Laboratory of
Information Technologies

How to write a paper that will be accepted for publishing

Assist. prof. dr. Kristina Stojmenova Pečečnik

New developments in statistics 2024/25

- A two-part lecture -

1st Part: Research plan

2nd Part: How to choose a scientific journal and write a scientific article

1st Part: Research plan

1. What is a research plan?
2. What does a research plan consist of?
3. What is should be included in a research plan

Disclaimer

1. Research areas vary
2. The contents of the workshop(s) do not apply equally to all areas
3. Consider the specific research methods within your field
4. Consider all statements as guidelines and recommendations
5. **Consult with your mentor** about each step of your research work

What is a research plan?

- A research plan is a ***plan*** for how to get an answer to a research question.
- A research method is the ***strategy*** used to implement the research plan:

  - data collection and processing strategy.
- A research plan is always prepared ***before*** the start of the research.
- The research plan is the ***basis*** for preparing a scientific paper:

  - Related work,

  - Metodology.

What does a research plan consist of?

1. Motivation
2. Research question and hypothesis
3. Methodology
    - 3.1 Experiment design and determination of research methods
    - 3.2 Variables
    - 3.3 Equipment
    - 3.4 Experiment and equipment validity
    - 3.5 Data analysis
4. Experiment protocol

1. Motivation

Literature review and problem identification (state-of-the-art)

- Digital libraries:
  - Web of science, IEEE Xplore, ACM Digital Library, Science direct, etc.
  - Google Scholar?
- Criteria (inclusion and exclusion):
  - Key words
  - Research field
  - Peer review
  - Chronology

Research plan

1. Motivation

Findings and identified shortcomings / areas where additional research is needed

1. Motivation

Research gap:

- From a theoretical point of view
- From a practical point of view
- Existing studies show different / conflicting results; there isn’t a clear or uniform solution
- Identified gaps, based on past research

