Writing a Scientific Article – Some Guidelines

S. Savary – Honorary Professor of Plant Pathology, GB Pant University of Agriculture & Technology, Pantnagar, India

Contents

Note: this text has been written for PhD and MSc Students. It however may be useful for Scientists with more professional experience. As will become clear, this has not been written by a native English speaker. No matter: my intention is only to be understood. I hope that I shall be.

0 – Foreword

Writing is one of the most difficult parts of a Scientist's work. Yet writing is full part of the profession: what is not written, read, and used, is lost forever. For a Scientist, reporting in writing her-his work is an absolute necessity. Writing, however, is not enough. In order to be read and used, a scientific text must be clear, making use of the exact amount of Science that the Author wants to convey, not less but not more; the text also must be understandable to the experts, but also to Scientists in neighbouring fields (and in some case, across widely different disciplinary areas); and it should, as much as possible, be engaging, even pleasant perhaps, and not pedantic.

Writing, publishing one's research, has consequences. Research matters, and so does written, published research. A good scientific article may inspire new, fresh minds; it may even be the trigger of a scientific vocation. Some published articles have literally changed the world, challenging pre-conceived ideas, or alerting the public and policy makers of challenges that must be faced. Very few scientific articles achieve such impact; but all articles that are published in recognised scientific journals may have an impact. Many do.

Strangely, very little, if any, attention is paid to writing in the standard training of a Scientist, compared to any other subject. Writing Science calls upon many different skills: grammar and syntax, an extended vocabulary, the ability to connect different elements: for instance, linking results shown in a graph and those retrieved from the literature; it requires knowledge: of the subject at hand, and also of ethics and ways to use what comes from fellow Scientists. It often is as if scientific writing was, for a Scientist, part of another world, of another profession. Nothing could be more wrong: the best scientific writers are those who have conducted the research themselves, pondered hypotheses, designed protocols, made measurements and analysed them. They do all this against the backdrop of what they hypothesize and what they know – and they are supposed to be the ones who know best – of the Science field where they work. An Editor may help, perhaps, but will never replace a Scientist in her-his writing efforts. Only a Scientist knows the elements to put forward and those which may not be essential, given a chosen audience, i.e., given the journal where she-he submits the work for publication.

1 – Some principles

Writing often is taken for granted from students: nothing could more be wrong. It does not "come easy". Writing in Science is very hard. It requires patience, persistence, iron discipline, openness towards readers (who always remain invisible and unknown), and time – tremendous amounts of it. It commonly takes many years to become a good science writer; this time will be reduced if one has had an early training in scientific writing; and good science writing may never happen to those who consider it a secondary element of their skills as Scientists, a detail to be left to others.

However, there are principles, rules, which one can follow. This text is meant to present an overview of some principles and key steps.

- **A good starting point is to want to write, but to want it for the right reasons.** Writing a manuscript because one's PhD depends on it, because one's project is ending, because one is looking for a promotion, to strengthen one's dossier: these are sensible, practical reasons. But these are not good enough. They may suffice to "get the job done", perhaps. But these reasons will not help this Author address the challenges that necessarily lie ahead on the road towards publishing her/his work. Most importantly: these are not reasons for the Author to be happy, if not proud, of the result. This result, a hopefully published article in a good scientific journal, will remain. It will be read. Colleagues will judge it, over the months, perhaps the years; through it, they unavoidably will judge you, as Author, as Scientist. One must not fear that. A good reason is to be confident that, as an Author, one is bringing forward results or ideas or methods that are new, or useful, or interesting, or the three together. In order to be able to produce an article like this, one has to be reasonably happy. Being happy to write is important at several levels: for the unknown colleagues, for those one knows, for those who have helped in one or other way, and also, simply, for oneself. This point will be addressed again.
- **Be happy to write.** A key to succeed in anything is to like it. Writing can be a joy, even for a Scientist. You need to show – the reader needs to feel – that you like your work, that it matters, that what you found is useful, that you think others will benefit from your work, if published.
- **Be confident.** You know your own work better than anyone. You necessarily know something no-one else does. What you write may matter for others: you should be confident in that.
- **Do not, however, be over-confident.** Over-confidence may derive from, or may be interpreted as, ignorance or arrogance. Do not ever write on a scientific topic with which you are not familiar. Ignorance and arrogance, both are faults in Science, the latter, an ethical one. A manuscript where Author(s) seem to believe they are the first to have such idea, to have such result, to have for the first time observed something, will inevitably draw the scrutiny of Editors and Reviewers. It is likely to result into straight rejection, because complete novelty, even in science, is rare. If that happens, then, the Author(s) will gain a reputation of arrogance or ignorance, or lack of professionalism. If it does not, then all will see arrogance or ignorance in the published article.
- **Being confident with reasons, in your own, modest and simple way: this is the objective you need to achieve.** When one writes on a familiar topic, where the details are personal knowledge – the methods, the literature, the results (how, for instance, the plant grew, or what the farmer said, or how the data were collected) – then it all becomes easier. Writing does not have to be stressful. It should provide the Author with a feeling of accomplishment – perhaps even of liberation. Stress in writing may come from the technicality of writing: the vocabulary, the syntax and the grammar. This can be fixed through reading more texts, articles and books, which will show how to write better, style-wise. But if stress comes from the fear of being read and criticised for what is written, then, advice from colleagues, supervisors, is required. The questions then to be discussed are whether what has been found truly deserves publishing; and whether one is truly writing within one's field of expertise and competency, or whether one may be entering foreign domains.
- **Writing does not have to be painful.** It is not a chore. It is, in fact, part of your work as Scientist. Please, be prepared for it. Welcome it. Writing, even, is your duty as a Scientist reporting to the broader community, as a student for her/his mentors or professors and, most importantly, for yourself. In writing, you exist. In writing, you want to contribute something new, something interesting that you modestly want to share.

- **One writes to be read.** One wants to be read because what is in print is interesting and valuable. In Science, one does not want to be entertaining; but you certainly want to be read. This is why you must write properly: with the right, specific and proper words; with short sentences that are easy to understand; with series of sentences that follow a logical structure (a plan), which the reader will understand. One will need to write sentences that are well constructed: **S**ubject – **V**erb – **C**omplement(s), and not too many of these complements. The abuse of adverbs (ad-verbs: verb modifiers) implies that the verb used is not the most effective choice: adverbs should be used sparingly.
- **One wants the manuscript published.** Publishing has rules. You must follow these rules, or fail. This is why you must follow the "Instructions to Authors" of the journal you have in mind. You already have read them? Please, read them again: there's necessarily something you missed. The deadly detail. Read again and highlight the important points.
- **Tens of thousands of scientific articles are published every month.** Irrespective of the particular field you belong to, there is a strong probability that, as you write, dozens of articles on subjects very close to your topic are being drafted by other Scientists. Many of them will be published. If published, your work will then enter the competition of attracting readers. That your work leads to a published article may satisfy a PhD jury; it may satisfy (with reason) your ego; and it may satisfy your supervisor. However, over the months and years – after the jury has decided, after the project is completed – this published article will become unimportant. Manuscripts that are being submitted perfunctorily to journals solely for reporting purposes seldom are really good, exciting, inspiring articles. They quickly are forgotten in the mass of publications appearing every week and month. **What matters is that the article you are writing is, over the years, maybe the decades, referred to and cited. Only cited articles matter to Science.** So – yes, tens of thousands of articles are published each month, and most of them will barely be cited once if at all. Sadly, it is just as if they never had existed.
- **So:** yes, scientific writing, **writing for a purpose**, is very hard. But there are ways. The first of them is to define this purpose, to be convinced of it, to be confident in it. This in itself is hard to many: it is the first step.

