decision of the other, but with a common interest).

Problem of Free-riding

- Large groups have more problems to materialize their common interest than small groups. Why?
  - **Anonymity:** defection (free riding) less noticeable
  - **Distribution:** of negative effects of free riding on many more individuals.
  - **Organization and coordination:** of collective action more difficult than in a small group.

Coleman boat

- **Bridge assumptions:** relates social conditions to the micro conditions of the actors. Opportunities and constraints of actors.
- **Transformation rule:** How to transform the individual outcomes to collective outcomes?

Difference psychology and sociology

- Psychology has analytic primacy on individual level.
- Psychology wants to understand precisely how individuals make decisions about behavior.
- Sociology is interested in individual behavior only to the extent that this leads to interesting predictions at macro level.

Lecture 4 – Ultee Chapter 2.4 & 12.5 + Article Coleman (1987)

2.4 Already discussed in lecture 1

12.5 Individual and collective rationality according to utilitarianism

Free markets: effective and efficient when it comes to producing private r, individual goods. But collective goods are not produced optimally.

- Characteristic: they rest on the exchange of exclusive property rights and Rivalizing rights of usufruct.
- Persons decide independent of one another (part of free markets).

Rivalizing: The claim of some person to utilize a good narrow the utilization of this good by others.

Prisoner's dilemma paradox: Rationality (choosing what is best for yourself) does not lead to rationalization (collective interest, both keeping silence and only getting 2 years). → Individual rationality leads to collective irrationality.

Prisoner's dilemma bad example for sociology:

- Sociology is about societies, not only of two persons.
- There is a third party involved.
- Since it is rational to lie it is possible that innocent persons wind up in jail.
- So the structure of this dilemma does not make for efficient and effective protection of the lives of all inhabitants of a particular society.

N-persons dilemma

- Many persons making decisions independent of one another
- Collective goods in large groups not optimal
- Since it is profitable for every person that the collective good is produced without having contributed to its production.
- If everybody contributes it is not wise to contribute, because one can utilize it anyway
- If no one contributes it is not wise to contribute because the good is not produced by the contribution of one person alone.
- Free riders problem
- **After you effect**: as a group becomes larger, the production of collective goods declines.
- **Not in my backyard effect**

Article Coleman 1987 – The micro macro link

Micro-Macro problem: the movement from the individual level, where observations are mad to the systemic level where the problem of interest lies.

Macro-level proposition: represented by the upper horizontal arrow.

Coleman boat

- First is from the system level to the individual level
- Second is wholly at the individual level

- Third is from the individual level to the system level.
- The micro-to-macro transition is made simply by aggregation of individual orientations, attitudes or beliefs.
- Example:

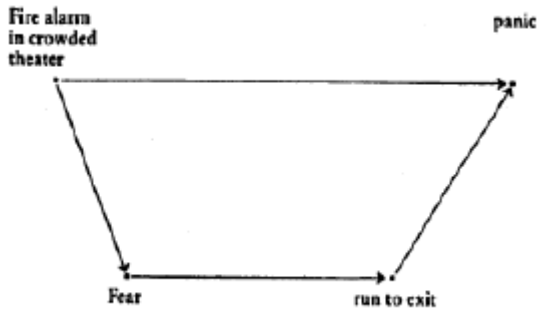


FIG. 6.4

- But based on the prisoners dilemma there is the following model:

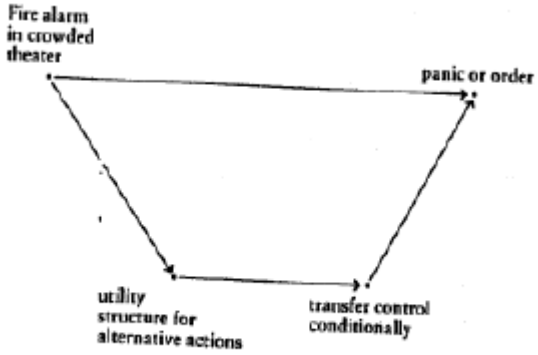


FIG. 6.6

Since a rational decision would be to run towards an action it is not in the common interest of all people since there would be panic. If there is a third party involved and there is elaboration the individual may take another action unilaterally instead: run OR walk (leads to order).

Lecture 5 – Slides

Contents:

1. How to come up with a good theory?

2. Distribution written assignment 1: Design and management of online communities: Designing for Sociability

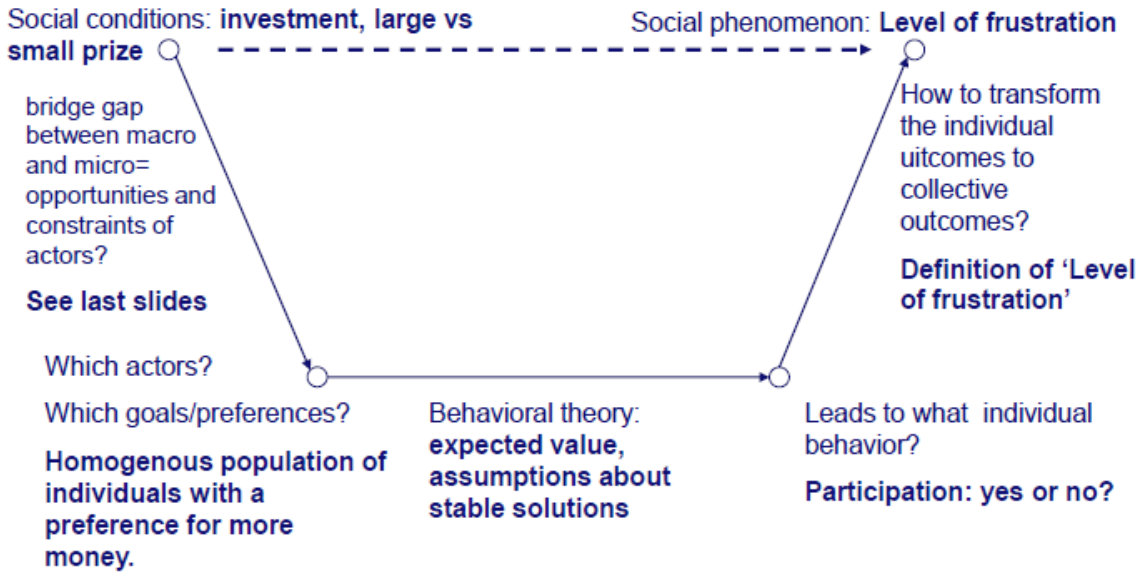
How to come up with a good theory?

