The Secret of Building a Logical Argument

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At Mei-Writing we advocate a writing approach for research papers that begins with a preliminary thesis statement. The entire process of research writing under the Mei-Writing approach is the development and confirmation of the thesis statement, by equipping it with logical or convincing support. At the end of the process, the thesis statement is turned into a confirmed conclusion. The approach to building a logical argument from an argument's conclusion is called Construction Logic. In this paper, I will briefly explain the motivation for Construction Logic. I will also address an important question concerning the new approach; namely, what are the premises that constitute convincing support? As we shall see through an example, there are basically two types of premises needed in order to make a thesis statement convincing. The first is called the Premise of Proof, which functions to prove that the thesis statement is true by presenting the evidence that infers the truth. The second is called the Premise of Defense, which functions to prove that the thesis statement is not false by presenting the evidence that can defend the statement against some known counter statements. I shall explain why these premises make one's argument clearer and more convincing, so as to explain what makes Construction Logic "special".

1. What This Paper Is About

This paper is based on my talk given at the 3rd International Symposium on Academic Writing and Critical Thinking. There I introduced an approach to logical thinking education that I call Construction Logic. Briefly speaking, construction logic teaches the construction of a logical argument from the argument's conclusion. In my view, construction logic is more effective than conventional studies of logic in teaching graduate students how to build a logical argument for their research writing. However, the argument for this thesis statement involves not only a comparison between two different approaches to logic studies, but also the reason why graduate students need to learn logical thinking skills for writing research papers. Thus, the whole project of construction logic covers both logical thinking studies and academic writing education. That scope, however, is too large to be fully covered in this short paper.

In this paper, I can only highlight some important elements. Specifically, I will briefly introduce the motivation for construction logic, which comes from both research writing and logical thinking studies. Then I will turn my attention to the two premises that constitute convincing support, highlighting what they are and why they are special. I will end the paper by responding to a potential counter-statement to construction logic.

2. Research Writing

I think it is fair to say that research writing is a very special kind of writing. Arguably, only a very small number of people know how to write a research paper. This is because writing a research paper is very different from, say, writing a diary. Research writing is not about writing down what you have experienced today and how you feel. The primary focus of learning how to write a research paper should not lie in the training of language use.

John Swales and Christine Feak are right in saying that research writing is about competition among fellow researchers for acceptance and recognition in their respective research field (Swales and Feak 2012, 284). But contrary to what they go on to suggest, what is primarily important in research writing is not learning how to use a language more professionally or academically. It is about having a clear research idea and convincing support for the idea.

No doubt, presenting your research in vocabularies and phraseologies that are commonly understood by those professionals in your research fields is important for acceptance and recognition. But as far as the competition is concerned, in order to win, you need to demonstrate something unique in your research. And that cannot be just the mastery of the standard terminologies and phraseologies, because all fellow

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researchers could learn to do the same thing if they follow the guidelines from a good textbook (such as Swales and Feak's).

Indeed, if we look at the competition from the perspective of academic publication, then it is even more obvious that the battle for acceptance and recognition is not fought at the level of language use. Assuming that all the fellow researchers in your field use the standard terminologies and phraseologies, and present them in more or less the same formats and styles in their writings (by following the same templates and so on), then the ultimate weapon for winning the competition – hence publication – should be the original idea presented in one's research writing.

An original idea is the heart of a research paper. But an even more crucial and challenging task is to provide convincing support for the idea, so that the journal editors, reviewers, and other people who are reading the paper can take the idea seriously.

Research, according to Wayne Booth and his colleagues, is about gathering information to answer a question that solves a problem (Booth, Colomb, and Williams 2008, 10). What is insightful about this broad definition is not what research involves but what it implies. If one did not have a hypothetical answer in mind before going out to gather information, then one would not even know where to begin. The process of information gathering in research is but a process of forming a hypothetical answer and confirming the hypothesis. Coming up with an original idea and having it convincingly confirmed are the keys to conducting satisfactory research.

