Programme of advanced academic doctoral studies – academic year 2019 / 2020

Ethics and academic integrity in scientific research and dissemination of findings

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Lectures delivered based on the materials of

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Course outline
Communication through scientific papers

3. Elaboration (design) of a scientific paper

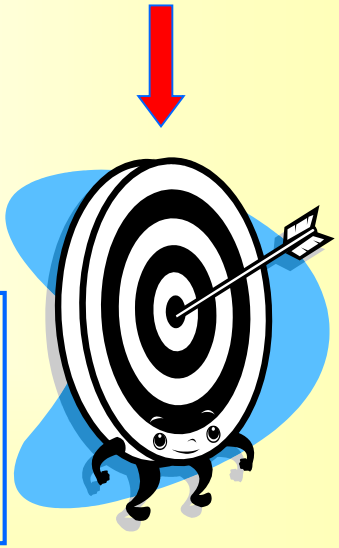
3.1. Establishing the strategic elements of communication (lecture 4)
3.2. Organizing the research findings (lecture 4)
3.3. Structuring the scientific paper
R1 – Refining the outline of the future paper
R2 – Primary editing of the manuscript
R3 – Final editing of the manuscript

3. Elaboration of a scientific paper:

Editing

Design → Editing → Communication

- R1 – refining the outline of the paper
- R2 – primary editing of the manuscript
- R3 – final editing of the manuscript



R1 – Refining the outline of the future paper

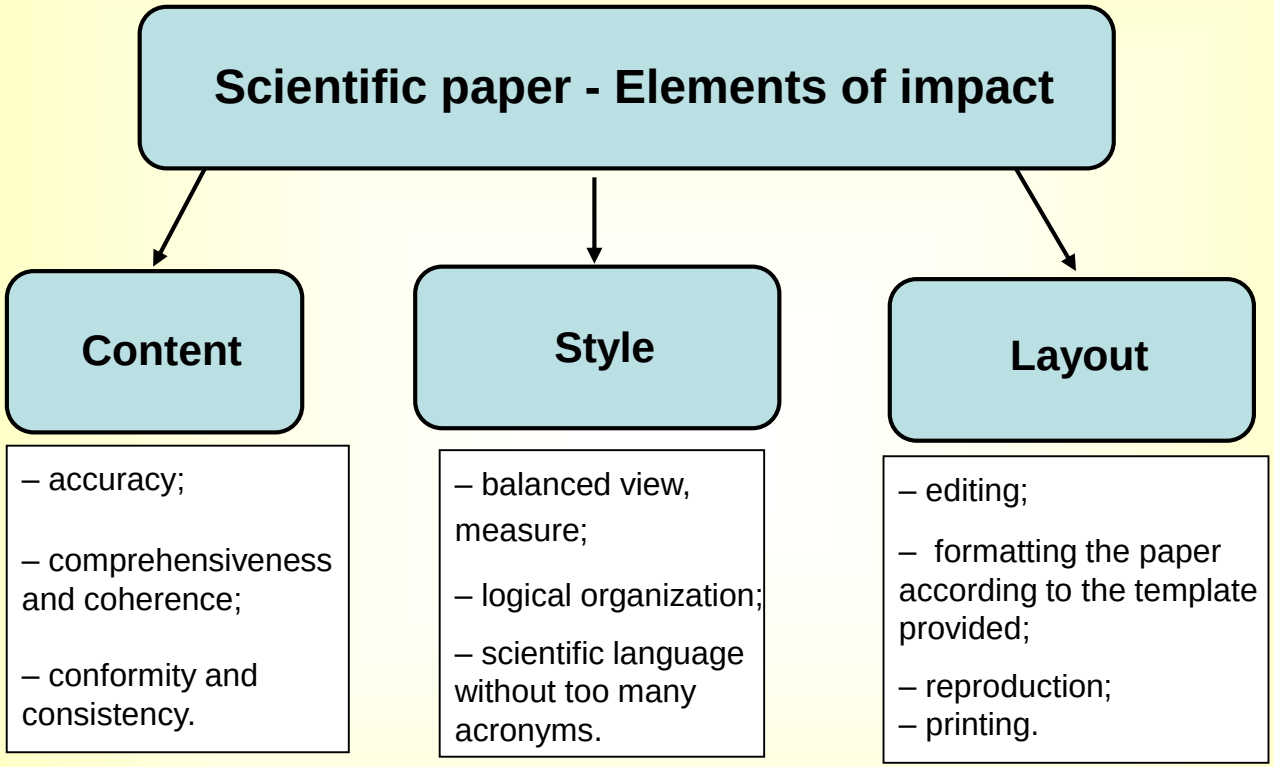
a. Self-assessment of the content of the scientific paper

