Sociology of Technology

Summary

SS2022

Contents

Sociology

- science which aims at interpretative understanding of social action
- in order to gain explanation of its causes and effects
- core is the people
- the actions of human beings as a whole

Social action vs. behavior

- behavior: each activity / movement of an organism/living creature
- social action
  - makes **'sense'**
  - 'sense' attached by social beings to all their actions
  - subjective meaning guides action
  - understanding necessary
  - **intention**
  - **orientation towards each other**
  - not primarily outcome of biological reflex
  - involvement of mind & deliberation
- social: action of humans with reference to other humans

Technology

- technological artifacts
- their interaction, interconnection in aggregates, ensembles, networks
- their underlying procedures
- actions & procedures/techniques as related to those objects
- corresponding knowledge
- distinct from "Technik", would include all thinking & acting, provided it
  - is systematic
  - adheres to methodological rules/criteria
  - aims at certain goal

- technology is always socially embedded
- influences our world experiences

Dual nature of technology

- **first dimension**:
  - technology is a medium $\rightarrow$ structuring function
- **second dimension**:
  - technology is a cultural element $\rightarrow$ (symbolic) meaning
- both dimensions present at same time

Social action and meaning

- humans act towards things on basis of meanings that things have for them
- meanings arise out of social interaction

Culture

- historically transmitted pattern of meanings
- embodied in symbols
- system of inherent conceptions expressed in symbolic form
- by which humans communicate, perpetuate, develop knowledge about attitudes toward life
- **everything generated by human practice**
- cultural elements
  - have meaning
  - are symbols (discursive vs. presentative)
- culture vs. nature
  - nature: exists independent of humans
  - culture: generated by human practice, does not exist without existence of humans

Technology as "cultural element"

- technological devices have a **meaning** in certain cultural context
  - arises from collective action of people
  - $\neq$ 'essence' of things
  - = context-sensitive: cannot be discussed without the context, can be different in contexts
  - = culture-dependent
  - not characteristics of things, part of our interaction with them
  -
- they are **symbols**
- $\rightarrow$ **symbolic meaning**
- meaning

Example: meaning of moped in youth subculture

- not primarily mans of transport
- marking urban territories (driving around, make noise)

- status symbol within own peer group
- provocation towards grown-ups

Example: meaning of telephone

- proof of physical theories of human speech & perception
- quasi-radio (beginning)
- means of transferring information into one direction (beginning)
- tool for two-way communication (later - now)

Example: mechanisation in household

- in America: connected to
  - question of the position of women
  - question of the position of servants
  - conception of democracy with no privileged class, no privileged gender
  - feminist movement
    - establishing external power: political equality
    - establishing internal power: rationalising the household
  - extension of women's power to reign over the household
- Europe:
  - sticking to pseudo-feudalistic class system
- example: microwave oven
  - accepted better in France than in Germany
  - role of women in society was different
  - France: women were working in
  - Germany: society believed they have to do the household, put labor effort into cooking meals
- example: vacuum cleaner
  - spread quicker in US than Europe
  - Europe: rich people had servants
  - US: less idea of privilege, more equality

Technology as a medium

- techn. devices put between humans & external reality
- mediate between humans & external reality
- serve as media
- structure perception and action of humans
- $\rightarrow$ **structuring function**
- technology is interpreted as extension of body or physical functions

Example: telephone

- as soon as telephone was established as medium of 2-way communication
  - structuring function: de-hierarchisation - democratisation of society

Example: use of firearms

- more deaths by firearms in US compared to Canada
- firearms have different meaning in the US
- USA:
  - instrument of free people
  - *"defend yourself and your family"*
  - used as problem-solving tool
  - actively used to shoot people
- Canada: tool for hunting etc.
- number of people owning guns does not correlate with percentage of murders with firearms
- $\rightarrow$ depends on meaning they have to people

Relation technology $\leftrightarrow$ social structure/society

- technology has structuring function if used
  - according to certain meanings
  - in specific cultural context
- technology follows (developments in) society
- once technology is used according to certain meanings, in specific context
  - $\rightarrow$ structuring function
  - reinforcing retro-action
    - use rebounds developments in society in reinforcing way
    - use strengthens developments & those meanings

Example: street lights

- France:
  - symbol of sovereign control mechanism
  - symbol of power
  - movement to destroy them was kind of liberation movement
  - destroying them was a criminal act & heavily punished
- England:
  - more pragmatic meaning
  - not same symbolic meaning as in France
  - no movement to destroy them
  - destruction was not criminalized