- Good theory:
  - Is focusing on a process
  - Leads to interesting implications
  - Is as general as possible
- How to develop:
  - Understand the observation as the result of an underlying process
  - Make assumptions based on these observations
  - Draw conclusions out of the process and test them
  - Adapt the model

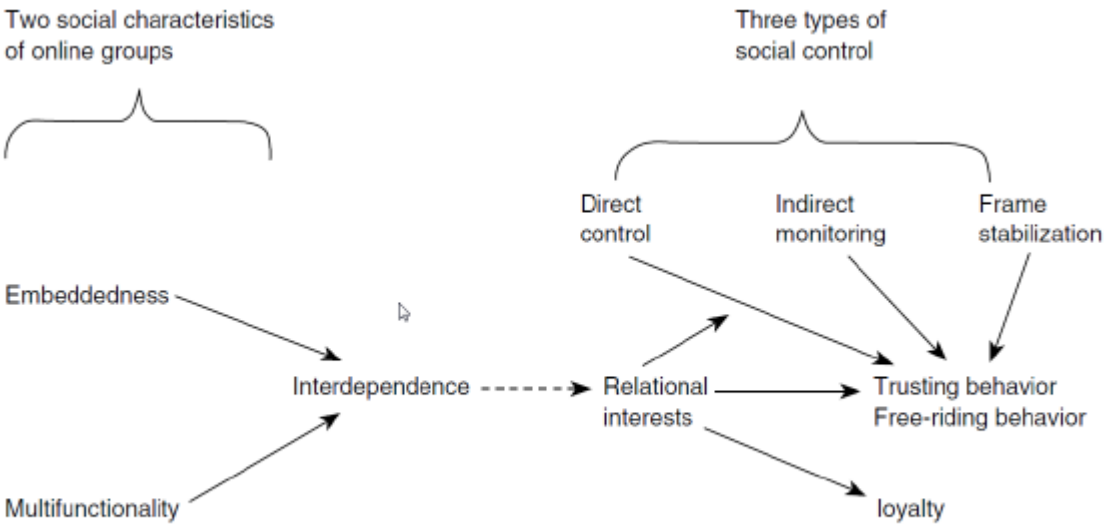
Lotery example

- If expected value of participation is strictly higher than the value of non-participatino then individuals participate.

  Bridge assumptions: no binding agreements, complete info and better condition: chance to win higher prize.



Theory of relational signals in online groups



• Figure 2 The main arguments

Direct control: manipulation of direct benefits (works through choice alternatives)

Frame stabilization: Week control, manipulation of 'perceived benefits'

- Works through **'de-individuation'**: minimize individuals identity, strengthen group identity, promotion of group conformity, triggers of group administrator, 'group' becomes the decision frame.

Lecture 5 – Article Matzat (2009)

Online group: a group of individuals that interact with each other by using the same CMC (computer-mediated-communication) tools such as an email list, a chat group or a bulletin board for the members.

Three typical problems in online group interaction

1. Opportunity problems (free-rider problems)
2. Problems of trust
3. Problems of loyalty (members interests have to be compatible with many other members interests to keep them attracted to the group)

Types of goals/interests

1. Relational goals (for fulfilment of goals, social interaction is necessary e.g. new contacts)
2. Material goals (e.g. attainment of information)

Cognitive framing: attention is focused on one situation-specific goal rather than taking into account all their goals at once.

Three kind of signal sending

a) Every members sends signals to other members as to how (s)he evaluates the bilateral relation.

b) A member sends signals to the whole group. E.g. by discussion contributions.
c) The administer sends relational signals to the members for e.g. behavioral standards.
    a. In the short term: weak/strong social control
    b. In the long term: changing interdependencies between members.

Three types of social control

1. Frame stabilization: increasing the salience of the common group goal. Increase the individual's attention to the frame of the group.
2. Indirect monitoring tools: make use of the (in)formal rules that exist in a group. Have the effect that the member restricts fulfilment of his/her personal short-term goals and takes into account the group frame.
3. Direct control tools: enhancing the real direct benefits of a group member (e.g. rewards)

Effects of social control

- Direct control strategies signal a lack of relational interest.
- Direct control less adequate in online self-help groups that intends to develop a climate of mutual understanding.
- The lower the degree of relational interests, the more direct control is useful.
- Frame stabilizing (and indirect control) tools helps in groups with a high degree of relational interest.

Typology of online group structures

- Under a higher degree of interdependency it is more likely that relational interests will develop.
- Social Embeddedness: influences what the effects of (direct or indirect) control are.
    - Members of an embedded online community have real-life relations.
    - Thus under a high degree of social embeddedness, there is some degree of relational interest.
- Degree of multifunctionality: online group which serves many different purposes for their members at once.
    - People are more likely to join and stay in a group when membership is useful to reach more aims at once.
    - There is a higher degree of interdependency than in single common interest groups.
- Social control: The effects of frame stabilizing and indirect control are larger in embedded (multiple common interest) than in pure (single common interest) online groups.

Functions of online groups

1. Transaction online groups (e.g. auctions)
    - Single, economic transactions. Strongly conflicting interests, no relational interest.
    - Direct control increase membership participation.
2. Online groups of interest
    - Regular and extensive interaction among group members
3. Online groups of fantasy
    - Entertaining (gaming) purpose. One goal: stimulation.
    - The more conflicting elements, the less frame stabilizing tools will increase the membership participation.
4. Online groups of relationships
    - Members have a strong need to create new contacts with others.