b. Presenting supporting evidence

c. Terminology, symbols and units of measurement

Refining the outline of the future paper

a. Self-assessment of the content of the scientific paper



Coherence – *clear, consistent relation among the parts or elements of a whole* [*lat..cohaerentia*] .

Conformity - *Agreement, appropriateness* [*Fr. Concordance*]**.**

Consistency - *hardness, strength, firmness, the quality of an axiomatic system of not being contradictory* [*Fr. consistance, It. Consistenza*] .

Refining the outline of the future paper

Self-assessment - essential questions:

1. Are available findings sufficient?
2. The situation acknowledged, is it acceptable or unacceptable?

   (≈ SWOT analysis of the paper, based on sound information and clarity)

(V. http://ro.wikipedia.org/wiki/Analiza_SWOT, SWOT analysis may be used in any field during the design stage.)

3. If the actual situation is unacceptable, what can / needs to be done / is worth doing in the short term (and possibly in the long term)?

b. Evidence - Forms of presentation

Evidence = facts and arguments related to the transmission of the main message of the paper

- written text

  the main alternative, the easiest and most accessible way of highlighting ideas and evidence in scientific papers

- mathematical equations

  alternative specific to the evidence retrieved from mathematical proof, from the quantitative correlations among different quantities, expressed by analytical or numerical functions, established by proof or by experiment

- tables

  preferred alternative, sometimes the only one possible, of logical organization and synthetic presentation of a set of precise, repetitive and/or large numerical data

- visual representations, generically called figures

  the most appropriate way of presentation and of synthetic and intuitive description for connexions, balances, distributions, instantaneous states, temporal developments, (highlighting) ideas.

Refining the outline of the future paper

Presenting evidence – main requirements

- representation of available elements of information and knowledge in a clear, concise, interesting and appealing manner;
- natural integration of evidence and related information into the internal logic of the paper and of its sections;
- autonomous understanding of presented evidence, without referencing or further documentation, given the relative independence of the text from the illustrative material and vice versa;
- the possibility of a deeper understanding of the pieces of evidence in a paper, both consecutively and quasi-randomly.

c. Terminology, symbols and units of measurement

- **Terminology and related symbols –**

terms and symbols designating quantities and properties of the phenomena, processes, objects and systems under investigation

- nationally and/or internationally standardized terms and symbols
- terms and symbols established and promoted by scientific consensus
- terms and symbols coined ad hoc by the author.

Symbol *– Conventional sign or group of signs used in science and technology, representing sums, quantities, operations, phenomena, formulae, etc.* [*Lat.* ***Symbolum***]**;**

AD-HÓC *– for a particular purpose only, circumstantial.*

Refining the outline of the future paper

- The notations, acronyms and abbreviations used in the paper can be explained in the form of: text, tables or nomenclatures.

Notation *- System of conventional graphic signs (letters, numbers, etc.), used in a field of science or in a domain of activity. [Lat. Notatio];*

Acronym – *Word made up of the initial letter(s) of the words forming a phrase, expression, title, etc.* [*Fr. acronyme*]*;*

to ***Abbreviate -*** *to shorten a word, title, etc.; to express something by a shorter form, to shorten by reducing the number of letters or syllables. [Lat. abbreviare].*

➢**Units of measurement of physical quantities** – ISO - international system of quantities and units (except for certain special situations).

