Writing a research proposal -- 研究計畫撰寫

Notes taken on Dr. P's presentation by Emad

1 - Introduction. 介紹

1-1 Why would you ever have to write a research proposal?
為何你必須寫一篇研究計畫

(1) To get a research grant to finance a research project.
從獲得研究獎助金以籌措研究計畫的資金。

(2) To get a stipend. 獲得獎助金。

(3) A requirement for both the MSc(MSD) and the PhD degrees. It is considered a part of the research.
為獲取碩士和博士學位的必要規定，也是研究論文的一部分。

(4) It helps in organizing your thoughts and at the end you can see whether you have achieved your goals or not.
幫助你組織你的想法並且最後你可以得知是否你已達到你的目標。

1-2 What are the main components and characteristics of a good research proposal?
什麼是一篇好的研究計畫的主要成分和特性

(1) Good ideas should be presented.
好的想法應該被呈現

(2) The ideas must be well presented.
這些好的想法必須被好的呈現

(3) You should present yourself as a competent researcher.
你應該呈現自己成為一位有能力的研究者

It is very important to present your ideas clearly and concisely because if you did not present your ideas neatly, the reviewers will ignore your application. This is because they are overwhelmed with applications which they have to review and evaluate in a very short time (sometimes they have 1 minute per application!!!). So, you should give enough time and effort in writing research proposals.

很重要的是呈現你的想法要清楚並且精確，因為假如你沒有呈現你的想法有條理，那麼檢閱人員會忽視你的申請。這是因為他們被申請案淹沒了!他們必須在很短的時間去審閱和評鑑(有時候他們甚至只有一分鐘一個案件)。所以，你應該給予充足的時間和努力在寫你的研究計畫。

2 - Research ideas -- 研究方向
2-1 Research questions vs. research themes -- 研究問題和研究主題

If the proposal did not have any general theme and it was full of research questions and ideas, the reviewers will say that the proposer does not have a research program. Conversely, if the proposal did not have research ideas and it contained general themes only, the reviewers will say that the proposer has no specific project. Therefore, the proposal should have a balance of research ideas and research themes. In other words, the proposer should have a framework and some ideas and questions that are formulated within this framework. For example, plant modeling is a general theme. While modeling trees in some way that has not been discussed before is a research idea within this general theme.

假如提案沒有一般的主題並解她充滿了研究問題和想法,那麼檢閱者將會認為提案者沒有計畫程序。相反的,假如提案沒有研究問題和想法,它只包含一般主題,檢閱者會認為提案者沒有具體明確的計畫。因此,提案者應該要再研究問題和研究主題間達到平衡點。也就是說,**提案者應該要一個各研究架構並且一些想法和問題,而這些想法和問題有系統的被框架下整個架構裡。**舉例,植物模型是一個主題,當模型樹木以某種方式這是尚未被討論過的,而這各研究想法就在這各主題裡。

2-2 Generating research questions -- 引發研究問題

Do not choose a research question or idea from the list of open problems at the end of the articles. 不要選擇一個研究問題或想法是從文章最後面所列的一堆問題中選擇

These ideas are either difficult for the researcher how presented them, or they are not interesting and will have very little, if any, contribution. Nevertheless, some authors present some feasible and interesting ideas to urge people to use the techniques they are proposing. To reach a good idea, the researcher should have a good background of the field he is working in. **The researcher should know what has been solved, what is solvable and what is interesting to him/her.** Unawareness of these aspects may lead to projects that are not solvable or feasible (e.g. finding a cure for cancer).

這各想法不是不同於研究者如何呈現他們,就是他們不覺得有趣和有意願。然而,有些作者提供一些可行的和有趣的想法去促使人們使用科技。餵了提到一個好的想法,研究者應該有一個好的背景領域,這是他專門的。**研究者應該知道什麼已經被解決了,什麼是可解決的和什麼是有興趣的對他個人而言。**不察覺這些方面可能會導致計畫沒有辦法解決或不可執行。(例如為癌症找一個治癒方法)

Consequently, there are two main sources for researchers to find good ideas. First, the supervisor; who has very good experience and who will help the researcher. Second, the researcher himself/herself; by spending substantial time and effort in his/her domain before writing the proposal. This is a period of 6 to 12 months.

結論是,這裡有兩各主要來源位研究者找到好的想法。第一,監督者,他有非常好的經驗並且願意幫助研究者。第二,研究者本身花大量的時間和努力在他的領域,再寫一篇研究計畫之前。

2-3 Safe vs. risky research -- 安全和有風險的研究

"If we knew what we are doing it would have been called research."
假如我們知道我們在做什麼那麼這就已經被稱為研究了。

Students in MSc programs tend to choose very ambitious topics which have no scientific roots. These projects are expected to fail. Topics for research should have scientific roots. In MSc, no novelty is required. And in PhD, students are not expected to "find a cure for cancer."

