IAT 804
Foundations of Research Design for Human-Centred Design of Interactive Technologies

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Today

- Introduce Alissa and Check in
- SIAT Grad Program Educational Goals/Course Goals
- What is theory?
- What is a related work section about?
- Assign 2: SIAT 3 Lenses: experiment, observation, creation
- Assign 2 hands-on activity

About the SIAT Graduate Program

Report

SIMON FRASER UNIVERSITY

School of Interactive Arts and Technology

External Review

Self Study Report

March 2014

Ask your supervisor if you want a copy

SIAT Educational Goals

Graduate School -- Program Wide Educational Goals

SIAT graduate programs revolve around four well-defined educational goals.

A. Research, Scholarship and/or Creative Production

Students will be able to:

1. Master the substantive constituents of the chosen field of knowledge and/or creative practice
2. Identify and conduct independent and original research, scholarship and/or creative practice
3. Draw from and apply scholarly and artistic reference material

SIAT Educational Goals

B. Methodological Tools and Processes

Students will be able to:

1. Conduct their work using research methodological tools and processes appropriate to their disciplinary and/or interdisciplinary field;

2. Use iterative and integrative creative methods and processes where appropriate

SIAT Educational Goals

C. Critical Thinking, Problem Solving, Communication and Dissemination

Students will be able to:

1. Think critically and creatively, and identify and solve problems in their field of study.

2. Demonstrate excellent communication skills in their field of study through scholarly writing, creative exhibitions and presentations.

SIAT Educational Goals

D. Technical Proficiency

Students will be able:

- To demonstrate their computational literacy through the use of a programming language and/or electronic prototyping frameworks.

- Choose and use technical tools and processes appropriate to their field of research and/or creative production.

SIAT Educational Goals

- These are the expected, mandatory goals behind our graduate programs, but our graduate students often learn a range of skills that goes well beyond the above.

- Whether as a research assistant or as a teaching assistant (or course instructor), students often learn to teach, write grants, as well as self-manage in academic setting.

IAT 804: Course Goals

- Students will be able to:

- - understand and use key terminology around the creation of knowledge, inquiry, and methodology

- - understand and analyze the underlying concepts of research in the human-centred design of interactive technologies and the differences between research methodologies (e.g., experimental research design, ethnographic research study, phenomenological study, art/design based approaches)

- - plan a research investigation using one or more methodologies for conducting research in the areas of human-centred design

- - understand and apply principles of research ethics surrounding the design and use of interactive technologies for people and conducting research studies with human participants

- - document a research study plan through writing and oral presentation

Theory

- Goal of research: create knowledge (may be in form of a theory)

As researchers … we also use theory

- to create research designs*
- to design prototypes
- to create art

*spend most of our time there today

Knowledge | Contribution

- Scholarly Activity → Knowledge
- Research is a process of inquiry to create knowledge
- At SIAT often empirical inquiry about P A C T
  - People doing an Activity in a Context w/ an Interactive Technology
  - Perspective: design, tech development, creation …
- Generalizable
- "Knowledge Claim"
- A research contribution is …

Other Contribution Types

- See ACM Interactions articles for reading week 1
- Empirical Contribution (focus of much HCI research)
- Also
  - Artifact (e.g. creation approaches)
  - Methodological
  - Theory!
  - Others

What is a theory?