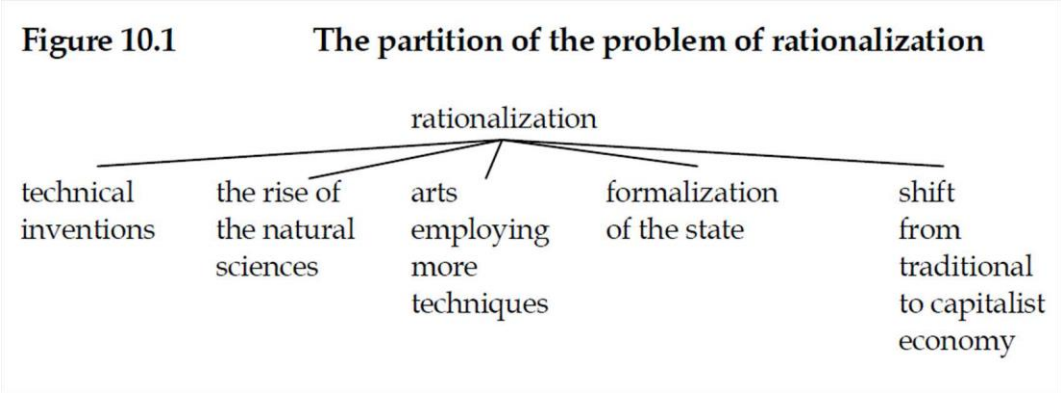
Lecture 6 – Slides

Contents

1. *The problem of rationalization (Max Weber)*
2. *Emotions and diffusion processes in social media: Facebook*

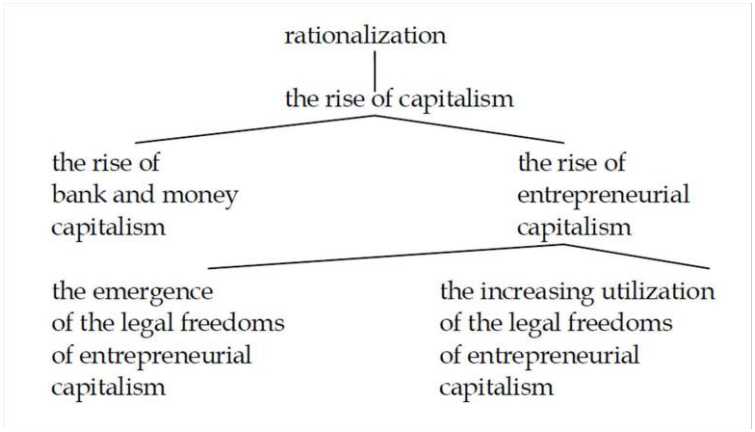
The problem of rationalization (Max Weber)

- Founding father of sociology (with Durkheim)



Q1. Max weber question: "What is characteristic of Western, especially modern Western civilization, and how is the emergence of this civilization with its specific characteristics to be explained?"

- Earlier explanations:
  - Simmel: Money as medium of exchange (emergence of banks)
  - Sombart: population growth leads to more labor and mass production
  - Sombart: Legal system (written constitutions)
  - Technology (West of the world was behind China in 16th)



Interpretative Individualism the core

a) Each highly developed pre- and early modern society
b) has a particular religion
c) with some view of the world;
d) this world-view puts forward to the members of this society, within certain limits, a particular salvation goal (certain people are chosen by God for heaven)

e) and encourages them to achieve the salvation by certain means of salvation (suggests some ways of living as the proper way to reach salvation)
f) and the more activist this world view, the more the members of this society pursue a practical-rational way of life and the more they exploit opportunities for a more efficient production of goods.

Weber vulde deze kern in voor samenlevingen.

- Lutheranism:
  - Strict duty to hard and methodical work
  - People who live this way come to wealth
  - Profit will not be consumed but invested again in the company.
- Confucianisme = oude China
  - De mens kan zich aan de wereld aanpassen
  - Aardse rijkdommen worden niet afgewezen
- Hindoeïsme = oude India
  - Wereld is een eeuwig rad.
  - Mens onderdeel van steeds terugkerende onveranderlijke wereld.
- Katholicisme = middeleeuwse Europa
  - het eeuwige leven, niet op aarde maar in de hemel.
  - Zonder toedoen van de kerk kunnen mensen dit heil echter niet bereiken
- Protestantisme = Latere Noord west europa en de VS
  - Eeuwig leven in het hiernamaals
  - het wereldbeeld van het protestantisme kent aan mensen daadkracht toe en spoort aan tot een praktisch rationele levenswijze.

Q2. Theory of World-views: *Why did the number of entrepreneurs especially in England in the 16th century grow stronger than in the Netherlands, and in the Netherlands stronger than in Germany?*

- 1st hypothesis: In the 16th and 17th centuries all forms of Protestantism suggested that one's profession is one's calling in life and man can administer the world, this idea is the least developed in the German Lutheranism, more in Dutch Calvinism and most in the English rigorous movements.
- In the 16th and 17th centuries, in England the number of entrepreneurs grew more strongly than in the Netherlands, and in the Netherlands more than in Germany.

Q3. Rationalization: *how can we retain desirable traditions but take up useful innovations?*

- Diffusion of Innovations theory
- Social Network Theory
- Improvement of 'Quality of Life' part of rationalization problem

Facebook and rationalization: Does Facebook make users 'happier'?

- Study 1: Facebook emotional consequences: why Facebook causes a decrease in mood
  - Result: the more time of Facebook, the worse the mood (feeling of time wasting)
- Study 2: experimental evidence of massive-scale emotional contagion through social networks.
  - Expression to positive or negative newsfeed content
  - Outcome: change in own posting behavior, content consistent with exposed emotion.
- Interpretation: emotional contagion without interaction takes place
- Micro-macro link: small effects on individual level may lead to a larger change at the macro level.
- Passive consumption of Facebook may lead to mood decline.

