THE UNIVERSITY *of* EDINBURGH

Researching Responsible and Trustworthy Natural Language Processing

Week 2: Research Methods

Prof Frauke Zeller

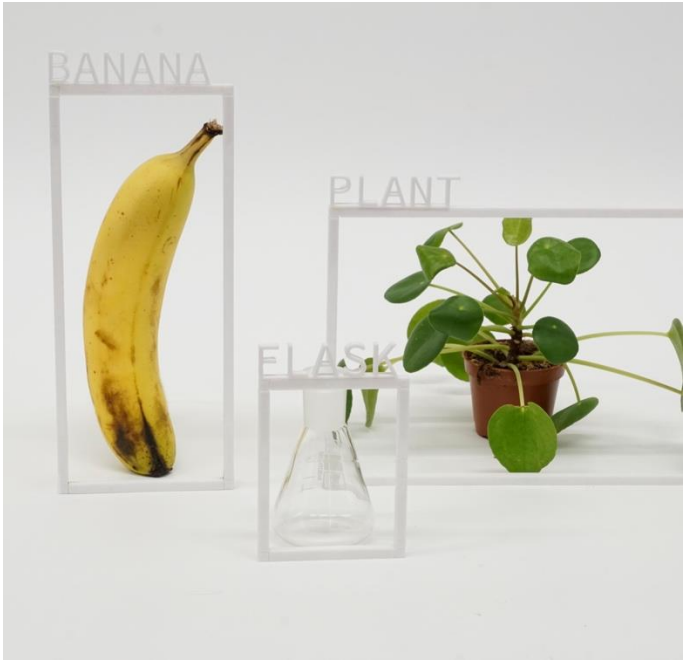
Today…

- Research aims
- Research methods
- Philosophical assumptions
- Research paradigms

Most slides are thanks to Caterina Moruzzi's courtesy

What are research methods?

Strategies or processes used during research to uncover new information or to understand a topic.



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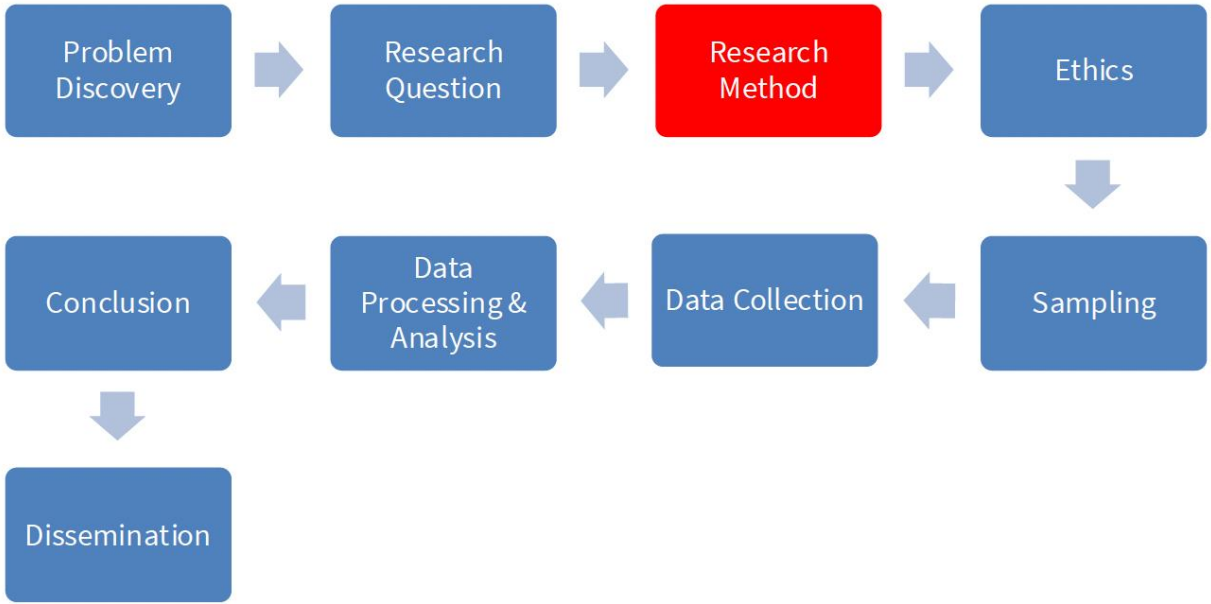
Different types of research aims