Research plan

1. Motivation

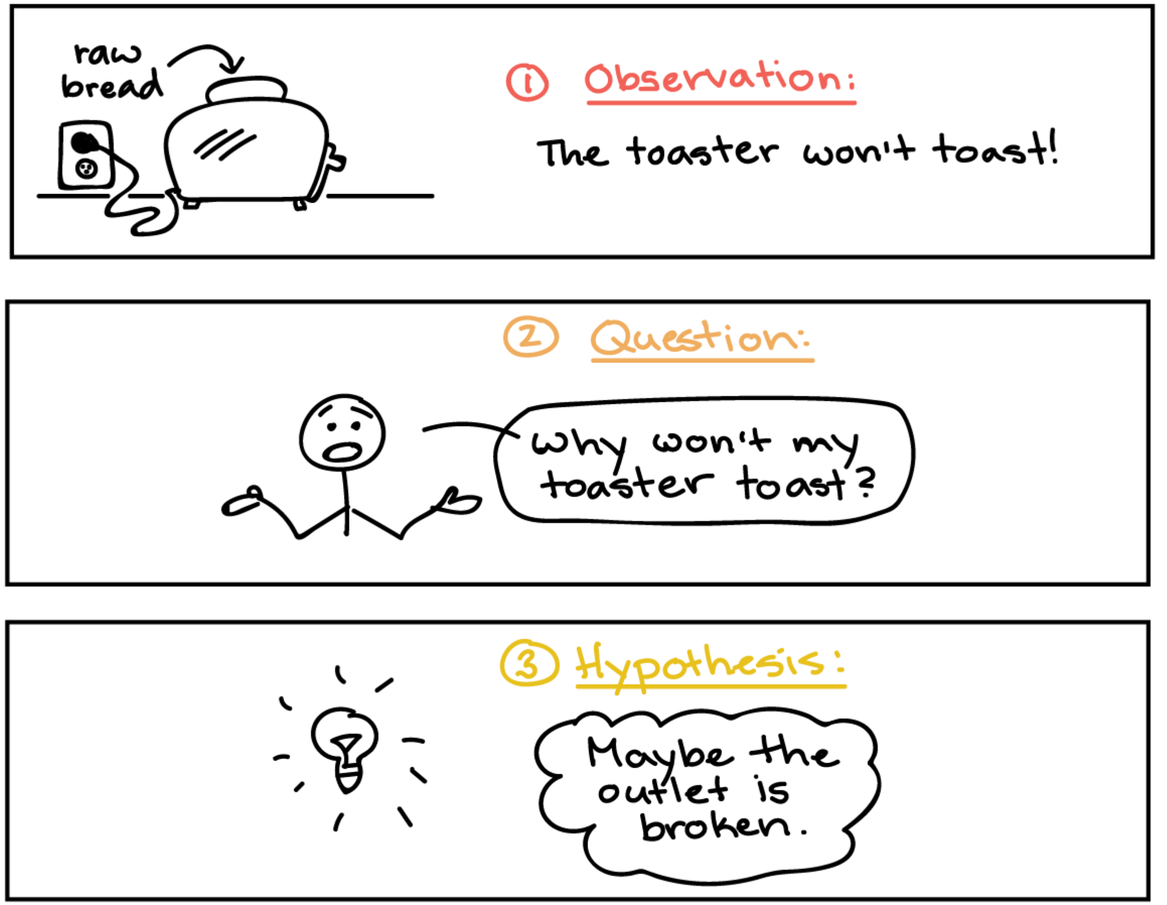
Research gap

2. Research question and hypothesis

Motivation: Observing a phenomenon and definition of the problem.

Research question: What is the essence of the problem?

Hypothesis: A verifiable (possible) answer to the research question.



2. **Research question** and hypothesis

A research question is:

- Clear and easy to understand
- Concise
- Open type that cannot be answered with "Yes" or "No"
- Verifiable
- Broad enough to cover the entire identified research problem

2. **Research question** and hypothesis

Types of research questions:

- Explanatory - Why does a phenomenon behave this way?
- Descriptive - How widespread is a phenomenon?
- Exploratory - What are the characteristic of a phenomenon?

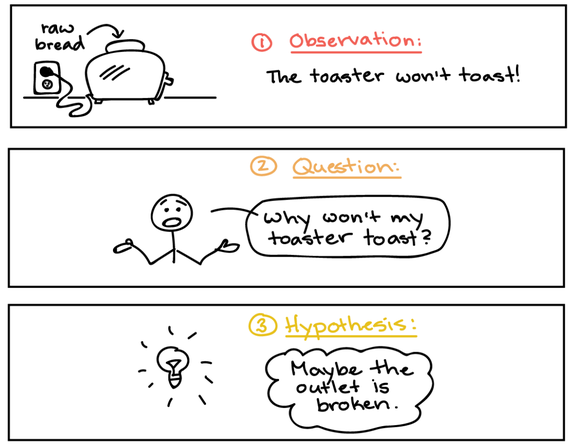
Quantitative methodology

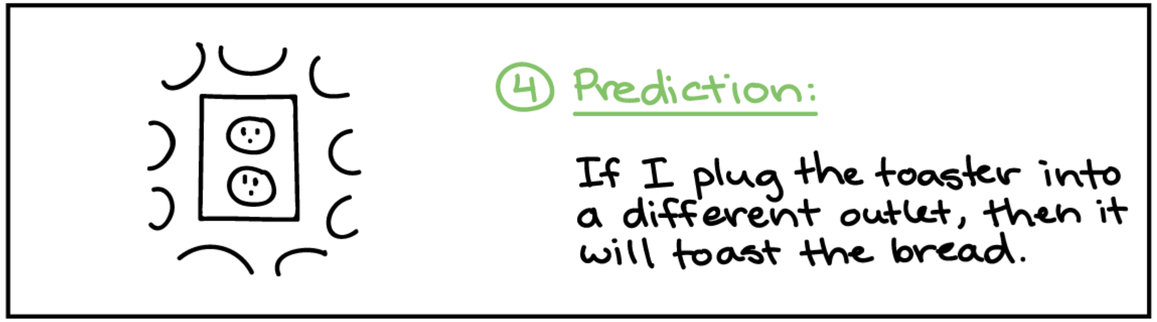
Qualitative methodology

2. Research question and **hypothesis**

A hypothesis is:

- An assumption that can be verified empirically*
- It is specific (without the best, the most suitable, it can be, there are examples, etc.)
- It is a prediction of the outcome, which however cannot be accepted with certainty when formulating it





*verifiable by observation or experience rather than theory or pure logic

2. Research question and **hypothesis**

Examples of poorly designed research questions

Good and Bad Research Questions

Bad: "Why are social networking sites harmful?"