Lecture 6 – Ultee Chapter 9 + Article Kramer et al 2014

Kramer et al 2014 – massive-scale emotional contagion through social networks

Emotional contagion: transfers emotional states to others leading people to experience the same emotions without their awareness.

Purpose of study: Test whether emotional contagion occurs outside of in-person interaction between individuals by reducing the amount of emotional content in their Facebook newsfeed.

Experiment

- Manipulates the extent to which people were exposed to emotional expressions in their News Feed.
- Two parallel studies for positive and negative emotions: one reduced the positive emotional content, the other the negative emotional content.
- Posts were determined to be negative or positive if they contained at least one positive or negative word.

Results:

- Results show emotional contagion
- People who had positive content reduced in their newsfeed produced a larger percentage of negative words in their status update and vice versa.
- Withdrawal effect: people who were exposed to fewer emotional posts were less expressive overall on the following days.

Ultee Chapter 9

The question of the rise of the west

- Weber's answer: interpretative tradition

Problem of rationalization (one of sociologies main question)

- Rationalization not linear (e.g. with fall of roman empire, western civilization declined)
- 'McDonaldization of Society

Characteristics Western World

- Technological Progress (West lagged in technology at beginning of modern times)
- The rise of empirical theoretical science
- Arts: in the west they differed from those in other civilizations.
- States: states in the west show a distinctive combination of aspects: written constitutions, general laws corps of officials. In other civilizations they only had rudiments of such states.
- Material goods: different production, not only for household's purpose but for faraway markets.
- These 5 characteristics = Progression

The rest of the chapter is accordance to the summary of the slides and therefore not summed here.

Lecture 8 – Slides

Rogers: interested in innovations that 'do not take of' (don't diffuse) while they seem to be promising and economically useful.

- E.g solar box, solar wall oven, Itera plastic bicycle, Dvorak keyboard

Disadvantages of cooking on fire

- Cooking 3 meals a day is equal to smoking 3 packets of cigarettes
- Contribution to erosion
- Collecting wood is time consuming
- People lose lives because of indoor cooking

The Diffusion Theory: Diffusion is the process in which an innovation is communicated through certain channels over time among the members of a social system.

1. Diffusion
2. Innovation: an idea, practice or object that is perceived as new by an individual or other unit of adoption.
3. Channels: communication channels
    - Knowledge: awareness, how does it work, how do I make it work?
    - Persuasion: is it better, compatible, complex?
    - Decision: can I try it, can I observe somebody else using it?
    - Implementation: build it and work with it.
    - Confirmation: regret or not.
4. Social system: set of interrelated units that are engaged in joint problem solving to accomplish a common goal.

Diffusion curves

- Predict diffusion : Rate of adoption of innovations
    - Perceived attributes of Innovations
    - Type of innovation-decisions
    - Communication channels
    - Nature of social system
    - Extent of promotion efforts
- Predict is difficult: especially the future (already often failed)

Five characteristics of innovations

1. Relative advantage
    - Best predictor of adoption
    - Economic advantages (e.g. reduction of costs, quality)
    - Comfort
    - Social prestige (influence-ability)
2. Compatibility
    - Value & beliefs
    - Previously introduced ideas

- Needs (sometimes not recognized, e.g. killing Ecoli bactery in example of solar water pasteurization)
- Compatibility is influenced by framing (naming and position)

3. Complexity
    - The degree to which an innovation is perceived as relatively difficult to understand and use.
4. Trialbility
5. Observability

Time: rate of adoption, adopter categories, the innovation decision process.

Adopter categories

- Early adopters
- Early majority
- Late majority
- Laggards

Lecture 8 – Article Rogers, Elements of Diffusion

Communication: a process in which participants create and share information with one another in order to reach a mutual understanding.

- Two-way process of convergence
- Diffusion is a special type of communication

Uncertainty: the degree to which a number of alternatives are perceived with respect to the occurrence of an event and the relative probability of these alternatives.

Social-change: diffusion is a kind of social-change, which is the process by which alteration occurs in the structure and function of a social system.

Four main elements in the diffusion of Innovation

1. Innovation
    - If an idea seems new to the individual it is an innovation
    - Newness may be expressed in terms of 'knowledge, persuasion or a decision to adopt'.
    - Diffusion/adoption of innovations not necessarily desirable
    - Often use the words 'innovation and 'technology' as synonyms.
    - Technology: a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome.
    - Technology clusters: consists of one or more distinguishable elements of technology that are perceived as being closely interrelated.
    - Re-invention: the degree to which an innovation is changed or modified by a user in the process of adoption and implementation.
2. Communication Channels
    - The process involves:
        i. An innovation

        ii. An individual or other unit of adoption that has knowledge of, or has experienced using the innovation.
        iii. Another individual or unit
        iv. A communication channel connecting the two units
    - Mass media channels are usually the most rapid and efficient means of informing an audience of potential adopters about the existence of an innovation
    - Interpersonal channels: involve a face-to-face exchange between two or more individuals.
    - Homophily: the degree to which two or more individuals who interact are similar in certain attributes, such as beliefs, education, socioeconomic status and the like. → when homophily is present, communication is therefore likely to be rewarding to both participants.
    - Usually participants are quite heterophilous.
3. Time
    - Time dimensions is involved in diffusion in
        i. The innovation decision process: individual passes from knowledge of an innovation, to the formation of an attitude toward the innovation (knowledge, persuasion, decision, implementation and confirmation).
        ii. The innovativeness of an individual
        iii. An innovation's rate of adoption in a system (innovators, early adopters, early majority, late majority, laggards).
    - Most innovations have an S-shaped rate of adoption. Slope can differ.
    - Rate of adoptions is usually measured by the length of time required for a certain percentage of the members of a system to adopt an innovation.
4. A social system
    - Diffusion occurs within a social system.
    - The social structure affects the diffusion.
    - Structure: the patterned arrangements of the units in a system → gives regularity and stability to human behavior.

Norms: the established behavior patterns for the members of a social system. A systems norms can be a barrier to change.