- Model
- Simplified version of reality
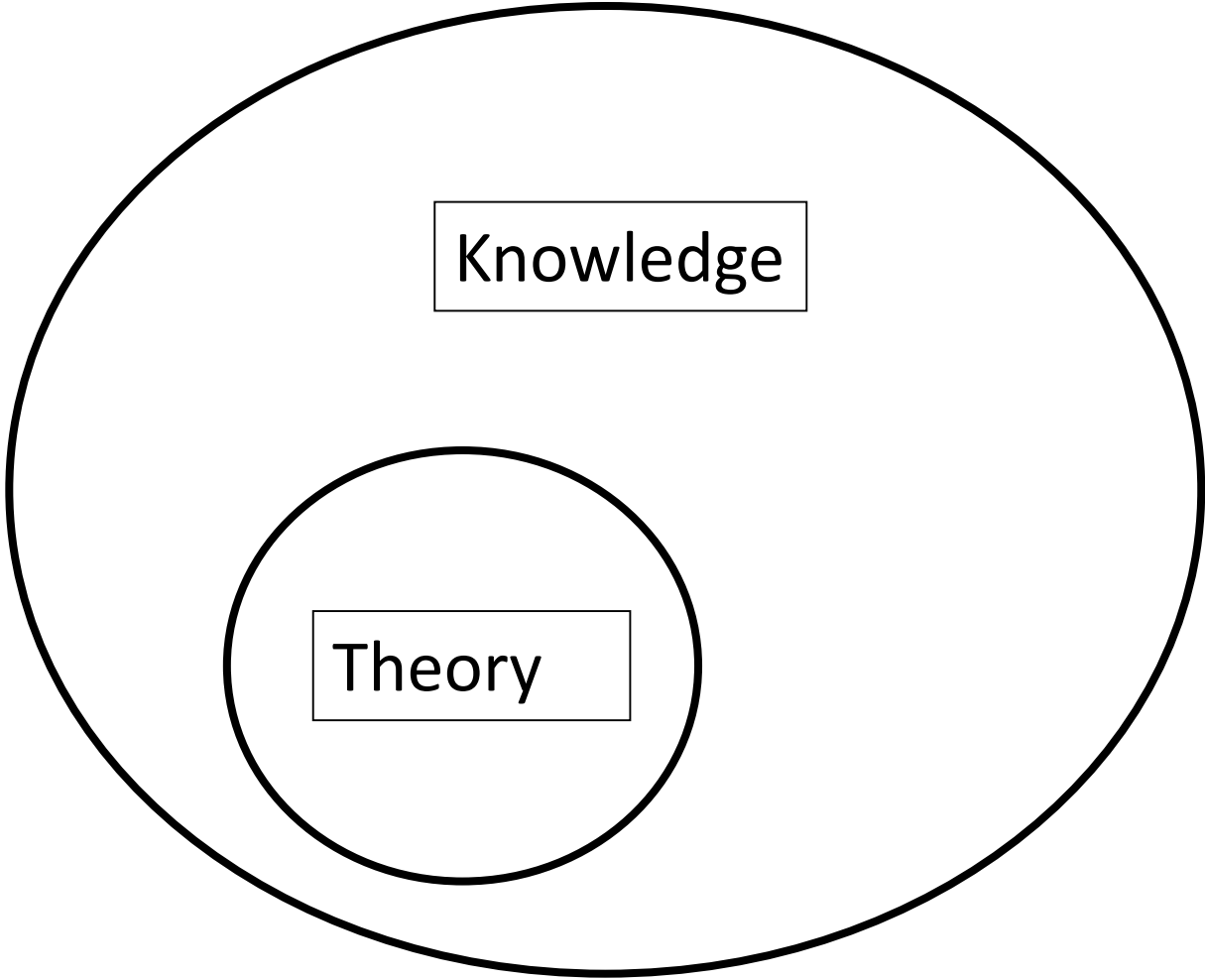- Factors/relationships
- Dynamic or static?

A good theory (scientific)

1. Comprehensive: accounts for most of the data already collected

2. Must be testable: through empirical study

3. Should have parsimony

4. Predictive power

Knowledge | Kinds of Theory

- Classification

- Taxonomy

- Descriptive

- Explanatory

- A "framework" can be …

Knowledge vs theory?

What do we do with theoretical knowledge?

- Goal: Scholarship create knowledge as contribution, which may be or add/revise a Theory

- Process: Research design (of empirical study)
  - Different ways of using theory …

Also use/create existing theory through making …

- In design (of research prototype/instrument)

- In artistic creation (of artifact/exhibition)

Logic of research

- Different ways of using/creating theory
- Based on strategies of inquiry: Quant, Qual, Mix

Each methodology has a systematic approaches to create evidence related to K/theory

1. Collect data
2. Analyze of data
3. Interpret data (answering RQs w/ analyzed data)

+ Need to apply reasoning to create K

Reasoning: Logic

Inference (evidence + reasoning)

      Deduction

      Induction

Deduction

- If set of evidence (facts or data) are true – then we can infer deductively that a conclusion is true

Example

- All crows are black (theory → hypothesis)
- No crows are any other colour (null hypothesis)
- Collect data: Observe crow colours
- Analyze data: are all crows black?
- Finding: one crow is white!!
- Deduction if one crow is white (data) then we can deduce some crows are white …
- thus disproving the theory, all crows are black!

Deconstruct Example

Theory was used

- going in/up front to generate hypothesis and to determine what to measure

Deduction was used

- to reason from the data to make a conclusion about the hypothesis
- In this case -- in order to update our knowledge about the theory of crow colour

We say:

Theory was used going in + deductively

Induction

- From a set of evidence (data) – we see a pattern then we can inductively infer that this pattern **may hold** true

Example

- we observe a lot of crows from the skytrain
- We notice all are black
- we induce a theory that crows are black, although we cannot be absolutely sure.
- (requires data!)