Example: writing

- Sokrates' assumptions
  - writing is evil
  - memory and mind will degrade and lose its power
- reality
  - opened up possibilities of humanity
  - asynchronous communication
  - things could be written down, remembered at a later time

  - did not reduce humans' abilities

Railway

Beginnings of the railway - structural function

- **Delocalisation** of time
  - time lost anchorage in local contexts
  - became standardised, independent of specific locations/places
- **Change in perception of space-time**
  - elimination/compression of space
  - expansion of space: people could reach places faster
- **Different route planning** compared to other means of transport
  - ideal of straight line as shortest path
  - route cuts through environment
- locomotive driver was no longer a driver who decides the direction to go, but the operator of a machine
- inclusion of telegraph system supported separation between railway and surrounding

Development

- people perceived rail tracks and vehicles as one machine ensemble
- people could not imagine that iron wheels can co on smooth iron tracks
  - at first only concepts made use of this
  - not possible to go uphill without using cogs

Steam engines

- steam machines primarily used in coal mines to pump out water
  - very energy inefficient enough coal as fuel
- main energy source was water (e.g. Mills)
  - steam machine did not replace water
  - rotation was needed, steam machine only moved up & down
  - used as pumps to reuse water
- important transformation: stem machine that produced rotation (Watt)
- need to move steam machines around $\rightarrow$ advent of the railway
- railway was the first automobile - steam powered vehicle
  - used in coal mines to get coal out
  - rails were already there (coaches before pulled by horses)
  - enough source of energy
- steam engines replaced horses: grain was expensive and used to feed people

Invention of the railway in 19th century

- products no longer produced in distributed fashion, but large factories
- necessity to bring raw material to factories

- mass production relied on fast and reliable way to
  - transport material to factories
  - bring goods to customers
- before mass production: skilled workers only produced what was needed by close range of customers
- with mass production: goods had to be distributed
- need to ship energy (coal) too the factories

Problems in the beginning

- problem to create time tables
  - no coordinated time
  - people were using local time
  - but railway was too fast
- unification started in 1840
  - but only applied to certain train line
- UK established a standard railway time (Greenwich) - only used for railways, local time for each town stayed in place
  - Greenwich time already existed before railway for ships going across the ocean
- in Austria: local time until 1910
- $\rightarrow$ **Standardization of time and loss of local time: one structuring function of the railway**

Modes of perception and experience

Traditional

- paradigm: stagecoach
- traveling **in** the landscape
- immediacy of experience
- multi-sensory
- continuum of changing, connected impressions

Panoramic

- paradigm: railway
- travelling **through** landscape - virtually outside of landscape
- distance between perceiving subject & perceived object
- largely visual (long distance senses)
- less detail, perception of whole
  - $\rightarrow$ overview

Examle: Panorama

- pan - orama: to see all
  - used to describe an overview
- first mass media
- large round building with large paintings covering the inner walls

    - were changed when enough people have seen it
- people entered via tunnel that went to the center of the building
    - staircase brought them from darkness to a platform n the middle of the room
- platform had fence so that people could not reach the walls or edge of the platform
- roof covered platform
- observers had a small angle of view
    - not able to see the floor and ceiling
- observers stood in the dark, paintings lit by windows in the roof
- created illusion the be in the middle of a scene with 360° view
    - enforced by placement of things in front of the paintings

Example: Panopticon

- not mass media, but general principle
- guard tower in middle covered in darkness
- prisoners never know if they are really observed, have the impression to be constantly observed
- panoramic principle: no longer physical violence, but feeling of constant observation

Example: Mountain climbing

- in past: people climbed mountains to cross land or catch lost animals
- with modernity:
    - to be on top of it
    - enjoy the overview

Disembedding

- disembedding of social relationships as location-based interaction and restructuring across indefinite spans of time-space
- fundamental for modern times

Delocalisation

- Objects, events, information no longer localised
    - lost temporal and spatial embedding
- lose socio-historical and cultural embedding
- $\rightarrow$ are changed
- often accompanied by process of standardisation

Aura

- the here and now
- unique existence at place is located

Contemporary decay of the aura

- delocalisation: tendency of minimising/eliminating physical and social space
- tendency of overcoming uniqueness by permanence, made possible by reproduction