R2 – Primary editing of the future paper

a. Internal logic of the future paper

b. Order of sections in the paper

c. Writing the manuscript

d. Avoiding collision with plagiarism and self-plagiarism

Primary editing of the manuscript ot the future paper

a. Internal logic of the future paper

ENTRY Sections	CONTENT Sections	END Sections
1. Title **2. Authors** **3. Keywords** **4. Abstract**	**5. Introduction** **6. Materials and Methods** **7. Results** **8. Discussion** **9. Conclusion** **(For 6, 7 and 8, there are also other variants)**	**10. Mentions / Acknowledgements** **11. References** **12. Appendices**

Primary editing of the manuscript ot the future paper

Introduction (5)

Logical function accomplished: to convince the reader, by relevant information and arguments, that there is an important and relevant scientific or/and technical matter, for which the paper under consideration offers logical solutions. The introduction provides the frame of reference and positions the paper within that frame.

Content:

- states the matter addressed in the paper;
- describes, based on bibliographical references, the state of the art in the field; (as a rule, citation makes up about 75% - 90 % of the bibliography used in the paper)
- argues for and describes the need for new research;
- defines the main research objectives presented in the paper within the new research identified above as necessary research;
- outlines the methods and the means of investigation to be used to meet the objectives, using bibliographical references, if necessary;
- broadly assesses the findings arrived at in the paper.

Recommended length: maximum 2 printed pages

Materials and Methods (6)

Logical function accomplished: to convey necessary and sufficient information and knowledge to domain experts, in order to describe the research performed and to identify the findings presented in the paper.

Content:

- describes, in a logical and comprehensible manner, the way in which the research was carried out; flowcharts may be used;
- defines the system under research, i.e.: purpose, structure, outputs (response functions searched), inputs (influence factors), the system states and regimes (state and development parameters of interest);

  *i.e. – abbreviation for **id est** (namely; that is to say)*
- describes the scientific research methods to be used;
- argues for and describes the research methods used, from the following perspectives: *substantial* (materials), *constructive and functional* (processing, measurement and control equipment, etc.) and *operational* (modelling or simulation programmes; acquisition, processing and graphic representation of measurement data programmes, etc.);

Results (7)

Logical function accomplished: to synthesize the findings derived from the research performed, which can be correlated with the main message of the paper, conditioning its validation or invalidation

Content:

- describes, in a systematic, logical manner and according to thematic, hierarchical or chronological criteria: synthesis indicators (environments, dispersions, confidence intervals, etc.) of measurement data, envisaged methodologies and algorithms accompanied by their supporting hypotheses, as well as other significant findings under discussion in the paper;

- emphasizes, using text to avoid any interpretation: mathematical equations, tables and figures, domains and variation trends in measurement or simulation data characteristic of the investigated system.

Primary editing of the manuscript ot the future paper

Discussion (8)

Logical function accomplished: to explain the research findings in relation to the objectives and hypotheses assumed, to other relevant findings provided by other researchers, and to the demands of further development in the field.

Content:

- reviews, confronts and correlates the ideas and evidence provided in the paper;
- searches for and puts forth plausible explanations concerning the agreement / disagreement between ideas and evidence;
- develops inductive and deductive inference processes regarding the research findings, and assesses them in terms of validity;
- identifies the sources of errors that may affect the accuracy and reliability of the findings;
- assesses the scientific and technical importance of the findings;
- highlights the importance of authors' personal contribution to the research.

Recommended length: maximum 4 printed pages

Inference – *Logical operation of deriving a proposition from another, through which a judgement is validated as true by virtue of its relation to other judgements.* [*inférence, cf. Lat. inferre – to bring*]

Conclusion (9)

Logical function accomplished: to reveal the importance and relevance of the research findings, as well as their implications in relation to the current state of the art and to future developments in the field.

