



## How to Write a Thesis and Turn It into Publication

EDITORIAL

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As a fellow or a researcher, we should completely be clear why we want to begin a thesis and to be published? Science progresses through writing a thesis that begins with brainstorming about novel ideas, iterative nature of drafting, soliciting feedback from the professors, and revising. The main finality of a thesis is to reach to a reader by publication of it in a prestigious peer-reviewed scientific or medical (inter)national journal. Therefore, learning of writing a thesis is central to science progress and writing skills are critical for this. In other words, a thesis is the first writing experience and opportunities of you to learn scientific writing, which should motivate you as you make the journey, for instance, to the front page of the "Survey of Ophthalmology" (1).

My aim is to give you some strategies to assist in the preparation of a thesis and to encourage you to disseminate your thesis through an international journal publication with practical ideas. Therefore, the primary audience for this "Editorial" is not only the fellows who are conducting a thesis at present, but also the assistant or associated professors of faculties who completed a thesis with their fellows in the last few years which remain unpublished. So, if you don't care about "finishing the thesis" or "being published", I immediately suggest you doing another useful job instead of reading the remaining of the present "Editorial".

When the hard part of a thesis (the completion of it) is over, you will soon realize that it is only just the beginning as it has to be written-up. However, it is obvious that the writing process of a thesis is frightening. Indeed, busy clinical training or work and lack of time make it difficult for you, the novice fellows, to turn your work into written thesis and then into peer-reviewed (inter)national publications. However, you must consider early publication of your thesis in journals before the examination of it by a selected jury will be completed. In other words, new data you found in your thesis have a limited shelf life and so get your thesis publish, when available, before it perishes.

Writing an international article from your thesis is always much more difficult than you anticipate. The authors who have discovered the tricks and the secrets of writing and publication are generally unwilling to pass it on to younger rivals, that is you in this circumstance, and this can be understandable (2). Therefore, you will face many frustrations along the way and you should be prepared for the consequences of writing a thesis as it is actually a stressful event. Indeed, it has scientifically been demonstrated that episodic stress associated with "writing a thesis" causes increased cortisol levels after awakening as a sign of psychosocial stress in undergraduate students (3). Additionally, you will soon realize that nobody pays any attention to what you did or published. Moreover, nobody will mention your thesis and nobody will respond it as well. Furthermore, it is extremely clear that most of you, as the readers of the present "Editorial", will never win the Nobel or even TÜBİTAK prize as many theses are poor and will neither be read nor cited, unfortunately. But still, please do not drop out during the course, take others less seriously, do not let them discourage you and stop being scared by co-workers in your department who appear to be more successful at finding a new idea or tricks than you (2). For this, I will give you some realistic tips and tricks that may make the "writing" and "publishing" process as easy as possible. Please do not forget that you cannot learn to paint by visiting only the art galleries and looking at pictures hanged on the walls.

A fellow who begins a thesis and writes it is engaged in scientific ways of *thinking*, *questioning* and *synthesizing*. In other words, writing skills are not acquired automatically and one of the best opportunities to write like internationally published authors is to finish a thesis first and then write it. However, the skills that fellows are least likely to develop are "writing skills" and the hardest aspect of any thesis is the "thinking" part. Therefore, although a thesis

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supervisor, who is generally a faculty professor, works one-on-one with a fellow, the most important component of a thesis is not the data or the tables and figures, it is only you as the “thinking” and “writing” is extremely personal processes. Please do also not forget that writing a scientific journal article differs from writing a thesis. Moreover, you should understand that you can win the publication game at the end by only working very hard and becoming an international author. For this, you should finish and get your thesis published not only for intrinsic and extrinsic motives including employment opportunities, career advancement, academic pressure and personal satisfaction, but also to keep the journal editors in a job. Indeed, without you (the fellows, researchers and nationally or internationally published authors), there would be no editors and co-editors, like me. In other words, researching and writing a thesis play a major role in the acquisition of knowledge and writing skills that may consequently be transferred into scientific international articles. Therefore, we need you more than you need us and it is still worth learning how to begin and write theses (2).

