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Research Methods

NLP-RR: Researching Responsible and Trustworthy Natural Language Processing

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Overview

Research aims
Research methods
Philosophical assumptions
Research paradigms

What are research methods?

What are research methods?

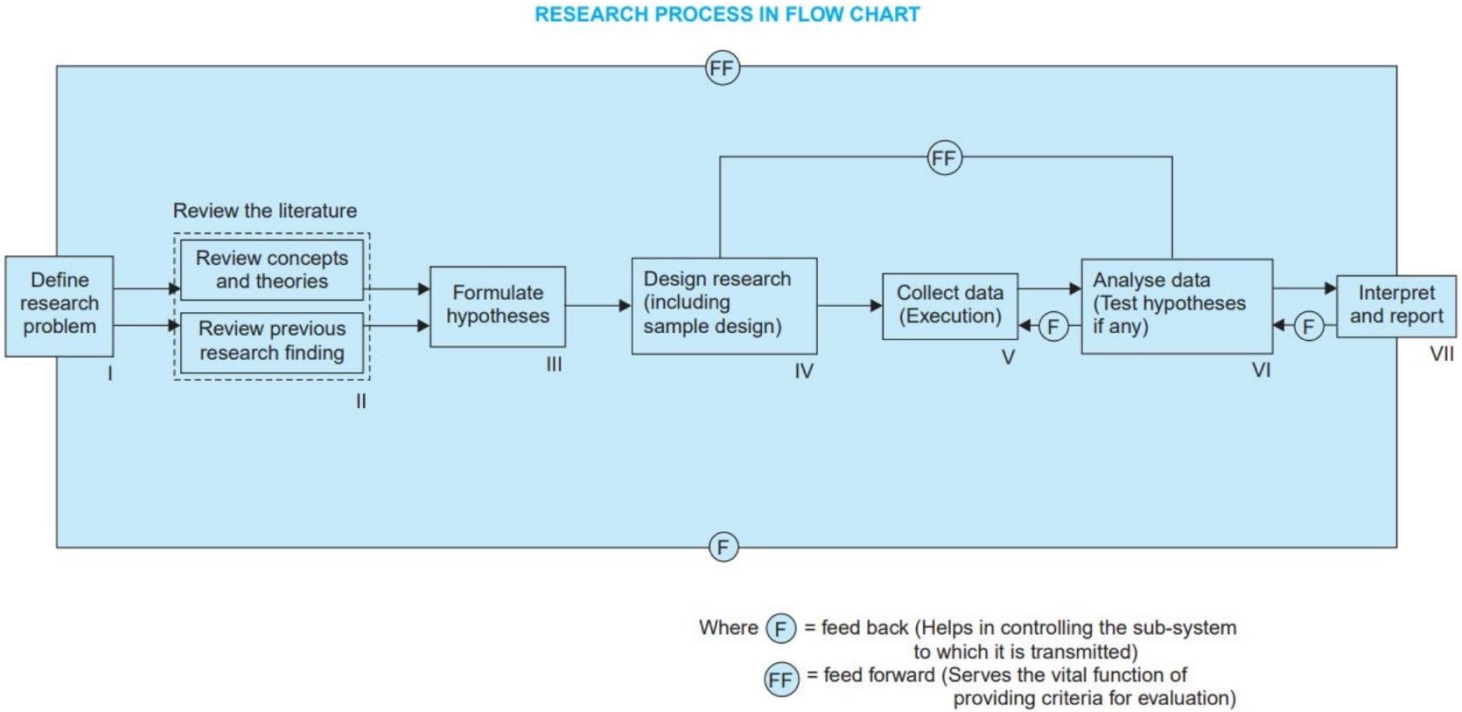
Strategies or processes used during research to uncover new information or to understand a topic better.

