How to Write a Thesis

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Outline

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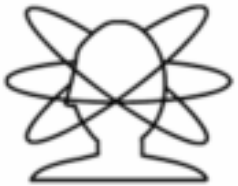

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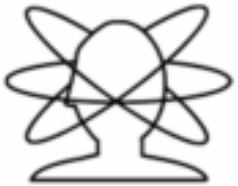
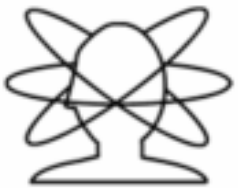


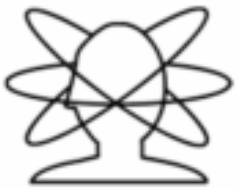
Title (1/6)

- Functions
  - To identify the main topic or the message of the paper.
  - To attract readers.
- Number of words
  - No more than 15 words



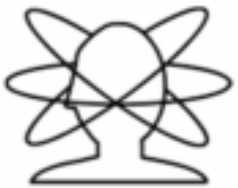
Title (2/6)

- A good title accurately, completely, and specifically identifies the main topic or the message of the thesis.
- For accuracy, use the same key terms in the title as in the question and the answer, the message, or the message and the implication (descriptive paper), or the name of the method, the purpose, and the animal or population stated in the paper (method paper).
- For completeness, include all the necessary information
- For specificity, use specific words that can also function as indexing terms.



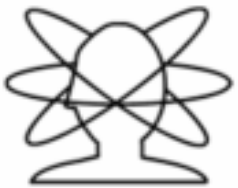
Title (3/6)

- A good title is unambiguous.
  - Avoid noun clusters.
  - Do not use abbreviations.
    - Exceptions: abbreviations that are more familiar than the words they stand for, chemical formulas, and abbreviations identified in the title.



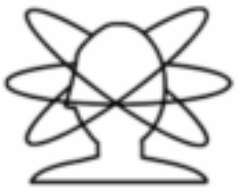
Title (4/6)

- A good title is concise.
  - Keep titles as brief as possible
  - Omit unnecessary words.
    - Omit nonspecific openings such as “Studies of.”
    - Omit other vague or uninformative words.
    - Usually omit “the” at the beginning of the title
  - Compact the necessary words.
    - Use a category term instead of several details.
    - Use an adjective instead of a noun followed by a preposition to express a message (for example, “altered” rather than “alteration in”).



Title (5/6)

- A good title begins with an important word that will attract the intended readers.
  - If necessary, use a main title (for the most important word) followed by a colon and a subtitle.
    - The main title states the general topic of the paper.
    - The subtitle states the specific topic.
    - Have a clear relation between the main title and the subtitle: the preposition or the verb that the colon replaces should be easy for the reader to supply.



Title (6/6)

- Example

國立台灣大學機械工程學研究所碩士論文

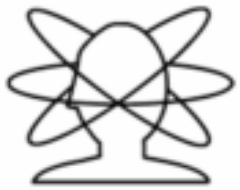
指導教授：黃漢邦　博士

Multi-CAMSHIFT 應用於
多角度人臉追蹤與辨識

Multi-CAMSHIFT for
Multi-View Faces Tracking and
Recognition

研究生：林俊廷　撰

中華民國九十四年六月



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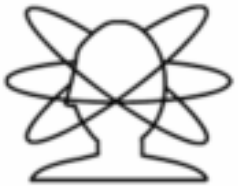
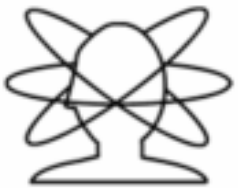


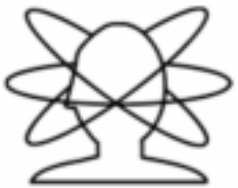
Abstract (1/4)

- Functions
  - The abstract should provide an overview of the main story and a few essential details.
  - The abstract should be clear both to readers who read the paper and to readers who do not read the paper.
- English and Chinese Abstracts
  - Number of words
    - about 100~200 words
- English and Chinese Keywords
  - Number of keywords
    - No more than 5 words
- Contents
  - Do not copy from title of the paper
  - Focus on methods of approach, results and conclusions



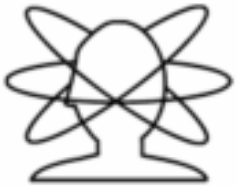
Abstract (2/4)

- State
  - the question you asked.
  - the experiments you did to answer the question
  - the results you found to answer the question, including only the most important results.
  - If useful, also include
    - background, at the beginning of the abstract.
    - an implication, a speculation, or a recommendation at the end of the abstract.