Similarly, the entire process of research writing centers on the formation and confirmation of an original research idea. The primary purpose of writing a research paper is not just to communicate a bunch of symbols presented in a particular way. It is to convey an original research idea to the paper's readers and to convince them to accept the idea by demonstrating the logical steps that lead to its confirmation. The convincingness of an original research idea is the key for a research paper to be accepted for publication.

In research writing, it is common to use a technical term to describe the original research idea. The technical term is *thesis statement*. The thesis statement can be regarded as an umbrella term. The early stage of a thesis statement can be simply an intuition, a hypothesis. The development of a thesis statement is a process of collecting and building supporting evidence to confirm that the thesis statement is true or most probably true. Once the supporting evidence for a thesis statement is well established, and the truthfulness of the statement is confirmed, then the thesis statement will become the conclusion of a research paper.

Mei-Writing advocates an approach of having a thesis statement built in the beginning of the research writing process. This is not really a new approach. Many western approaches to teaching how to write academic papers already embrace such a strategy. For example, Kathleen Moore and Susie Cassel wrote a textbook for college writing that places "thesis statement" in the title of their book, emphasizing the importance of having a thesis statement in an early stage of the writing (Moore and Cassel 2011).

What makes the Mei-Writing approach "special" is how the thesis statement is supported. Specifically, what makes our approach special is the education on how to build a logical argument based on a thesis statement. This is where construction logic comes in.

3. The Logical Thinking Studies

Many writing instructors and specialists have talked about the importance of having a logical argument in research writing. For example, Wendy Belcher believes that the main reason why research papers are rejected is that they do not have an argument. And the main reason why many research papers do not have an argument is because "Argument is notoriously difficulty to teach" (Belcher 2009, 82).

I met many students who thought that they could learn how to build a logical argument by reading a standard textbook on logic. This is a misunderstanding. Conventional studies of logic do not teach people how to build a logical argument, let alone how to build a logical argument for research writing.

The conventional studies, which include both classical and contemporary studies of logic, have a very specific focus regarding the studies of logical argument. And that is the proper assessment of a logical argument. This focus is clearly stated through a definition of logic given by a popular logic textbook: "Logic is the study of the methods and principles used to distinguish correct from incorrect reasoning" (Copi and Cohen 2005, 4). The definition of logic places the primary goal of logic studies on the *analysis* or

assessment of the logical relations linking premises and conclusions. It is through the analysis of the logical relations that the general rules and principles underlying the relations can be identified and used to distinguish between correct and incorrect arguments. Indeed, the study of validity principles has been widely regarded among logicians as the cornerstone of logic studies.

No doubt, knowing how to properly assess a logical argument is very important for understanding how statements can be correctly related, which is important for knowing how to improve an existing argument. However, in order for the assessment to be carried out, we must already have a group of statements available for assessment, regardless of whether they are qualified to be an argument or not. But this is usually not the case as far as research writing is concerned. Research writing is by nature a process of construction, which often requires the writer to construct a logical argument from scratch. Here the problem a research writer faces is not about how to improve an existing argument, but about how to build an argument from nothing. Even if one has acquired the ability to properly assess the validity of an argument, it does not follow that one knows how to properly construct an argument. Understanding what makes an argument perfect is one thing. Knowing how to build one is quite another.

Now we can see that there is a gap between the assessment and construction of an argument. To teach how to build an argument, therefore, we need to adopt a radically different approach and attitude to the studies of logic. Instead of teaching what makes an argument valid, we need to teach how to build the first statement of an argument, and then the second, and then the third. The goal of the present education is not about finding the universal law that connects one truth with another.[1] It is also not about understanding what makes a logical argument valid. It is simply to teach students how to build a logical argument based on a thesis statement that comes from their research.