About two decades ago, we would visit libraries to search the literature, leafing through thick editions and taking small notes on blank papers. We would then take a pencil to write the first draft. In today's fast moving scientific world, you are very lucky as you can search the needed databases from your own chairs, downloading articles that interest you in seconds. Your labour-saving personal computers produce a range of tables and graphs within minutes and warn you when you make errors of grammar and/or spelling (2).

Theses must contribute not only for knowledge enlargements, but also to solve problems, offering background for further investigations. The aim of a thesis must focus on or address a single research question. In other words, a hypothesis should clarify only one simple message per thesis (4), though it is not the case in general and in Turkey. But still, please do not come up with enormous questions and tasks at the beginning, but generate new knowledge or apply existing knowledge to an important problem. Otherwise, your writing will possibly fail as the reader is unable to come away with a clear message and generally he or she blame himself or herself for not being clever enough to understand your message, though the fault, in fact, lies with you (2).

Every thesis must obey to some rules and most faculties have their own guide to writing a thesis with some limited minor variations (5). Therefore, headings and subheadings should be formatted consistently, which generally uses a standard structure of Title Page with a “Title”, Special Thanks, Table of Contents, Abbreviations, list of Graphs/Figures and Tables, Abstract with Key Words, Acknowledgements, Introduction and Aim, Background, Materials and Methods including Statistical Analysis, Results and Discussion with Summary, plus the final list of References. As a starting point, some criteria should first be fulfilled in a novel thesis as the basic building blocks of science are “original articles”; **(1)** is the idea new? (*original*), **(2)** is there any important advance? (*significant*), **(3)** has it been first demonstrated by the researcher? (*first disclosure*) and finally **(4)** can the investigation be repeated by independent other researchers? (*reproducible*) (2, 5-7). Then, put a realistic time limit on the whole writing process, such as 20 minutes a day and five days a week in a six-month period.

Now, you, as a researcher, know what and why need to write (2). So, please spend the necessary time deciding what you have to do to get there, that is, to get the final destination. Think first about what to write on the way to hospital or department. A good hypothesis is rooted in good thought, which is vital. Then, do a literature search in PubMed and set yourself a brief title. Keep the title as clear as possible and express it as one sentence of 10-20 words, with a verb. For example, imagine that you have started a prospective, controlled trial to see whether non-steroidal anti-inflammatory drugs are effective for preventing posterior capsule opacification after cataract surgery in pediatric cases. Finally, you will come up with a number of alternative titles:

1. *The effect of non-steroidal anti-inflammatory drugs on posterior capsule opacification in children with cataract surgery;*
2. *Non-steroidal anti-inflammatory drugs delay posterior capsule opacification after pediatric cataract surgery;*
3. *Do non-steroidal anti-inflammatory drugs delay posterior capsule opacification after phacoemulsification in children? A randomized, prospective controlled trial (8).*

Note that the first title gives the subject whereas the second and the third titles give the message, both of which have verbs. All might be plausible. However, the first title is generally preferred for the cover of theses whereas the remaining two for the journal publications. I personally preferred, for instance, the final third message, which was in “question style” (8). When writing a thesis or an article, such a message may narrow the field and should be a useful starting point for you. However, a thesis may also give the same title of subject during its (inter)national publication process (*The effect of reading and near-work on the development of myopia in emmetropic boys: A prospective, controlled, three year follow-up study*) (9).

How long should your thesis be? In general, a fellow think that the longer the thesis, the better it will be. It is completely wrong and the answer is quite simple. The problem is not the total number of words and the references, but how you order the thesis with clear messages. All theses can be shortened. This process will make life harder for you, but easier for the responsible university professors as well as for other readers.

