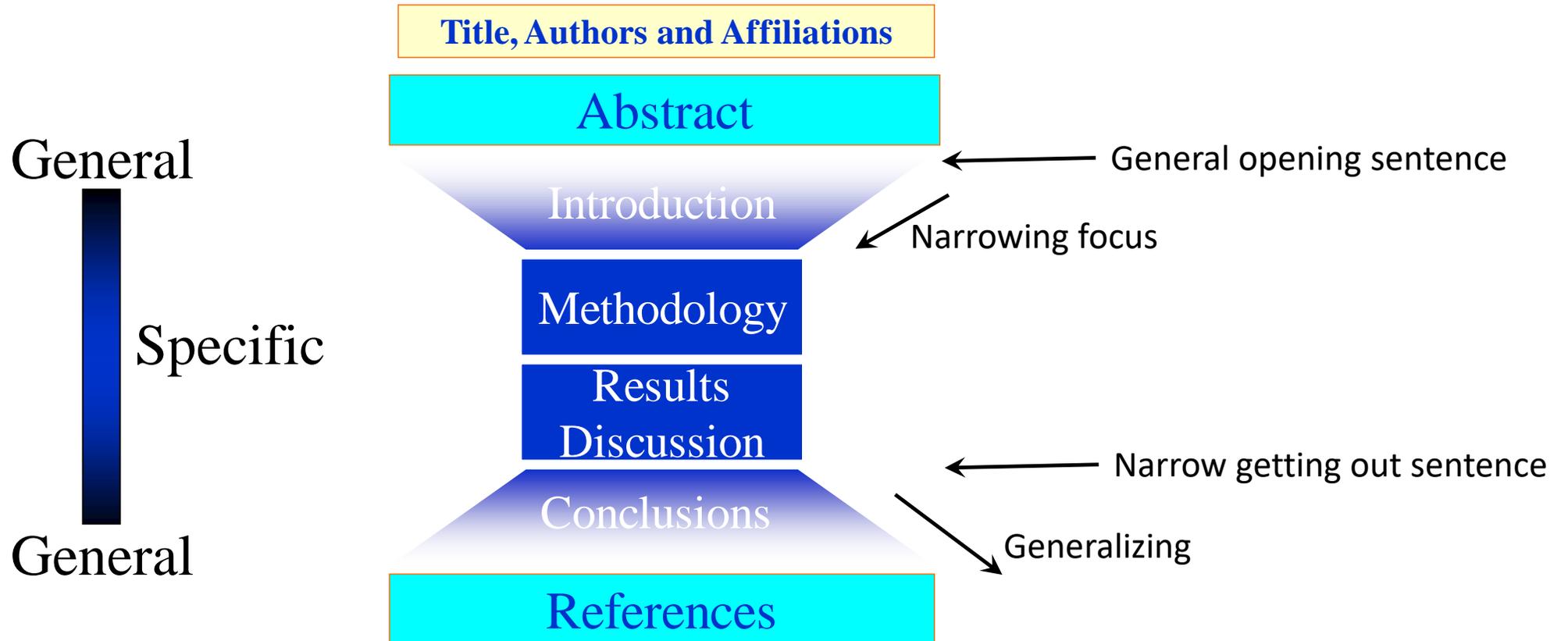




# Writing the Discussion/Conclusion

Dr. Azam Rabiee

# The general shape of a research paper or thesis



Opposite the introduction, in the conclusion, you help readers to move out of the article

# Conclusion vs. Introduction

<b>Introduction</b>	<b>Conclusion</b>
<b>Drawing a research map to see what kind of works exists in this field</b>	<b>locating your study in the research map</b>
<b>locating a gap (challenge) in the research or describing a problem associated with existing research</b>	<b>Explaining that to what extent you have responded to that gap or solved that problem.</b>
<b>writing about the present paper to move the reader to the central report section</b>	<b>revisiting some aspect of your work to move away from the central report section.</b>