In construction logic, the view about logical argument is a lot simpler. Logical argument is seen purely in virtue of the practical function it performs in research writing. Specifically, the practical function of a logical argument in research writing is to prove that the thesis statement of a research paper is true or most likely true by reference to the premises that can infer the truth. Accordingly, the first statement to be built in the argument construction is the thesis statement, which will become the argument's conclusion after the confirmation of its truth.[2] The rest of the construction process is to find and establish the premises that can infer and defend the truth of the conclusion. In my view, if you have the premises that can infer and defend the truth of a conclusion, then you have convincing support for the conclusion, which is just to say that you have a convincing argument.

4. The Two Premises

Now I have come to the most important question about the convincingness: What exactly are the premises that constitute a convincing argument?

The premises that constitute the convincingness can be basically divided into two types. One type is called the Premise of Proof (POP). Its function is to support a conclusion by presenting the evidence that can infer the truth of the conclusion. The other is called the Premise of Defense (POD). Its function is to defend a conclusion from some counter-statements by presenting the evidence that can infer the falsehood of the counter-statements.

Evidence for the use of POP and POD can be found in all fields of research, simply because the use of evidence to prove or disprove a claim is really a standard practice of investigation. What makes the account about the two premises special is that it incorporates an account about evidence, as well as an account about how the premises are derived from a conclusion.

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1 Gottlob Frege (1956) once thought that it is the task of logic to discern the *laws* of truth.

2 I will use the term "thesis statement" and "conclusion" interchangeably in this paper.

4.1. An Example

Here I am going to use a claim made by the Environmental Protection Agency (EPA).[3] The claim, according to the EPA, is already a confirmed conclusion, although it is still highly controversial. In order for the conclusion to be widely accepted by the public, it requires convincing support. For this reason, I think it serves as a good example of a thesis statement in a research paper. And I can use it to illustrate what convincing support for the conclusion should look like.

Here is the conclusion (I changed the original version slightly for a clearer illustration effect):

> *Greenhouse gas (GHG) emission causes global warming by causing the increase of GHG concentration.*

First of all, let us identify the key components of the conclusion and their relation. The key components are: GHG emission, global warming, and GHG concentration. These are then put together through a causal relation: GHG emission causes the GHG concentration to increase, which in turn causes global warming.

Identifying the key components and their relation is an important step for checking the clarity of the conclusion. If the key components and their relation cannot be clearly identified, then the conclusion is not clear enough. In that case, no further steps should be taken before it is made clear. Once the key components and their relation can be clearly identified, we shall naturally come to know how they should be supported. An argument's conclusion provides very good hints about what the argument's premises should look like.

4.1.1. The Premise of Proof (POP)

In the process of building convincing support for a thesis statement (or an argument's conclusion), we normally start with the Premise of Proof, or POP for short. POP collects the evidence that can confirm that the key components of the conclusion are actually related in the way being hypothesized. If the evidence collected is sufficient, then the truth of POP infers the truth of the conclusion. In this sense, POP serves as a sufficient condition for the conclusion to be true. In other words, if POP is true, then the conclusion being supported is true. The relationship between POP and the conclusion being supported is illustrated in Diagram 1.

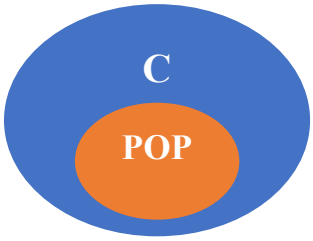

Diagram 1
C: Conclusion, POP: Premise of Proof

The relationship illustrated in Diagram 1 can be used as a guiding principle for finding the evidence for the conclusion. In order for something to be counted as evidence for the conclusion, it should fall within the boundary for the conclusion to be true. For example, one of the key components of the conclusion is the increase of GHG concentration. So in order for the conclusion to be true, there must be, among other things, evidence that shows the increase of GHG concentration. According to the EPA, there is evidence that shows "atmospheric CO_2 [carbon dioxide] concentrations have increased by more than 40% since pre-industrial times", and evidence that shows "CH_4 [methane] concentrations are now more than two-and-a-half times pre-industrial levels", etc. All these pieces of evidence fall within the truth boundary of the conclusion because CO_2 and CH_4 are members of GHG (see Diagram 2).