Opinion leadership: the degree to which an individual is able to influence other individual's attitudes or over behavior informally in a desired way with relative frequency. They exemplify and express the system's structure.

Change agent: an individual who influences clients' innovation decisions in a direction deemed desirable by a change agency.

Aide: less than fully professional change agent who intensively contacts clients to influence their innovation decisions.

Types of innovation decisions

1. Optional innovation-decisions
2. Collective innovation-decisions
3. Authority innovation-decisions

Consequences of innovations

- Consequences: the changes that occur to an individual or to a social system as a result of the adoption or rejection of an innovation.
    - Desirable versus undesirable
    - Direct versus indirect
    - Anticipated versus unanticipated

Lecture 9 – Slides

"Diffusion is the process in which an innovation is communicated through certain channels over time among the members of a social system."

Failed Diffusion

- Water boiling in Peruvian Village
    - Good idea, but villagers lacked knowledge about the health issues
    - Innovation involves major change in thinking and behavior

Types of adopters

- Custom-Oriented adopter
    - Mrs A is ill, she boils water every day but has no understanding of germs theory.
    - She acts according the 'hot and cold' theory
    - Adopts innovation but for the wrong reason
- Persuaded Adopter
    - Worries about diseases
    - Anxiety leads to easy convincing for alternative
    - Mrs. B is an outsider and therefore the community is not an important reference group to her.
    - She can deviate from the village norms on health innovations
    - She starts boiling water and gains personal security.
- Rejector
    - Mrs. C does not understand germ theory.
    - She believes only the sick should drink boiled water (hot and cold theory)
    - She does not adapt and keeps the norms of the village.

Social system: a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal (think of the whisper game as demonstrated in class).

Social Network Theory: a social network consists of a set of actors (nodes) and the relations (ties or edges) between these actors. E.g. telephone trees, bucket brigades, whisper game network, business organizations etc.

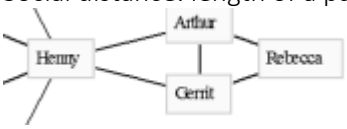
Natural networks: shape or structure is a basic property of networks. Visualizations can differ, but pattern of connections stays the same.

Four network rules

1. We shape our network (A is more central than B, C is more connected than D etc.)
2. Our friends affect us (social contagion, e.g. when friends are obese, increase in individual risk).
3. The friends of our friends affect us
4. The network has a life of its own

Fundamental concepts

- Graph: consist of a set of objects called nodes with certain pairs of these objects connected by links called edges.
- Neighbors: if two nodes are connected by and edge.
- Path: a sequence of nodes with the property that each consecutive pair in the sequence is connected by an edge.
- Connectivity: a graph is connected if for every pair of nodes there is a path between them.
- Components: small groups of graphs.
- Social distance: length of a path to be the number of steps it contains from beginning to end.



E.g. length between rebecca and henry is 2

- Diameter: the maximum distance between any pair of nodes in the graph.
- Average distance: the average distance over all pairs of nodes in the graph.

Strength of weak ties theory

- Does having friends help you finding a job, so are they a form of capital?
  - Yes, but vague acquaintances help just as much.
- Strength of a tie: a combination of the amount of time, the emotional intensity, the intimacy and the reciprocal services which characterize the tie.

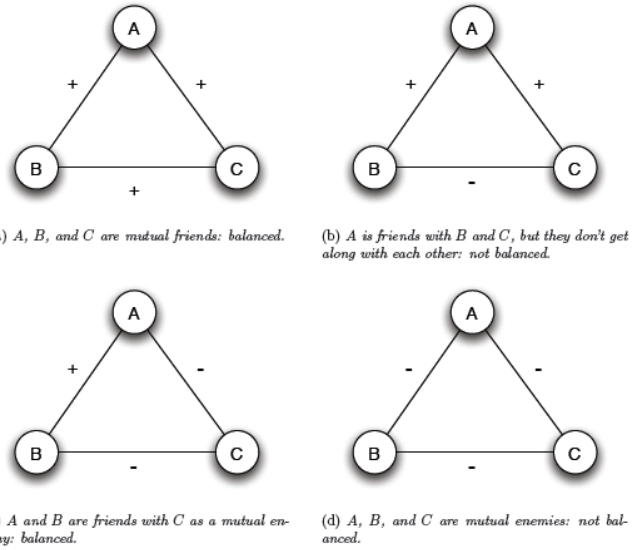
Transitivity

- Stronger ties involve larger time commitments
- If A-B and A-C ties exist, the amount of time C spends with B depends on the amount A spends with B and C
- Reason for transitivity: social balance. Otherwise there is cognitive dissonance.
- Transitivity exists! They tested it with email sending. The stronger the relationship between individuals, the more emails send.
  - Cyclic closure: it naturally generalizes the notion of triadic closure.
  - Cyclic closure bias: the empirical probability that two previously unconnected individuals who are distance dij apart in the network will initiate a new tie.
  - Focal closure bias: the empirical probability that two strangers who share an interaction focus will form a new tie.

Social Balance

A) A balanced harmonious triad (iedereen vrienden met iedereen)
B) Not balanced: A is friends with B and C, B and C don't get along with each other.
C) Balanced. A and B are friends with C as a mutual enemy.
D) Not balanced: A, B and C are mutual enemies.

See next page



(a) *A, B, and C are mutual friends: balanced.*

(b) *A is friends with B and C, but they don't get along with each other: not balanced.*

(c) *A and B are friends with C as a mutual enemy: balanced.*

(d) *A, B, and C are mutual enemies: not balanced.*

How realistic is transitivity assumption?

- When two individuals share at least one class, they are on average 3 times more likely to interact if they also share an acquaintance (dij=2)
- And they are about 140 times more likely if they do not (dij >2).
- The likelihood of triadic closure increases if the average tie strength between two strangers and their mutual acquaintances is high.

The clustering coefficient: the c.coefficient of Node A is denoted as the probability that two randomly selected friends of A are friends with each other.