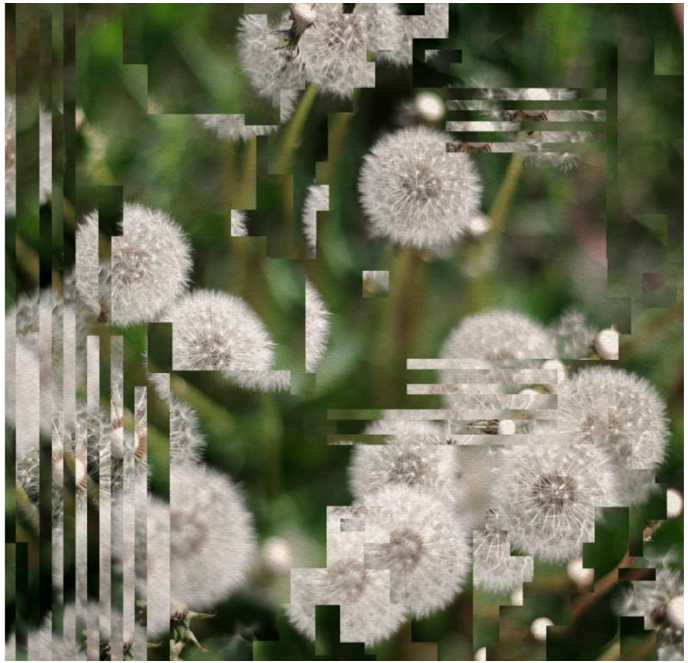
Exploratory

Explanatory

Descriptive



Paul Best, Anne Johnston, Queen's University Belfast



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Examples of research methods

- Surveys
- Focus groups
- Interviews
- Experiments
- Observations
- Literature review
- Statistical analyses
- Content analyses
- Thematic analyses

Different types of research aims

When embarking on a research project, we should ask questions in respect to the phenomenon that we are studying, in terms of its **ontology** and **epistemology**.

What? **How?**

What is ontology?

The study of what there is.

More broadly, the study of the features possessed by entities.

What is epistemology?

Generally speaking, epistemology is the study of knowledge.

Some of the questions epistemology is concerned with are:

- What are the necessary and sufficient conditions of knowledge?
- What are the sources of knowledge?
- What can we know?
- What are the limits of knowledge?

Table 2.2 Philosophical Assumptions With Implications for Practice

Assumption	*Questions*	*Characteristics*	*Implications for Practice (Examples)*
Ontological	What is the nature of reality?	Reality is multiple as seen through many views	Researcher reports different perspectives as themes develop in the findings
Epistemological	What counts as knowledge? How are knowledge claims justified? What is the relationship between the researcher and that being researched?	Subjective evidence from participants; researcher attempts to lessen distance between himself or herself and that being researched	Researcher relies on quotes as evidence from the participant; collaborates, spends time in field with participants, and becomes an "insider"
Axiological	What is the role of values?	Researcher acknowledges that research is value-laden and that biases are present	Researcher openly discusses values that shape the narrative and includes his or her own interpretation in conjunction with the interpretations of participants
Methodological	What is the process of research? What is the language of research?	Researcher uses inductive logic, studies the topic within its context, and uses an emerging design	Researcher works with particulars (details) before generalizations, describes in detail the context of the study, and continually revises questions from experiences in the field

Cresswell & Cresswell (2018)

Examples of philosophical assumptions

Positivism: scientific approach, research is a series of logically related steps.

Empiricism: only phenomena confirmed by the senses can be accepted as knowledge

Constructivism: the theory is developed inductively on the basis of the meanings that others have about their experiences

Pragmatism: the focus is on the outcomes of the research and on the solutions to problems.