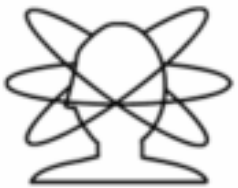
Abstract (3/4)

- Writing
  - The abstract is written as one paragraph to
    - Signal the question (“To determine whether,” “To test the hypothesis that”). or the question and the experiments done (“We asked whether….To answer this question, we…,” “We hypothesized that … To test this hypothesis, we…”)
    - Signal the results (“We found”).
    - Signal the answer (“We conclude,” “Therefore,”).
    - Signal the implication (“These results suggest that…”)



Abstract (4/4)

- Use appropriate verb tenses
  - Use present tense verbs for the question and the answer.
  - Use past tense verbs to state the experiments done and the results found.
  - Use a cautious verb for implications (for example, “may mediate”).
- Be careful not to omit the question, not to state the question vaguely, not to state an implication instead of the answer, and not to write a descriptive abstract if you tested a hypothesis.



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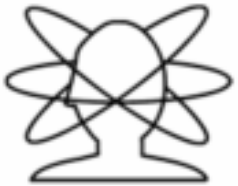
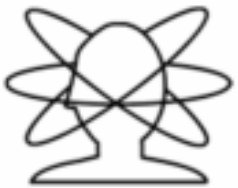


Acknowledgement

- This work is partially supported by National Science Council in Grant “How to Write a Thesis (NSC-94-E-001).” In addition, the assistance from Professor A and Institution B are greatly appreciated.



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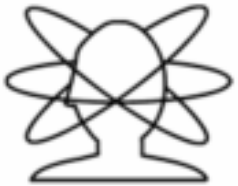

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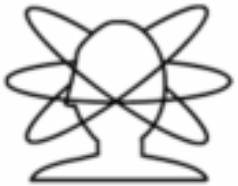
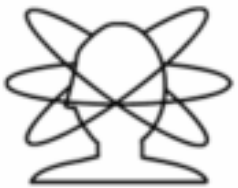


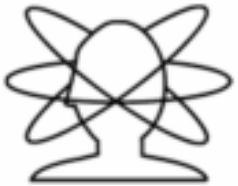
List of Tables (1/5)

- Tables are usually used to present background information related to methods or to present data.
- Tables of data either present individual data for all subjects, or specimens studied or make a point.
- Tables should be arranged to have clear visual impact.



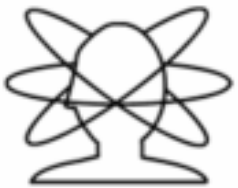
List of Tables (2/5)

- **The Title**
  - The title of the table should be written above the table.
  - The title should identify the specific topic or the point of the table.
  - For titles of tables that give background information or that present data for experiments having only dependent variables, use the form “Y in Z.”
  - For titles of tables that present data for experiments that have both independent and dependent variables, use the form “Effect of X on Y in Z” or “Y during X in Z.”
  - Keep titles brief by using a category term in place of the names of two or more variables.



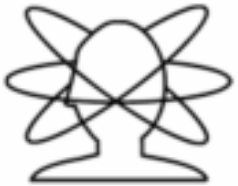
List of Tables (3/5)

- **The Size of Tables**
  - Avoid making tables so large as to be overwhelming or so small as to be unnecessary. However, a large table may be needed to present background data or individual experimental data.
  - If the purpose of the table is to make a point, keep the table as concise as possible. To condense a large table, omit unnecessary columns or rows of information and keep the title, column headings, and footnotes brief. If necessary, break a large table into two smaller tables, keeping data that are to be compared in the same table.
  - Avoid repetition of information within a table



List of Tables (4/5)

- **The Format of Tables**
  - To create a clear sequence of tables that tells the story of the paper, make the figures and their legends as parallel as possible, and make the tables and their titles and footnotes as parallel as possible.
  - Check that each table clearly and accurately shows what the text states.
  - Check that values repeated in the text are accurate.
  - Use the fewest tables needed to tell the story.
  - Do not present the same data in both a figure and a table. However, primary evidence (for example, a polygraph recording) may be shown in addition to a figure or a table of summarized data.



