Western

UNIVERSITY OF WESTERN ONTARIO

Complex Adaptive Systems Lab

Laypersons Literature Review Guide

Table of Contents

Chapter 1

Disclaimer: This guideline was created to help future students involved in the Complex Adaptive Systems (CAS) Lab project with James Shelley. The guideline was produced by the 4300F 2020/2021 Community Engaged Learning (CEL) team. The tips and suggestions presented in this guideline are based on our experience with the project. Following this guideline may help you in your project but please note that there is **more than one way** to complete this project.

How To Get Started

Learning Complexity

To accomplish this project, a good understanding of complexity sciences is needed. We encourage you to do your own research on complexity sciences, in addition to the listed resources.

- **CAS learning module:** a student-made introduction to complexity sciences. https://cas.uwo.ca/discover/modules.html
- **Complexity explained:** simplified brochure explaining complex adaptive system terms. https://complexityexplained.github.io/
- **Complexity theory course introduction:** compilation of videos explaining complex adaptive systems. https://www.youtube.com/watch?v=71n4GSM1jhw&list=PLsJWgOB5mIMDRt8-DBLLVfh-XeKs2YAcg
- **Complex Adaptive Systems – Healthcare Edition** (Chapter 2.3): explains complex adaptive system terms. https://www.health.org.uk/sites/default/files/ComplexAdaptiveSystems.pdf

- **Systems Thinker Notebook:** James Shelley explains complexity science terms in a simplified but slightly more advanced way. We recommend reading this resource after looking at the resources above. https://uwoca-my.sharepoint.com/:u:/g/personal/jshelle4_uwo_ca/ERlC52T1CWdDmdsmN7rTkZ0B7Na12RZpTd3IJ-uX_1ULNw?e=oQsZai

Finding Articles

Finding applications of complexity sciences in your topic of interest can be challenging. We provide you our process.

1. Conduct a broad search on your topic of interest.

Combine the search terms listed below with key words from your topic of interest. For example, "complexity sciences healthcare".

"Complexity sciences"	"Systems Thinking"	"Complex Adaptive Systems"
"Non-linear dynamics"	"Systems Model"	

We recommend finding a comprehensive review article that explains how complexity sciences had been applied in your topic of interest; however, depending on your area of interest, this can be challenging. Nevertheless, read some articles and try to grasp a basic understanding of how complexity sciences has been applied to your topic of interest. You may want to assign a certain number of papers to each group member and later discuss your findings.

2. Specify your search terms to find niche papers on your topic of interest.

After gathering a basic understanding on how complexity sciences have been applied to your area of interest, you may want to narrow in on your search terms. We found this to be helpful as it provided us new articles not presented by the listed search terms above. You may also want to combine several of these search terms with your topic of interest. For example, "Non-linear emergence healthcare"

"Connectivity"	"Nested systems"	"Simple Rules"
"Iteration"	"Chaos"	"Self-Organization"
"Non-linear"	"Dynamic"	"Feedback Loops"
"Signal Flows"	"Emergence"	"Interactions"
"Adaptation"		

3. Assessing applications of complex adaptive systems on your topic of interest.

You may want to now find papers that you can showcase in your article. Many papers will not provide you with an application that can be used in your article. We provide you with some tips to help you identify a paper's eligibility.

Abstract

The abstract will often explain how complexity sciences has been applied to your topic of interest. By reading the abstract you may be able to immediately identify if the article is eligible or not.

Introduction

The introduction will often provide information on how the topic of interest is complex adaptive system. The introduction will also often include *why* a complex systems approach was applied in the study. In some articles, the introduction will also provide faults or limitations of non-complex system models, which may be helpful to include in your article.

Methods

The methods may include the exact complex systems framework or explain what property of complex adaptive systems was analyzed. You may want to read the methods to grab a better understanding of the paper.

Results

Depending on the paper, the results can have high or little importance. Unfortunately, evaluating the importance of the result is impossible without actually reading this section. Therefore, we suggest that you briefly read the results.

Discussion

The discussion is often the "meat" of the paper in terms of complexity sciences. The discussion will explain *how* a complex systems model was applied in the study and the benefits of a complex systems model. We suggest you read this section carefully, as the discussion will likely provide you with the **applications** portion of your article.

4. Organizing your papers.

By completing the above steps, you will likely have a compilation of articles that apply a complex systems model to your topic of interest. You may want to group these articles into defined sections so that you can write your article in a more organized and comprehensible manner.

5. Picking papers to use in your article.

After organizing your papers into groups, you may need to choose between certain papers. You should pick papers that will best highlight the applications of a complex system model in your topic of interest. When picking papers, keep these questions in mind:

- Does the paper provide a clear and direct explanation on how the complex systems model was used in the study?
- How well did the application of the complex systems model relate to my topic of interest?
- Did the use of a complex systems model provide any new discoveries, insights, or suggestions? Can these new discoveries, insights, or suggestions be applied immediately? Or have these new discoveries, insights, or suggestions benefitted your topic of interest already.

After organizing your papers into groups, you may need to find additional articles in some of your designated groups. You may want to combine the suggested search terms above in combination with your specified groups. For example, "complexity sciences nursing".

Many students will not have conducted a literature review; therefore, we provide a rough template showing how the 4300F 2020/2021 team conducted the literature search process. Please note that is only a template and is only provided in this guideline to give you a rough idea on how a literature search could be conducted.