Until present, you set an initial title of your work. Write the sections in the order in which they will be read in the thesis. Do not try to impress your professor. So, use your natural language. Therefore, please set a brief first and expand it appropriately. Then, try sketching in some of the “**INTRODUCTION**” (2). This section is the hardest part of anything you write and should answer the question “why did we start to the thesis?” In this section, state the aim of the thesis and summarize the rationale for the investigation. Write down the first opening sentence. If you do not like this sentence, start with the second one. Therefore, please do cite a small number of strictly pertinent papers with references in this section and do not include any data or conclusions being studied.

The first paragraph(s) should give the *background* to the thesis and the gap in knowledge that your thesis is about to answer. You may

spend days thinking of a good first sentence for the *Introduction* section that may give a brief lesson on the subject (the **seminar** approach) (2): *Cataract in children require surgical removal of the crystalline lenses*. A second technique is to refer to a controversy (Much Discussion Recently - **MDR** - approach): *There has recently been much discussion about how to treat posterior capsules in children who have cataract surgery*. An alternative is to emphasize the gravity of the condition (**alarmist** approach) (2), which I prefer in general: *Children with cataract obscuring the visual axis **promptly** require surgical removal with or without posterior chamber intraocular lens implantation to avoid **severe amblyopia***. The last sentence of the *Introduction* should describe what the researcher of the thesis did (*The purpose of the present thesis was ...*).

Afterwards, it is very easy for a fellow to collect traditional information to put in "**BACKGROUND**", but much harder to decide what to leave out. Please do not exaggerate this section and collect only the relevant references.

The "**MATERIALS and METHODS**" (2) section of a thesis answers the question "what did you do in a logical framework of time?" It expands on the information just given in the final paragraph of the *Introduction*. Information in this section should be sufficient enough for readers to enable them to evaluate and to replicate the work, when necessary, with relevant statistical analysis. For this, describe your selection of the observational or experimental subjects. Identify the age, sex, methods and procedures in sufficient detail to allow other investigators to replicate the results. Give appropriate references to establish both statistical and non-statistical methods with brief descriptions. Information on all major study elements including the protocol, assignment of interventions and the method of marking (blinding) should be included. Describe statistical methods with enough detail at the end.

The "**RESULTS**" (2) section answers the question "what did you find?" For most of the theses, the heart of this section is the data, mostly presented as tables and graphs/figures, which should be as simple as possible and be augmented information given in the text. Otherwise, the reader will not thank you. Fellow often find it difficult to decide what goes in a table and what in the text. The text should emphasize or summarize only the important findings and observations to tell the main elements of the story and to draw the readers' attention to some of the main features of the tables and figures. So, present your results in logical sequence. Otherwise, the text in this section should not repeat the knowledge that was given in tables in detail or illustrations. Similarly, do not duplicate data in graphs and tables.

The "**DISCUSSION**" (2) section answers the question "what does it mean and why is it important to you and to readers?" Compare your findings with previous works. The first sentence should be clear and summarize the main finding(s) of the thesis: "*In the present study, we found that ...*". The most alarming and intriguing sentence the (co-)editors interested in is: "*This study has demonstrated for the first time that ...*". Therefore, the novel and important aspects of the investigation and the conclusion that follow from them have to be emphasized clearly to the readers and the editors. Do not repeat here the information and data given in

the *Introduction* and/or *Results* sections. Include the implications of the findings and their limitations, and make a discussion on the other observations to relevant studies. Avoid statements and conclusions not completely supported by your data. State new hypotheses when warranted. Appropriate recommendations may be included. Please find the answers for the questions; are the findings reliable and what do they mean and where do we go from here? The limitations of the study, if present, should be discussed in this section.

The most important message should appear in the last sentence of the thesis. Some examples may be as follows: "*We conclude that non-steroidal anti-inflammatory drugs are effective for preventing posterior capsule opacification after cataract surgery in pediatric cases*". Two other types of ending ("More Research is indicated" or "Perhaps Possibly" last sentences) may also be preferred in some instances: "*Further investigations are needed to support our preliminary results*".