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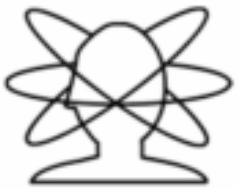

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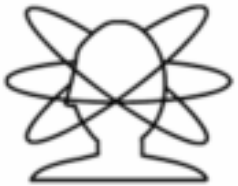
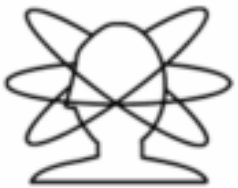


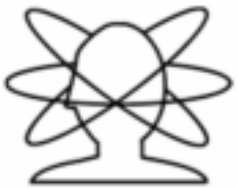
List of Figures (1/8)

- Figures are usually used to clarify methods or to present evidence that supports the results.
- Design figures to have strong visual impact.



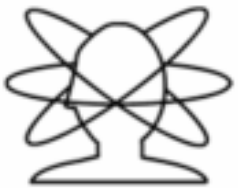
List of Figures (2/8)

- **Design**
  1. Make primary evidence of high quality
  2. Use the appropriate type of graph to display the type of data you have.
  3. Ensure that each figure is easy to read.
  4. Draw figures to emphasize the data. In line graphs:
     1) Make curves the darkest lines;
     2) Make axis labels less dark;
     3) Make axes, tick marks, error bars, key, and curve labels the least dark.



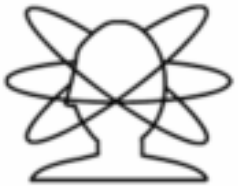
List of Figures (3/8)

- **Figure Legends**
  - Below the drawings or diagrams of the figures
  - A figure legend has four parts:
    - **Title**
    - **Experimental Details**
    - **Definitions**
    - **Statistical Information**



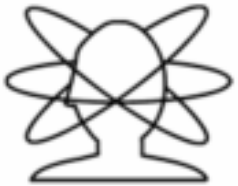
List of Figures (4/8)

- **Title**
  - The title is the first item in the figure legend; it does not appear in the figure.
  - The title should briefly identify the specific topic or the point of the figure. The title should contain no excessive details and no abbreviations.
  - For drawings, diagrams, and primary evidence, the title should identify the type of figure, if necessary, the apparatus, and concept. For example, “Fig. 1. Bright-field light micrograph of a segment of a bacterial filament.”



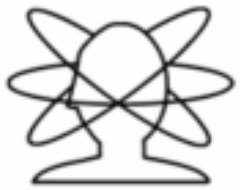
List of Figures (5/8)

- **Experimental Details**
  - Give just enough experimental details to permit the reader to understand the figure. In legends for graphs, do not simply repeat the information in the axis labels.
  - Write experimental details in sentences.
  - It is unnecessary to say “For details, see Methods.”



List of Figures (6/8)

- **Definitions**
  - Symbols, line or bar patterns, and abbreviations that are not defined in the figure or earlier in the legend should be defined after experimental details are given.
  - If the same symbols, line or bar patterns, or abbreviations are used in more than one figure, define them in the legend for the first relevant figure only. In succeeding legends, refer the reader to that legend. For example, “Abbreviations as in Fig. 1.”



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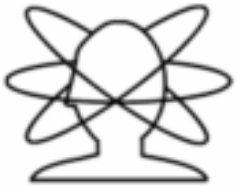
- **Statistical Information**
  - State whether data points or bars represent individual, mean, or median values and whether error bars represent standard deviations, standard errors of the mean, confidence intervals, or ranges.
  - For data in graphs that have been analyzed by a statistical test, state the statistics, which values were compared, and the statistical test used.



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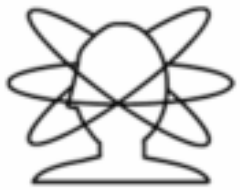

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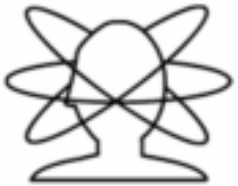
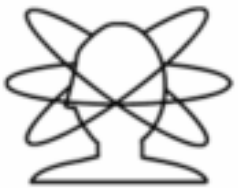


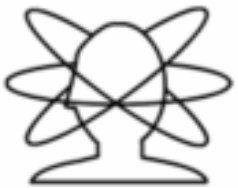
Functions of “Introduction”

- To awaken the reader’s interest
- To prepare the reader to understand the paper
- To convince the reader that this study is necessary



Introduction (1/4)

