"State of the art: a crash course to understanding the 'frontiers of science'”, working paper
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Abstract
This paper give students a method for orienting themselves in the frontiers of science.

Keywords
State-of-the-art, frontiers of science

Background
The introductory chapter of a thesis should be funneling down the phenomenon or phenomena; giving a broad picture in the background, giving different perspectives on it in the problematisation, showing its complexities, and after delimiting from some of them, giving the study a focused problem formulation.

Theory
In the theoretical chapter you should give an overview of the “state-of-the-art” of the scientific theories that try to explain the phenomena you are interested in. You find the state-of-the-art primarily by reading “peer-reviewed” journals, not books! You should only write about the theories that are of value for your own research.

Peer-reviewed journals
The first level of scientific approval is that science today is almost exclusive presented as articles in specialised journals with a ‘double-blind peer-review’-process. This means that before a scientific work is published in a scientific journal it must pass two scientists that give feedback on the article, and eventually, after often being rewritten several times, accepts the article for publishing. This process takes between 3 months and 1.5 years.

In "Academic Search Elite" you can indicate "peer reviewed", in "Business Source Premier" "Scholarly Journals" and in "ProQuest" "Scholarly journals, including peer-reviewed". Emerald has no possibility to screen for peer-reviewed articles, but the material generally has a very high scientific quality, at least in Marketing. I suggest that you use Google Scholar at least for most part of the work outlined in this
article. Not because of any higher quality of Google Scholar, but because as a database it is better organised for the work I outline here.

If you find articles through databases with no peer-review-screening or through the Internet, you can check if the journal is peer-reviewed by searching the journal in 'Ulrich’s Periodicals’ for the symbol ![Ulrich's Periodicals symbol]

**Searching articles**

1. Based on the problem formulation, start by listing a number of keywords reflecting your problem.
2. Use the keywords in searching databases allowing you to limit the results to articles in journals that are peer-reviewed.
3. Choose some articles that each one of you read individually and some 2 articles you all read to get a common “language”.
4. Discuss these articles to get a common understanding on the focusing you want to make.
5. That decision is the bases for choosing a new set of articles.
6. You take another decision and repeat the same procedure as many times as you need.
7. When you write the thesis you only include your chosen area of interest and a broader description that may be necessary to put that area in context.

**Keywords**

Use a thesaurus, like http://thesaurus.com (formerly Roget's Thesaurus), the thesaurus in Business Source Premier, or a general encyclopaedia like wikipedia or a subject-specific encyclopaedia, like Oxford Dictionary of Business and Management, can also be helpful to find synonyms to the keywords.

Use the keywords with Boolean operators to find articles that fits as precisely as possible. Go in to Google Scholar through the university library site (otherwise you will not have access to most articles), chose 'advanced search’ to make a search of the cut (the common part) between two concepts.

In the following example it is between ‘agency theory’ and ‘auditing’. You get some 100,000 hits!
Image 1. Advanced Google search of the cut between between ‘agency theory’ and ‘auditing’
The following example is the cut between 'stakeholder theory' and 'auditing', with more than 40,000 hits.

Another search, for 'institutional theory' from the year 2000, gives 1,640,000 hits. If you add the limiting aspect of institutional theory of 'accounting rules', that you are interested in, you will get a more manageable set of 14,300 articles.
**Economics of scale in reading**

Choose say 3 articles that each one of you read individually (green) and 2 articles you all read to get a common “language” (red)

![Image 3. Reading 10 articles, own.]

**Decision making**

You then discuss these articles to get a common understanding on the focusing you want to make

You are making a decision

![Image 4. Making a decision on what to focus, own.]

**Choosing articles**

That decision is the bases for choosing a new set of articles - with the same principles: economics of scale and a common understanding as a base

![Image 5. Reading 10 more articles, own.]

**Judgment**

You take another decision and repeat the same procedure as many times as you need, until you get down to a level, which according to your common judgment is focused enough.
**Only relevant theories in the thesis**

When you write the thesis you only include your chosen area of interest and a broader description that may be necessary to put that area in context.