Different types of research aims

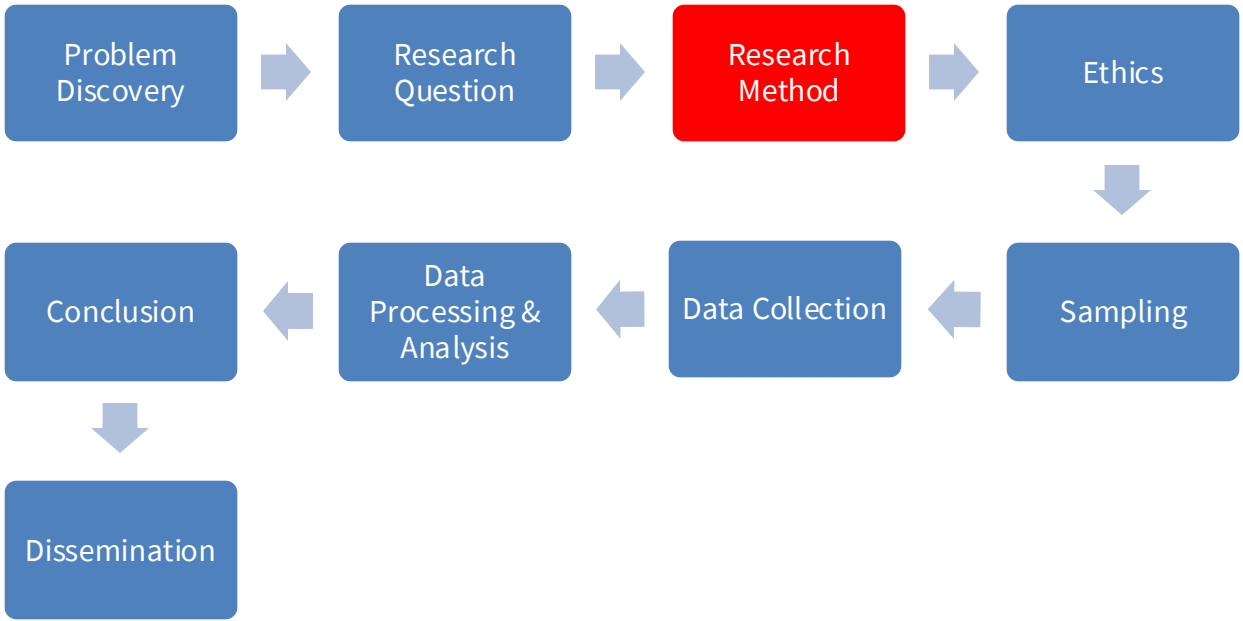
Exploratory

Explanatory

Descriptive



Kothari (2004)



Paul Best, Anne Johnston, Queen's University Belfast

Examples of research methods

Surveys
Focus groups
Interviews
Experiment
Observations
Literature review

Statistical analysis
Content analysis
Thematic analysis
Data analysis
…

Activity 1

Go to the Miro board: https://edin.ac/3zUS2Dp

When embarking in 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

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

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

Transformative framework: knowledge reflects power and social relationships.

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

From Cresswell & Cresswell 2018

Research Paradigms

Quantitative | **Qualitative** | **Mixed**

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 **Purposes** • Generates theory from observations. • Oriented to discovery, exploration. **Procedures** • Emergent design. • Merges data collection and analysis.	**Deduction** **Purposes** • Tests theory through observations. • Oriented to cause and effect. **Procedures** • Predetermined design. • Separates data collection and analysis.
Subjectivity **Purposes** • Emphasizes meanings, interpretation. • Tries to understand others' perspectives. **Procedures** • Researcher is involved, close to the data. • Researcher is the "research instrument."	**Objectivity** **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 **Purposes** • Emphasizes specific depth and detail. • Analyzes holistic systems. **Procedures** • Uses a naturalistic approach. • Relies on a few purposively chosen cases.	**Generality** **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 providing rich data.

Good fit for discussing more sensitive subjects.

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

Question

What are the advantages and disadvantages of **qualitative** research?

Quantitative approaches

Experimental

Non-experimental

Experiments

Intervention to change something.

Observation of the consequences.

Survey using questionnaire

Relatively cheap to administer.

Can control participant sample.

Database analysis

Reviewing existing datasets.

Coding might already have taken place.

Can be used in conjunction with survey data.