A. Information
   1. Related to title
B. History development
C. Acknowledgement of literature
   1. Advantages and disadvantages of previous studies
      a. Existing methods used
      b. Existing assumptions used
      c. Limited results
      d. Limited applications



Introduction (2/4)

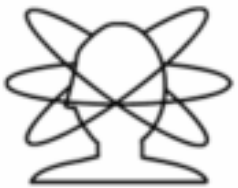
D. Originality

1. Purpose and contribution

   a. Create new theory, design, product, method and etc.

   b. Improve existing methods, design, calculated results with better accuracy, speed

   c. Reduce existing assumptions

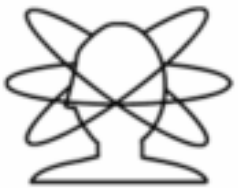


Introduction (3/4)

2. Appealing sequence – older appears first

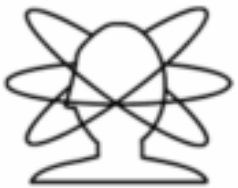
   examples:

   Compressors have been used in many applications [1], [3-5], [8-10]. Meydell [11] studied compressors. Huang and Yang [12] measured the air pressure. Fukuda [14, 15] analyzed the force. Fulin et al. [17] developed a compressor.



Introduction (4/4)

3. Technical terms
   English in parenthesis
   Written in small letters
4. Respect copy right
   a. Do not copy contents from other references

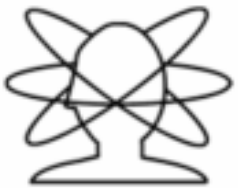


Tell a Story (Forest)

- Keep continuity:

  Present key steps in logical chain, repeat key terms, consistent viewpoint, transition words or phrases, omit unnecessary details (trees).

- Be consistent throughout the paper
- Funnel-shaped: from general to *specific*



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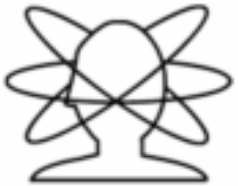
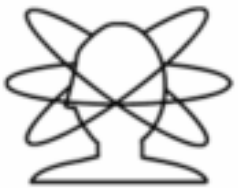


Background Materials

- Statement of the problem (super-topic sentence)
- Review of the up-to-date, the state of art & relevant literature (known, unknown, gap in knowledge)
- Rationale (logic)



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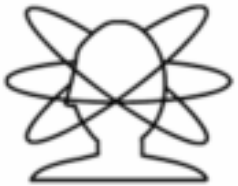


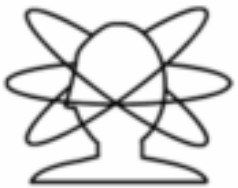
Problem Definition and Development (1/4)

A. **Summary of guidelines for writing simple, direct sentences**

B. **Express the core of the message in the subject, verb, object and complement.**
   1. Make the topic the subject of the sentence.
   2. Put the action in the verb.

C. **Avoid noun clusters.**

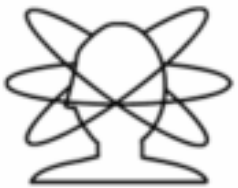
D. **Write short sentences.**
   1. Do not string ideas together.
   2. Talk about one thing at a time.
   3. Aim for a mean sentence length of no more than 22 words per sentence.



Problem Definition and Development (2/4)

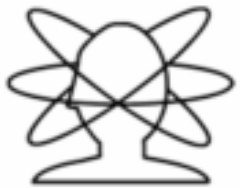
E. **Use clear pronouns.**

1. For a pronoun that has too many possible nouns to refer to, either restate the noun instead of using a pronoun or change the sentence structure.
2. For a pronoun (usually “this”) that has no noun to refer to, add the smallest category term after the pronoun.



Problem Definition and Development (3/4)

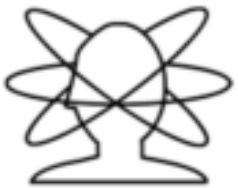
F. **Put parallel ideas in parallel forms.**
   1. Use parallel form for ideas joined by “and”, “or”, or “but” and for comparisons.
   2. Use “than” for comparisons, not “compared to”.
   3. Do not compare apples and oranges.
      1. When the comparative term is all together in one spot, add “that” or “those”.
      2. When the comparative term is split, do not add “that” or “those”.
   4. Do not write absolute statements as comparisons.
   5. Do not confuse pairs and series.
   6. Use parallel form with paired conjunctions.
   7. Use parallel form to avoid repetition.