Delocalisation by the implementation of the railway

- delocalisation of things
  - products no longer available/produced in one place
  - no longer belong to spatial locations (e.g. Feta only in Greece)
  - lose specific character, become normal and standardised
- delocalisation of places
  - places easily accessible
  - no longer long trips
- delocalisation = change

Railway compartment

new and disruptive technologies mask themselves as an improvement of the existing

Europe:

- stagecoach was model for railway carriages
- industrial successor to fully-fledged pre-industrial transportation system
- compartment cars
- fear and isolation in the compartment
- solving the “compartment problem” (isolation, toilets, heating)
  - premise: be undisturbed while travelling
  - considerations: speaking tube, cord, mirrors, alarm system
  - footboard on outside of carriage $\rightarrow$ many deaths
  - solution: compartment car: aisle as internal catwalk connecting compartments

America

- classless open cars
- railway followed design of the river boat
- opens up vast regions of previously unsettled wilderness

Industrial Revolution in America

- at beginning of 19th century
  - no developed crafts culture
  - no culture of travelling
  - but: huge, virtually useless natural resources
  - but: lack of workforce
- no developed road system
- settlement along natural waterways
- problem: rivers only comfortable usable downriver
- first revolutions: river steam boats, river streamers
  - rivers can be used in both directions
- railway later
  - opened regions that were not accessible by boat

  - no more price-reduction in transportation

Perception of mechanisation

- Europe: as destruction
  - people had to move
  - job's were threatened
- America: as positive
  - does not threaten people's jobs
  - land and resources can be won
  - lack of workforce

Industrialization / Mechanization in America

- mechanized transportation perceived as productive: produces territory
- ensures wealth / unity of the country
- industrial revolution connected cultural & national identity of America

Railway in England

- Economic situation
  - cheap workforce
  - expensive land
  - $\rightarrow$ building tunnels, bridges, dams is profitable
- Result
  - railway tracks follow ideal of straight line

Railway in America

- Economic situation
  - expensive workforce
  - cheap land
  - $\rightarrow$ tunnels, bridges, dams not profitable
  - $\rightarrow$ more profitable to build around obstacles
- Result
  - no straight lines
  - follow landscape - many bends
- Problem: axle distance has to be small to navigate bends
- Consequence
  - short cars
  - uneconomical proportions
- Reason: wheels and tracks have to be parallel
- Requirement:
  - rigidity and flexibility of axles
  - short and long axle distance
- Solution: Bogie

    - carriage made of 2 rigid axle with short distance
    - pivots connecting carriage and car (flexible)
    - $\rightarrow$ carriage and car no long a unit
    - already patented before in England, but no use because of straight tracks
- railway car
    - becomes partially independent of tracks
    - length can be extended
- $\rightarrow$ technological innovation is not adopted right away, but only if there is social and economic need for it

Car

Change of the symbolic meaning of the car in “social existence”

1. Beginning

- car as symbol of ruling time and space
- restoring lost sovereignty of the coach
- financially able middle class
    - claimed right for control over time and space
    - control of new social order
- not mere transport vehicle
- but: medium/instrument/path to secure social power at beginning of democratic times
- contest between classes during beginnings of industrial capitalism

2. 1920s - 1930s

- car as symbol for “elegant world”
- cultivating indulgent life style
- not useful or needed
- but: cultivate indulgent live style beyond everyday life

3. During Nazi era

- symbol of integration of everyone into (fascistic) society
- being part of the (traffic) mobilization
- attaching everyone to the “blood circulation” of nationalistic life
- highways as symbol for arteries of metaphorical German body
    - no need for cars
    - no need for army
    - not intended to create jobs
- traffic as symbol for unity of German people
- car and motorways used for political aesthetics
- propagated phantasm of universal mobility
- self-staging as high-tech society
- car ass counter-concept to anti-modern image of National Socialists

4. Post war

- symbol of economic wonder
- prosperity for all
- “we did it”

5. Throughout beginnings, until 70s and today

- symbol for freedom
- symbol for independence

6. Since mid 70s

- parallel opposite tendency
  - overloaded roads
  - daily traffic jam experiences
- slowly eroding promises linked with cars

7. Currently

- autonomous driving
- great promise:
  - risk-free
  - comfortable mobility

Computer (Technology)

Stages of computerisation

- since end of WW2: fully electronic mainframe computers
- up to 70s and 80s:
  - computers used by large companies and organisations
  - large research labs, military sector
  - $\rightarrow$ encountering computers limited to work environment
- since 80s:
  - PC as stand-alone devices
  - computers became every-day objects
- since mid-90s: interconnectedness of computers
- sine mid-00: interconnectedness of things