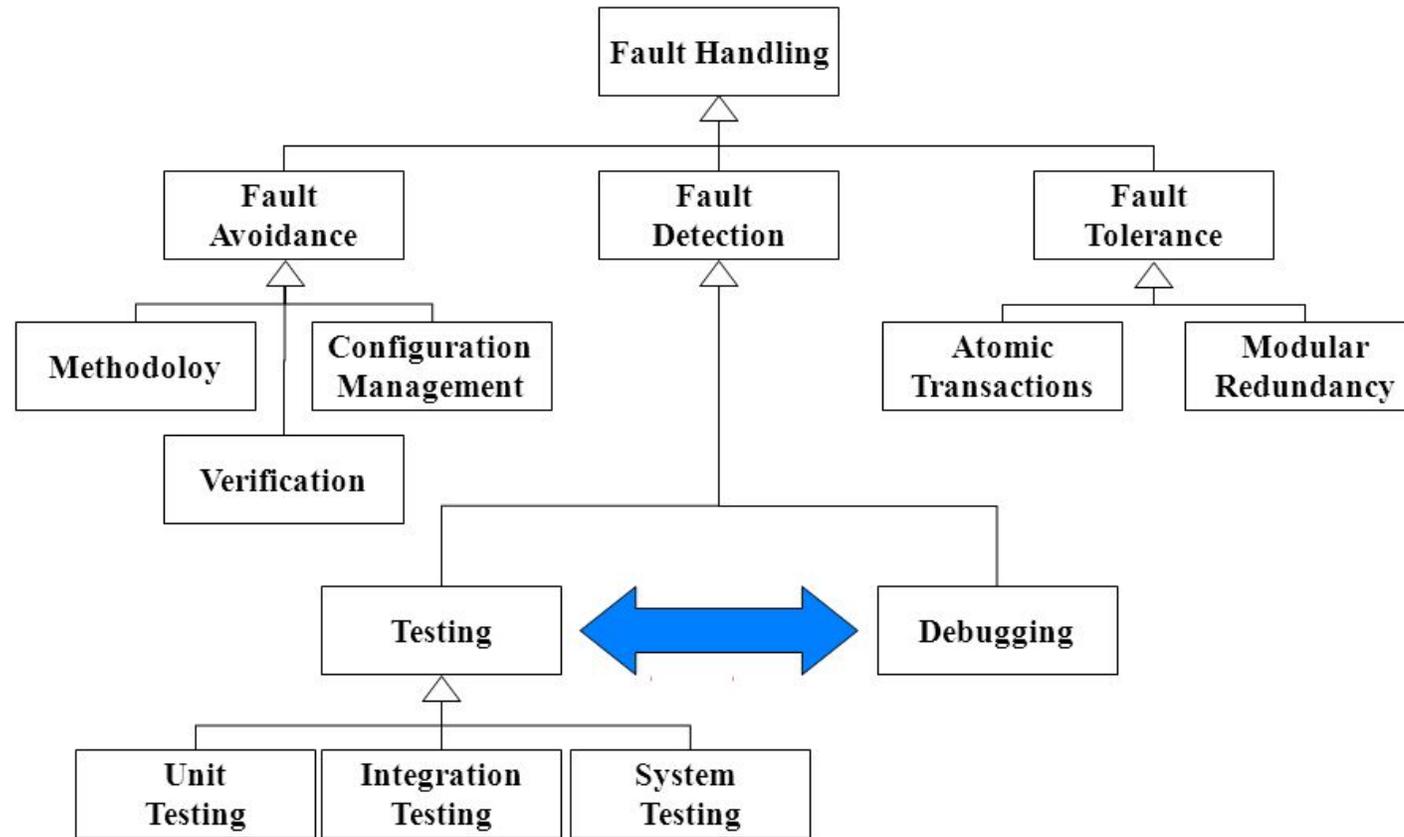
# Conclusion vs. Introduction

Introduction	Conclusion
<b>Drawing a research map to see what kind of works exists in this field</b>	<b>locating your study in relation to that research map</b>
locating a gap in the research or describing a problem associated with existing research	Explaining that to what extent you have responded to that gap or solved that problem.
writing about the present paper to move the reader to the central report section	revisiting some aspect of your work to move away from the central report section.