**What theory?**

Start writing down theoretical elements as you read them (with references so you can go back); as you read on you will get a sense of what is important or not for your study. In the thesis itself it is not meaningful to write about theory you are not going to use - even though you might impress some with your encyclopaedic knowledge it is really not the objective of the thesis. Write about the theory that is pertinent to your aim. Funnel it down as you go along; from a broader overview gradually focusing it, until motivating why the research questions are interesting.

**State-of-the-art**

The reason for why I demand you to do the state-of-the-art subchapter is that student theses tend to have "cut and paste" theory chapters, with no argumentation and no real understanding of the status of these theories in the scientific community.
**State-of-the-art is a scale**

The state-of-the-art part should discuss if science is pretty sure (we don’t know anything for sure) that the theory explains reality or if science is less sure or know nothing at all. Hence, it is a scale from 0 to something under 100 % sure. We never no everything and neither we do nothing.

I let this scale be represented by three levels: dominating theories and emerging theories or gaps, where science don’t have any good explanation to a phenomena.

![Image 8. What we know about a phenomena, own](image.png)

**Writing state-of-the-art**

To write about the state-of-the-art of the scientific study of a phenomena you have to read many articles about a phenomena. At your level 40-50 articles from the last 5 to 10 years. Professional researchers have to read several thousand articles. This reading permits you to see if a certain theory is accepted by other authors (citations supporting the theory). If it is well-accepted you have the first element to determine if the theory in question is dominating. But that is not enough. If there is little supporting empirical validation the theory is just of the character "genius speculating". So it has to be both well accepted and well-validated! You can find out if it is well validated by reading the abstracts of a sample of those articles citing the theory to see if they are validating it by independent empirical research.
Emerging theories and gaps
For emerging theories there is some (remember the scale) acceptance and some validation. There could be several "competing" emerging theories. For gaps there are no accepted explanations of the phenomena.

The state-of-the-art and the research question
The formulation of a scientific state-of-the-art permits you to formulate a precise research question that relates to the state-of-the-art-description.

Theories and research questions
The theoretical chapter should “boil down” to still more focused research questions or hypotheses
Those are formulated because one of the following reasons exists:
• You want to establish a new theory
• You want to validate an emerging theory
• You want to tear down (deconstruct) an existing theory

1. You want to establish a new theory
There are no or limited theory about the phenomenon, or there is a gap in existing theory
You want to build theory
2. You want to validate an emerging theory
The theory that you use is an emerging theory, with little proof substantiating it
Your objective is then to provide new empirical data validating it
3. You want to tear down an existing theory
Your hypothesis is that an existing, well-established theory is obsolete and you want to “tear it down”, prove that it is not valid or of more limited validity than previously thought

I recommend student to validate an emerging theory. You give some added value; and you will have a substantial aid from previous research. As alternative I recommend to ‘deconstruct’ a dominating theory. This means that you try to show that it is not valid under certain circumstances, thus giving some value to science, while still having substantial help from existing theory. I definitely do not recommend that you try to build theory from scratch.
State-of-the-art

The reason why I demand you to make a state-of-the-art subchapter of your paper, or in your thesis, is that students’ theses tend to have "cut and paste" theory chapters, with no argumentation and no real understanding of the status of these theories in the scientific community.

Professional researchers study a field for decades and read thousands of articles in the field. Students making bachelor and master theses clearly need a shortcut to orient themselves and understand if a certain theory is "mainstream", or an "outlier". This does not mean that the students are not allowed to use outlier theories, only that they should make such a choice knowing that the theory is an outlier:

So this small article is a "quick-and-dirty" to understand the state-of-the-art, even though they usually only read some 50 articles for there thesis.