Bridge: if the edge is literally the only route between the nodes A and B. If the edge would be left out the network would fall apart. (only weak ties are bridges and weak ties reduce path lengths)

Local bridge: edge joining two nodes A and B, deleting the edge would increase the distance between A and B to a value more than 2.

Schellings model

- Satisfied agents
- Certain threshold
- If t=30% and more than less than 30 of its neighbors agents are from a different sort, the agent wants to move to an other location.

Lecture 9 – Article Kossinets et al (2006) and Easly et al (2010)

Kossinets et al – Empirical Analysis of an Evolving Social Network

Social networks relevance in

- Information processing
- Distributed search

- Diffusion of social influence
- Social network as dynamic processes in themselves

Social network formation: complex process in which many individuals simultaneously attempt to satisfy their goals under multiple constraints.

Purpose of the study: they analyzed a longitudinal (i.e. collected over time) network data set created by merging three distinct but related data structures.

1. Email interactions (of university staff, students etc.)
2. Information specifying a range of personal attributes.
3. Complete lists of the classes attended and taught.

The stronger the relationship between two individuals, the more spikes will be observed for this particular pair.

By identifying new ties that appear in the network over time, two sets of measures can be computed:

1. Cyclic closure bias: the empirical probability that two previously unconnected individuals who are distance *dij* apart in the network will initiate a new tie.
2. Focal closure bias: the empirical probability that two strangers who share an interaction focus will form a new tie.

Results:

- In absence of a shared focus (i.e., class) cyclic closure diminishes rapidly in strength with *dij*. Thus individuals who are far apart in the network have no opportunity to interact and hence are very unlikely to form ties.
- The empirical probability of tie formation increased with the number of mutual acquaintances both for pairs with and without shared classes.
- The likelihood of triadic closure increases if the average tie strength between two strangers and their mutual acquaintances is high.
- Homophily does not play a big role.
- Conclusions relating differences in outcome measures such as status or performance to differences in individual network position should be treated with caution.
- Bridges may facilitate diffusion of info, however their unstable nature suggest that they are not owned by individuals, thus advantages are temporary.
- It is unclear to what extent individuals are capable of manipulation their positions in a large network.

Easly et al – Networks, crowds and markets

1.1 aspects of networks

it is generally difficult to summarize the whole network succinctly: there are parts that are more or less densely interconnected, sometimes with central ‘cores’ containing most of the links and sometimes with natural splits into multiple tightly-linked regions.

2.1 basic definitions

A **graph** is a way of specifying relationships among a collection of items. A graph consists of a set of objects, called **nodes**, with certain pairs of these objects connected by links called **edges**.

path in a graph: a path is simply a sequence of nodes with the property that each consecutive pair in the sequence is connected by an edge.

Cycle: which informally is a ring" structure such as the sequence of nodes.

With this in mind, we say that a graph is **connected** if for every pair of nodes, there is a path between them.

To make this notion precise, we say that a **connected component** of a graph (often shortened just to the term "**component**") is a subset of the nodes such that:

(i) every node in the subset has a path to every other; and
(ii) the subset is not part of some larger set with the property that every node can reach every other.

2.3 Distance and Breadth-First search

In addition to simply asking whether two nodes are connected by a path, it is also interesting in most settings to ask how long such a path is.

We denote the **distance** between two nodes in a graph to be the length of the shortest path between them.

Breadth-First search

- Figure out the distance between two nodes.
- You first declare all of your actual friends to be at distance 1.
- You then find all of their friends (not counting people who are already friends of yours), and declare these to be at distance 2.
- Then you find all of their friends (again, not counting people who you've already found at distances 1 and 2) and declare these to be at distance 3
- (...) Continuing in this way, you search in successive layers, each representing the next distance out. Each new layer is built from all those nodes that (i) have not already been discovered in earlier layers, and that (ii) have an edge to some node in the previous

small-world phenomenon: the idea that the world looks "small" when you think of how short a path of friends it takes to get from you to almost anyone else.

Triadic Closure: If AB and AC are already friends and BC also become friends then the triangle is 'closed'.

The clustering coefficient: The clustering coefficient of a node A is defined as the probability that two randomly selected friends of A are friends with each other.

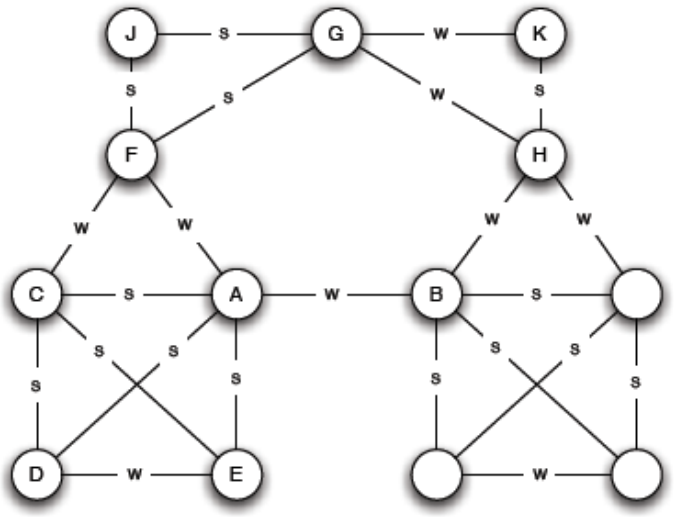
Reasons for triadic closure

1. If A and B have a common friend C, the **opportunity** to meet is high.
2. If B and C are both friends with A, there is a basis for **trusting** each other.
3. **Incentive:** if A is friends with B and C he/she might want to bring them together since it becomes a source of stress if B and C don't like each other.

3.2 the strength of weak ties.

We say that an edge joining two nodes A and B in a graph is a **local bridge** if its endpoints A and B have no friends in common - in other words, if deleting the edge would increase the distance between A and B to a value strictly more than two.