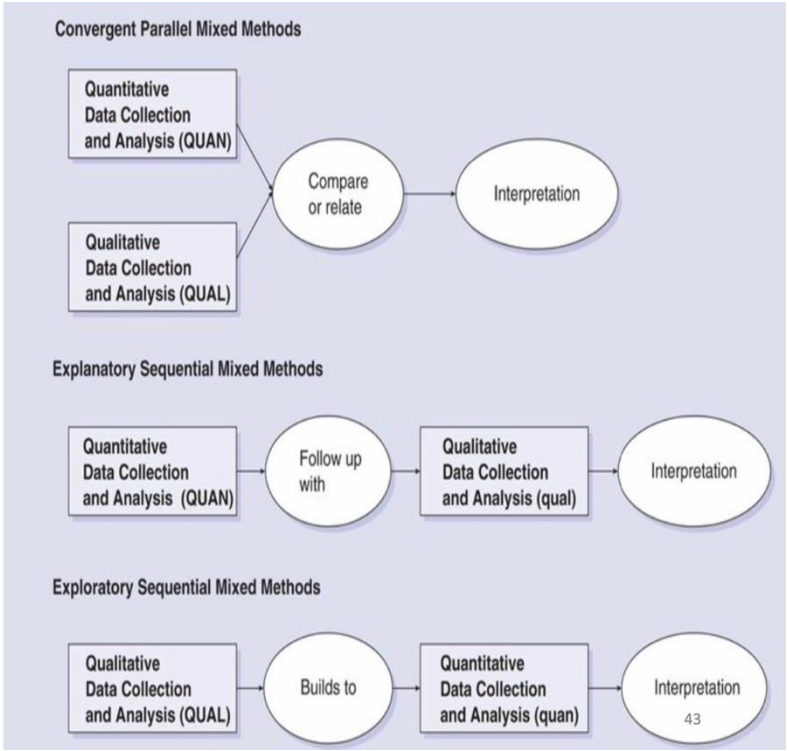
Question

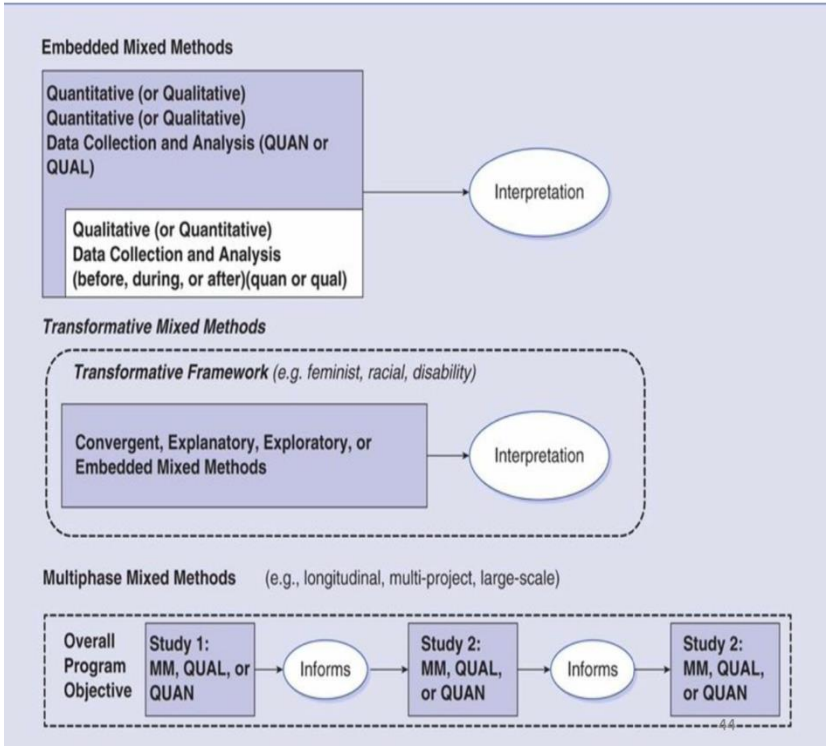
What are the advantages and disadvantages of **quantitative** research?

Mixed methods research

Incompatibility thesis stemming from paradigm wars.

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





Cresswell & Cresswell (2018)

Examples of mixed methods

Card sorting

Tree testing

Surveys with multiple choice _ open-ended questions

Question

What are the advantages and disadvantages of **mixed methods** research?

Activity 2

Go to the Miro board: https://edin.ac/3zUS2Dp

Entanglement HCI The Next Wave?

CHRISTOPHER FRAUENBERGER, Human-Computer Interaction Group TU Wien

This article argues that our intimate entanglement with digital technologies is challenging the foundations of current HCI research and practice. Our relationships to virtual realities, artificial intelligence, neuro-implants or pervasive, cyberphysical systems generate ontological uncertainties, epistemological diffusion and ethical conundrums that require us to consider evolving the current research paradigm. I look to post-humanism and relational ontologies to sketch what I call Entanglement HCI in response. I review selected theories—Actor-Network Theory, Post-Phenomenology, Object-Oriented Ontology, Agential Realism—and their existing influences on HCI literature. Against this background, I develop Entanglement HCI from the following four perspectives: (a) the performative relationship between humans and technology; (b) the re-framing of knowledge generation processes around phenomena; (c) the tracing of accountabilities, responsibilities and ethical encounters; and (d) the practices of design and mattering that move beyond user-centred design.

CCS Concepts: • **Human-centered computing → HCI theory, concepts and models**;

Additional Key Words and Phrases: Entanglement, posthumanism, new materialism, philosophy

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Evaluating Interpretive Research in HCI

Robert Soden, University of Toronto
Austin Toombs, Indiana University
Michaelanne Thomas, University of Michigan

Resources

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