What follows are some key steps to take.

2 – Developing a key message

This step requires is what is called "quality time", that kind of time when one can focus and yet leave one's mind explore an array of possibilities both freely, and with concentration. Here, the questions are: what is important in this work? What is it that the reader should remember, long after having read the article? Why is it that this work needs to be published, in order to be read, used and cited, in order to matter in Science?

These are difficult questions to any Scientist. As Scientists, we are trained to doubt: the observations, the results, and the validity of the reasoning. In our profession, doubting is a prerequisite. These questions seem more difficult for PhD students. They seem even more difficult for PhD students who are under pressure with very limited time to "get a paper published" in order to defend. And the case of PhD students and project-Scientists who work on a time-bound, budgeted project is worse.

It is my view that a reason why so many manuscripts are not accepted for publication, and why so many (actually, tens of thousands, every year) published articles never are cited not even once, is

that this simple initial stage, developing a key message, was omitted. In too many cases, Authors submit their manuscript because doing so is expected from them, because their degree or promotion is at stake, or because Authors want to expand their publication list. These reasons are not good enough.

It takes courage and effort to overcome the necessity of the moment (a degree to obtain, a project to conclude), and **convert *personal needs* into a *scientific reason***. Yet this effort is necessary. This is why this stage must take place when one can calmly focus on the objective(s) of the work, and for this reason, take place as early in the research as possible.

PhD students, in particular, should be trained to start developing their manuscript(s) as soon as possible, in order to ponder and produce a good submission. Developing a key message that will be conveyed is a first step to take in that direction.

3 – A good key message

A good key message should have the following characteristics

- **be specific**. The elements put forward must, simultaneously, (1) represent the results from the work, and (2) have direct implication with some current, possibly key, questions which the current literature addresses on the considered topic.
- **be short**. Not more than 3 sentences. Not more than 5 lines.
- **be perfectly clear** to the Author, her/his co-Authors, and if possible, to colleagues who are not directly involved in the work.

Some elements in a key message may for instance be related to

- some specific results achieved;
- filling a knowledge gap;
- some interesting associations or correlations among factors influencing an outcome;
- some entirely new method (this is quite infrequent);
- the transfer of a method used in a given domain in a different one, where it has not yet been used (this is more frequent, and often very valuable);
- a method which derives from another one, with simplifications or increased precision;
- a body of results that suggest an overall trend or pattern among multiple processes.

In order to be able to judge if the key message is compelling enough, the Author refers to her/his own work and its domain, of course. Harder will be to judge if this key message truly adds to what is already known. There, literature search and reading is critical. Attending scientific meetings may also be very valuable. Filling a knowledge gap, for instance, can only occur is this gap has been ascertained: this can be achieved only with a good overview of the existing knowledge in a given field.

Authors must be aware that **novelty** is a key criterion for the receiving Editor when deciding whether a submission is worth a review. Editors are busy; some receive many submissions every day. That decision is made by an Editor very rapidly – often, 10 minutes, or less if the inflow of submissions is much higher than the outflow of published articles. Novelty is key. However, absolute novelty in Science is exceedingly rare. A **compelling level of relative novelty against the backdrop of scientific knowledge** is therefore what is to be sought. Therefore, this is where a good knowledge of the literature on a given subject is indispensable. This knowledge cannot be allowed to be too narrow: it must cover a sufficiently broad range of themes surrounding the subject of the work.

Literature search, reading, analysing other colleagues' published work from colleagues from all over the world, never is a waste of time. There always is something more to learn, to understand. Reading others' work, trying to understand what they did, assess what they achieved, and how they did it, is a matter of respect as much as a source of inspiration. It also provides invaluable information on the landscape of knowledge. This applies to books as well as to "old" publications: these contain treasures of knowledge. Reading them helps to not repeat other's work (and sometimes perhaps their mistakes).

The few lines of the key message, which may be scribbled on a notebook and will never be printed anywhere, is a synthesis of all this: what was done (by others) and what has been achieved (by the author(s)); and also what is the meaning of this work in that landscape of knowledge and unknowns. This meaning, the meaning of this work, is the reason why it needs to be published. These few lines are for you only, Author. They should remain your compass throughout the journey toward publication. Never should you depart from the course you set, lest being lost and perhaps despaired. They define what you want to do, and so, a little of yourself.

4 – Developing a writing plan

The writing plan is the blueprint of the writing project. Imagine yourself building a ship. The blueprint has a definite purpose; it needs to carefully be followed; it provides an overview of everything; there are no details on the blueprint, but the important elements are there, precisely located, so that one can clearly see how each part is connected to others and effectively contributes to the whole. Nothing is superfluous.

A good ship must have a good hull; its shape and thickness depends on what the ship is intended for: not too thick if speed is necessary, but very strong if ice packs may be encountered. There needs to be solid masts; their height depends on the overall weight of the ship, on the anticipated weight of its cargo, on the intended maximum speed, and the type of sails. There needs to be effective and efficient ropes and pulleys; and an anchor, perhaps several; one or several boats and rafts; lots of details have to be considered inside the hull, including a kitchen. Some details of course must be left aside for clarity.

A good writing plan connects all the parts into one cohesive, well-oiled machine which will convey effectively a key message to the reader.

- The **Title** is short, written with as simple words as is possible given the subject, and must convey the core subject of the work.
- The **Abstract,** has a length reflecting the size of the work, with a series of key sentences: (1) overview of scientific background; (2) a clear statement of the objectives; (3) methods used; (4) statement of main result(s); (5) a conclusive sentence on the significance of the work, and/or its implications on over-arching questions, and/or perspectives.
- The **Introduction** addresses the scientific setting (geographical, social, economic) of the work; a summary of research developments, applications, and impacts; the needs and science gaps; an explicit description of the objectives of the work. Author needs to make each word count. Repeating the same idea can effectively destroy an otherwise excellent Introduction. The Introduction is one of the two sections of the manuscript where citations to listed references are needed. The number of citations needed varies depending on the nature of the work, its scope, the width of the science field to which it belongs.