Span: the distance its endpoints would be from each other if the edge were deleted. E.g. the distance of local bridge AB is 4 since the length from A to B if bridge deleted is 4.



3.3 Tie strenght and Network structure in Large-Scale Data

Giant component: a single connected component containing most (±80%) of the individuals in the network.

Neighborhood overlap:

$$\frac{\text{number of nodes who are neighbors of } \textit{both } A \text{ and } B}{\text{number of nodes who are neighbors of } \textit{at least one of } A \text{ or } B}$$

The key feature of this definition is that this ratio in question is 0 precisely when the numerator is 0, and hence when the edge is a local bridge.

3.4 tie strength, social media, and passive engagement

Facebook tie strength
To make this precise using the data they had available, they defined three categories of links based on usage over a one-month observation period.

- Reciprocal (mutual) communication: if the user both sends and receives messages to the friend.
- One-way communication: if the user sent one or more messages to a friend.
- Maintained relationship: if the user followed information about the friend at the other end of the link, whether or not communication took place.

Chapter 10 – Slides

Emotional Contagion: people influence each other emotion wise

- E.g. 1 person starts to laugh at a bus stop and slowly all the others start laughing to even though they don't know why they are laughing.
- E.g. Movie example in lecture: Children affecting each other with hysteric behavior → school needs to close.

Thomas Valente (1996)

- Threshold models as one explanation for the success or failure of collective action and the diffusion of innovations.
- Adopter categories
- Threshold: sensitivity to social influence
- First one loner acts, than a follower, than a few followers, **tipping point**, everybody follows.
- The bandwagon effect: 100 people, all have a threshold from 0 to 99. If the instigator (person with threshold 0) starts then a riot with 100 people engaged is the result.
- People have different thresholds → cause for varying times-of-adoption and thus for the S-shape.
- The more innovative you are the lower your threshold = early adopter.

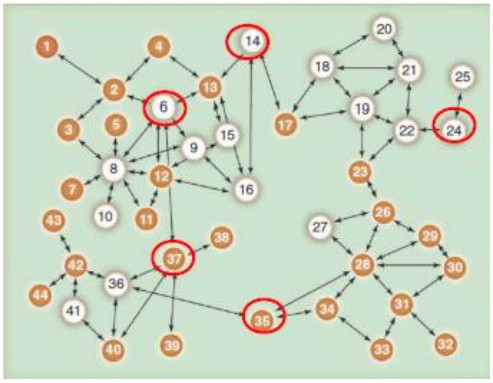
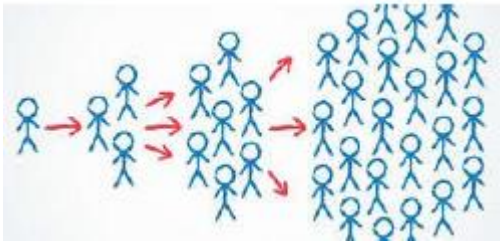
Table 4
Opinion leadership scores (number of network nominations received) by system and cohesion network categories

	Personal network: direct ties				System total
	Very low threshold	Low threshold	High threshold	Very high threshold	
Early adopters					
Doctors [a]	**3.08**	2.00	1.50	–	2.60
Farmers [b]	**3.07**	1.77	4.38	3.23	2.80
Women [c]	**5.47**	5.24	5.04	–	5.34
Early majority					
Doctors	1.27	**4.31**	3.50	2.29	2.82
Farmers	3.45	**3.94**	8.00	2.47	3.84
Women	3.05	**4.86**	4.69	–	4.50
Late majority					
Doctors	1.00	2.00	**5.33**	2.23	2.30
Farmers	2.84	2.91	**2.87**	2.71	2.80
Women	2.38	3.69	**3.91**	–	3.61
Laggards					
Doctors	0.50	0.00	2.00	**1.35**	1.26
Farmers	0.40	–	–	**1.48**	1.30
Women	1.36	–	–	**3.15**	2.99
Personal network total					
Doctors	1.80	3.46	3.50	1.84	2.35
Farmers	2.72	2.87	3.61	2.17	2.63
Women	4.13	4.73	4.44	3.15	4.02

[a] ANOVA diffusion phase significant at $p < 0.05$.

- Opinion leaders expect to be early adopters but according to this data they are not. (their score is highest for early majority)
- Opinion leaders often are part of the majority! (important for the exam)
- Opinion leadership: e.g. friends on Facebook, amount of connections, subscribers on YouTube.

Valente Network interventions

- Identifying and target individuals
  - Most frequent intervention of this type is 'opinion leaders'
  - Measure opinion leadership by number of nominations (who has the most connections to his-/herself)
  - Centrality: nodes that are relatively close to all other nodes in the network (reach other nodes in fewer steps than the rest). Note: this is different from 'centrality between nodes'.
  - Bridging individuals may be more amenable (vatbaar) to change and may be in a better position to change others.
  - Bridging individuals may be preferred as change agents.
  - Bridging nodes can be identified as brokers who have many connections to people who are not directly connected.
  - There are also bridges whose connections maximize network cohesion.
  - 
- Segmentation
  - Identifies groups of people (nodes) to change at the same time.
- Induction
  - Induction interventions stimulate or force peer-to-peer interaction to create cascades (stroom versnelling) in information/behavioral diffusion.
  - Word-of mouth (WOM) interventions stimulate interpersonal communication to persuade other to adopt the new behavior.
  - 
- Alteration
  - Many interventions deliberately (opzettelijk) change the network to improve efficiency.
    - Adding/deleting nodes
    - Adding/deleting links
    - Rewiring existing links

Lecture 10 – Article Valente (1996) & Article Valente (2012)

Valente 2012 – Network interventions

Social networks can be used to

- Accelerate behavior change
- Improve organizational efficiency
- Enhance social change
- Improve dissemination and diffusion of innovations

Caveats for network interventions

1. Network interventions are not agnostic or impartial, but depend on the goals and objectives that initiate the intervention.
2. Scientific theory regarding how individuals or organizations change or can be changed is critically important for between communities.