State-of-the-art is a scale

The state-of-the-art part should discuss if science is pretty sure (we don't know anything for sure sure) that the theory explains reality, or if science is less sure, or know nothing at all. Hence, it is a scale from 0 to something under 100% sure. I let this scale be represented by three levels: dominating theories (50-70%), often several, conflicting emerging theories (20-30%), or theories proposed to fill a gap (5-10%), where science don't have any good explanation to a phenomena.

Writing state-of-the-art

To write about the state-of-the-art of the scientific study of a phenomena you have to read many articles about a phenomena. At your level 40-50 articles from the last 5 to 10 years. Professional researchers have to read several thousand articles. This reading permits you to see if a certain theory is accepted by other authors (citations supporting the theory; can be found in Google Scholar or Thompson web).

You have to state if the theories are well accepted (cited), but also if they are well empirically validated by empirical studies by others. You will find if they are by reading a sample of the abstracts of the articles that cite a theory in question, to see if they have conducted empirical research on the article in question.
A dominant theory has some 500 or more citations and at least 10% of these doing studies which validate the theory.

If it is well-accepted you have the **first** element to determine if the theory in question is dominating. But that is not enough. If there is little independent supporting **empirical validation** the theory is just of the character "genius speculating". So it has to be both well accepted and well-validated! You can find out if it is well validated by reading the **abstracts** of a **sample** of those articles citing the theory to see if they are validating it by independent empirical research.

**Emerging theories and gaps**

For emerging theories there is some (remember the scale) acceptance and some validation. There could be several "competing" emerging theories.

For gaps there is no accepted that explains the phenomena.

Take an article by Cornwell (2008). If you look it up in Google Scholar:

![Image](https://example.com/image9)

It is cited by 48 other authors. Click on this "Citerat av 48" (Cited by 48), circled above. That opens a new window, below, with these 48 articles.
**Example of a state-of-the-art statement**

"Following section will evaluate and judge the different scientific articles presented in the literature review. This will be done to evaluate the strength of the theories and to see how dominating the theories are. Thereby, this section together with the theoretical chapter will be the foundation for the research gap identification and the hypotheses.", Hansen & Jonsson (2013-10-04:21):

"2.3.1 Online consumer behaviour

This theory states that the consumers’ shopping habits has changed due to the technology development. This theory concerns the new needs and values that the customer has in this online environment and the importance to understand those to be able to reach out to the customer.", Hansen & Jonsson (2013-10-04:21).

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Reference</th>
<th>Citations</th>
<th>Validity</th>
<th>Strength in the theories</th>
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<td><strong>Online consumer behavior</strong></td>
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<tr>
<td>New needs and values</td>
<td>-</td>
<td>-</td>
<td>Well validated</td>
<td>Dominating</td>
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<tr>
<td>New needs and values</td>
<td>-</td>
<td>-</td>
<td>Some validation</td>
<td>Emerging</td>
</tr>
<tr>
<td>New needs and values</td>
<td>Fan &amp; Tsai (2010)</td>
<td>4</td>
<td>Limited validation</td>
<td>Proposed new theory</td>
</tr>
</tbody>
</table>


**The state-of-the-art and the research question**

This formulation of a scientific state-of-the-art permits you to formulate a precise research question that relates to the state-of-the-art-description. The research question can be anything that is left when you have ‘deducted’ the state of the art from your problem formulation in the introductory chapter, because the study should add value, not re-invent what us already known.
The theoretical chapter should boil down≈ to a still more focused research questions or hypotheses. Those are formulated because one of the following reasons exists:

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- You want to validate an emerging theory
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3. You want to tear down an existing theory
   Your hypothesis is that an existing, well-established theory is obsolete and you want to ≥ tear it down≈, prove that it is not valid or of more limited validity than previously thought.
You make a sample of the most well-cited of these and read their abstracts, to see if they have done own empirical research, validating Cornwell's theory.

If it is well validated (some 10-20% of the citations validating her research), it is an emerging theory. However, if the original theory had 500 or even better 1500 citations of which a large sample had empirically validated the original theory, it would have been a dominating theory.
References