- **Materials and Methods** is the section where all the technical components of the study are itemised. The order of presentation of these method components needs to exactly coincide with the order of presentation of the **elements** of the manuscript. These elements are the successive pieces of results which are reported in, and motivate the manuscript. This order will also be strictly followed in the Results and in the Discussion. If the work involves sampling and statistical analyses, these must be presented in detail. In short: from the scientific-technical standpoint the Material and Methods section is the most important section of a manuscript. This section must provide all the necessary details that another Scientist would need in order to repeat the work. **Repeatability** is a tenet of Science: any valid research can be repeated, provided that the same methods are used. This tenet is essential in Mathematics, Physics, and Chemistry; much less so (if at all) in Sociology or Psychology. Biology and the associated disciplinary fields have variable stands towards this tenet: extremely strong in Genetics and Molecular Biology, and less so where more complex systems are considered, as in Ecology.
- **Results** is the section which **mobilises the Elements**. These (Tables, Figures, or paragraphs where specific results are reported) need to be presented in the logical sequence that allows understanding. The text of the Results section is clinical. No adverbs, very few complements. Only facts, as they have been found. Statistical results are provided drily in order to enable the reader to judge by her-/himself. In statistics, a test leads to rejection of a null hypothesis H_0 with a given level of probability *P*. That level of probability is entirely the choice of the analyst. The test enables, or not, to reject H_0 with that chosen level of probability. A difference is found statistically significant at a given *P* level. Nothing is "highly", or "very highly" significant. It is, or not, significantly different. Critically: **no comment, of any kind, on the results is allowed**. The Results section is the heart of the manuscript. This is where facts are given. Comments must be left to the Discussion.
- The **Discussion** is the section where the bulk of the references are mobilised. It usually is organised in two parts: first, the results are discussed, in **the same order as the one followed in the Results** section. In this way, the reader will follow easily. Second, these results are compared to other studies, on other systems, or on the same system under different conditions. The Discussion needs to address the relevance of results: for studies focused on the very system, or the very question, addressed in the work, and then, for studies that pertain to other systems, either analogous or smaller or larger. The reader needs to be provided with a fair, unvarnished assessment on the validity of the work. Long Discussion sections are very often frowned at.
- Conclusion is often not really needed as a section of its own. What is often best is a simple, short conclusive statement. Perspectives for future research often provide a good conclusive theme.

Figure 1 shows the overall architecture of a scientific article. Its core is formed by a series of elements, Tables and Figures (and paragraphs reporting results). These elements are arranged in the sequence which corresponds to a logical path: from the methods used, to the successive results which are generated by the methods used. In the reported research, these methods have been used in a logical sequence to address the questions at hand. These methods in turn produced results, which the reader can see and examine in the elements (Tables or Figures, or paragraph of results).

These elements are addressed in turn in the Results section. This is also done sequentially, element by element. Elements are then addressed in the Discussion where the Author discuss, comments, and assess each piece of result achieved, and then the entire set of results. The Discussion is therefore the place in the article where all the components of the manuscript meet: the

elements (Tables and Figures); the Materials and Methods which have enabled generating results shown in these elements; the Results section, which simply describes the results achieved and provides explanations on how to read or interpret the elements, and makes short statements on the relevance (including statistical significance) of the results.

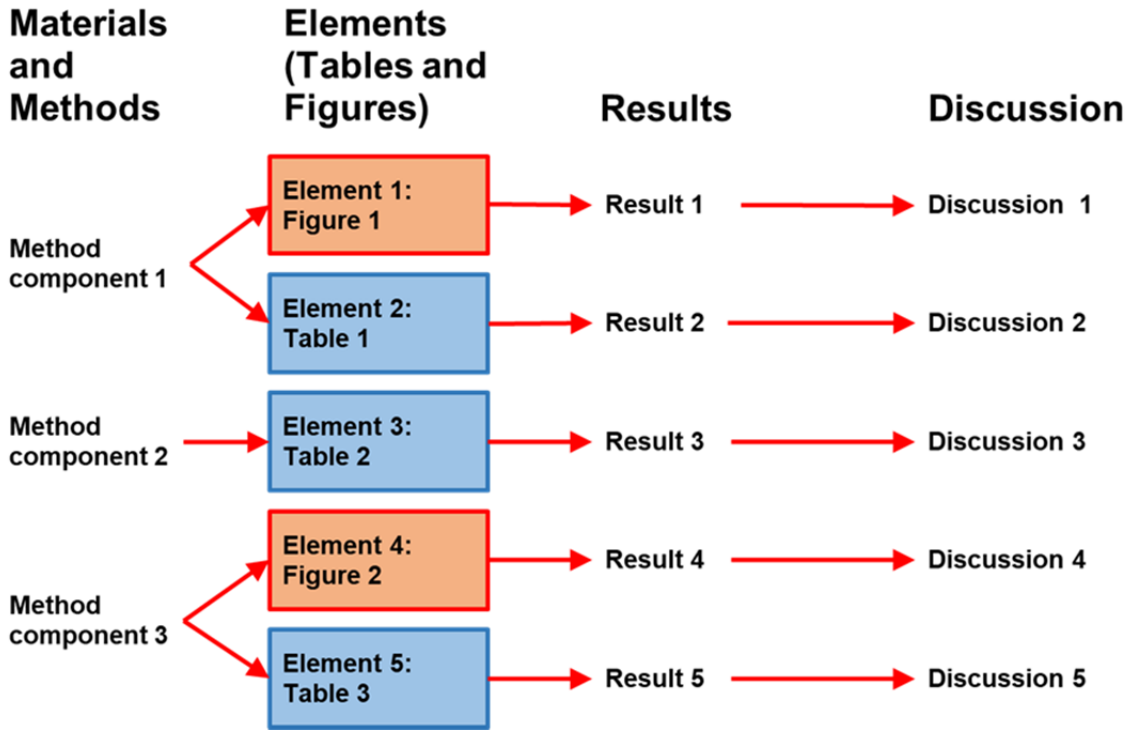

Figure 1. Overall architecture of a scientific article and its main elements.

5 – Prepare your elements

By **element**, I mean the core material that you want to share in your article: **tables** or **figures** (and possibly paragraphs where pieces of results are stated). Each of these elements must provide a unique piece of information that the reader needs to see and understand.

Be aware that these core elements, the ensemble of Figures and Tables, represent a very large, perhaps half, of the weight of a Reviewer's decision: "this manuscript [is/is not] worth publishing", and "this article [is/is not] worth reading". Because of the way most human brains operate, these core elements will last for a long time in the mind of your reader: they leave a lasting imprint on the minds. This is especially true for Figures. Bad graphics, graphics that are overwhelmingly complex, or which are ridiculously simplistic and do not convey clear results or ideas, or even worse, figures that are clumsily derived from well-known, already published ones in a famous article: all these will contribute to rejection of the submission.

These elements constitute the backbone of a manuscript. They will: (1) illustrate the key message you want to share with your readers; (2) determine the entire organisation of your article; (3) define the value to be attached to your work, and hopefully, your published article. These elements **must** at the same time **be unique**, **non-overlapping** (provide unique information), and be connected in a logical manner through a structure – the writing plan, which is discussed later.

Here are some important points:

- While writing, one needs to assume that **readers** are lazy, or busy, or both. Readers have very little time to pay to too many things: we live a world of overwhelming information, including publications. Too many elements – too many tables, too many figures – or too complex ones, will destroy your efforts to communicate efficiently with the reader: they will make your manuscript unwieldy and hard to review; organising the links between all these figures and tables in an effective and clear way (that is, with a good writing plan) may be impossible. **The number of elements – the number of figures and tables in a manuscript – needs to match exactly what is necessary.**
- **Reviewers** are exceedingly busy. They have no time. They review your work on their own, unpaid, additional working time. They cannot afford to be very patient. The elements must convince them, at a glance, that your submission is serious, solid, interesting, and worth their limited time.
- **Editors** have even less time. Editors are gate-keepers: they will, or will not, allow your submission to enter the review process. Editors must protect their Reviewers, and the reputation of their journal. Editors will not convey to Reviewers material that is not worth their Reviewers' time. Your elements must convince the Editor, in a split minute, that your submission is worth a review.
- In short: have as few elements as is exactly required to report your work. Nothing must be missing; there must not be confusing additional detail; and the elements must, each of them, remain as simple as they possibly can be. This way, each of your elements will be understood.
- Most journals are very specific on the format of tables and figures. These absolutely must be followed strictly. If you have read the Instructions to Authors in that respect, this is excellent: read them again. There probably is a point you missed: there are details and all are important.
- **Spend all the time you need to craft your elements**, figures and tables. This crafting, this time, needs to be invested in the capacity of each element to convey clear messages; details, superfluous design, is not helpful and even detrimental to your efforts. If you succeed in developing elements that are satisfactory for you, then, you will be confident and happy to write. It is very useful at this stage to seek the advice or comments of a colleague.