Four strategies to develop planned change programs

1. Identifying individuals
    - Network data are used to identify individuals
    - Opinion leadership
    - Identify central nodes with centrality:
        - Centrality closeness: nodes that can reach everyone else in fewer steps on average than other nodes.
        - Centrality betweenness: nodes occupy critical gate-keeping positions by most frequently lying on the shortest path connection other nodes.
    - The most critical nodes for behavior change programs can be identified by finding those that most optimally span the network (Borgatti)
    - Using the number of links a node has to identify key players may not identify the best nodes to disseminate information.
    - Leaders may not always be the best change agents → Leaders are vested interest in the status quo whereas bridging individuals may be more amenable to change and may be in a better position to change others.
    - Bridging nodes are brokers: they have many connection to people who are not directly connected
    - Bridging nodes can be identified as bridges whose connections maximally increase network cohesion.
    - Low threshold < 50%
2. Segmentation: intervention is directed toward groups of people
    - Identifies groups of people to change at the same time.
    - E.g. companies often introduce new procedures at separate locations sequentially rather than having all locations adopt the new procedures simultaneously.
    - May also be used to identify nodes that occupy the same roles in the organization.
3. Induction: excitation of the network occurs such that novel interaction between people are activated.
    - Stimulate or force peer-to-peer interaction to create cascades in information/behavioral diffusion.

- Word-of-mouth interventions stimulate interpersonal communication to persuade others to adopt the new behavior.
- E.g. going viral on the internet.
- Snow ball effect

4. Alteration: interventions that change the network.
    - Adding/deleting nodes
        - Adding uses outside change agents and expert consultants.
        - Add new people to a network to facilitate behavior change (e.g. Anonymous Alcoholics).
        - Node-addition interventions often create connections randomly, yet it is probably preferable to add nodes to the network selectively on the basis of network position.
        - Node-deletion remove nodes that occupy critical positions in a network.
        - Nodes are then ranked on the degree to which their removal changes the network statistics.
        - E.g. removing critical nodes from sexual networks is an effective way for public health agencies to reduce disease spread and protect communities.
        - Node-deletion interventions change the focus from individual behavior to system dynamics.
    - Adding/deleting links
    - Rewiring existing links
        - Networks can be rewired to increase efficiency or improve performance based on certain goals.
        - E.g. teachers often randomize classroom networks so that ability levels are randomly distributed in the network.
        - Optimal networks are those with short average distances between nodes and a high degree of clustering (Watts).
        - Rewiring may be conducted to connect individuals with different attributes.

Interventionist should use induction or alteration techniques to create a network amenable to change. Once the network is built or restructured, identification and segmentation tactics can be used to accelerate change!

Interdependent behaviors: increase in values as more people adopt them.

- E.g. Facebook becomes more appealing as more of one's friends use this social networking site.

Article Valente (1996) – Social network thresholds in the diffusion of innovations.

Diffusion of Innovation: the process by which a few members of a social system initially adopt an innovation, then over time more individuals adopt until all (or most) members adopt the new idea.

Social network: the pattern of friendship, advice, communication or support which exists among the members of a social system.

Opinion leaders: those individuals with the highest number of nominations, they are a significant influence in the rate of adoption.

Threshold models: postulate that an individual engages in a behavior based on the proportion of people in the social system already engaged in the behavior.

Personal networks: the set of direct ties that an individual has within a social system.

Adopter categories model advantages

- It can be used to determine the critical mass
- To predict the pattern of diffusion of innovation
- Identifies opinion leaders and followers in order to understand the two-step flow hypothesis better.
- Provide a mechanism for audience segmentation.
- Early adopters have more sources of external influence.

This new model by Valente:

- Explicitly includes the influence of non-adopters on adopter decisions
- Links micro- and macro level influences in one model
- Tests the results against data rather than relying on computer stimulation.

Exposure: the proportion of adopters in an individual's personal network at a given time.

- Since adoption thresholds are the proportion of adopters in an individual's personal network, the threshold is the exposure at the time of adoption (E.g. when you adopt after two of your six friends have adopted, your threshold is 40%).

Innovativeness

- With respect to their personal network
- With respect to the social system

External influence: cosmopolitan actions and communication media. Individuals have earlier awareness of an innovation enabling them to be earlier adopters.

Table 3

- Reports the external influence scores for each of the 16 categories of adopters for the three datasets.
- Shows how external influence scores vary for individuals who are innovative relative to the two dimensions.
- Shows that external influence scores are almost always highest for individuals who are most innovative (early adopters) to the system and their personal network.
- Early adoption is associated with high external influence.
- The upper triangle scores are usually greater than the lower triangle, indicating that external influence tends to make individuals innovative relative to the social system more than relative to their personal network.
- Laggards can be partitioned into isolated and high thresholds
    - Laggards with low thresholds do not receive exposure to the innovation and it is the question whether they will ever adopt.
    - Laggards with high network thresholds hear about the innovation but do not adopt.
- It is often interpersonal influence with friends and neighbors which leads to actual adoption.

- This leads to the **Two-step flow hypothesis:** the media inform opinion leaders who in a second step influence opinion followers.

Table 4

- Shows the average number of network nominations
- Highest scores occur along the diagonal.
- Opinion leaders behave in a normative fashion by having consistency in their system and personal network thresholds.
- The pattern of nominations received is different for the three datasets.
    - Score increase along the diagonal for the medical innovation data
    - Shows inconsistencies for the Brazilian farmers
    - Decreases along the diagonal for the Korean woman.
- For the Korean data, OL seemed to follow the classic diffusion model → opinion leader scores are highest along the diagonal indicating that individuals who were consistent in their thresholds are more likely to be opinion leaders.
- The Korean woman who adopted early became opinion leaders
- For each diffusion phase the number of network nominations received was highest for doctors who adopted.
- Korean women followed the classical two-step flow model.

Discussion

- Possible bias by the presence of time lags between the time an individual exposure reaches his/her threshold and the time of adoption.
- Possible bias in the data