Microcomputer $\rightarrow$ PC

- prerequisite: development of microprocessors
- generic name at that time: Microcomputer (not PC)
- 1981:
  - IBM release “Personal computer”
  - promoted it as well as its name

- “Personal Computer” became generic name

Precursors

- computers sold as kits to be assembled by user
- could be mail-ordered
- parts had to be soldered together
- after that: programmed
  - very troublesome
  - devices had to be programmed in machine language
  - by toggling switches

First PCs

- 1977 onwards
- advantage: bought ass whole
- keyboard enabled easy operation
- first Apple PC: built into briefcase
- succeeding model: Apple II
  - aluminium case
  - no integrated peripheral devices (screen or printer)
  - instead of screen: connected to TV screen
  - programming language: BASIC
  - not sufficient for professional use

Early times of PC

- device for hobby users
- play around, create different effects
- clear discrepancy between
  - actual performance of PC
  - rate of adoption

Public Image of Computer

- menacing, large, uncanny
- provoked a lot of anxiety (uncertainty, insecurity)
- “Being Controlled” Fantasies
- apprehensions oof computers becoming independent and unmanageable
- computer as repressive instrument
- people see themselves
  - billed by it
  - taxed
  - enumerated
  - administrated
  - manipulated
  - controlled

- computers make it easier for big countries to dominate smaller ones
- senior governments control local governments
- large corporation take over small companies

PC - symbolic meaning at beginning of its socio-cultural existence

- trying magically to take away fear of technology that is perceived as menacing and mighty
- same time: participation in this technology
- PCs as endearing and harmless pet
- computer for personal use
- does not belong to company, personal property of owner
- turned out that they could hardly do anything of practical use
  - no need for being afraid of this technology
- on other hand & same time: simple applications were emanation of same technology
  - that was used in astronautics, armament purposes
  - made advancements in these fields possible
- PET - Personal Electronic Transactor
  - PC as tamed & domesticated technology, looses threatening nature
  - PC as kind of technological pet, harmless and may be petted

Symbolic meaning at transition of 80s / 90s

PC as better companion

- referring to man-woman-relationship
- referring to man-to-man-friendship

Freedom, independence, velocity, acceleration, ubiquitousness

- PC symbolizes independency in society
- successors of automobiles, partly replacing them
- device for individual use
- release from constraints of time, space, social coordination
- but: real constraints of everyday life in society still exist
- fast processing speed, high performance (power & strength)
- overcome constraints of time and space, eliminate them
  - connected worldwide within seconds
- ultimate promise: ubiquitousness - be anywhere at any time, instantly

Delocalisation by Computer

- induced media advances process of disembedding & delocalisation that reaches its tentative completion
- loss of
  - locatability/situatedness of information - information can no longer be localised
  - social historical anchorage of information
- origin of information can no longer be localized adequately

- origin can no longer be retraced
- removal of local proximity in favor of media-mediated world experience
- increased difficulties to identify subjectively intended meaning

Ultimate delocalisation → ubiquity & simultanousness

- everything and everyone is available / accessible
- anywhere, anytime/instantly

Kaleidoscopic perception

- paradigm: interconnected computers
- facets of reality changing in quick succession / simultaneously
- everything equally close, equally distant
- equally relevant / irrelevant
- new mediatised immediacy of experience
  - instantly close to all phenomena
  - not physically but via ICTs & techn. comm. media
- change of dimension of time and space: repealed from each other

Ways of Perceiving and Experiencing

Traditional	Panoramic	Kaleidoscopic
Premodern era (Stagecoach)	Modernity (Railway)	Late Modernity (interconnected Computers)
immediacy of experience	distance between observing subject and observed object	new immediacy of experience
continuity of changing coherent impressions	details no longer perceived, recognition of whole (Overview)	facets of reality changing in quick succession or simultaneously

Different Subjects

- Individual in middle ages
  - born/put to place/position
  - duty: bear and accept fate
  - life and options determined by position in society
- Modern subject
  - distant, interested, watching, changing, moving stance towards outside world
  - actor of their history & circumstances
- Late Modern subject
  - node in flat net of equal simultanousness
  - confronted with changing requirements of different facets of reality
  - not necessary coherent
  - require adequate behavior in quick succession