# Deconstruct Example

Induction was used

- to reason from our data to make a conclusion about some phenomena (crow colour)

Theory was not used going in (we had no theory)

Theory was created

- Coming out – we generated a theory that all crows are black (note: we did not prove or disprove this theory ... we just generated it)

- We say,

theory "came out" or was created inductively.

Larger research process cycle
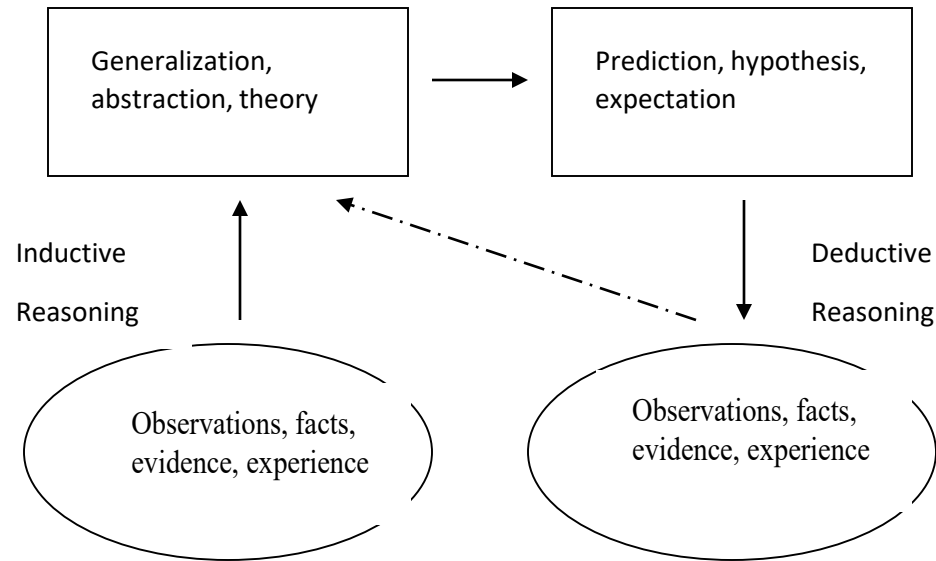
One more use of theory

Originated in social sciecnes

Inductive/going in

- Theory may help you decide what to focus on i.e. what construct or factor to collect data about; it thus serves as a **lens**

- However, your methodology may not be scientific/deductive … it may be inductive

- Data about this construct or factor from theory → is there a pattern?

Ways of using theory

- Deductive – theory going in -> generate hypotheses that we will test

- Inductive – theory going in -> as an analytical lens to focus our inquiry

- Inductive – induced from data – theory coming out (often as design implications/recommendations)

- Note: Creswell transformative lens … doesn't mention as a design or artistic lens.

Art/Design Creation

Even without a user study ... researchers may use/create theory or knowledge

- What are some uses of knowledge?

- What are some ways to create knowledge?

What is in a related work section?

- Argues gap in literature/research problem
- Argues importance of solving research problem (by creating Knowledge)

- May introduce **theory** for "going in" approaches

E.g. theory about concepts, constructs, factors and relationships

- May also argue for other aspects of methodology e.g. tasks, specific measurement instruments, procedures, important system or UI features etc.

SIAT: Three Main Lenses

- **Effective:** experimental study
- **Experience:** observational study
- **Creation:** art/design - making an artifact

IAT 804: Three Main Lenses

- **Effective:** experiments
  - Is system effective for humans doing X?
- **Experience:** observation
  - What is users X experience like w/ system?
- **Creation:** art/artifact/design
  - What is important when designing/creating X type of system?

Assignment 2

- Choose paper
1. Worldview
2. Strategy of Inquiry & Methodology
3. Methods
4. What work did theory do*
5. How was validity assessed
6. Ethical concerns
7. Why was this research approach taken?
8. Do knowledge claims fit to research approach?
9. What other approaches could have been used and why might other approaches be valid?

Experiments

1. Worldview?
2. Methodologies?
3. What "work" does theory do? (How is theory used or created?)
4. Methods: Data types? Analysis methods? Logic?
5. Validity?

- Strengths?
- Weaknesses?

Observational Studies

1. Worldview?
2. Methodologies?
3. How is theory used or created?
4. Methods: Data types? Analysis methods? Logic?
5. Validity?
- Strengths?
- Weaknesses?

Art/Design Creation

1. Worldview?
2. Methodologies?
3. How is theory used or created?
4. Methods: Data types? Analysis methods? Logic?
5. Validity?

- Strengths?
- Weaknesses?

Questions?