學生在碩士的課程中企圖選擇非常有野心的主題，其中沒有科學依據。在碩士，**不新穎是必要的**。在博士，學生也沒有被期待要找到癌症的新發法。

In writing research proposals for grants, researchers should provide a wide range of possibilities. That is, they must include some safe ideas and some risky ones. This should be balanced. They must be aware of the ideas that are safe or solvable and the ideas which constitute some risk.

為了補助金寫研究計畫，研究者應該提供一個廣大範圍的可能性。也就是，他們必須包含一些安全的想法和一些有風險的想法。這是應該有平衡點的。他們必須知覺到哪些是安全的或可解決的而哪些是有貢獻有風險性的。

2-4 Evaluating research ideas -- 評估研究方向

In evaluating research ideas, success should be well defined. In other words, the researcher should know at the end of the project whether he/she had any success or not. It should not be vague to decide. Moreover, the goals should be worthwhile. That is, the goals - if achieved - should be of some use either in further research or in the industry. Another important aspect in evaluating research ideas is the feasibility study. This is very much related to the plan of the research. The researcher should take into consideration the managerial problems of allocating the resources he/she has. These include: students doing research, money, time and equipment. Researchers should take into consideration that planning research constitutes some uncertainty and consequently the plan should not be very ambitious in one direction only but it should have a spectrum of possibilities as mentioned above.

評估研究方向，成功應該是被好好定義的。換句話說，研究者應該在計畫的尾聲就知道他是否會成功，這應該不是模糊的。此外，目標應該是值得去研究的。就是，目標，如果達成，應該是不是再未來研究或是在工業上都有一些用途。另外重要的方向是評量研究方向是可行的研究。這是研究計畫最關乎的部份。 研究者應該考慮管理分配資源的問題。這些包括學生做研究、錢、時間、知識的管理。研究者應該將計劃研究貢獻一些不確定和持續性的計畫不應該很有企圖的在一方面，而是應該一個可能性的範圍就上述提及到的。

3 - Creating bad impression -- 創造負面印象

Reviewers will get a very bad impression of the proposer if he/she attempted to do any of The following:　檢閱者將會獲得非常負面的印象有關申請者企圖作以下列的事項：

(1) Trying to show cleverness by writing expressions like "In my experience, I know that so andso ..."　試圖展現聰明，寫有關就我經驗而言。
(2) Trying to speak like a salesman.　試圖說話像是個銷售員
(3) Rearranging order of authors in the referenced articles and books in a way that may help the proposer in proving his abilities.
在參考文獻中重新整理作者的順序以至於可能幫助申請者證明他的能力
(4) Writing a proposal that is too technical and full of jargon.
寫研究計畫太過技術性和專業術語。
(5) Writing the proposal in a very easy language.　寫研究計畫以非常簡單的方式。

See Table 1 in Bundy's "The researcher's bible" for a complete list of things that may create bad impressions.
請參考Bundy所寫的『研究者聖經』目錄1，其中對如何製造負面印象有完整的條列可供參考。

4 – Questions -- 問題

4-1 In the field of computer graphics people are used to borrow some topics from mechanical engineering, biology and others. Will these research projects be acceptable if they have been a PhD thesis ?
在電腦繪圖領域，人們習慣於借用一些主題是從機械工程、生物學或是其他。是否這些研究計畫可以被接受假如他們已經是博士論文的主題？
Answer: This is very risky. There should be something new. Probably, there will be a referee in the examining committee from one of these fields and he/she must be convinced of what you are doing.
解答：這是非常具有風險性的。他們應該是新的東西。或許，有一位審閱專家在審問委員會時，它使其中這些領域的專家，他必須被說服你所做的。

4-2 What are the differences between an academic research and an industrial research or project? 什麼是學術論文和產業論文研究或計畫的差別
Answer: In industry, people are interested in applications. They may give grants to professors at universities to do software development. This is not acceptable as research in an academic institution. Approach to acquiring knowledge in the natural sciences 解答：在產業，人們對申請有興趣。他們可能給予大學教授獎助金為了軟體的發展。但是在學術機構卻不被接受。學術機構比較傾向在自然科學中獲得知識

1. identification of problem; 定義的問題
2. hypothesis; 假設
3. deductive reasoning- decide on procedure; 推論的理由 決定於程序
   -- what would be observed if hypothesis was true? how can it be tested? 假設如果是真的什麼是被發現的？如何可被測試？
4. data collection and analysis; 資料庫的整理和分析
5. derive conclusion. 衍伸結論
   -- never prove a hypothesis. 從不證明假設
   -- confirm or fail to confirm Scientific theory. 已確認或失去確認的科學理論
   -- what is a theory? compare to law. 什麼是理論 比較定律
   -- characteristics of theories. 理論的特性
   -- explains observed phenomenon [explain why]. 解釋觀察到的現象和原因
   -- should be consistent with previously established knowledge. 應該與先前架構的知識一致
   -- should be verifiable [can we test it?] 可被驗證 如何被驗證
   -- should stimulate further research. 應該更近一步刺激研究

typical sequence 典型的順序
1. selection of problem and derive a hypothesis; 選擇問題和衍生假設
2. review of research; 檢閱文獻研究
3. develop method; 發展方法
4. data collection; 資料整理收集
5. statistical analysis; and 統計分析
6. interpretation of results & conclusions. 闡述結果和結論