[3] For details about the claim and its supporting data, see the following website: https://19january2017snapshot.epa.gov/climate-change-science/causes-climate-change_.html

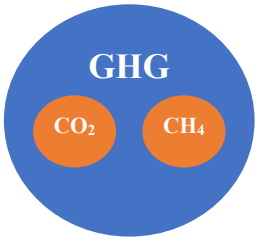

Diagram 2

Ideally speaking, in order for the POP in this example to be fully sufficient, there must be a complete set of evidence for the key components of the conclusion and their relation. Thus, there must be evidence that shows the increase of GHG concentrations and the rise of global temperature, and there must be also evidence that shows that the rise of global temperature is caused by the increase of GHG concentrations. Thus, ideally speaking, there should be evidence that shows the following relationship (see Diagram 3).

Diagram 3

But realistically speaking, it is almost impossible to obtain the evidence that can undoubtedly exhibit the relationship in Diagram 3. It is possible that the increase of GHG concentrations is not followed by the increase of global temperature, and it is also possible that something other than GHG can also cause the increase of global temperature. Unless these known possibilities can be eliminated convincingly, it is unrealistic to make the conclusion that the increase of GHG concentration causes global warming with absolute certainty.

Here it is important to note that while idealized illustrations are used as a guide to show what POP and evidence should look like, it does not mean that one needs to have the ideal POP and evidence in order for the support to be convincing. Knowing what kind of evidence is needed to prove a conclusion does not mean that we can actually get that kind of evidence. Whether or not the support for a conclusion is convincing does not only depend on having the evidence that can prove that the conclusion is true. It also depends on whether or not the known possibility or possibilities for the conclusion to be false can be eliminated. Thus even if the evidence we have is not ideal for supporting a conclusion, as long as we can show that the conclusion is not false, then we have convincing support nevertheless.

4.1.2. The Premise of Defense (POD)

The unlikelihood to find the evidence that can provide an absolute proof for the truth of a conclusion creates the need for having the second type of premise in the construction of convincing support. This premise is called the Premise of Defense, or POD for short. As we have just seen, a clear understanding about a conclusion can help us understand what needs to be done to prove it. But it also reveals the major possibilities for the conclusion to be false. POD functions to defend a conclusion by eliminating those possibilities. If the known possibilities for a conclusion to be false cannot be eliminated, even though we may have good evidence to support the truth of the conclusion, the truth would become unsustainable. In this

sense, POD serves as a necessary condition for a conclusion to be true. In other words, if POD is false, then the conclusion being supported is false. The relationship between POD and the conclusion being supported is illustrated in Diagram 4.

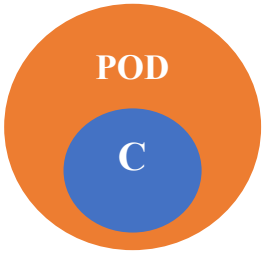

Diagram 4
C: Conclusion, POD: Premise of Defense

There are several ways to interpret the relationship illustrated in Diagram 4. One of them is that POD paves the ground for the existence of C. POD may not be sufficient for making C true. But if POD is false, then C would not be even possible in the first place. To see how POD paves the road for the existence of C, let us return to the example about the cause of global warming.

As we have seen earlier, in order for the conclusion that GHG causes global warming to be true, we need to consider a major possibility that something other than GHG can also cause global warming. For example, according to EPA, certain natural phenomena such as changes in solar energy, volcanic eruptions, etc., can also cause the increase of global temperature. This possibility represents a counter-statement to the conclusion that GHG causes global warming. If the counter-statement cannot be refuted, then the truth of the conclusion would be seriously doubtful even though we have all the evidence about the increase of the GHG concentrations. The illustration of the counter-statement and thesis statement are shown in Diagram 5.

