

COMP320: Research Practice

2: Conducting a literature review and forming the research question



Learning outcomes

- Explain what makes a good research question
- Formulate research questions in the area of your chosen project
- ► Conduct a scholarly literature review

► The dissertation is marked **holistically**

- ► The dissertation is marked **holistically**
- ► There is a rubric, but no weightings

- The dissertation is marked holistically
- There is a rubric, but no weightings
- The markers will take account of all criteria, and apply their academic judgment to reach a final mark

- ► The dissertation is marked **holistically**
- There is a rubric, but no weightings
- The markers will take account of all criteria, and apply their academic judgment to reach a final mark
- Don't neglect any part of the rubric all are important!





Literature review

► Introduction: introduce the broad context and motivation, culminating in your research question(s)

- ► Introduction: introduce the broad context and motivation, culminating in your research question(s)
- Literature review: survey existing work related to your project

- ► Introduction: introduce the broad context and motivation, culminating in your research question(s)
- Literature review: survey existing work related to your project
- ► **Method**: explain how you went about answering your research question

- ► Introduction: introduce the broad context and motivation, culminating in your research question(s)
- Literature review: survey existing work related to your project
- Method: explain how you went about answering your research question
- Results: present and analyse the data obtained, and discuss how it addresses your research question

- ► Introduction: introduce the broad context and motivation, culminating in your research question(s)
- Literature review: survey existing work related to your project
- Method: explain how you went about answering your research question
- Results: present and analyse the data obtained, and discuss how it addresses your research question
- ► Conclusion: summarise the dissertation, suggest directions for further work

- ► Introduction: introduce the broad context and motivation, culminating in your research question(s)
- Literature review: survey existing work related to your project
- Method: explain how you went about answering your research question
- Results: present and analyse the data obtained, and discuss how it addresses your research question
- ► **Conclusion**: summarise the dissertation, suggest directions for further work
- ▶ References

► Understand the **context** of your work

- ► Understand the **context** of your work
- Understand the state of the art in the field

- Understand the context of your work
- Understand the state of the art in the field
 - ► What is currently known?

- ► Understand the **context** of your work
- Understand the state of the art in the field,
 - ► What is currently known?
 - What are the important open questions?

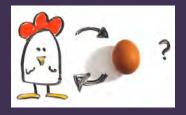
- ► Understand the **context** of your work
- Understand the state of the art in the field
 - What is currently known?
 - What are the important open questions?
 - What research methods are used in the field?

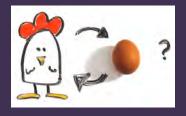
- ► Understand the **context** of your work
- Understand the state of the art in the field
 - What is currently known?
 - What are the important open questions?
 - ▶ What research methods are used in the field?
- Understand how your work fits in

- ► Understand the **context** of your work
- Understand the state of the art in the field
 - What is currently known?
 - What are the important open questions?
 - ▶ What research methods are used in the field?
- Understand how your work fits in
 - Is your work novel (i.e. has it not been done before?)

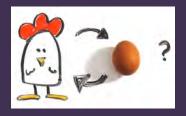
- ► Understand the **context** of your work
- Understand the state of the art in the field
 - What is currently known?
 - What are the important open questions?
 - ▶ What research methods are used in the field?
- Understand how your work fits in
 - Is your work novel (i.e. has it not been done before?)
 - Does it build sensibly on what has come before?

- ► Understand the **context** of your work
- Understand the state of the art in the field
 - What is currently known?
 - What are the important open questions?
 - ▶ What research methods are used in the field?
- Understand how your work fits in
 - Is your work novel (i.e. has it not been done before?)
 - Does it build sensibly on what has come before?
 - Is your research question one that others have asked, and possibly tried to answer?

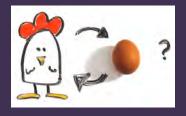




 Having an initial research question in mind will help focus your literature search



- Having an initial research question in mind will help focus your literature search
- ▶ What you read will influence your research question



- Having an initial research question in mind will help focus your literature search
- ▶ What you read will influence your research question
- Be prepared to refine your research question

► Read widely!

- ► Read widely!
- ► Keep thorough notes

- ► Read widely!
- Keep thorough notes
- ► Annotate (either on paper or on screen)

- ► Read widely!
- ▶ Keep thorough notes
- ► Annotate (either on paper or on screen)
- ▶ Write up as you go along

Recommended reading

D. Boote and P. Beile. "Scholars before researchers: on the centrality of the disseration literature review in research preparation," *Educational Researcher* Vol. 34 No. 6, pp. 3–15, 2005.