6 – A good Table

Tables are used for several purposes, and not just one. Their obvious role is to report results in a tabular form. But there are other roles: one is to shorten the text (such as for instance a list of variables, their symbols, and their units or dimension); another is to provide synthetic qualitative information in the form of brief text elements (for instance, the description of groups resulting from a statistical grouping procedure; or, to describe different types of landforms according to a few of their characteristics).

In the past, publishers were weary of publishing very large tables because of the entailed costs. This constraint does not exist anymore, yet is retained in some editorial policies. At any rate, very long and very complex tables which would cover entire pages, or more, should be a source for concern to the Author. The usual question is valid with a table: will it be read? A good table has the following characteristics:

- A good table is as simple as can be. Any superfluous information is to be removed. Very large tables are candidates for possible split in a few, simpler and shorter tables, if that is possible.
- A good table is clear. When reporting figures, it is not infrequent to see in manuscripts: “Yield = 4.2364” or “Sum of square = 12,654.39535”. This is a lot of useless numbers. Actually, this kind of precision is, most often, ridiculous. Authors should report figures that are in agreement with the precision of their own measurements, or that of the chosen statistical method (or sample size). Ideally, a measurement figure should be provided with the precision associated with the standard error of the mean, or some other statistics. Often, the principle of having “three significant numbers” is used: “Yield = 4.23” or “Sum of square = 12,654”. Some Authors even sometimes decide to round-off their figures to enable easy reading and comparison: “Yield = 4.2” or “Sum of square = 12,700”. This approach is a very good one, I feel, as long as it is based on good reasoning.
- A good table may be read in isolation from the text, as a stand-alone: it should have a short, yet informative title, and should be followed by captions that (1) summarize the context of data collection or analysis if needed; (2) explain all the abbreviations used.

7 – A good Figure

Entire books are dedicated to designing effective scientific figures. Only some major recommendations are offered here. They are fairly similar to those offered for Tables.

- Figures are very important. They convey in one glimpse some key features of the work. The role played by a figure is related to the way a human brain functions; it usually leaves a durable imprint. Good figures can very effectively convey interest in the reader (and the Editor and Reviewers). Bad figures, on the opposite, may be very destructive on to the value associated to a submission. Designing good, effective figures is a very important task.
- A good figure is simple. Authors sometimes think that a highly sophisticated and complex figure will impress favourably the Editor and Reviewers. It can be the opposite. A good figure needs to convey exactly what the reader needs to see, not more. More detail generates confusion in the reader (or lead to questions the Authors may have difficulties answering to); the opposite, information that is missing, makes the Figure ineffective: this will raise queries and requests for revisions.
- It is not necessary that a manuscript includes a figure. A figure is meant to provide a synthetic view of results. It may in some case be used to describe an apparatus or an experimental set-up. A figure may also be used to represent concepts; in that case it is very strongly advisable to not create a figure representing well-known concepts and their obvious relations: this will not add to the manuscript, on the contrary.
- A good figure should be clear. When it comes to graphs and photos, the Instructions to Authors are to be followed. It also is very useful to read recent articles published by the targeted journal. Clarity does not come only from the size of arrows, fonts, symbols and lines. Clarity is also essential in a figure for instance showing the (possible) links between components of a system or among concepts. Looseness in the Author’s system’s view, or in the way concepts are defined and linked, will be immediately visible, and damaging for the submission’s fate.
- A figure must have a good title and a comprehensive caption. As a table, it must be a stand-alone element that a reader who has not read the text may understand. The title must be short and clear. The caption must be comprehensive and provide all the details necessary to understand the figure and the context in which it applies. Figure captions may be long: 15

lines and more is possible. Length of figure caption is no reason for major criticism – this is actually one of the very rare place where more detail, more explanations, will not hurt. Reviewers and Editor will request shortening, if necessary.

8 – Linking Tables and Figures to the text and vice-versa

It is very often that the Elements (Figures and Tables) seem loosely pasted on the text of a manuscript, because no reference to them is made in the text. It is as though the Elements were floating aside the text, on some direction, but without clear link. It is as if, on sailing ship, the sails were floating freely, without strong connections with the masts and the hull of the ship. This will not do at all. The Reviewers will not guess to which part of Results a given figure pertains to.

Tables and Figures are being used first in the Results section: each segment of this Result section needs to be propelled by one of the Elements, Table or Figure. The text needs to guide and show what the results are, their patterns, their possible associations: these are shown in the Tables and Figure, and are repeated in a strongly shortened format in the captions of these Elements. Each Element, also is numbered (sequentially and separately, for the Table and the Figures, respectively), and has a clear, short, and explicit title summarising what the element shows or pertains to.

Thus, Authors must not leave any guess-work, ever, to the reader. There must be, in particular, a simple, direct dialogue between the text and the Elements. This must work back and forth. As the reader makes progress in the text, at each stage of the reading, the Reader's attention must be drawn to the figure which she-he must look at. In the following stage of the text, reference will be made to another Element, Figure of Table, and so on, so that the series of Elements is exhausted and has been presented to the Reader in the proper order required to understand the work. In most cases this process takes place in the Result section.

Sometimes an Element is provided in the Introduction (for example to summarise the literature); Sometimes, an element can be also provided in the Discussion (for example to provide a quick, simple tabulated complement, or a Figure where further understanding, or a hypothesis is shown). All this is possible, but must be limited to what is necessary. It is expected, on the other hand, that the bulk if not all the Elements are presented to the reader in the Result section. These Elements, each constituting a segment of the results presented, will have to be taken up again in the Discussion.

In this way, each bit of result is presented sequentially in Results (sometimes as text, of course, but frequently, as Elements); and each bit of result absolutely must be addressed again in the Discussion. In a research article, this architecture is simple and usually strict.

9 – Literature search

Literature search is paramount. This is true, in my view, not for the young Scientist only, but for any Scientist, irrespective of the experience and knowledge. There is always something more to read and understand, something else to try, something new to consider. This, after all, is one of the greatest, perhaps the most valuable thing a Scientist's profession can offer. Reading opens new doors, nurtures imagination, the latter being not limited to young minds only.