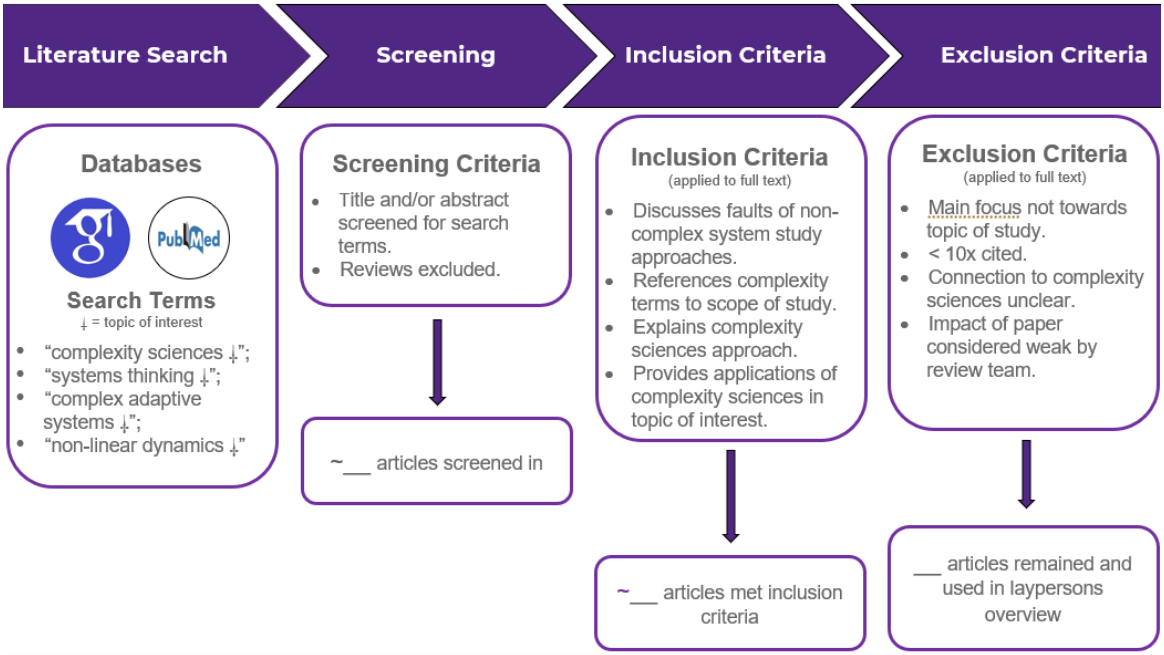

Figure 1. **4300F 2020/2021 Literature Search Process**. The search process explains how the 4300F 2020/2021 found articles for the CAS UWO Lab literature review article.

Chapter

2

Writing the Overview

In this section we explain our train-of-thought when writing our article. The goal of this section is to HELP you with the process of writing your article. There are many ways to write literature review articles; thus, you may want to tackle your project in a different manner.

Introduction

Given the complex nature of complexity sciences, our team felt the need to briefly explain the general idea of complex adaptive systems within our introduction. Some questions you may want to ask yourself are…

- What are complex adaptive systems?
- Why are complex adaptive systems needed?
- What are some relevant terms related to complexity sciences?

Afterwards, we narrowed in our topic and discussed the associated applications of complex adaptive systems. In your introduction you may want to…

- Explain complexity science terms used in your article.
- Briefly introduce the applications found in your topic.
- In general manner, summarize how a complex adaptive system model benefitted your topic of interest.

Body Paragraphs

<u>Introductory paragraph/sentence</u>

In our article, our aim was to highlight the applications of complex adaptive systems within our topic of interest. Our introductory body paragraphs served the purpose of explaining the importance of the complex adaptive system model within the selected subareas (ex. Nursing, healthcare organizations, etc.). In this paragraph, you may want to include…

- How this specific subarea is related to complexity sciences.
- How this specific subarea is considered a complex adaptive system.

- A brief and summarized statement explaining the advantages of complexity sciences in this specific area.

Main Paragraphs

In the main paragraphs, we found it best to discuss the selected articles. For each paragraph, we selected approximately 1-3 articles. We had 2-3 main paragraphs per subheading. In these paragraphs, we tried to focus on the applications found within our articles. In order to accomplish this, you may want to…

- Discuss the faults of linear, non-dynamic models.
- Explain how a complex adaptive systems model was applied in each study.
- Explain why a complex adaptive systems model was applied in each study.
- Discuss the outcomes provided by the complex systems model. What were the benefits? Did the complex systems model help solve any current issues, highlight certain problems, or improve our current understanding?
- Explain any subjective terms found in your selected articles.
- Discuss future steps provided from the studies.

Concluding paragraph

The concluding paragraph should summarize your points discussed in the main paragraph. Our concluding paragraphs were generally short and focused on how a complex adaptive systems model benefitted a specific subarea.

Conclusion

In the conclusion, our main goal was to summarize all the points discussed in the body paragraphs. We tackled the conclusion using an "upside down pyramid" approach, where we begin specific and end broad. In our final remarks, we provided a broad statement regarding the future of complexity sciences within our topic of interest. For this statement, you may want to discuss…

- Future steps/direction of complexity sciences in your topic of interest.
- Your own interpretation of the future of complexity sciences in your topic of interest. What do you think is currently lacking in regards to complexity sciences? Do you think complexity sciences could help with other prevalent problems found within your topic of interest (that were not discussed in your article)?
- Current barriers found for complexity sciences in your topic of interest, and corresponding suggestions on how to remedy them.

Laypersons Writing Tips

- Provide examples when possible. Complexity sciences is a difficult area to discuss, making examples paramount to your laypersons audience.
- In general, use shorter sentences; this often helps simplify your article and provides a straightforward "flow" that helps readers understand your article.
- Use analogies! While difficult to incorporate, analogies will surely help bring your point across to the laypersons audience.

Acknowledgments

The guideline was written by Joshua Yi in the Medical Sciences 4300F Team.