Counter-statement Thesis statement

Diagram 5

To justify the existence of the conclusion that GHG causes global warming, therefore, there must be evidence that shows that natural phenomena such as solar energy changes have not caused the increase of global temperature. According to the EPA, there is indeed such evidence: “over the last 11-year solar cycle, solar output has been lower than it has been since the mid-20th century, and therefore does not explain the recent warming of the earth.”

The POD in this example is the place to present the kind of evidence that can refute the counter-statement. Furthermore, apart from the counter-statement just mentioned, another possible counter-statement should be also refuted through the POD in order to further strengthen the ground for justifying the conclusion. That is,

the possibility that the increase of GHG concentrations is not followed by the increase of global temperature. But unfortunately, the EPA has not presented such possibility in their research.

If the known possibility for the conclusion to be false cannot be absolutely eliminated, then the conclusion cannot be said to be absolutely true. In that case, the conclusion needs to be changed. For example, instead of saying that GHG causes global warming, it would be more realistic to say that GHG probably causes global warming. Here it is important to note that although in construction logic premises are established based on a conclusion, if premises cannot provide a convincing support for a conclusion because of the lack of evidence to prove or defend the conclusion, then the conclusion would have to be changed. A conclusion must be consistent with the evidence available.

5. Why Are the Two Premises "So Special"?

So far I have explained what the premises that constitute a convincing argument are. Now I will explain more about why they are "special" through a comparison with the classical as well as the contemporary study of logic. This will shed light on why construction logic is "so special".

5.1. From Classical to Contemporary Logic

The postulation that a convincing argument is composed of a conclusion plus two premises is not a new idea. Classical Aristotelian logic already postulates that a complete argument is composed of two premises plus one conclusion. Among the two premises that forms Aristotle's categorical syllogism, one of them is called the Major Premise, and the other the Minor Premise. The reason for calling the premises as such is due to the technical terms that compose each of them. The Major Premise is composed of the Major term, whereas the Minor Premise is composed of the Minor term. The Major term and the Minor Term are also the predicate and subject of a syllogistic argument's conclusion, respectively.

The "term-logic" of Classical Aristotelian logic provides major inspiration for the construction approach to logic because it explicitly requires that the component of a premise match the component of the conclusion that the premise supports. However, it is very difficult to make sense of the technical terms. Contemporary logicians (e.g. Walton, Reed, and Macagno 2008) still cannot provide a more specific explanation about what the Major Premise and Minor Premise are other than that they are composed of the Major term and Minor term respectively. It is still unclear as to what functions the two premises are supposed to perform in the classical argument.[4]

A contemporary study of logical argument also postulates that an argument is basically composed of two types of premises. This was the study of Stephen Toulmin. In his celebrated book, *The Uses of Argument*, Toulmin spelled out a framework of logical argument commonly known as the Toulmin Model. The Toulmin Model is perhaps the most practical model among the known studies of logical argument. Unlike the abstract analysis about the validity principles in formal studies of logic, the Toulmin Model specifies a more practical category of elements (e.g. "claim", "data", "warrant", etc.) that constitute a convincing argument. "Claim" is an argument's conclusion. "Data" is the premise that directly supports a claim. And "Warrant" is the premise that connects the "Data" with the claim being supported. Because of its down-to-earth approach, the Toulmin Model is the most popular model used in education about logical argumentation in an academic writing course.

The Toulmin Model is another major inspiration for my work on construction logic. However, in my view, the Toulmin model is unnecessarily complex. The complete model covered not only "Data" and "Warrant", but also "Rebuttals", "Qualifiers", and – in some versions – "Backing" (Toulmin 2003, 87-134). And even more unfortunately, the Toulmin Model was not really designed for argument construction. The model was just about, in Toulmin's own words, the "practical assessment of arguments" (2003, 7). Even if students know that "data" and "claim" are the elements that constitute a convincing argument, they would still not know how to build a logical relation linking the "data" and "claim", because they would not know what would qualify something as the proper data for the claim.