Problem Definition and Development (4/4)

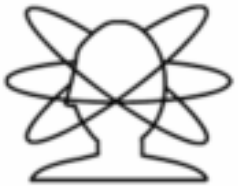
G. **Avoid writing flaws.**

1. Be sure that the subject and verb make sense together.
2. Be sure that the subject and verb agree.
3. Do not omit helping verbs.
4. Be sure that sentences containing information in parentheses make sense.



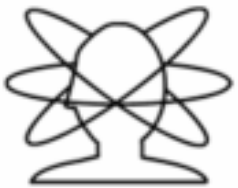
Paragraph Structure (1/7)

- **General**
  - To send a clear message and tell a clear story, paragraphs should be organized, should have continuity, and should emphasize important information.
- **Specific**
  - **Organization**
    - Give overview first, in a topic sentence. Then give details, in logically organized supporting sentences.
    - Do not omit any steps in the logic.
  - **Emphasis**
    - To de-emphasize less important information, condense, omit, or subordinate it.
    - To emphasize important information, place it in a power position, label it, repeat it, and state it rather than just implying it.



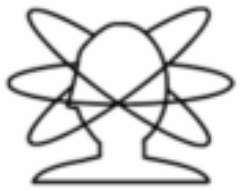
Paragraph Structure (2/7)

- **Continuity**
  - Repeat key terms.
    - Repeat exactly.
    - Repeat early.
  - Link key terms when you switch from a specific term to a category term, or vice versa.
  - Use transition words, phrases, or clauses to indicate logical relationships between ideas.
  - Keep a consistent order.
  - Keep a consistent point of view when the topic of two or more sentences is the same.
  - Use parallel forms for parallel ideas.
  - Signal subtopics within a paragraph.



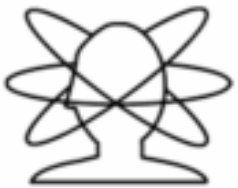
Paragraph Structure (3/7)

- **Tell a story.**
  - Funnel step by step from what is known to what is unknown or a problem.
  - Make sure that the question follows inevitably from the preceding sentences and is very similar to the unknown. If there are two questions, be sure to give background information leading to both.
  - Use the techniques of continuity and topic sentences as needed to tell the story.
  - State (or strongly imply) the unknown, so that what is new about the work is evident.



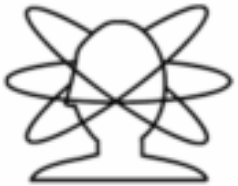
Paragraph Structure (4/7)

- Make sure that importance of the work is evident. State or imply it if necessary.
- If necessary, state the experimental approach after the question.
- Do not state the answer to the question in the introduction.
- Do not include results or implications.
- Cite references that reflect the key work led to the question.
- Keep the number of references to a minimum.



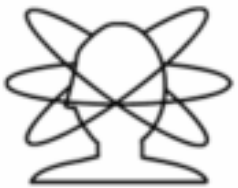
Paragraph Structure (5/7)

- **State the question, either as a question or (better) as a hypothesis.**
  - Make the question as precise as possible, so that the question anticipates the answer.
  - Use a present tense verb in the question.
  - Make sure the question includes both the independent variable and the dependent variable, where appropriate.
  - Put a signal of the question at the beginning of the sentence.



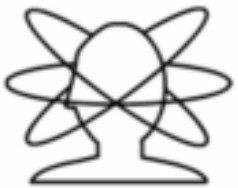
Paragraph Structure (6/7)

- **Be sure the experimental approach is evident.**
  - If necessary, describe the independent variable, the dependent variable, or both.
  - If the study design was retrospective, use the word “retrospective” in the experimental approach or in the signal of the question.



Paragraph Structure (7/7)

- Keep the introduction short.
- Aim to awaken interest, not to kill it off.
- In introductions of descriptive papers, the story can have only two steps: known, message.
  - The relation between the known and the message, and thus what is new about the work, should be clear, for example, that the message extends or contrasts with what is known.