**A sample research map (taxonomy) in the next slide**

# Map of the existing studies (Taxonomy/Survey table): sample

## Taxonomy for Fault Handling Techniques



# Mapping in introduction vs. in conclusion

- **In the introduction:**

- Mapping shows the location of the current research, emphasizing on the gap, explaining the necessity of the research

- **In the conclusion:**

- Mapping explains how the achievement fits into the research picture in this field, emphasizing on the results

# Components of the Conclusion

- 1. Revisiting the main reference and the gap (introduction)**
- 2. Revisiting methodology**
- 3. Revisiting general or key results**
- 4. Mapping (relationship to existing research)**
- 5. Achievement/Contribution/Refining the implications**
- 6. Limitations/Current and future work/Applications**

# Begin by revisiting the most significant aspects of your work, either of the followings:

## 1. Revisiting the Introduction:

- restate the aims of the paper, important background information, the original prediction/theory/assumption or the problem the study was designed to solve

## 2. Revisiting the Methodology:

- reminder of the rationale for the procedures or a summary of the procedures in the methodology

## 3. Revisiting the Results:

- a summary of the results obtained by the author

## Question: which one is revisited in this conclusion? Introduction, methodology, or results?

**We have proposed a genetic-based algorithm for optimizing n-D simple-bounded continuous functions. We have evaluated our approach on the two well-known test problems. Furthermore, we have compared the results with a simple genetic algorithm. The proposed approach benefits from the small population size and a rotational mutation process to find the best direction toward the optimum solution. The proposed rotational mutation process helps our approach to achieve the optimum solution faster than similar approaches with fewer numbers of generations. Therefore, the proposed algorithm is a promising approach to engineering optimization problems.**

# Question: which one is revisited in this conclusion? Introduction, methodology, or results?

Revisiting Methodology  
Revisiting Results  
Achievement/Contribution  
Application

We have proposed a genetic-based algorithm for optimizing n-D simple-bounded continuous functions. We have evaluated our approach on the two well-known test problems. Furthermore, we have compared the results with a simple genetic algorithm. The proposed approach benefits from the small population size and a rotational mutation process to find the best direction toward the optimum solution. The proposed rotational mutation process helps our approach to achieve the optimum solution faster than similar approaches with fewer numbers of generations. Therefore, the proposed algorithm is a promising approach to engineering optimization problems.

# Notes on Revisiting (Introduction/Methodology/Results)

- **Do not add new information**
- **It is not common to refer to a large number of studies in the conclusion for the first time**

# Notes on Revisiting:

## Verb tense used for restating in conclusion

- **In order of priority:**

1. **Present Perfect (cause you already explained it; the effect is still remain)**
2. **Present simple (for simplicity)**
3. **Past Simple (it's also possible; but last priority)**

# Example: changing the verb tense

We **have proposed** a genetic-based algorithm for optimizing n-D simple-bounded continuous functions. We **have evaluated** our approach on the two well-known test problems. Furthermore, we **have compared** the results with a simple genetic algorithm. The proposed approach **benefits** from the small population size and a rotational mutation process to find the best direction toward the optimum solution. The proposed rotational mutation process **helps** our approach to achieve the optimum solution faster than similar approaches with fewer numbers of generations. Therefore, the proposed algorithm **is** a promising approach to engineering optimization problems.

# Revisiting the Methodology to explain the achievement or contributions

- **Restate the principles of your method (no details)**
- **Recall significant features of your method (achievement/contribution)**

# Example: principles of the method/ significant features

The proposed approach benefits from the small population size and a **rotational mutation process** to find the best direction toward the optimum solution.

The proposed rotational mutation process helps our approach to achieve the optimum solution **faster** than similar approaches with **fewer numbers of generations**.

# Revisiting the Results to fit it to the research map

- **Possible ways to fit your research to the map of the existing studies:**
  - **Confirming** the results obtained in a previous study
  - **Contradicting** and therefore discrediting results obtained in a previous study
  - Offering a completely different or new approach or it may extend the results and therefore confirming (**developing**) the implications of previous studies.

Question: how does this sentence try to fit to the map of the existing studies? Confirm, contradiction, or developing?

**These findings extend those of Kaliom, confirming that a longer, more intensive period of stress-management training tends to produce more effective skills than when those skills are input over a shorter period via information transfer media such as leaflets and presentations (Kaliom et al., 2003).**

# Notes on Revisiting the Results (cont.)

## **A Common Mistake:**

It is not sufficient to present a superficial interpretation that simply re-states the results in different language. In the discussion, it is your responsibility to suggest why results occurred; and offer an explanation of the mechanisms behind your findings and observations.