Why it's bad:

- 'Harmful' is a vague term, and it is subjective (It means different things to different people.)
- No specific social networks are named. There are so many and they are different from each other.

Good: "How do privacy policies affect users of Facebook and Twitter?"

- This is good, because it is clearer and more specific.

Good & Bad, continued…

Bad: "What is the effect on the environment from global warming?"

Why it's bad:

- Way too broad. This question couldn't even be answered in a whole book.

Good: "How is the melting of glacial ice affecting penguins in Antarctica?"

- Narrowing it by location and the specific animals affected makes it clearer and more focused.

Research plan

2. Research question and hypothesis

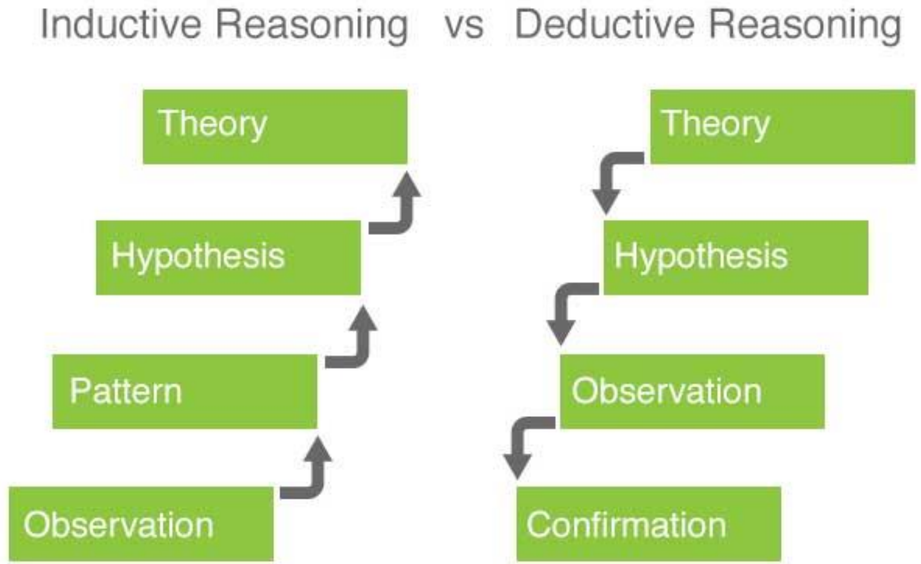
RQ 1; RQ 2; … H_1, H_2 …

See also: Mattick, K., Johnston, J., & de la Croix, A. (2018). How to… write a good research question. The clinical teacher, 15(2), 104-108. https://asmepublications.onlinelibrary.wiley.com/doi/10.1111/tct.12776

When to define the hypothesis?

1. An object at rest will stay at rest, and an object in motion will stay in motion unless acted on by a net force.
2. The acceleration of an object depends directly upon the net force acting upon the object, and inversely upon the mass of the object.
3. All forces between two objects exist in equal magnitude and opposite direction: if one object A exerts a force FA on a second object B, then B simultaneously exerts a force FB on A, and the two forces are equal in magnitude and opposite in direction: FA = −FB.

Hypotheses non fingo!



H: New species are formed due to the action of natural selection on random mutations.

“making observations without prejudice as to what they might mean and accumulating observations related to a particular subject so that a universal statement or conclusion could eventually emerge from them”

Google Scholar

Stand on the shoulders of giants

3. Methodology

It contains all the instructions necessary for an independent implementation of a research:

- 3.1 Experiment design and determination of research methods
- 3.2 Variables
- 3.3 Equipment
- 3.4 Experiment and equipment validity
- 3.5 Data analysis

3.1 Experiment design and **determination of research methods**

- Experimental
  - True experiments
  - Quasi-experimental
- Observational
  - Descriptive
  - Correlations
  - Causational
- Meta analysis