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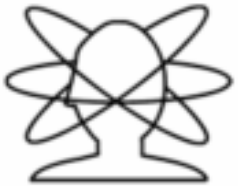
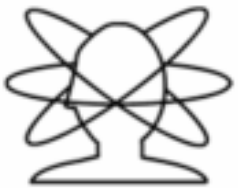


Simulation and Experiments

- Outline
  - Materials and Methods
  - Results
  - Discussion



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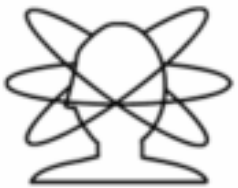
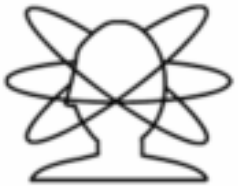


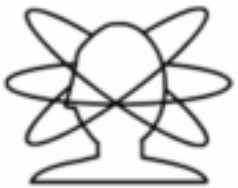
Function of Materials and Methods Section (1/2)

- Hypothesis-testing paper
  - To tell the reader what experiments you did to answer the question posed in the Introduction
- Descriptive studies
  - To tell the reader what experiments you did to obtain the message stated in the Introduction
- Method paper
  - It describes the new method in complete detail and also tell what experiments you did to test the new method



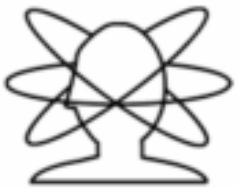
Function of Materials and Methods Section (2/2)

- For all types of paper, the Methods section should include sufficient detail and references to permit a trained scientists to evaluate your work fully or to repeat the experiments exactly as you did.



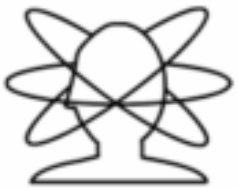
Story Line (1/2)

- Hypothesis-testing & Descriptive papers
  - 1st step (in the Introduction)
    - Question being asked or the structure being described
  - 2nd step
    - Overview of the experiments you did
      - The strategy of the experiments; the plan that connects the methods to each other and to the question or the message



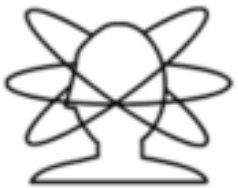
Story Line (2/2)

- Method papers (in the Method section)
  - 1st step
    - A statement to present a new or improved material, method or apparatus
  - 2nd step
    - A complete description of the new method, material, or apparatus
    - A description of how this new method, material, or apparatus was tested



Content of Materials and Methods Section

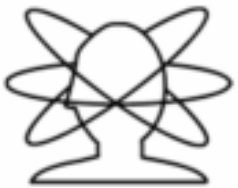
- Essential information:
  - What you did (including Study Design)
  - How you did it
  - Why you did it
- Other information (as needed)
  - Preparation
  - Assumptions
  - Definitions of indicators



Methods (1/10)

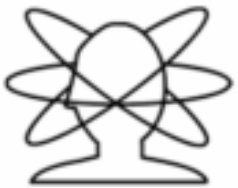
- What you did
  - Study design

    include
    - Questions asked
    - Independent variables (= intervention made)
    - Dependent variables (= variable measured)



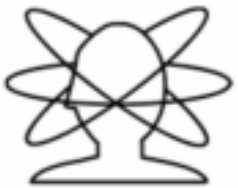
Methods (2/10)

- What you did
  - Study Design versus Experimental Approach
    - Study Design: in the Methods section; Experimental approach: at the end of the Introduction
    - There is some overlap between the Study Design and the experimental approach. This overlap helps to keep the story line that runs from the Introduction to the Methods section clear.
    - Study Design: more extensive; specific details (timing, doses)



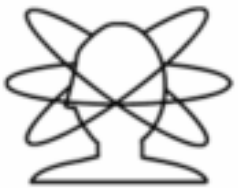
Methods (3/10)

- What you did
  - Study Design as “Topic Sentence”
    - Study Design gives an overview of the experiment and followed by cookbook details (in separate subsection)
    - As brief as possible, so that the overview is clear



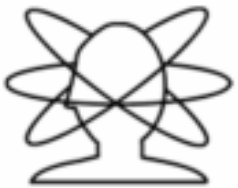
Methods (4/10)

- How you did the experiment: cookbook
  - Methods and Apparatus
    - Well known method:
      - need not be described. All that is needed is the references.
      - e.g.: In these samples, lipids were extracted (Bligh and Dyer, 1959) for phosphorus determination (Bartlett, 1959) and for thin-layer chromatography (Poorthuis et al., 1976)



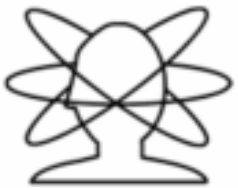
Methods (5/10)

- How you did the experiment: cookbook
  - Methods and Apparatus
    - Less well known method
      - State the essential features and give the references
      - e.g. Lamellar bodies were isolated according to a previously reported procedure (Baritussio et al., 1981). This procedure separates lamellar bodies into two populations that have different densities: light lamellar bodies, which are collected between 0.33 and 0.45 M sucrose, and dense lamellar bodies, which are collected between 0.45 and 0.58 M sucrose.