Examples

Some examples of good literature reviews from last year's students are on LearningSpace



Formulating the research question

Motivates and focuses your research

- Motivates and focuses your research
- Is relevant to the field

- Motivates and focuses your research
- Is relevant to the field
- Has originality (doesn't have to be completely original, but shouldn't be "solved")

- Motivates and focuses your research
- Is relevant to the field
- Has originality (doesn't have to be completely original, but shouldn't be "solved")
- ▶ Is manageable in the context of your project

- Motivates and focuses your research
- Is relevant to the field
- Has originality (doesn't have to be completely original, but shouldn't be "solved")
- Is manageable in the context of your project
- ▶ Is neither too broad nor too narrow

- Motivates and focuses your research
- Is relevant to the field
- Has originality (doesn't have to be completely original, but shouldn't be "solved")
- ▶ Is manageable in the context of your project
- Is neither too broad nor too narrow
- Leads to testable hypotheses

- Motivates and focuses your research
- Is relevant to the field
- Has originality (doesn't have to be completely original, but shouldn't be "solved")
- Is manageable in the context of your project
- Is neither too broad nor too narrow
- Leads to testable hypotheses
- Requires argumentation and analysis, not mere statistics

- ► Motivates and focuses your research
- ▶ Is **relevant** to the field
- Has originality (doesn't have to be completely original, but shouldn't be "solved")
- Is manageable in the context of your project
- ▶ Is neither too broad nor too narrow
- Leads to testable hypotheses
- Requires argumentation and analysis, not mere statistics
- ▶ Is interesting and addresses a need

- ► Too broad:
 - ► Are videogames bad for children?

- ► Too broad:
 - Are videogames bad for children?
- ► Too narrow, not interesting:
 - ► How many children in Cornwall play Overwatch?

- ▶ Too broad:
 - Are videogames bad for children?
- ► Too narrow, not interesting:
 - How many children in Cornwall play Overwatch?
- ► Better:
 - ► What effect does regular videogame playing have on the academic attainment of children ages 11–14?

► A research question invites **exploration**

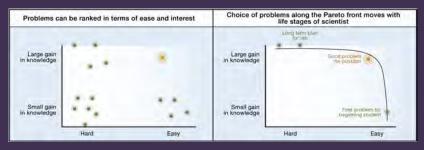
- ► A research question invites **exploration**
- A hypothesis makes a testable claim

- A research question invites exploration
- A hypothesis makes a testable claim
- Research question:
 - ▶ What effect does regular videogame playing have on the academic attainment of children ages 11–14?

- ► A research question invites **exploration**
- ► A hypothesis makes a **testable claim**
- Research question:
 - What effect does regular videogame playing have on the academic attainment of children ages 11–14?
- ► Hypothesis:
 - ► There is a positive correlation in children ages 11–14 between hours spent playing Minecraft and grades in computing

- ► A research question invites **exploration**
- A hypothesis makes a testable claim
- Research question:
 - What effect does regular videogame playing have on the academic attainment of children ages 11–14?
- Hypothesis:
 - There is a positive correlation in children ages 11–14 between hours spent playing Minecraft and grades in computing
- ► A good research question leads to several hypotheses

Choosing a research problem



U. Alon, "How to choose a good scientific problem," Molecular Cell 35, pp. 726-728, 2009.



Exercise

Exercise

► Look at some of the papers you have been reading

Exercise

- Look at some of the papers you have been reading
- ▶ What are the **research questions** behind them?





 \blacktriangleright Last week you were asked to prepare a \approx 500-word research proposal

- ▶ Last week you were asked to prepare a \approx 500-word research proposal
- Divide into pairs pair up with someone who doesn't know (much) about your proposed project

- ▶ Last week you were asked to prepare a \approx 500-word research proposal
- Divide into pairs pair up with someone who doesn't know (much) about your proposed project
- ▶ 5 minutes: **read** each other's proposals

- ▶ Last week you were asked to prepare a \approx 500-word research proposal
- Divide into pairs pair up with someone who doesn't know (much) about your proposed project
- ▶ 5 minutes: **read** each other's proposals
- ► I will ask **you** to explain:

- ▶ Last week you were asked to prepare a \approx 500-word research proposal
- Divide into pairs pair up with someone who doesn't know (much) about your proposed project
- ▶ 5 minutes: **read** each other's proposals
- ► I will ask **you** to explain:
 - In 1 sentence: what is **their** proposed research topic/question?

- \blacktriangleright Last week you were asked to prepare a \approx 500-word research proposal
- Divide into pairs pair up with someone who doesn't know (much) about your proposed project
- ▶ 5 minutes: **read** each other's proposals
- ► I will ask **you** to explain:
 - In 1 sentence: what is **their** proposed research topic/question?
 - ▶ In 1 sentence: why is this interesting and/or important?

Discuss in your pairs:

Discuss in your pairs:

▶ Did you understand each other's proposals?

Discuss in your pairs:

- ▶ Did you understand each other's proposals?
- Were there any misunderstandings or misrepresentations?

Discuss in your pairs:

- Did you understand each other's proposals?
- Were there any misunderstandings or misrepresentations?
- How can the proposal, and particularly the research question, be improved?

For the rest of this session:

Discuss in your pairs:

- Did you understand each other's proposals?
- Were there any misunderstandings or misrepresentations?
- How can the proposal, and particularly the research question, be improved?

For the rest of this session:

 Refine your proposal into a well-defined research question, to discuss with your supervisor after this