The "**REFERENCES**" (2) are an integral part of the text and should be numbered consecutively in the order in which they are first mentioned in the text. Avoid using abstracts as references. References to articles accepted but not yet published should be designated as "in press". All the references must be verified by you against the original document. In other words, you should have read all the papers you cite and be ensure that the article you cite say what you say they do. Make sure that the numbers of each reference in the text are the same as the numbers in the "reference list".

The "**SUMMARY**" (2) section should reflect the text accurately and briefly. It should briefly summarize the purpose, basic procedures, main findings and principal conclusions. This section must be short. So, try to avoid repetition here. If you have only one objective in your thesis, you should have one clear conclusion. So, do not add a new material to the summary. If you, on the other hand, have more than one objective, you may have more than one conclusion. But still, it should emphasize new and the most important aspects of your work, not every single finding. In addition, do not speculate or overestimate your conclusions those were not verified by your finding.

Fellows should write their thesis themselves, possibly with some help from their supervisors. Today, there are various unimaginable commercial services that provide help for writing a fellow thesis. This condition is called ghostwriters and is stated to be totally unacceptable (10).

Once you have finished your writing with the rules stated above, you possibly submitted a poorly written draft. So, walk away from the thesis and put some distance between you and it. Leave it for a few days or weeks on the shelf. Finally, read the print out of the drafted thesis/paper carefully for grammar, style and consistency. Otherwise, how can a professor in the jury or an editor rely on the accuracy and consistency of your work if you show no accuracy in your use of language, grammar and style? Check the consecutive page numbering as well as the consistency of the numbering of tables and figures or graphs. Check the tables and figures for their accuracy. Check the margins of the pages whether they are in accordance with the rules of your faculty. The right margins must also be justified throughout the thesis (2).



Many theses are not being submitted for professional publication, perhaps due to a combination of various factors including time constraints and lack of mentoring (10). In addition, a recently graduated fellow is now engaged in searching for a new position and moving to another city. However, please do not forget again that the longer you wait, the greater the risk that your data will grow stale (11).

One of the big problems a fellow confronted with is the order of the responsible researcher and the co-authors when a thesis will be published in a journal. You have carried out an outstanding work for your thesis and it has finally finished. Now you think that you deserve to be the first author due to your contributions and time allotted to your thesis. However, when the time came to write your thesis, you did not demonstrate any attempt to write it even though your supervisor warned you again and again (11). The reason of this may be that you do not have sufficient knowledge or skills to think and conduct a thesis and prepare a publishable article without substantial support from your supervisor (12).

Please do not forget that writing is a personal activity and you should know that first authorship is equated with substantial contribution to writing the manuscript, so it is important you understand this is part of the responsibilities of being first author (11). In peer-reviewed international scientific publications, the first and the last (senior/corresponding) authors are typically the researchers who made the most valuable contributions to the article (13). Doctoral students or fellows are usually authorized as the first authors of theses based on their dissertation research (14). It has been recommended that when there is any question as to who made the primary contribution, the student should receive higher authorship (11). The reason of this is to protect the student who has less power in such a situation (11).

Who would be the first author if the supervisor wrote the thesis for international publication instead of you? Although this kind of controversial situation may be familiar for you and your supervisor, there are no guidelines that might be implemented in advance to handle this kind of problem (11). But still, the supervisor and fellow should discuss the reasons for changing authorship order, when necessary. In general, authorship should be negotiated in the context of following questions; **(1)** who is the owner of original idea? **(2)** who planned and designed the study? **(3)** who carried out the work that created the data? **(4)** who wrote the first draft and the final article? Therefore, as intellectual contribution is more important than actual time and effort expended when determining the order of authorship (11), my personal opinion is that if you, as a fellow (not your responsible professor), is the person who is *thinking* the original idea, *writing* and *rewriting*, it means that you are the team leader and you can be the "first author". We know that the supervisor will revise your first draft. However, this activity does not warrant a change in authorship order (11).

