

The ABC of writing a grant proposal

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Writing a grant proposal is similar to writing a manuscript in several ways. Getting started is no fun; in fact, it is agony. As Harold Frost told Pierre Meunier, and Pierre told me many years ago, “Trust your brain” The same is expressed in ‘Finding Forrester’, a film about a famous writer in the last years of his life who takes on an insecure young student from the Bronx—just sit down and start, write something, anything, just.....write!! [1].

The struggle from chaos to order, from confusion to clarity, takes time. There is a delightful music within, but to write it, to enable others to hear it distinctly, takes time and an ‘all too ready self approval’ must be avoided; otherwise, ‘no one, not your own self even, will ever know the tune that beset you....’ [2].

Page 1 is particularly difficult. The reviewers, the committee and the chairman are not happy people. They are locked away in a room reading many, many grants. Do not make them more unhappy. Do not make them angry. They are unlikely to work in your specialized field. To convince this judge and jury of your peers of the worth of your application, the content of this page—the Title, Aim, Hypothesis, Rationale and Significance—must be simple, clear, comprehensible and impactful in a single reading. This simplicity takes many, many hours of work. *Je n’ai fait celle-ci plus longue que parce que je n’ai pas eu le loisir de la faire plus courte* [3].

The first step is to prepare early, a year or two before the application is due! Does anyone do that? Of course, they just won’t tell you! Do most investigators do it? Of course not! Most investigators start about three to four months before the

grant deadline; few wonder most applications go to the ‘never-never-land’. Early preparation is critical for many obvious reasons.

Success requires pilot data. Without it, why should the reviewer believe you can do what you so confidently claim you will do. Success requires collaboration, and whenever possible, evidence that you and your collaborators have published previously. Surround yourself with investigators better than yourself. This is not difficult for me. Two heads are better than one. A biologist needs a statistician; a biomechanical engineer needs a clinician. Build a team, and bring together experts in the elephant’s trunk, ears, legs and tail; all are needed to understand the elephant and grants are partly judged on this. No one realizes greatness without the courage to recognize their limitations. Collaborate—don’t worry; the person deserving of first authorship will become clear. The first page may be structured as follows.

Title: Don’t worry about this now, you are not yet worthy.

Aim: This is a general statement of purpose to bring the reviewer to the area to be explored. It is important, but it does not compare with the importance of the Hypotheses and the challenges in getting these right.

Hypothesis: What is the question? This is the hard part. Ensure you have an answerable question by writing the proposed answer. This ‘answer’, this ‘postulate’, is the ‘hypothesis’. It is written in unambiguous quantifiable terms. The whole application depends on getting this right; it is the rudder of the ship. Without it, you have nothing and your grant will wander aimlessly, purposelessly in a wilderness of words.

We hypothesize that the sky is level 12 (baby) blue. Moving backwards from that, the question was what is the colour of the sky? Moving backwards again, the Aim of the study was to study the colour of the sky. At this stage, we know the hypothesis in quantitative terms, the colour of the sky is level 12 baby blue, but we have no idea why you want to study the colour of the sky.

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Nor do we know if it is important. (What is ‘important’?) Look at the Aim as written, ...to study the colour of the sky...; this is quite meaningless. But many grants and papers are written just like this. There is never an aim, there is never a question, there is never a stated hypothesis. What is often written is ...we aim to study..., we aim to measure..., we are the first to measure this and we will measure lots of people, with state-of-the-art technology that we are the first to have... Aims are often aimless and hypotheses are often never stated or they are so vague that it is difficult to know what is intended. This is what can make a reviewer angry. If you don’t know what you want, no one else will.

Rationale: For every question there is a second question—why are you asking? This is the ‘Rationale’ or ‘Background’; it forms the ‘Introduction’ of the manuscript that one day will be written, and of course, it will be published in *Nature* or the *New England Journal of Medicine*!

The Rationale is *not* a literature review. The literature is cited but it is not cited to define what is known; it is cited to define what is not known. Defining what is not known is the foundation of progress. Identifying what is not known, what is the growing edge, is hard work. The Rationale is the prologue leading the reader to understand why you are asking the question. It is an explanation of why you have decided to spend the next few years of your one life measuring the colour of the sky. What is the problem? Why is it important?

Does the colour of the sky tell us something about the weather? If so, so what? What if it tells us about the seasons, temperature levels at different times and suitability of soil for planting and the growth of food? From this information, the reviewer can start to understand your project, and so will you! Yes, through the labour, you will also start to better understand your own project than when you started developing the Rationale. The same occurs in preparing a manuscript, or a lecture—you learn yourself, and if you don’t, well, you won’t teach, and your application is unlikely to advance what is already known.

When you read this literature, you will find some investigators say they have ‘shown’ the colour is baby blue; others say its navy blue while other investigators say it is always black and twinkles. Some investigators report that it is lots of colours while others say it’s all of the above. How can everyone look at the sky and see it in so many different ways?

You must be fully conversant with all of the literature on the topic, and you can only achieve this by early preparation because the reading must be critical reading, a hard-earned skill in itself. In the beginning, it takes a lot of time, but like all things, it is a learned, an earned, skill.

You cannot possibly cite all of the literature, but, by critical reading, you can formulate what is not known, what methodological differences there may have been that reconcile the different colours reported; some investigators measured the colour

only at midday, others only at night, and others only in the morning or evening or only from the North or South Pole.

Critical reading is the labour of scholarship, learning; its requires you to disassemble and then reassemble this literature—this reassembly is the rationale and it leads your reader—and you—to an understanding of what is not known and why, and from this the question, the hypothesis becomes clear, the significance reveals itself and finally the title comes to you. Rarely, if ever, is the title of the final draft of a manuscript the same as the title of the first draft.

This process of critical reading, organization in your own mind of information into what is known and not known, and then the orderly writing is the foundation of progress. You have laboured and now are now able to design a study taking into account the factors that contribute to the colours of the sky from which you can help the scientific community understand the rotation of the earth, the seasons and determinants of the best time to plant seeds and harvest wheat.

Methods: The content and organization of the Methods section must precisely follow the order of the Hypotheses—the most important first; then, secondary hypotheses follow. Each hypothesis is addressed by a given method—the appropriate sample size based on power calculations derived using the pilot data; appropriate inclusion and exclusion criteria ensuring the only difference between cases and controls are the interventions or the effects of exposure to a risk factor you are testing. No measurement (blood test, imaging), none, should be included that is not justified and relevant to testing the hypothesis you have stated.

Significance: This should be written in clear terms that convey how the results influence longevity, or clinical applications to help individuals or the society. This is the translational aspect that demonstrates ‘importance’; there is no point in defining the colours of the sky if all you find out is the colours of the sky. Your point is that these colours explain the spin of the planets and the behaviour of the weather and provide information concerning the best time to plant seeds, grow crops and harvest the fruit, and thereby your work will increase exports and provide a solution to world poverty and starvation. Finally, you are worthy, and the title will be revealed to you: The Colour of the Sky as a Predictor of Crop Yield. That’s ‘important’, that’s ‘significant’.

Conflicts of interest None.

References

1. Finding Forrester (2000) Author Mike Rich, director Gus Van Sant
2. Proust M. On art and literature. Publishers Carroll & Graf NY. Ontra Saint-beuve, p 276
3. “I have made this longer than usual because I have not had time to make it shorter.” Blaise Pascale 1657.