1 --> 2 is not necessarily a linear process!!!
   從選擇問題和衍生假設到文獻檢閱中間過程不需要是線性的，也就是可以水平的檢閱。

The organization of primary research articles follows the steps in the scientific method
首要研究文章的整理依照科學方法有以下步驟

Abstract -- 摘要
brief overview of the article. 簡短概跨整篇文章
usually 200 -250 words maximum. 通常200到250字最多
convenience to reader, not all journals require an abstract. 方便讀者，而不是流水帳。

1. Introduction -- 前言
states the problem in a general way. 就一般地陳述問題
cites important previous theory. 引用重要的先前理論
justify the importance of the study -- importance should be objectively clear.
辯證研究的重要性　此重要性應該客觀清楚

2. Review of research -- 文獻探討

- cite previous research -- what is the background in the field that leads to your study?
  引用先前研究 什麼研究背景導致你的研究方向
- **should be evident where your research fits -- look for evidence of bias.**
  應該明顯的知道你的研究適合點　尋找證據的偏見
- **who is the author? what is the author's affiliation? does affiliation indicate bias?**
  誰是作者？什麼是作者的加入觀點？加入觀點是否指出偏見
- if author is strong proponent or opponent of certain theory, may be an indication of bias. 假如作者強烈支持或反對某一理論，這可能是一個偏見的徵兆。
- does author cite relevant research? 是否作者引用相關研究
- usually key studies will be mentioned over and over again, if these are missing, may signify that author hasn't done a thorough review.
- 通常主要相關研究會被一再地被提及一便又一便，假如這些有疏漏，可能表示作者沒有完整的檢閱之前的相關研究
- is review of research biased toward a particular viewpoint?
- 檢閱研究的偏向是否朝向一個特定的觀點
- are contradictory studies ignored? is biased language used?
- 是否相矛盾的研究被忽略 是否偶偏見的語言使用
- how many articles in a review of research? 有多少文章被檢閱
- can't review everything, depends on **journal space**; general guideline, 5-10 key articles should be cited, if only briefly.
- 無法檢閱每一樣東西 有賴於日，一般指導方針是5到10各文章應該被引用，假如只有簡單的情況下。

3. Hypothesis -- 假設

research hypothesis is a statement of what we expect.
研究假設是一個我們期待研究什麼的陳述
we make a guess about the relationships between variables or the differences between two treatments, etc. 我們猜測可變因素之間的關係或是差異性等。
may be a statement or in question form. 或許是一個陳述或是一個問題。
a good research hypothesis: 一個好的研究假設有以下幾點：

(1) sets up a "testable" situation; 設計成可測試的情狀
(2) gives direction to research; 給予研究方向性
(3) identifies the variables of importance; 為可變因數的重要性下定義
(4) is grounded in theory; 架構於理論上
(5) is brief but with clarity. 是簡單但是清晰

Some studies use **objectives**, instead of a hypothesis -- descriptive study, ethnography. 有些研究使用**客觀存在事實**，而不是假設，是可描述性的研究，例如人種誌。

ex.- do descriptive study of teacher salary -- look at **salary schedules and policies**; objectives are to describe level of salary for state and education levels. 例如做可描述的老師薪水研究，看月薪計劃表和月薪保單，客觀存在事實就是去描述教師月薪水準狀況

和教育水準。

　　ex.- study sex-role related prejudices in kindergartners observe sex-role related play, record instances of peer learning of sex-role related behaviors, look at influence of teacher.
例如 研究性別角色相關偏見,在幼稚園中觀察性別角色相關的遊戲和紀錄性別腳色相關行為的同等學習紀錄,看老師的影響。

4. Methods -- 研究方法

sampling -- how was sample selected? 樣本 樣本如何被選取

what does sample look like? 樣本看起來應該怎樣

can't study entire population. 無法研究整個人口

want to get a sample that reflects the population. 想要獲得一個樣本可以反應人口

data collection - what data was collected. 資料收集 哪些資料要被收集

how was data collected. 如何被收集

does data seem to be reliable and valid (Construct vs. Indicator).
是否資料可信賴和有根據。

statistical analysis. 統計分析

how was data analyzed? 資料如何分析

5. Results -- 研究討論

data crunching results are given with level of statistical significance.
資料成了結果有了某種程度的統計上的重要性

6. Conclusions -- 研究結論與建議

are conclusions warranted? or do they go beyond the results?
是否結論正當有依據?或是他們超出結果?

Look at article critique --website: Author makes statements about teaching effectiveness, not warranted by what was investigated.
看文章批評網頁:作者對教學效用做出陳述,不是就就發現而得到正當結論。

do conclusions answer the research question?
結論是否解答研究問題

do conclusions agree with previous research?
結論是否與之前的研究一致

what is the future of research in this field?
在這個領域上,未來的研究是什麼

good research often generates more questions than you answer.
好的研究通常產生更多問題是超出你的答案的