Most, if not all, the very good, useful, read, and cited articles are based on careful literature search. Literature search enables:

- designing a study, its limits (physical, intellectual), its elements, its connections with existing work in the same, or more distant, fields;
- defining, improving, or developing the techniques that will be required;
- focusing on what is important – what must be considered and, therefore, measured or taken into account or explored;
- spotting those elements of knowledge which are currently badly or insufficiently considered, if not altogether ignored: these will become research targets;
- understanding the difficulties of a study as documented by colleagues' work.
- seeing the possible traps one must avoid in a research path;
- making possible the adaptation of techniques from another, alien, field to one's own, with great benefits sometimes;
- comparing one's work with others. Research is often seen and described as a competition. I personally see this view as a fallacy, as a childish and potentially dangerous view. *It is very important* indeed to know better what others do, how they achieve their progress, because one must gauge one's work oneself. Let us not make an Editor decide whether one's research is good or bad; let us, instead, be responsible of our work as Scientists.

10 – A right order for writing a scientific article

There are many different ways to write. One of the most effective ways follows this sequence:

1. **Results**
2. **Materials and Methods**
3. **Discussion**
4. **Introduction**
5. **Abstract**
6. **Title (and Short Title)**
7. **Authorship**
8. **Keywords**

All scientific articles mobilise references, which are cited in the text, and are listed at the end of the manuscript. **References** occupies a particular, very important, and specific part in a submission. The Reference list corresponds to a document which the Author needs to develop in parallel with the overall text. It is best to develop the Reference list on a separate document when writing. References are addressed specifically in a following section.

The above order, from 1 to 8, seems illogical at first; but it really is not. **One deals first with the Result section**, because it is this section which will link up with all the Elements (Tables, Figures) of the manuscript. Results is the reason why the manuscript is drafted in the first place. This is the most important part the Author wants to share. It is the core of the manuscript, the section which must convince the reader (and the Reviewers) of the value of the work as it is presented with as much details as possible and necessary. And this will apply also to readers of the journal, if the manuscript is accepted for publication.

When the Results section has been written, **Materials and Methods** is the section which comes logically next: it then is necessary to carefully, and completely, document the methods that have enabled to produce each piece of result.

Immediately following Material and Methods comes the **Discussion**. In the discussion, each piece of result is taken up again (with reference to one of the corresponding Elements, as needed), and is examined.

The questions to develop in the Discussion include, for each piece of result (and for the overall picture that emerges from them):

- is this a new result? – if yes, this needs explaining;
- if it is not a novel finding, a new result, in itself, does it agree with the existing literature? does it strengthen an existing theory, commonly agreed, or shared hypothesis? does the fact that this result conforms with theory indicates that the research has been properly conducted, and therefore provide strong support to the results obtained?
- if, on the other hand a piece of Results disagrees with the existing literature: to what extent is it so – are the differences with what would be expected very large? does this departure from what would be expected leads to question the existing theory? – or does this discrepancy reflects the specific nature of the work on a particular example?

Now that the central and ending parts of the manuscript have been drafted, then is the time to reflect and draft the best way to present the work to the reader: the **Introduction**. This is addressed in a section of this document.

The **Abstract** is a critically important element of the manuscript. It requires an excellent overview of both the text and its associates Elements and can be developed next. This discussed below.

The **Title** needs to be developed next. It probably has been on the Author's mind all the time – of course it has. Perhaps has a tentative title been found. But now that the Abstract and all the written pieces are drafted, it is time to develop a final one. A good title is absolutely paramount, for the receiving Editor, for the Reviewers, and for the Readers. This is because it is the title that they will read first. It often also will be what they will remember most. Some journals require that the Title be associated with a short-hand version, a **Short title**, and can easily be done.

Authorship requires thinking. This will be developed taking into account the conventions that surround the Author, and the journal's practices. While this is done, it is a good practice to think about the **Acknowledgements** which very often are expressed at the end of the text, before **References**. References are addressed below.

Keywords are those words or short phrases which will accompany the manuscript. If accepted into an article, keywords will help search engines to retrieve the article by colleagues.

11 – Drafting the Results section

Results is the section where **Elements** are mobilised (Figure 1). These Elements (Tables, Figures) need to be presented in the logical sequence that allows understanding of the work. The results must be put forward clearly, completely, and honestly. The text of the Results is clinical: dry, sticking to elements of results only. To write the Results, one uses very short and plain sentences, no adverbs, very few complements, and no references (what is presented are the results generated by the reported work). This is because the Results section of a scientific article must provide the facts, the results, in a such way that Editors and Reviewers (and hopefully Readers) can be allowed to judge the results by themselves. In this judgement process, the Author is not allowed to interfere.

Sentences in the Results section refer only to facts as they have been found. Statistical results are provided drily in order to enable the reader to judge by her-/himself. Results in an Ecology or Biology article very often include results of statistical analyses. In statistics, a test leads to rejection of a null hypothesis H_0 with a given level of probability *P*.

It is little known that *P* is to be defined, and sometimes justified, by the Author. That level of probability is therefore entirely the choice of the analyst, that is, of the Author. Some very large surveys, with very large sample sizes, may make use of relatively large *P* values: they may tolerate a fairly large risk of wrongly considering true an incorrect hypothesis. This may happen in Sociology or Ecology, for example. A large *P* for instance may be justified by the fact that one seeks to detect small effects against a background noise of large variance. Another interesting reason may be that one wants to give a *heuristic* value to the work, that is to say , consider new hypotheses and possibilities, and so one is willing to consider a hypothesis even if its likelihood to be un-true is comparatively high. Studies in Medicine (on the efficacy of a drug) or in Engineering (on the resistance of a dam) will only accept very small *P* levels: In such fields, it is better to discard a comparatively weak hypothesis even though it might be true; no such risk is acceptable. If the questions which are addressed in the work do not entail immediate risk and have an exploratory value, then a (reasonably and explained) larger *P* level may be chosen.

In practice – in Science – anything is allowed in a manuscript, under the absolute rule that everything is explained.

A statistical test enables, or not, to reject H_0 with that chosen level of probability *P*. A difference is found statistically significant – H_0 is rejected – at a given *P* level. Nothing is "highly", or "very highly" significant. A difference is, or it is not, significantly different. The Test Theory is simple, black or white. This is key to scientific progress. A hypothesis H_0 which has not been rejected is considered "true" as long as a new study is conducted leading to (1) its rejection, and (2) a new hypothesis (or theory).

Critically: in Results, no comment, of any kind, from the Author on the results obtained is allowed. The Results section is the heart of the manuscript. This is where facts are shown and judged – by the reader. This judgement must be free of any influence. Comments, if any, are left to the Discussion; so are comparisons or references to the literature.

12 – Drafting the Material and Methods (or: Methodology) section

Materials and Methods is the section where all the technical components of the study are itemised. The order of presentation of these components absolutely needs to coincide with the order of presentation of the Elements; this same order needs to be followed in the Results and in the Discussion. This section, too, needs to be written with simple words, in short and clear sentences or statements.

If the work involves sampling and statistical analyses, these must be presented in detail. From the technical-scientific standpoint, the Material and Methods section is the most important of a manuscript. In that section the Author(s) must provide all the necessary details that another Scientist would need to repeat the work. Repeatability is a keystone in Science: any valid research must be repeatable, in theory, provided that the same methods are used by another independent Scientist. This tenet is essential in Mathematics, Physics, and Chemistry; much less so (if at all) in Sociology or Psychology. Biology and the associated disciplinary fields have variable stands towards this tenet: it is

extremely strong in Genetics, Molecular Biology, and less so where more complex systems are considered such as in Ecology.