# Notes on Revisiting the Results (cont.)

## **A Common Mistake:**

It is not sufficient to present a superficial interpretation that simply re-states the results in different language. In the discussion, it is your responsibility to suggest why results occurred; and offer an explanation of the mechanisms behind your findings and observations.

**Regarding the above description, what is the difference between research writing and report writing?**

# Notes on Revisiting the Results and achievements

- **Saying what your results *are* is the central function of the Results section;**
- **Talking about what they *mean* is the central function of the Discussion.**
- **Use “*It seems that/suggesting that/indicating that*”; be careful not to make unqualified generalizations.**

# Notes on Revisiting the Results and achievements

- **It is difficult to be absolutely sure that no-one has ever done a particular type of study until now, so before you make such a statement, you should check as thoroughly as possible. Don't rely only on the Internet.**
- **The information you get from the Internet will only be as good as your skill in looking for it, and it is unprofessional to make a mistake like this.**

# Limitations and future works

- **Positive outcomes are mentioned close to the limitation in order to lessen its negative impact**
- **Then, with respect to that limitations, draw a broader picture in mind about the current research area and address some future works**

# A little bit of grammar

**Modal verbs are frequently used in discussion and conclusion**

# Modal Verbs

- **may**
- **might**
- **could**
- **can**
- **should**
- **ought to**
- **need to**
- **have to**
- **must**

# Example: the difference?

1. The drop in pressure **was** due to a crack in the pipe.
2. The drop in pressure **may have been** due to a crack in the pipe.
3. The drop in pressure **must have been** due to a crack in the pipe.

# Example: the difference?

1. The drop in pressure **was** due to a crack in the pipe.

**No modal verb! The experiment is a certain evidence to prove it.**

2. The drop in pressure **may have been** due to a crack in the pipe.

**With doubt!!**

3. The drop in pressure **must have been** due to a crack in the pipe.

**More power (without proof)!!**

# Modal verbs are difficult to use

- **Two reasons:**
  - **some modal verbs have more than one meaning.**
  - **most modal verbs do not follow standard grammar rules. Some disappear and others change their meaning in the negative, or in a different tense.**

# Types of modal verbs

1. **Ability/Capability: can, could**
2. **Possibility/Options: may, might**
3. **Probability/Belief/Expectation: should, ought to**
4. **Virtual Certainty: must, have to**
5. **Advice/Opinion: should, ought to**
6. **Necessity/Obligation: must, need to, have to**

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weak {  
Should  
Ought to (less common)

strong {  
Must  
Have to  
Need to

# 1. Ability/Capability: can, could

- **Ability is different from capability!**
- **'Can' has only simple present and past tenses. For other tenses, you can use 'be capable of' or 'be able to.'**
  - E.g. 'will be able to', (no 'will can'!!)

# 1. Ability/Capability: can, could

- ‘could’ is different from ‘was able to’
  - Could: ‘was **generally** capable of doing/able to do something in the past’
  - Was able to: is used in relation to **specific** past events or past occasions
- If you’re not sure whether to use can or be able to, use be able to, it’s safer.

## 2. Possibility/Options: may, might

- might is slightly weaker than may.
- could not and cannot are fall into this category, too.
- can not and cannot don't mean the same thing at all!
  - Cannot = impossible
  - Can not = possibly not (in the same way as may not or might not; but it's not commonly used)

# Types of modal verbs

1. **Ability/Capability: can, could**
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## Categories 2, 3, and 4:

### Possible reason/Probable implication/Obvious interpretation

- To separate Categories 2, 3 and 4, imagine that for John, it normally takes about 20 minutes to walk home from laboratory. Has he arrived home yet?

(category 2: possibly)

- if he left the lab 18 minutes ago, he may/might be home by now

(category 3: probably)

- if he left 30 minutes ago, he should/ought to be home by now

(category 4: virtual certainty/obvious interpretation)

- if he left 50 minutes ago, he must be home by now (almost certainly)
- if he left 5 minutes ago he cannot be home yet (almost certainly not)

# Complementary points

- **have to** is less common in science writing
- **must not** means 'not allowed/permitted', it doesn't mean 'not possible'.

# For the next week

- Try to read the Unit 4: discussion/conclusion.
- I will talk about Unit 5: Abstract soon in the future. Then, we will cover whole the textbook.