Content:

- selects and synthetizes the main conclusions derived from the research performed;
- emphasizes and argues for the novelty, value and applicability of the research findings;
- assesses potential means and consequences of scientific and/or technical application of the findings;
- points to further research ideas needed to strengthen and generalize relevant research findings.

b. Order of editing paper sections

Scientific paper – refined outline

a)

1. **Title**
2. **Introduction**
3. **Materials and methods**
4. **Results**
5. **Discussion**
6. **Conclusion**
7. **Abstract**

b)

1. **Materials and methods**
2. **Results**
3. **Discussion**
4. **Conclusion**
5. **Introduction**
6. **Abstract**
7. **Title**

Primary manuscript of the paper

Authors writing their first scientific paper are advised to chose b) from above.

c. Final editing of the manuscript

Strategic objective:

- to present the scientific content of the future paper in a logical, precise and comprehensive manner

Immediate objective:

- creating the first draft of the manuscript, which should include the most important and relevant pieces of information and findings related to the research performed

Primary editing of the manuscript ot the future paper

Recommendations for editing the first draft of the manuscript :

- editing should be guided by the main message and the refined outline of the paper;
- writing should be coherent and smooth, similar to an oral presentation for an interested colleague;
- the first draft should be as comprehensive as possible, even redundant, with no size constraints;
- editing should focus on content rather than form, style and grammar;
- the language used should be natural, colloquial and precise enough;

Colloquial *adj. (about language, style) characteristic of the spoken language (familiar)*

- the style should be balanced; one's own ideas and opinions should be presented and assessed in an objective, honest and unpretentious manner.

Primary editing of the manuscript ot the future paper

Once the first draft is ready:

- read it again for further additions, clarifications and explanations, so as to make it easy to read and understand;
- scan it from „A to Z" to make sure paragraphs and sections are organized in a logical manner;
- send it to the research team for constructive feedback.

PARAGRAPH, *paragraphs, n. 1) A division of text smaller than a chapter, which begins on a new indented line (marked by § and numbered).* ***2.*** *Piece of text separated from the other pieces by a new indentation (and by a special graphic sign); (whole) fragment in a text devoted to one idea.*

INDENTATION / INDENT*, n. Line in a text that begins more on the right, to mark the change of ideas; a fragment of text beginning with such a line.*

After a short 'break' (usually a few days),

- read the manuscript once again and revise it until it reaches an acceptable scientific level for a first draft.

'First line indentation' is often replaced by spacing, i.e. adding space between paragraphs (see the example on page 9).

d. Avoiding collision with plagiarism and self-plagiarism

Plagiarism = a form of intellectual theft

- LAW no. 206 of May 27, 2004 (updated) on good conduct in scientific research, technological development and innovation (updated until January 28, 2016)

[http://legislatie.just.ro/Public/DetaliiDocument/52457, accessed in 27.05.2020] :

- *Art. 2:*

" (2) The deviations from the norms of good conduct provided in art. 2 lit. b), insofar as they do not constitute crimes according to the criminal law, include: : a) plagiarism; b) self-plagiarism; …"

- Art. 4:

" (1) For the purposes of this law, the following terms are defined as follows :

……

Primary editing of the manuscript ot the future paper

e) plagiarize* – *i) to steal and pass off (the ideas or words of another) as one's own : use (another's production) without crediting the source; ii) to commit literary theft : present as new and original an idea or product derived from an existing source;* ***- plagiarims*** *- the act of using another person's words or ideas without giving credit to that person* ***:*** *the act of plagiarizing something;*

f) self-plagiarism* - *the reuse of one's own words, ideas, or artistic expression (as in an essay) from preexisting material especially without acknowledgment of their earlier use*

…….. “

Uncited (unnamed) bibliographic sources in the paper do not absolve the author (s) of plagiarism. On the contrary, they induce suspicions of plagiarism.

* Definitions were taken from „merriam-webster.com dictionary”

§.R3 – Final editing of the manuscript of the future paper

a. Bibliographical references

b. Scientific writing

c. Final editing

a. Bibliographical references

Several systems:

- ‘first author’s surname, alphabetically – date of publication’;

Bejan, A. 1988. Advanced Engineering Thermodynamics. Wiley, New York.