In the Materials and Methods, also, lie those elements which may lead to specific scrutiny by experts. Experts, including Reviewers, will pay particular attention to this part of the manuscript to check if the procedures used are rigorous and repeatable (the latter at least in theory). Failing that test will unavoidably lead to straight rejection of the manuscript. In that respect, Statistics occupy a specific status. Statistical methods are pervasive in all fields of Science. Statistics is a very rapidly evolving and expanding field. Very importantly, statistical methods may (and often, must) concern nearly all the phases of a scientific investigation: from the early stages (such as sampling), to the design (such as the statistical design of an experiment), and to the analysis of results. Major problems occur when there is a discrepancy between the analysis of results with the early stage, or the design, of the investigation. Faulty statistical approaches at any stage of an investigation are a most frequent cause for rejection of the submitted manuscript.

One area, which combines imagination, knowledge, and observational capabilities in a Scientist's mind, however totally escapes from Statistics: this is the observation and the inference(s) that this observation generates. Observation leads to inferences, to hypotheses. Observations may be a molecular pattern, a comment by a member of a household, or the distribution of plant disease in a field. Good observation is vital to Science: without observation of the real world, no Science is possible. Unfortunately, that vital part of Science is often not compulsory in a scientific article, and thus is not published. Observations their derived inferences, however, *are* published in (good) science books: this is why, in part, books are so very important to read.

13 – Drafting the Discussion section

A good Discussion must have a purpose. It must be short and clear. Yet, although short, the Discussion needs to (1) efficiently review the results achieved, and (2) provide the reader with an outlook. The Discussion is also the manuscript part where the bulk of the references are mobilised as citations in the text.

The results thus need to first be addressed in the Discussion, and this must be done in the same order (of Elements – Tables, Figures, or text paragraphs listing results) as the one which is followed in the Results section. In this way, the reader will follow easily the Author's reasoning. Discussion is the section where results may be assessed by the Author. This needs to be done briefly. Discussion is also the part of the manuscript where some comments may be made, for example to explain how difficult a given stage of the research has been. Generally speaking, the Author provides briefly some context to the work. In doing so, superlatives and emphasis are the main enemies. One may be proud of one's results; but one is not allowed to try and impose (or "sell") one's view to the reader: this is precisely why a manuscript is submitted: to the journal, its Editor, and her-his Reviewers, who ultimately act on behalf of future readers, in assessing and reviewing the submission.

One theme of the Discussion which is often overlooked by Authors concerns the Methods. The Discussion is the place where Methods are discussed -- where the reasons of choosing a given approach was followed. For instance, this is where one explains why such statistical method was used. Many statistical methods exist; the reason of the choice made will need explaining. Absence of explanation is not necessarily ground for rejection, but it certainly is a basis for requests for additions from Reviewers and for queries from Reviewers and Editor. There is no need, there is no use, to either be lazy or try escaping questions: it always is better to anticipate questions, and doing so will provide confidence to Reviewers in what they see. It is good, there, to be pro-active. Explanations

with too much detail will never be criticised, but instead welcome – if this occurs in the submission, Reviewers will simply require shortening.

The results achieved may then be compared to other studies, on other systems, or on the same system under different conditions. The Discussion needs to address the relevance of the results achieved in the particular work which is submitted. This applies to studies that have addressed the same or similar system, and similar questions; but the Discussion must go beyond that, and consider published studies that pertain to other systems, either analogous, or smaller or larger.

Overall, the reader needs to be provided with a fair, modest, and unvarnished assessment on the validity and the value of the work. Long Discussion sections are very often frowned at.

A Conclusion, which was compulsory in the past, is often not really needed as a section of its own. What is often best is a simple, short conclusive (set of) statements in an ending paragraph. Perspectives for future research is often a good conclusive theme. Please note that **a conclusion is not a summary of the manuscript**.

14 – Drafting the Introduction

The Introduction seems the easy part. Beware: *it is not*. The Introduction needs to simultaneously explain: (1) the scientific setting (geographical, social, economic, technical or technological, conceptual) of the work; (2) the needs and gaps that exist in the considered field of science; and (3) a summarisation of the research field in its development over the years, its applications, its impacts (and the possible controversies on these).

The Introduction must close with a **final paragraph** providing a very brief, clear, and explicit description of the **objectives of the work**. All this needs to be short. Author needs to make each word count. Repeating the same idea will effectively destroy an otherwise excellent Introduction. The Introduction is also one of the two sections of the manuscript where citations to listed references are needed. The number of citations needed varies depending on the nature of the work, its scope, the width of the science field to which it belongs.

Yet the number of references usually needed in an Introduction is, or should be, small. This is for a number of reasons. A main reason is that quite often Authors feel the urge for, or have the feeling they should be, paying some sort of respect to a keyword. A sentence which includes the key word: “climate change” does not require any reference for using this key word: all the scientists in the world are aware of climate change. Another reason, similar in its form, but different in mental path is the need to pay some sort of token, as one would do at the entrance of a pay-bridge: “conservation agriculture” does not need a citation if nothing more about it is discussed in the manuscript. A third reason, which contains some level of risk towards the Editor and the Reviewers is of the type: “this problem [with which the present study deals] is the most important in (a) the world, (b) the Northern Hemisphere, (c) in the Developing economies, (d) etc”. This statement, followed by a citation is self-serving, and will necessarily be detected as such by any reader. It also is absurd: if true, such statement is useless.

References should be used sparingly, carefully, and reflecting the actual need of the matter at hand. Their use should be focused to specifically address a question for which (some) readers may need a very precise answer.

15 – Designing and drafting the Abstract

Upon receipt of a submission, there are two elements which the Editor, followed by the Reviewers, will read first: the title and the abstract. If a manuscript yields a published article, these are also the two elements (and for the great majority of readers: the only two) that the scientific community will ever read. These are the title and the abstract. These components of a submission require the greatest care in thinking and crafting. These components will not ensure that a submission will enter a full review (i.e., will be relayed by the Editor to Reviewers), but they certainly can, and will, generate straight rejection if defective.

The Abstract needs to have a length that is congruent with the size of the work. Manuscripts that report very large, or multidimensional, or multi-faceted studies may be longer. Very long abstracts will be shortened: Instructions to Authors must be followed in that respect. It also is excellent practice to read and analyse several articles of the targeted journal. The abstract must contain: (1) a brief overview of the scientific background of the work; (2) a clear, short statement of the objectives; (3) an explicit list of the methods used and connected together; (4) a brief statement of the main result(s) found; (5) a conclusive sentence related to the significance of the work towards the considered field of research, and/or the implications of the results on over-arching questions (in the scientific background), and/or perspectives of research steps that will be necessary, given the results found.

16 – On the title

A good title is difficult to develop. It is often safe to craft a seemingly dull, yet sincere and complete, title. Most Editors, and certainly most Reviewers, dislike titles that are excessively trying to draw the reader's interest. Authors should not try to be fun or fancy, or challenging: this often does not work, or in the wrong direction when it does. Change in title during the review process is always possible, but entails risks: usually an electronically submitted manuscript is defined by the following components: Corresponding Author / Title / Reference code. If one of these is changed or lost, issues or delays may emerge – it is important to remember that each journal has several hundred or even thousand submissions being processed at any time.