Interpretivism: Max Weber's notion of Verstehen

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Research Paradigms

Qualitative

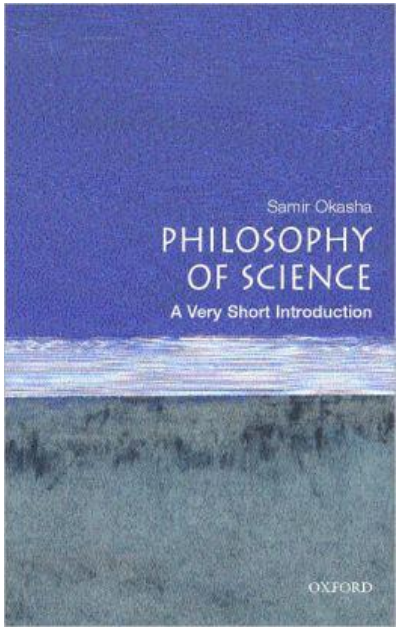
Quantitative

Mixed

C.P. Snow, The Two Cultures

Wittgenstein vs. Popper

Philosophy of Science



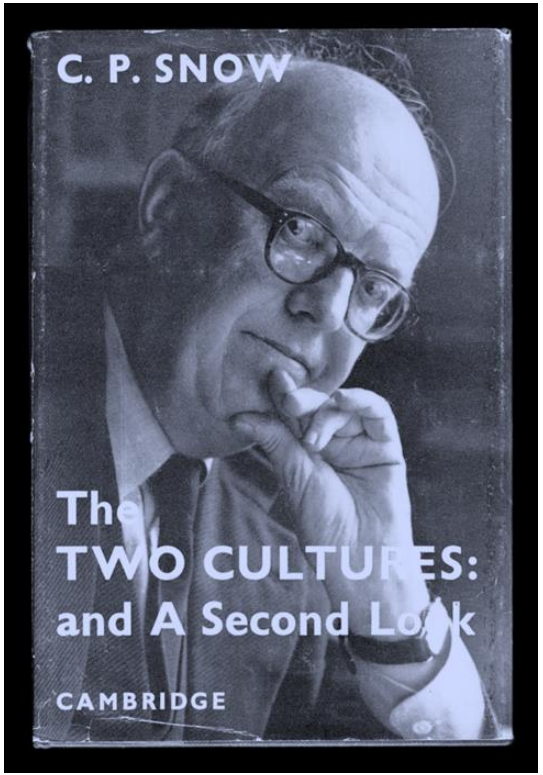


TABLE 2.1 Emphases of Quantitative, Mixed, and Qualitative Research

	Quantitative Research	*Mixed Research*	*Qualitative Research*
Scientific method	Confirmatory or "top-down" The researcher *tests* hypotheses and theory with data.	Confirmatory and exploratory	Exploratory or "bottom-up" The researcher *generates* or *constructs* knowledge, hypotheses, and grounded theory from data collected during fieldwork.
Ontology (i.e., nature of reality/truth)	Objective, material, structural, agreed-upon	Pluralism; appreciation of objective, subjective, and intersubjective reality and their interrelations	Subjective, mental, personal, and constructed
Epistemology (i.e., theory of knowledge)	Scientific realism; search for Truth; justification by empirical confirmation of hypotheses; universal scientific standards	Dialectical pragmatism; pragmatic justification (what works for whom in specific contexts); mixture of universal (e.g., *always* be ethical) and community-specific needs-based standards	Relativism; individual and group justification; varying standards

Guba (2008)

Table 3.1 Comparing Qualitative and Quantitative Research

Qualitative Research	Quantitative Research
Induction	**Deduction**
Purposes • Generates theory from observations. • Oriented to discovery, exploration. **Procedures** • Emergent design. • Merges data collection and analysis.	**Purposes** • Tests theory through observations. • Oriented to cause and effect. **Procedures** • Predetermined design. • Separates data collection and analysis.
Subjectivity	**Objectivity**
Purposes • Emphasizes meanings, interpretation. • Tries to understand others' perspectives. **Procedures** • Researcher is involved, close to the data. • Researcher is the "research instrument."	**Purposes** • Emphasizes things that can be measured. • Results do not depend on beliefs. **Procedures** • Researcher is detached, distant from the data. • Relies on standardized protocols.
Context	**Generality**
Purposes • Emphasizes specific depth and detail. • Analyzes holistic systems. **Procedures** • Uses a naturalistic approach. • Relies on a few purposively chosen cases.	**Purposes** • Emphasizes generalization and replication. • Analyzes variables. **Procedures** • Uses experimental and statistical controls. • Works across a larger number of cases.

Morgan (2014)

Qualitative Approaches:

Phenomenology

Case studies

Grounded theory

Ethnography

Interviews

Gaining the interpretation of an issue from participants.

Usually provide rich data; good for questions about what is actually going on inside someone's head

Good fit for discussing more sensitive subjects.

Not so good for research questions about what actually happened, or regarding large populations (too few to generalise).

Observations

You have access to a ‘scene’ (group of people or place where people spend time)

Often requires a ‘gate keeper’ contact, permission.

Non-participant observation; participant observation (overt vs covert).

Focus Group

Use group dynamics to generate data.

More or less structured.

Researcher to facilitate discussion.

Documentary Analysis

Professional records, stories, diaries.

Socially constructed meanings and statements.

Surface and underlying meanings to be interpreted.

Triangulation

Important for reliability and validity of research.