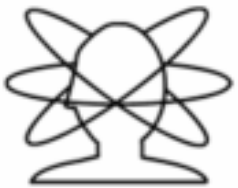
Methods (6/10)

- How you did the experiment: cookbook
  - Methods and Apparatus
    - Modified method
      - State the essential features of the modification in addition to giving the reference.
      - State the purpose of the modification
      - e.g. In lamellar bodies and other fractions obtained from the density gradient procedure, the amount of protein was determined (Lowry et al., 1951) using 1% sodium dodecyl sulfate (Eastman Kodak, Rochester NY) to reduce interference by lipids (Lees and Paxman, 1972).



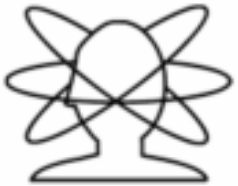
Methods (7/10)

- How you did the experiment: cookbook
  - Methods and Apparatus
    - New method
      - Present a complete description
  - Analysis of data
    - State how you calculated derived variables
    - State how you summarized your data



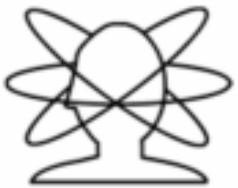
Methods (8/10)

- How you did the experiment
  - Preparation
    - Procedures done before the experiments can be done (anesthesia, insertion of catheter)
  - Assumptions
    - If your experiment design is based on assumptions, state the assumptions and your reasons for believing that they are valid.
    - If they are lengthy, they can be presented in the Discussion or Appendix.



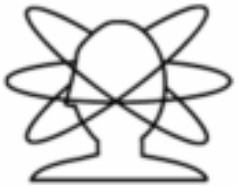
Methods (9/10)

- Why you did the experiment (procedure): purposes & reasons
  - Purposes: commonly signaled by
    - To + Verb
      - e.g. The materials was eluted in 5 mM Tris HCl/ 100 mM NaCl, pH 7.40, to separate collagenase-resistant fragment from intact surfactant protein A.
    - For + Noun
      - e.g. For primary culture, the cells were resuspended in Dulbecco's modified Eagle's medium containing 10% (vol/ vol) fetal bovine serum and gentamicin (50 ug/ ml)



Methods (10/10)

- Why you did the experiment: purposes & reasons
  - Reasons: commonly signaled by
    - because
      - e.g. Bovine serum albumin (0.1%, fraction V) was included in the binding medium **because** albumin reduced adherence of surfactant protein A to microcentrifuge tubes and …
    - Sometimes “because” is omitted
      - e.g. Radiolabeled surfactant protein A was used within 2-3 weeks after the iodination; **storage** for longer period of time reduced binding of protein to cells.

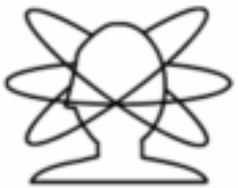


Materials and Methods (1/2)

- Relationship of parts
  - Relate the study design to the question it answers
    - Restate the question before describing the study design
      - In a topic sentence

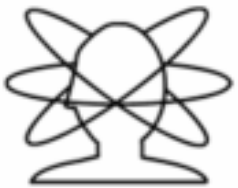
        e. g. The effect of high-frequency ventilation on the discharge of the three known types of pulmonary receptors was ascertained as follows. After a single….
      - In a transition phrase

        e.g. To determine the effect of beta-adrenergic agonists on clearance of liquid and protein from the lungs, we instilled into..
  - Relate the Methods to the Results
    - For every result in the Results section, there should be a method in the Methods section.



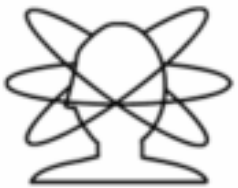
Materials and Methods (2/2)

- Length
  - As long as necessary to describe fully and accurately what was done and how it was done
  - Fewest words, not contain fussy detail
  - What constitutes fussy detail depends on what the readers of the journal can be expected to know.