[4] As a reviewer of this paper pointed out, contemporary forms of logic that present some version of Aristotelian term logic face the kinds of problems that Aristotelian logic does, and are likely to lack general applicability.

5.2. From Conclusion to Premises

A main reason for me to come up with a different version of the two premises is to clarify and simplify the classical as well as the Toulmin Model. Unlike the two premises in categorical syllogism, the two premises in construction logic have very distinctive functions. The Premise of Proof (POP) functions to prove that the conclusion being supported is true, whereas the Premise of Defense (POD) functions to defend the conclusion from known counter-statements. Unlike the Toulmin Model, one can easily learn how to build POP and POD based on a conclusion. If a conclusion's essential components and their relation are clearly visible, then how the conclusion should be supported would become clearly visible too. The evidence that can prove that the conclusion is true should fall within the boundary for the conclusion or its components to be true. And based on a conclusion, we can also know the possible counter statement to the conclusion, and thus what counts as the evidence that can refute the counter statement.

Building a logical argument from its conclusion is a trademark of construction logic. Unlike the conventional analysis approach to logic which assesses an inference from premise to conclusion based on validity principles, the construction approach confines the building of the premises by reference to the content of a conclusion.

The focus on content is really what radically distinguishes construction logic from the conventional ones, and it is the secret of building a convincing argument. The effect of content on reasoning has been widely studied by psychologists since the well-known reasoning experiment called the Wason selection task (see Wason, 1968; Wason & Johnson-Laird, 1972). In my earlier work (Lai 2004), I also wrote about how content effect can be understood in the context of a philosophical theory of reasoning. And yet the majority of philosophers are still reluctant to acknowledge that content is relevant to studies of logic. After all, logic studies are essentially about an argument's form, rather than its content. This is because the primary focus of these studies is the analysis of the legitimacy of the syntactic relation between one statement and another so as to discern the universal principles governing the relation. For this purpose, the contents of the particular statements are not important. But the pursuit of universal principles puts the studies of logic on a rather abstract level, far away from the practical reasoning that ordinary people conduct in everyday life.

For students who are writing a research paper, what they are after is not really knowledge about what a perfect argument should look like. All they want is to be able to build an argument for a particular research, so that they can demonstrate that the conclusion of the research is not just an empty hypothesis. All they need to learn to accomplish this goal is how to find evidence that can turn a hypothesis into a confirmed conclusion. To help them develop the selective sensitivity to the evidence that supports a conclusion as well as the counter statement that challenges it, students are taught to see the relation between premises and conclusion of an argument through a simple diagram. No doubt, this is a rather simplified picture of logical argumentation from the conventional viewpoint of logic studies. But for learning how to build a logical argument, a simplified picture of logical argumentation has been proven, through years of experiences of teaching the subject, to be more effective than a comprehensive but abstract picture of a perfect argument.

6. Is It Dangerous to Start with a Conclusion?

At the second symposium on academic writing and critical thinking, a participant asked if it is dangerous to teach students to start writing a research paper by beginning with a conclusion. The motivation for the question is a notorious case of data fabrication. Haruko Obokata claimed that she successfully developed a quick and easy way of making stimulus-triggered pluripotent (STAP) cells. But it is well known now that she fabricated the data to support her claim. So might the starting-with-a-conclusion approach be misleading for students?

The approach would indeed be misleading if students were told to stick to the conclusion regardless of the data collected. But this is certainly not what construction logic teaches. In construction logic the process of confirming a conclusion is a cyclic process, which means that a conclusion is changeable throughout the confirmation process. As I have mentioned in section 3, if one cannot obtain sufficient evidence to support or defend a conclusion at the end of the day, then one should change the conclusion, making it consistent

with the evidence available. Evidence is found or established based on a conclusion, but the conclusion changes according to the evidence obtained. The two must be consistent with each other.