Bejan, A. 1994. Engineering advances on finite-time thermodynamics. Am. J. Phys. 62:11-12.

Bucher, M. 1986. New diagram for heat flows and work in a Carnot cycle. Am. J. Phys. 54:850-851.

Curzon F.L., Ahlborn B., 1975, Efficiency of a Carnot engine at maximum – power conditions, Am. J. Phys., 43: 22-24.

- ‘serial numbers in the alphabetical list of first author’s surnames’;

[1] Berthelot, J – M., - Materiaux composites, Comportament mecanique et analyse des structures, Paris, 1996.

[2] Cicală, E. – Methods of statistical processing experimental data, Ed. Politehnica Timişoara, 1999.

[3] Cicală, E. – Optimization of the processes of laser materials sharp cutting. Doctoral Thesis, Universitatea Politehnica, Timişoara, 1997.

[4] David, I., Gubencu, D., Malaimare, G. – Dimensional Tolerance and control, Laboratory Guidelines, Editura Politehnica Timişoara.

Final editing of the manuscript of the future paper

- ‘serial number following in-text citation order’;

[1] CHEN J. "The optimum performance characteristics of a four temperature level irreversible absorption refrigeration at maximum specific cooling load", J. Phys. D, Applied Physics, 1999, 32(24), p 3085-3091.
[2] ZHENG T., CHEN L., SUN F., WU C., "Performance of a four heat reservoirs absorption refrigerator with heat resistance and heat leak", International Journal Ambient Energy, 2003, 24 (3), p. 157-168.
[3] HAJ TALEB, FEIDT M., "Analyse parametrique de la performance optimale d'une machine frigorifique quadritherme (Parametric analysis of the optimal performance of 4 heat reservoirs machine)", Proceedings COFRET'04, 22-24.04.2004, Nancy, France

✳ **Sound deontological practice (and implicitly, one’s sense of honesty) requires written mention of the sources of new ideas and facts, sometimes accompanied by short comments (*Deontology – professional ethics*).**

- Self-referencing of previous papers should be limited and dictated by common sense.
- Referencing of papers that have not be used in the paper under consideration, for reasons of convenience or reciprocity, runs counter deontological principles of scientific communication.

b. Scientific writing

Main requirements:

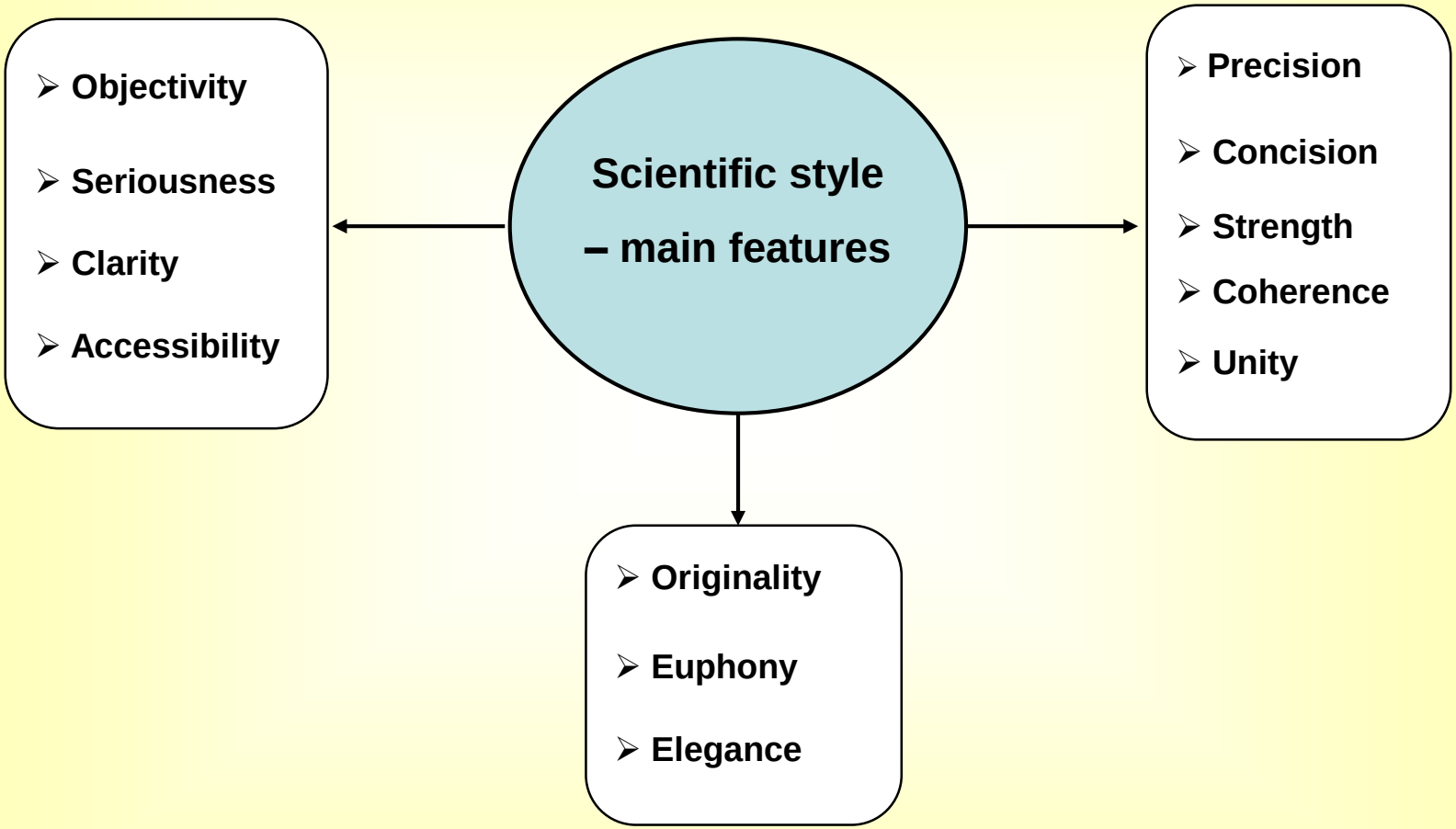
- a neutral, balanced view on the content of the scientific paper (in terms of form - content, ideas - evidence, generic - specific, text - mathematical equations - graphic representation, personal opinion - other researchers' opinions, etc.)

- logical organization of the research topic into sections, subsections, and paragraphs, to ensure textual coherence and cohesion

- the use of appropriate scientific language

Final editing of the manuscript of the future paper

Features



Euphony – a harmonious succession of sounds in the syllables of a word, *with a pleasant auditory effect.* [*Lat., Gr. Euphonia*]

c. Final editing

Main objective of final editing: to proofread and complete the primary manuscript of the scientific paper, according to style, grammar, orthography, orthoepic and punctuation rules and conventions

Stages:

- assessment, in terms of clarity and coherence, of the primary manuscript in its whole, as well as of its individual components (e.g. sections, paragraphs, clauses, sentences, tables and figures)
- assessment of the primary manuscript in terms of objectivity, seriousness, precision and concision
- assessment of the primary manuscript in terms of unity, accessibility and linguistic accuracy;

The assessment, proofreading (even revision) and completion of the primary manuscript of a scientific paper aims to satisfy the interest of future readers and to meet their expectations and exigencies. That is why it is highly advisable that authors also read the paper from the point of view of an interested reader and try to figure out whether the ideas presented in the paper can be easily grasped by readers.

Concluding remarks

- If authors are interested in patenting their inventions, they should first and foremost familiarize themselves with patenting requirements before writing the paper, in order to make a sound decision about the best way of using their research findings: i) only paper, ii) only patent, iii) patent and paper (in this particular order), iv) paper and patent (in this particular order).

- Any paper carries information on various levels. Besides ‘the visible level’ we have examined throughout this lecture, there is almost always, ‘an invisible level’, which carries information we did not intend to convey. Authors are advised to take that into account as well for the final editing.

- Scientific papers are neither teaching materials, nor books!