- Data triangulation
- Investigator triangulation
- Methodological triangulation
- Triangulation of theories

Quantitative Approaches:

Experimental

Non-experimental

Experiments

Intervention to change something and the observation of the consequences

There is something (x) that might be causing something else (y) to change

E.g. An advertisement causes people to buy a product

There can be two situations

Experimental: X and Y are present

Control: X is not present, but Y is present

Experiments

Classical experimental design:

- You recruit a group of respondents
- Randomly respondents into two groups (experimental and control)
- You give a stimulus to the experimental group, not the control

Experiments

Online design

- Create a stimulus (e.g. an infographic on HIV)
- Send the stimulus to a randomly selected set of people online
- Evaluate if those receiving the stimulus are “different” than another similarly selected group that did not receive it
-Can use survey or observe behaviour to see if they are “different”

Experiments

Good for research questions about…

- Cause and effect

Not so good for research questions about…

- How people feel about something
- What people actually do in everyday life

Surveys

Relatively cheap to administer

You need to make sure the people you select represent your population of interest

You will create a list of mostly closed questions

Surveys

Writing survey questions isn't easy:

Questions need to be worded in a way that all respondents can easily understand

Questions need to have exhaustive response categories

Make sure to chose questions that will actually provide relevant answers to your research questions

Surveys

Good for research questions about…

- What's happening in a large population
- Common types of opinions

Not so good for research questions about…

- A deep understanding of how people feel about something
- The actual text that people produce
- What people are really doing

Surveys

People generally don't like doing surveys
- low response rate to telephone surveys
- people are rarely motivated to return paper surveys by mail
- online survey's only useful for tech savvy populations

Surveys conducted in organizations may have high response rates, but you need a "gate keeper" to work with you

Conducting surveys in vulnerable populations brings brings a lot of bureaucratic obstacles

Non-Reactive Methods

No direct interaction with subjects
Rather, a more passive way of conducing research
E.G. quantitative content analysis
Log-File analysis
Twitter Analysis
Instagram Analysis
Big Data Analysis often draws on non-reactive methods

Database analysis

Reviewing existing datasets

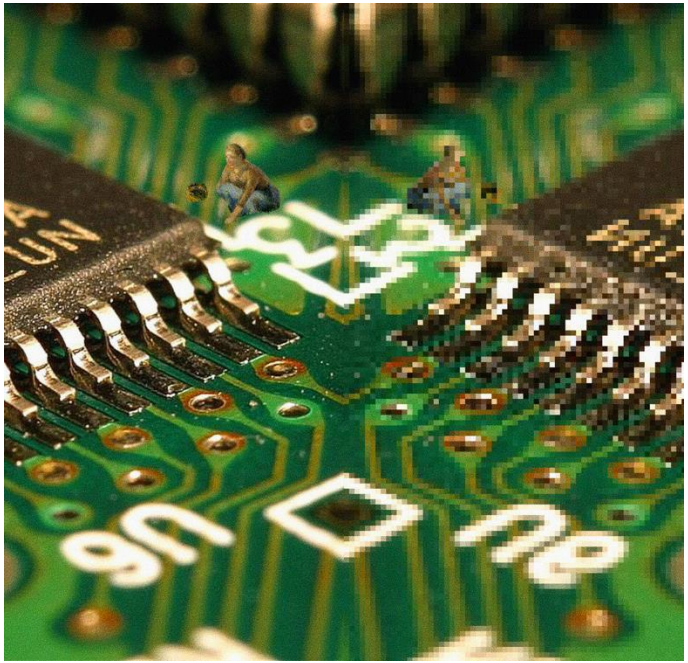
Coding might already have taken place

Can be used in conjunction with survey data

Mixed Methods Research

Incompatibility thesis stemming from paradigm wars

Purposeful mixing of methods in data collection, analysis and interpretation (Shorten and Smith, 2017)