Simulation and Experiments

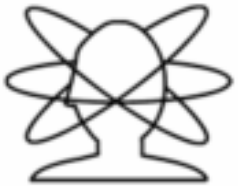
- Outline
  - Materials and Methods
  - Results
  - Discussion



Results (1/2)

A. Concept

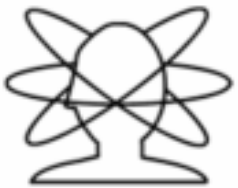
1. Present data only
2. Discussion should not be shown in this chapter
3. Present data in good order
4. Figure is better than bar chart
5. Bar chart is better than table
6. Table is better than words
7. Same data should not be shown in different forms
8. Results with comparison



Results (2/2)

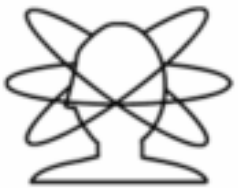
B. Contents

1. Data with comparison data in the same figure
2. Data with comparison data in the same table
3. Maximum four curves in one figure with different symbols



Simulation and Experiments

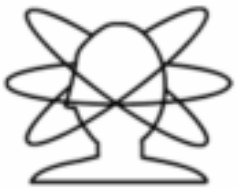
- Outline
  - Materials and Methods
  - Results
  - Discussion



Discussion (1/2)

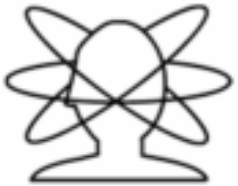
A. Concept
   1. Results should be presented in this paper

B. Contents
   1. Discuss methods used
   2. Discuss problems of computer program used
      a. Language
   3. Discuss calculated results



Discussion (2/2)

4. Discuss accuracy and uncertainty of measurement equipment
5. Discuss measurement data
6. Each figure should be discussed
7. Each table should be discussed
8. Discuss in good order and sequence following the numbers of figures and tables
9. Comparison with existing data



Outline

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- Abstract
- Acknowledgement
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- List of Tables
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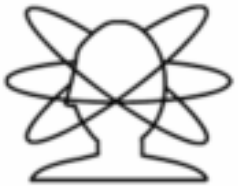
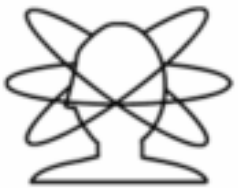
- Chapter 2 Background Materials
- Chapter 3 Problem Definition and Development
- Chapter 4 Simulation and Experiments
- **Chapter 5 Conclusions**
- References



Conclusions

A. Short summary from discussion
B. Recommendation for future works



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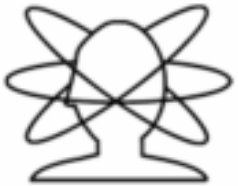
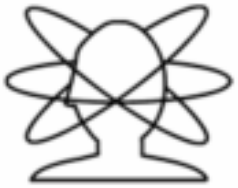


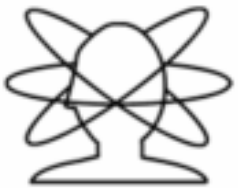
References (1/4)

- 參考資料之撰寫格式如下。但須注意：
  1. 論文或報告以中文撰寫者，中文及英文參考資料分開處理；中文參考資料依姓氏筆劃排列，而英文參考資料則依 Last name 字母順序排列。
  2. 論文或報告以英文撰寫者，將中文參考資料譯成英文，所有中文英文參考資料一起考慮，依 Last name 字母順序排列。



References (2/4)

3. 所有作者的名字均須列出。
4. 所列參考資料，在文章中均需引用。
5. 下頁說明例中，若無法用出體字或斜體字打出者，可改成畫底線方式。



References (3/4)

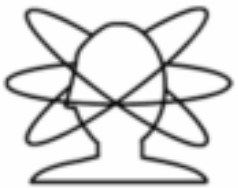
一. 會議論文(依次列出：作者、題目、論文集名稱、會議地點、卷號、頁碼、年份)

二. 期刊論文(依次：作者、題目、刊物名、卷號、頁碼、年份)

三. 學位論文(依次：作者、題目、學校系所別、頁碼、年份)

四. 技術報告(依次：作者、題目、發行單位、報告編號、頁碼、年份)

五. 書(依次：作者、書名、版次、書局所在地、出版書局、頁碼、年份)



References (4/4)

- Example

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