# How to publish a scientific paper?

## Fourth session



## 1. Question periode

**What tense to use to discuss other’s results and what for our own findings?**
**What is the advantage/disadvantage to use passive or active voices?**
**How to put numbers in the text?**
**How to express, „It is easy…”?**

## 2. The “Experimental” or “Materials and Methods” section of the paper

**Such a section – when it exists - follows usually the Introduction. There you describe the materials used, their treatment and the testing conditions.**

**For materials, their exact technical specifications have to be given. Avoid using the exact name of the supplier because of their advertising inherent. Instead, give generic or chemical names of the material. When registered trade names are used, they should be put capital (Teflon, for example).**

**When human subjects are considered (papers in biology or in medical topics), it is important to state that they were informed and agreed with the experiments (statement about “informed consent”). Example: “Blood samples were taken from 48 informed and consenting patients…the subjects ranged in age from six months to 22 years”.**

**Be sure that you describe all details necessary for a reproduction of your experiments. The journal where you want to send the paper usually gives instructions about the preparation of the experimental and material description requirements. You must be very precise. The description of a new experimental technique is similar to a cookbook recipe. Others will**

**follow and repeat your technique. The syntax of your sentences has to be clear.**
**A wrong example: "After standing in boiling water for an hour, the material was examined".**
**Correction: "After the material was standing in boiling water for an hour, it was examined"**

**The "Experimental" section does not contain major results. It only serves for the description of the used materials and the techniques employed. The results of the measurements are presented later in the "Results" section, see below.**

**Example for an "Experimental" section:**

**Copper samples of 99.95% purity with a grain size of 60 µm with weak initial textures were deformed in three different deformation modes at 293 K; in torsion, to torsion strains of $\gamma_t \leq 3.9$ at a deformation speed of $\dot{\gamma}_t = 1\ s^{-1}$, in compression, to true strains of $\varepsilon \leq 1.2$ with $\dot{\varepsilon} = 10^{-2}\ s^{-1}$, and in rolling, to true strains of $\varepsilon \leq 2.4$ at strain rates of $\dot{\varepsilon} = 1...10\ s^{-1}$. For *torsion*, bulk dumbbell-shaped samples with diameter of 9 mm and gauge length of 50 mm were used. The formulas given by Grewe & Kappler [10] were applied to derive the torsion stress and strain values (for details see [11]). *Compression* tests were performed in a conventional tensile machine by means of a compression cage, allowing for deformation of cylindrical samples with an initial height/diameter – ratio of h/2r = 1.5. These tests did not reveal any friction down to h/2r = 0.5 from where the samples were re-machined to the original h/2r-ratio [11]. Concerning the *rolling* deformation, small and equal steps of $\Delta\varepsilon = 0.1$ to identical final thickness of h = 1 mm were applied so that the conditions for deformation homogeneity were well fulfilled [12].**

## 3. The main sections of the paper

**This is the major part of the paper. It follows the Introduction or the Experimental part and can be devided into several sections. Its composition depends on wether the paper is a theoretical or an experimental type.**

**In an <u>experimental work</u>, the main sections begin with the Experimental Section (or: Materials and Methods). Then, in a following section, the obtained results are displayed on figures and/or in Tables.**

**Thus, this section is normally headed by "Results". Important: the results obtained should be presented in past tense.**

**Usually you have to carry out many experiments. However, in the paper, you cannot present all data; you have to synthesize them by selecting the relevant information. There are two methods; i. Presenting the results in tables or, ii. in figures. The latter ones are more informative. The selection of relevant information is very important. "The fool collects facts; the wise man selects them".**

**When statistical matters are examined, be sure to carry out enough number of tests to be representative from a statistical point of view. One experimental point is not enough. You should repeat the tests several times and then present the average value with its standard deviation. For example, when micro hardness is measured, it should be done about 10 times on the same sample under the same conditions. However, you should not give all measurements for the 10 points, only the average value. A wrong example: "33,3% of the mice used in this experiment were cured by the test drug; 33,3% of the test population were unaffected by the drug; the third mouse got away".**

**Even more important: you should never change the obtained experimental data in order to make them in better agreement with your theoretical predictions. It is very serious. One can be tempted to change the data slightly to have better agreement and a good justification of his or her new theory. It is, in fact, a crime. An ethical one. There is always a chance that your theory is not good enough. Then, another person who will follow your work and tries to make a better theory may come to bad conclusions using your false experimental data. That may hinder significantly the progress in science. It can even be more embarrassing if it is you who will find a better theory later and you cannot use your own experimental results to prove it!**

**The falsification of experimental observations is not really rare. Even Ptolemy, the famous astronomer in about 150 AD published false data concerning his astronomical observations in his important book, the Almagest. Imagine; his theory of celestial spheres was then standing for 1500 years!**

**There can be, however, experimental data that you can ignore. Nevertheless, you must be absolutely sure that you can eliminate them. Example:**

**"A soccer player kicks a ball 100 times in direction north. There is a strong wind from north. The records of measured flying distances of the ball show an average value of 25 m with little standard deviation (about 2m). Two records, however, are about 65 m. Can we ignore them or not?**

**Yes, we can ignore them if, for example, we were present at the experiment and observed that there was no wind at all at those specific moments.**

## 4. The Results Section

**The Results section should be short. Especially, when it is preceded by a good Materials and Methods section and followed by a well-written Discussion. In the Results part you describe what you obtained, i.e. what is your major contribution to the development of science. The preceding sections (Materials and Methods) serve to describe *how* you obtained the results, the Results section *describes* them, and finally, in the Discussion part you examine what they *mean*. Evidently, the whole paper is standing on the Results, so you must write this section with crystal clarity.**

**Redundancy has to be avoided in the Results section. It means that you do not have to describe again in words what is already well illustrated by a figure or a table. This is a typical mistake. It happens in many doctoral theses presented here in France.**

**The Results Section is followed by the Discussion. The rules around the Discussion will be examined later.**

**In a theoretical paper, one normally begins with the presentation of the new theory. Then, comparisons are made with other theories, or the theory is tested on experimental results. It is especially important to test a new theory and to demonstrate its capacities. If you only present the theory and no comparisons with experiments or with other theories, you may risk your paper to be rejected by the Referees (not necessarily though).**