The name "conclusion" in construction logic does not mean the final conclusion until the very last stage of research, when it is finally confirmed. Before that, the "conclusion" is just a hypothesis or thesis statement. In construction logic, starting with a conclusion is actually starting with a hypothesis. This is in fact consistent with the common research practice, which is centered on a process of hypothesis formation and confirmation.

One reviewer of this paper asks if the research practice is really common among all the academic disciplines, particularly the Social Sciences and Humanities. According to the reviewer, "it is considered acceptable or even preferable to conduct the study without a clear, pre-conceived idea of what might account for the phenomenon under investigation." I think this is a fair comment. I actually know some graduate students from Humanities who conducted their studies without a "clear, pre-conceived" hypothesis. But frankly speaking, I cannot see the advantage of such an "open-minded" approach, especially when taking into account a common phenomenon that most graduate students of the Social Sciences and Humanities tend to take much longer time to finish their research compared to those of the Natural Sciences and Engineering. I am not suggesting that those disciplines which do prefer the "open-minded" approach should reform their research strategies and practices in order to help their students speed up the research process. However, people who favor an "open-minded" approach should understand that explanatory research by nature is predominately a process of narrow-minded investigation with a specific focus.

In "The Craft of Research", a celebrated book by Wayne Booth and his colleagues, research is broadly defined as something we do "whenever we gather information to answer a question that solves a problem" (Booth, Colomb, and Williams 2008, 10). The valuable thing to learn from this definition is not about what research is but why and how it is carried out. Research is carried out because there is an unsolved problem, which is something very specific. The problem invites a question, which is also something very specific. And then we proceed to solve the problem by going out to search for the answer. Since both the problem and question are something specific, it is quite hard to imagine that the information gathering process is not specifically focused. Indeed, if we did not have any form of hypothetical answer in mind before going out, we would not even know where to start.

Once again, the hypothesis formed in the early stage of research is modifiable throughout the entire research process whenever some new piece of information becomes available. Having a hypothesis in the beginning only guides, but does not dictate, the rest of the information gathering process. If research were conducted without a hypothesis in any form, it would be just like sailing into the open sea without a direction. That would be rather dangerous.

References

Belcher, Wendy. 2009. *Writing Your Journal Article in 12 Weeks: A Guide to Academic Publishing Success*. Sage.

Booth, Wayne, Gregory Colomb, and Joseph Williams. 2008 *The Craft of Research*. Chicago: University of Chicago Press.

Copi, Irving, and Carl Cohen. 2005. *Introduction to Logic*. Pearson.

Frege, Gottlob. 1956 "The Thought: A Logical Inquiry." *Mind, New Series* 65, 259: 289-311.

Lai, Wai Ling. 2004. "Reasoning and content: A fundamental problem in formulating a naturalistic theory of reasoning." *Psychologia* 47, 4: 264-276.

Moore, Kathleen, and Susie Lan Cassel. 2011. *Techniques for College Writing: The Thesis Statement and Beyond*. Cengage.

Swales, John, and Christine Feak. 2012. *Academic Writing for Graduate Students: Essential Tasks and Skills*. Ann Arbor: University of Michigan Press.

Toulmin, Stephen. 1958. *The Uses of Argument*. Cambridge: Cambridge University Press.

Walton, Douglas, Christopher Reed, and Fabrizio Macagno. 2010. *Argumentation Schemes*. Cambridge: Cambridge University Press.

Wason, Peter Cathcart. 1968. "Reasoning about a rule." *Quarterly Journal of Experimental Psychology* 20, 3: 273-281.

Wason, Peter Cathcart, and Philip Johnson-Laird. 1972. *Psychology of Reasoning: Structure and Content*. Cambridge, MA: Harvard University Press.