Over the years, a habit has developed (from the book publishing industry) to develop titles in two parts, such as for example: "My manuscript: A very interesting study". This is not fashionable anymore, and makes for lengthy, sometimes awkward titles. There are differences among disciplinary fields with respect to title length. Titles in the Social Sciences are often very long. Irrespective of cultures and styles, titles that have over 40 words really need shortening: this is a title of a scientific article; it therefore will necessarily be followed by an abstract.

It is a good policy to be simple and direct, and not try anything fancy. A good title is short and informative on the subject of the submission (and this may include some technique, if new or adapted to a new question).

17 – Short title

Some journals require Authors to provide a short title, an abbreviated version of the original title, which will be used on top (or bottom) of the pages of the article if the manuscript is accepted and published. This is far less important than the title itself. All what is required is that the most important words of the title be retained.

18 – Authorship

This is a sensitive element of scientific writing, which has a strong cultural (discipline- or country-wise) component. Seldom does nowadays a Scientist submit a manuscript alone. This is in part a reflection of the evolution of Science, and of the evolution of Sociology in Science. Nowadays, research is seldom, if ever, conducted in isolation, except perhaps in some branches of the Social Sciences.

Sometimes, articles have a very long authorship. This may be a reflection of several different publishing motivations: the work may result from many years of work by a large number of Scientists, possibly across the world; or, the article may be seen as a motion in favour, or de-favour, of a proposal or theory; or again, the work has been conducted by a network of Scientists in a given research project conducted over a limited period of time. In that case, an alphabetical order of Authors' names is one convenient, commonly used option.

The standard, the common scientific publication, does not fall in these categories. Often, a manuscript is developed by a Scientist working in a laboratory or a team, somewhere in the world. The work has been shared, or at least discussed in this team, and so, the team supports the submission. Order in names also matters. Often, but not always, the first Author is the main Scientist involved in the work, and also the Corresponding Author. Sometimes, the Corresponding Author is not the first Author. It may also be that the Scientist who has been in charge of writing the submission, or who has a supervision role in the study, is named last.

19 – Key words

If the submission successfully leads to an article, the key words will help , retrieve more easily the article by search engines . Key words may be revised at will during the review process. One should never, however, list a key word which is not truly linked with, which does not really reflect, the actual study.

20 – References

The fact that references come at the end of a manuscript does not mean that they are unimportant. The reference list will not be overlooked by the keen reader. In particular, the Editor and her/his Reviewers will pay specific attention to the references. They must do so.

Some terminology is needed. "*Citation*" refers to the quotes that are made within the text, such as, e.g.: "Jones et al., 2020". "*Reference*", on the other hand, corresponds to the full reference of the cited work. References are listed at the end of the manuscript. A reference can be a journal article, a book, a peer-reviewed report, or again a website. Each publisher has its own policy on the formats of both citations and references. The details on the format to follow are provided in the "Instructions to Authors" of all scientific journals. These must absolutely be followed scrupulously.

The references used in a manuscript are important. Here are a few pointers.

- **Never should an Author cite works she/he has not read.** Citing someone else's work and providing a reference to this work implies that this cited work has been examined by the Author(s) and judged by them as a useful and relevant basis for their work, be it conceptual (Introduction), methodological (Material and Methods), or of general, comparison,

perspective, interest (Discussion). Citing work one has never read is unethical. Doing so may be detected by a careful Reviewer or Editor.

- There is a tendency to cite the most recent references on a given topic, the rationale being that one wants to show that the manuscript represents a new, recently addressed, topic. This is a mistake for at least two reasons. Doing so – ignoring older references, and citing only very recent work – disconnects the submitted work from the knowledge base on which it builds upon: this is unfair for the earlier Scientists who initiated research on the considered subject, and this may lead to omission or mistakes: subjects, hypotheses, approaches necessarily evolve in Science. It is my very strong view that references should not be time bound – that **old references, if relevant, should always be provided**. Older work may well present hypotheses or approaches which have later-on been overlooked in more recent work. Then again, recent and valuable work must be cited.
- There is sometimes a tendency to cite articles that have been published in "famous" journals. This is understandable. Making it a routine however leaves out very valuable work published elsewhere in specialised yet respected journals.
- A very long reference list carries an implicit penalty. A research article is not supposed to cite all the work done in a given topic. A reasonably short, and scientifically justified, reference lists is the objective an Author should have.
- This document has not specifically addressed a particular type of scientific publication: the **Review Article**. If such is the goal of the Author(s), then very long reference lists (100 and more) are the norm. Yet as for a research article: (1) all the cited references must have been read by Author(s); and (2) each cited reference must contribute precisely to the path of thinking of the Review Article. Please note that a good Review Article is not a comprehensive listing of all the scientific production associated with a given topic (nowadays, electronic databases produce such listing rapidly and efficiently). A good Review Article is one where the state of knowledge on a given topic is rapidly surveyed, where emerging trends are identified, and where new ideas or new ways to looking at the chosen topic are offered to the reader. Good reviews are notoriously difficult to write.
- Reviews have become a familiar publication format, which actually is encouraged by many Editors and journals. Some are very useful; many are simple listings. There even are reviews of reviews. It is perfectly logical, in the Introduction (or the Discussion) of a standard research article, to cite a few review articles. These should be chosen very carefully by the Author(s), because these absolutely must correspond exactly to the topic, and fill an actual gap in the work reported in the manuscript. Reviews of reviews must be avoided at all cost.

21 – Achieving success: on the acceptance of an article, and on the meaning of publishing your research

After all, the acceptance of an article and the meaning of publishing research, are rarely discussed. The truth is that "success" is a very relative and complicated notion. It will depend on the Scientist(s); it will depend on her-his character. It depends also on her-his professional (disciplinary area, national culture, sociology of science) environment – an environment which, essentially, is not chosen but imposed on her or him. Some Scientists approaching the end of their carrier have published dozens, sometimes over a hundred, articles; some of these are published in reputed scientific journals, but of course, not all of them. Other Scientists of about the same age and experience only have published a little; maybe, ten or twenty articles. These articles are not necessarily published in outstanding scientific journals. Yet a close look detects a pattern of very solid

Science, each article offering something really new and interesting to learn. We live in a world where publishing seems everything to some. Yet this second category of Scientists is highly respectable.

When thinking of "success", acceptance of a manuscript for publication in a journal comes naturally first. This is the legitimate objective of a PhD student who must defend her-his PhD in time, of the young professional who must show, and rapidly so, her-his ability to deliver. And it also is the goal of any Scientist who wants to share results reasonably rapidly, and make progress in her-his carrier. Most articles belong to this category. Acceptance will happen in stages: first, the Editor will decide that the manuscript is worth the time of her-his Reviewers; second, Reviewers will deliver recommendations to the Editor; very seldom (nowadays) is a manuscript accepted for publication right away, with no requests for changes. Most of the time, the Reviewers, and the Editor, will require revisions on the submitted work; these revisions may be very light or quite heavy; … and the process will continue until the Editor decides that the revised manuscript is ready for publication. The opposite outcome, rejection, may result from two main stages: “desk rejection” by the Editor, or rejection after review. I briefly address ways to avoid such outcomes below.