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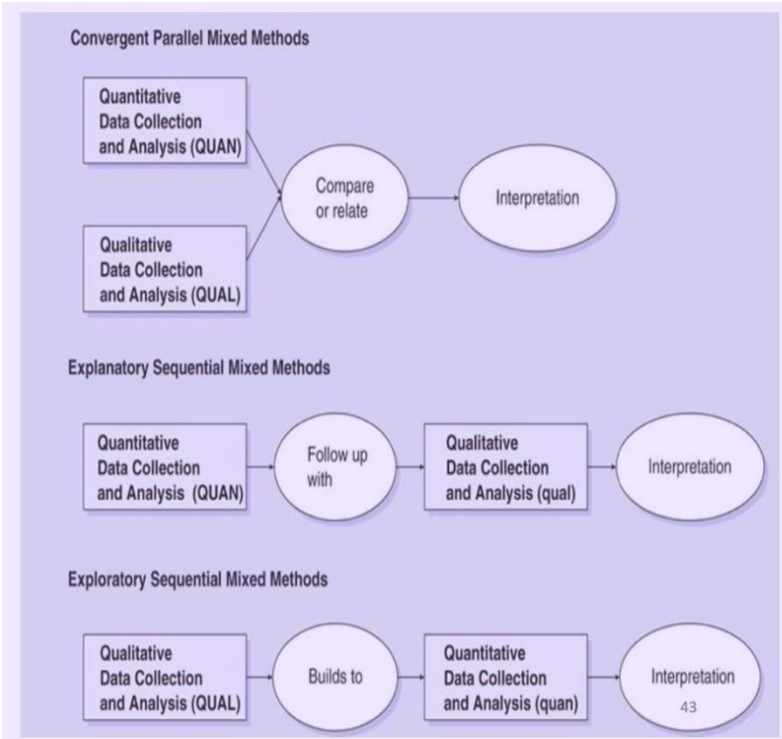
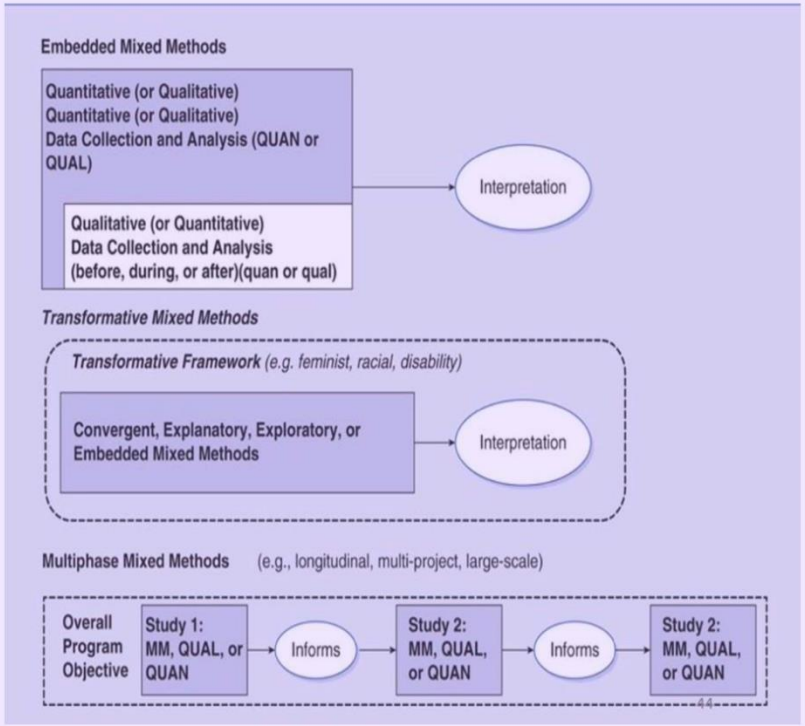
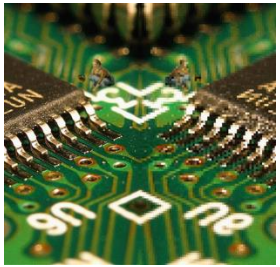




Cresswell & Cresswell (2018)