If, on the other hand, the thinking and managing responsibility of the project belongs to your university professor and if you do not write even the first draft of your thesis, the paper will likely get written completely by your professor. In that case, he or she will have a sound of moral case to be the "first author" even if you seem to be the owner of the thesis (2, 3). But still, it will be the managing

professor's responsibility to solicit you individually and make decisions. That is, the professor may prefer you as the first author and him/herself as the corresponding author.

We, editors and co-editors, have sometimes encountered by clear cases of "ghost authorship" when authors who had no right to share the credit have insisted that their names be included on the final authorship list during its publication process. However, only individuals who have made important substantial scientific or professional contributions to your thesis should be listed in the final authorship list, regardless of their status (12). At least one of the following criteria must be met; *conception, design, analysis* and *interpretation* of data, *drafting* or *critical revising* of the article, or *final approval* of the version to be published. That is, general supervision by, for instance, the head of the department is not sufficient for the authorship, which is sometimes the case in Turkey, unfortunately. If you do not want your thesis starts to look ridiculous, please avoid listing, for instance, eight or ten authors during the national or international publication process of your hypothesis reporting only a single test on a group of subjects, which will obviously jeopardize your chances of publication. Therefore, the order of remaining authorship should be negotiated between you and your supervisor in the initial stages of your thesis and its writing. If you do not perform all the statistical evaluation and analysis yourself, please do not forget that you involve a statistician in acknowledgements. If, on the other hand, you have consulted one who performed a significant contribution to the thesis with a numerous statistical analyses, please consider his or her name in your final authorship list, whenever relevant.

Start asking yourself the following difficult and critical questions (2); **(1)** is there a clear message in your thesis, **(2)** do you prove the message, and finally **(3)** is the structure and the length of the thesis appropriate and reader-friendly? Do micro-editing for omissions and errors. Be obsessive at this stage. Most computers have a spell check. Please use it. It will take only minutes. You will almost pick up many misspellings that you will probably never spot (Did you notice the missing "s" in "obsessive" above?). Please do not forget that long sentences are not reader-friendly or understandable. In addition, long sentences and words are not a sign of cleverness of you. In fact, new ideas must be conveyed in the fewest words. Therefore, be vigilant, use clear English and avoid pompous polysyllabic words. Finally, always ask someone else to read your thesis to check for its readability or use voluntary internal reviewers as good advice from your experienced co-workers will be essential (2).

Now, choose the appropriate journal for your article, as a paper delivered to an inappropriate audience will possibly be rejected directly by the editors. In other words, decide whether the journal you submitted your thesis is interested in the type of research you conducted, which can easily be found from the "Instructions to authors" of the journal (11).

Plagiarism, a familiar concept to most researchers and authors, should strictly be avoided, though many of it are unintentional as the authors are unaware of some of the nuances regarding plagiarism (11). However, there are two generally accepted categories (11, 15); **(1)** *cryptamnesia*, in which you think your idea is original when it in fact was reported previously by another person,

(2) *inappropriate paraphrasing*, in which you are copying or paraphrasing someone else's published paragraph without citing that source in the text, and/or using someone else's expressions with little or no modification (16). Similarly, there are also some ambiguous use of citations or self-plagiarism by repeating verbatim text from a previously published article without permission (11). To avoid plagiarism, limit the use of direct quotes and avoid the use of secondary sources and instead cite the original source when available (16, 17).

Publishing in multiple sources should also be avoided. Although it is appropriate to submit some part of your work for presentation at a conference prior to its publication in a journal, an article should not be under review by more than one journal at a time.

Sometimes, a thesis may include various researching points. So, you can publish the different parts of your work in different journals provided that two papers differ substantially and you are citing this situation in your latter paper or disclose this situation appropriately in your cover letter. However, please strictly avoid from salami science.

Your thesis should generate transferable knowledge and skills that must be used in daily work. You are now familiar with how to search for and evaluate information in a scientific manner and required these attributes during your thesis process. In other words, writing a thesis is a way of learning how to write a scientific article. Therefore, you now won the publication game. Congratulations.

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