Journals very much differ in their review philosophies. Some are handling very large numbers of submissions, and also have a very large publishing output. Often, these journals do not offer very detailed reviews to Author(s). As a result, Authors learn and benefit little of the review process. Other journals (they are fewer) do make comprehensive reviews, in part because the inflow of submissions is smaller, in part also because these journals are strongly discipline- and topic-oriented, their reviews therefore are conducted by dedicated experts. If a submission undertakes a formal review in such journals, much may be gained by the Authors in the process, irrespective of the final outcome – reject or accept. The work will then have a chance to be resumed and eventually published in the same or another journal.

Science is a collective good. It belongs to the scientific community and serves the public. Publications are the main channel with which Scientists speak to one another, and with the public, too. Publication, irrespective of the model a journal chooses to have (there are several), remains in the hands of Editors, and, most importantly, Reviewers. The latter work on a volunteer basis. Reviewers are Scientists who serve, maintain, and support a collective good. Editors, in turn, play the important role of identifying Reviewers and of ensuring fair and timely review. Authors, irrespective of their goals – the simple and legitimate need to publish their work, or the much more ambitious goal of having impact at a small or large scale – are contributing to this collective good. Science publishing has been and still is a major mechanism for the advance of Science, for the sharing of knowledge, among Scientists, citizens, and policymakers.

Ultimately, considering only the publication aspect (there are others, such as Extension and Education), and leaving aside the daily contingencies and constraints of a Scientist’s life, what will matter – what will remain – only are those articles that are cited and truly used by other Scientists in their work. Some articles may serve as knowledge lighthouses for decades; there are very few such ones indeed. But they exist, and are not necessarily published by the most famous journals of their time. This is, in my view, what true publication success is.

Annex 1: some main causes for manuscript rejection

0. Automated rejection

- Plagiarism. Plagiarism is forbidden in Science. Most reputable journals have computer programmes to detect plagiarism. Plagiarism may concern several, one, or a section of sentence. Plagiarism includes self-plagiarism.

1. Straight ("desk-top") rejection

- The topic of the manuscript is not in the scope of the journal.
- The scientific English is much below the minimum standard of the journal.
- Teleology: a study is designed to demonstrate a theory which is considered a priori true by the Author(s), and (a) does not actually test the theory, or (b) does not address alternative hypotheses (example of worst case: "the data are wrong, because they do not fit with 'the' model").
- The design of the study is wrong.
- Methods used in the study are outdated, and/or not reliable.
- The statistical approaches used are incorrect: in the design (e.g., sample size, experimental design); in the analysis (e.g., wrong or outdated or unreliable technique used); in the interpretation (e.g., confounding causation and association).
- Instructions to Authors not followed.

2. Major revisions (if compounded, may lead to rejection)

- There are serious statistical issues in the work, but the Editor considers that new and correct analyses can be re-conducted.
- Major references to the subject are missing.
- The overall organisation of the manuscript is not good.
- Instructions to Authors not fully followed (including Reference list).
- Language issues: phrasing too assertive, too emphatic, or exaggeration.
- Serious issues of grammar and syntax throughout the text.

3. Minor revisions

- Inadequate Figure or Table title.
- Insufficient Figure or Table caption.
- Bad Table organisation.
- Missing references for a citation in the text.
- References with no citation in the text.
- Some grammar or syntax issues.

Annex 2: What are the key aspects which are scrutinized by an Editor and a Reviewer?

What follows are only results of my personal experience. Editors and Reviewers vary widely in their ways to looking at a submission to their journal.

The lists below are for hypothetical, let us say, average, Editor and Reviewer.

Items are listed in steps, in the order they are likely to be considered by the Editor, and by the Reviewer. As these steps are being taken, an assessment is being mentally built by these two persons: a very good impression on an element considered first will have a stronger bearing on the overall assessment. The opposite is true.

Critical aspects are marked with a **C**; important aspects are marked with an **I**; Additional aspects are marked with an **A**.

Editor:

1. Title - **I**
2. Abstract- **C**
3. Elements: Tables and Figures – **I**
4. Style - **I**

Reviewer

1. Title - **I**
2. Abstract - **C**
3. Elements: Tables and Figures - **I**
4. Methods - **C**
5. Results (along with elements) - **C**
6. Style - **A**
7. Grammar, Syntax - **A**
8. Discussion – relevance of comments, interpretations - **C**
9. Discussion – overall outlook, perspectives, and links with other systems / theories / concepts - **A**
10. Overall logic displayed in the work - **C**
11. Literature cited - **I**

Annex 3: some remarks about the style

Style is difficult. It is a matter of taste. While English is used as a communication device across the entire scientific world, there are different forms of English: British, American, Irish, Pilipino, Indian, Chinese, Australian, South African, for instance. I believe that, in scientific writing, two rules apply: (1) do not use a spoken form in a written text; and (2) the style must be such that it helps, and not prevents, understanding.

These are simple rules. They do not solve all the difficulties of scientific English writing. There are books on the topic. A strong advice I would make is this: if English is not your primary language and if you are not used yet to write scientific articles, then:

- select and read (study) scientific articles;
- some of them will attract you, not (only) because of their scientific content, but because you like the style of these articles for the easiness of understanding which this style creates;
- books in your field, especially “classics” in your field, can be major sources of inspiration, including their style;
- select some sentences which you find particularly good in these select texts;
- collect and write these key sentences in a notebook;
- review this notebook on a very regular basis, to learn these sentence-examples, and add new ones in your collection;
- when the time comes for you to write, you can use these sentence-examples, modify and reformulate them to suit exactly your needs.

The same applies to vocabulary. The most excellent books in Science often have a Glossary: this is an outstanding source of scientific (and non-scientific) vocabulary, in a Science context.

Some examples of most common style issues are listed below.

- Avoid very long sentences: the reader will tire and will not follow.
- It is safe to use the conventional Subject – Verb – Complement structure in a sentence. This may not lead to elegance, but will allow better control of the sentence structure and facilitate its understanding.
- In scientific writing, it is perfectly acceptable to repeat the same word in successive sentences: if the choice of word is accurate, there is no good reason to change for another word (which may be less accurate).
- Avoid sentence expressing several ideas: the reader will be confused; the “one sentence – one idea” rule makes for easier reading and understanding.
- Do not use loose words: “get”, “thing”, for example.
- Do not use familiar expressions.
- Do not write aggressive sentences against another Scientist(s) or another published work: In the worst cases, this is ground for rejection.
- Do not start sentences with an undefined pronoun, for example: “It shows that…”. The pronoun (pro-noun) replaces a noun. What is this noun? Use this noun and remove this “It”. The noun will thus be repeated in the text: no matter. What counts first is to be clear.
- Successive sentences or paragraphs (often in an itemising form) starting by “For”. For example: “For the Ph, we adjusted…; For the density we ...”. This gives an impression of itemisation of elements to the reader, as if the Author were entering in a routine, compulsory, listing of things that she/he has to mention. The Author needs to draw the interest of the reader, demonstrate her/his enthusiasm of conducting the work without missing steps.

- Emphatic words (adjectives) on one's work: avoid: "exceptional" (result), "(very) interesting" (work conducted); "unique" (speaking of the work).
- Emphatic expressions on one's work: "for the first time" (if one really wants to express this, this must be done with modesty, and accompanied by precautions. For example: "to the best of our knowledge, this is the first time that ..."; or: "to the best… this appears to be the first time that…").
- Avoid expressions that imply the reader's knowledge, e.g.; "It is well known that…".