Approaches to Mixed Methods



Triangulation

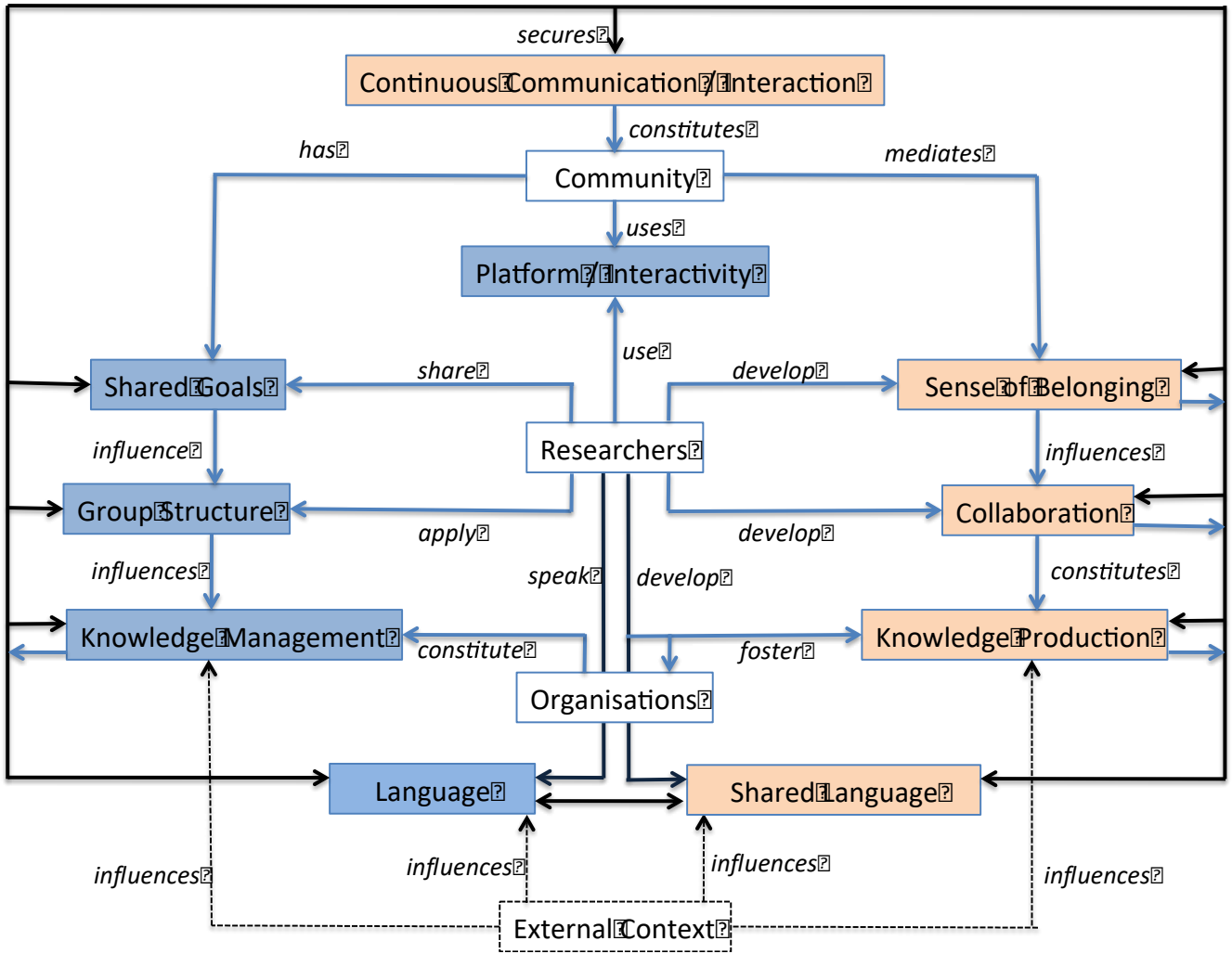
- The use of quantitative research to corroborate qualitative research findings or vice versa

Facilitation

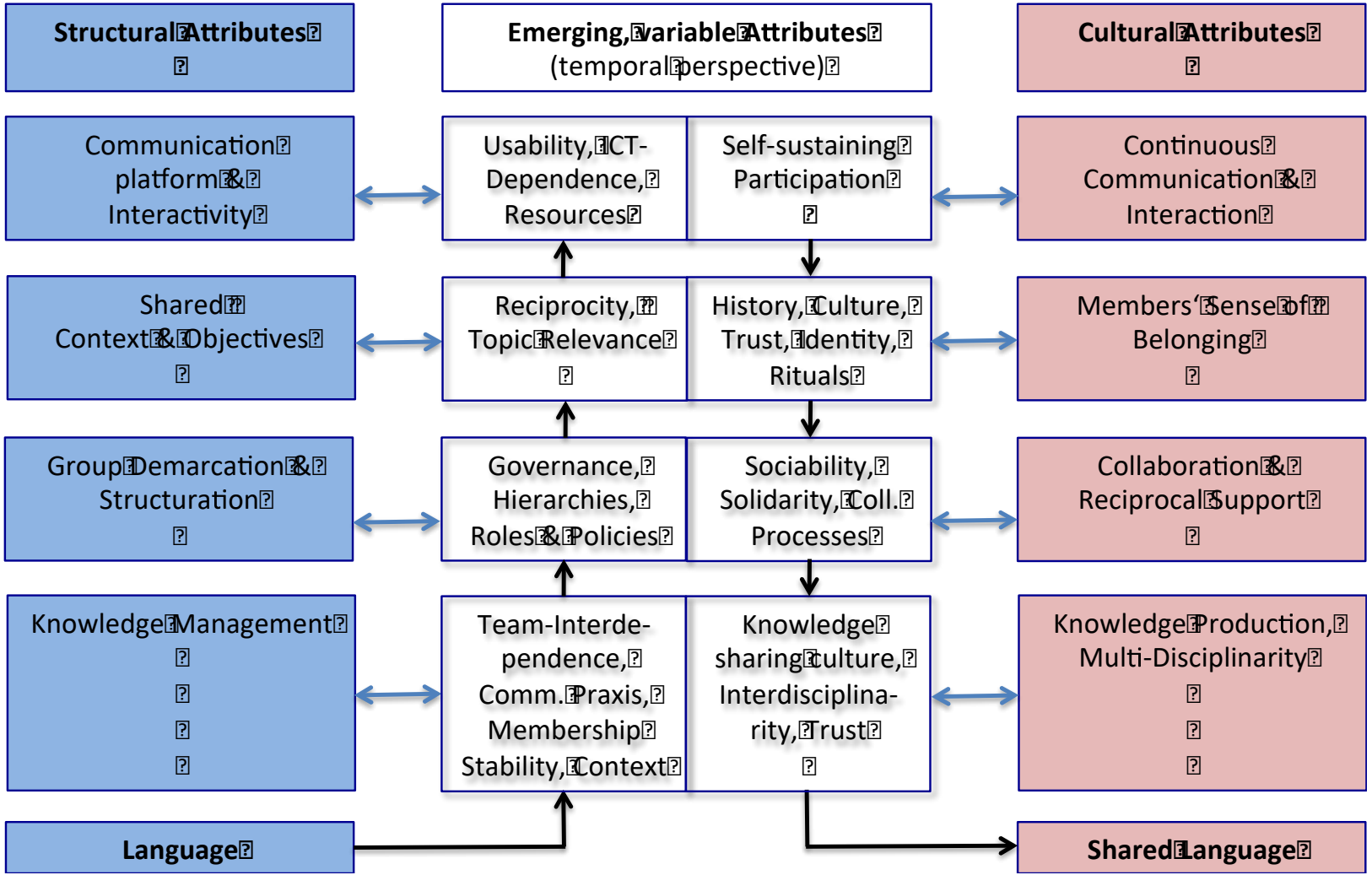
- The use of one research strategy to aid research using another

Complementarity

- The use of two different research strategies so that diverse aspects of an investigation can be combined



Zeller, F. (2011). Online-Communities. Unpublished Habilitation thesis.



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		Empirical Instruments in Communication Studies	*Adaptable Instruments / Social Media Analytics*
Quantitative	Reactive (Interactive)	Online Survey Online Experiment	Crowdsourcing, Living Lab MROCS
	Non-Reactive	Web Content Analysis Network Analysis Log File Analysis Data Mining	Audio, Video & Image Analyses Sentiment & Opinion Analyses (SOA) Natural Language Processing Topic Analysis, Predictive Analytics Social Media Monitoring & Analytics
Qualitative	Reactive (Interactive)	Online Experiments Online Interviews Online Focus Groups Online Field Studies	Physiological Measurements, Eye-Tracking MROCS Virtual Ethnography
	Non-Reactive	Web Structure Analysis Web Content Analysis Online Discourse Analysis Video & Image Analyses	Audio, Video & Image Analyses Online Discourse Analysis Multimodal Analysis
Mixed Methods	Reactive (Interactive)	Reactive / Non-Reactive Quantitative / Qualitative	Q-Method Crowdsourcing/MROCS, Focus Groups
	Non-Reactive	Non-Reactive / Reactive Qualitative / Quantitative	Social Media Monitoring, SOA Web Tracking

Zeller, F. (2023). The Good, the Bad and the How-To of Analyzing Social Media Data, 2nd fully revised edition. In Anabel Quan-Haase, Luke Sloan (eds.), SAGE Handbook of Social Media Research Methods (2nd ed.). Sage.

Usage Variable	Indicator/Measurement
Visibility, Range, Attention	• Share of buzz, share of voice • Number of sources, posts • Number of authors • Number of positive/negative mentions
Virility and impact potential of content, authors, channels, engagement	• Degree of profile networking/cross-linking, recommendations, likes, evaluations • Interaction rate per post • Growth of fan community • Unique user/views per channel • Number of relevant fans
Popularity of content / author	• Web tracking • Number of website visits • Number of website visits generated from social media channels • Duration of stay on website • Visibility

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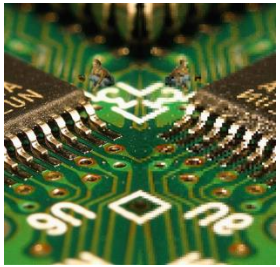
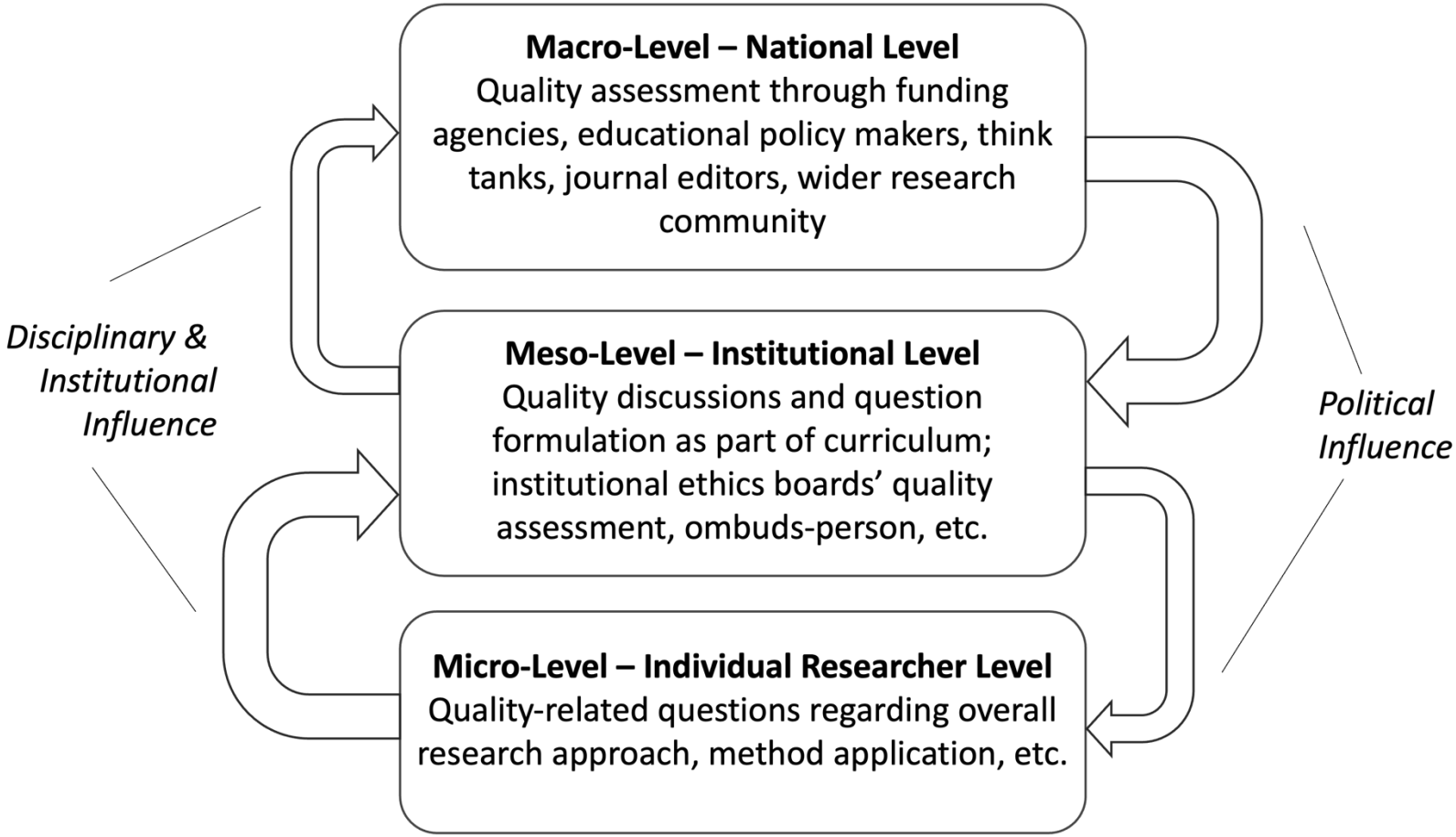
How can we assure research quality?



Quality in research faces evaluation and assessment challenges on three core levels

- Micro
- Meso
- Macro

Zeller, F., & Woods, J. (2025). Qualitative research quality in social media research. In U. Flick (Ed.), *The Sage Handbook of Qualitative Research Quality* SAGE Publications. https://doi.org/10.4135/9781529674354.n19



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Thank you!