- Questionnaires

- Surveys
- Focus groups
- Diaries
- Case studies

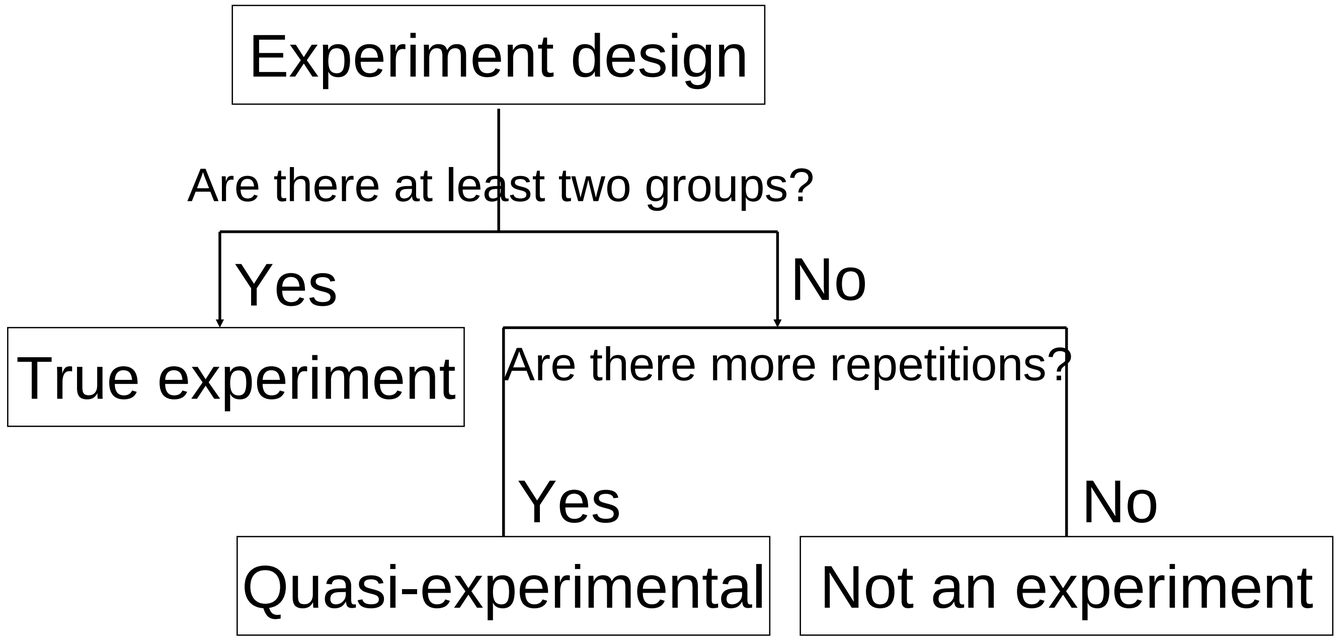
Research plan

3.1.1 Research method

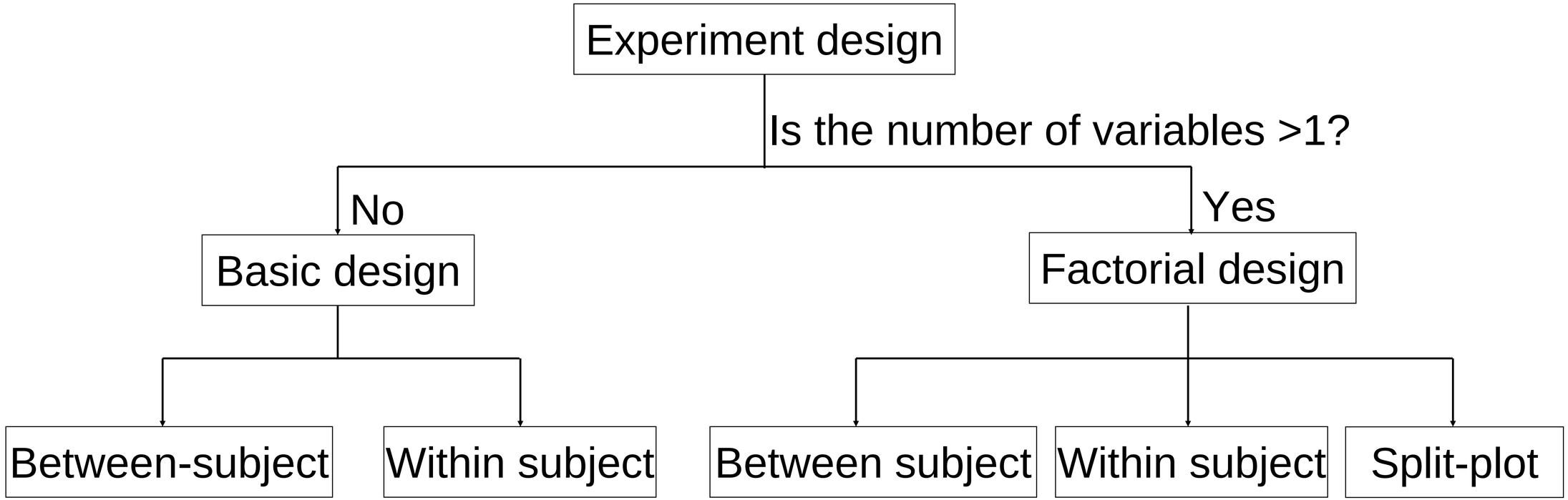
Quantitative methodology

Qualitative methodology

3.1 Experiment design and **determination of research methods**



3.1 **Experiment design** and determination of research methods



Research plan

3.1.2 Experiment design

3.2 Variables

Basic division:

- Dependent variables – outcome or an effect, which we are researching
- Independent variables – the causation of a change in the dependent variable

H_1 „If I plug the toaster into another outlet, it will toast the bread“

The part of the statement that relates to the independent variable

The part of the statement that relates to the dependent variable

3.2 Variables

Division according to the variable nature:

- Nominal variables - the difference in quality, not in quantity (ex. gender)
- Ordinal variables - classification of the sample by categories (ex. education)
- Continuous variables - interval values, are time-dependent (ex. age)
- Discrete variables - numerical type of data that includes whole, concrete numbers with specific and fixed data values determined by counting (ex. grade)

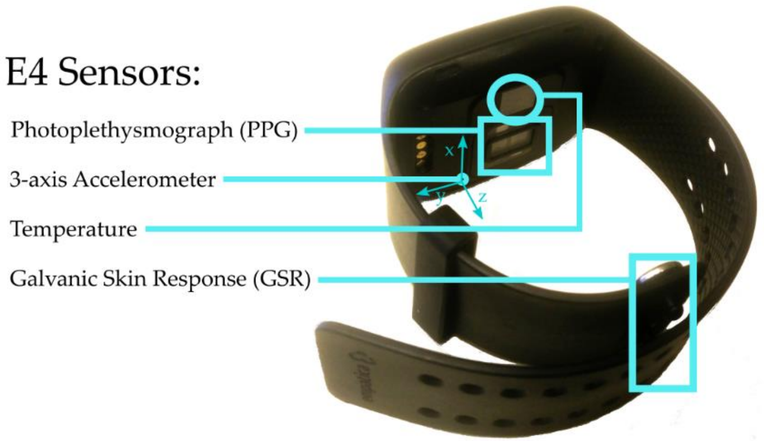
Research plan

3.2 Variables

3.3 Equipment

E4 is a wearable device in the form of a wristband, equipped with a number of sensors for assessment of electrodermal and cardiovascular activity (Figure 1). The E4 wrist band can measure BVP, inter-beat interval (IBI), heart rate (HR), electrodermal activity (EDA) or GSR, skin temperature (ST), and motion with an accelerometer.

One of the main features of the E4 device is a photoplethysmography (PPG) sensor. Photoplethysmography sensor uses an optical technique to detect changes in blood volume in the microvascular bed of tissue. The PPG sensor in E4 consists of two red and two green LEDs, which provide two different wavelength light sources, and two sensors for detection of the reflected light, with a sampling frequency fs = 64 Hz.



Research plan

3.3 Equipment

3.4 Experiment and equipment validity

- Discriminatory validity – levels of reliability of discriminatory power
- Convergent validity – comparison to established methods
- Ecological validity – the results of the research will be the same in the real environment
- Predictive validity – the highest level of validity; Can use current data to predict

a phenomenon in the future?

Research plan

3.4 Experiment and equipment validity

3. Methodology

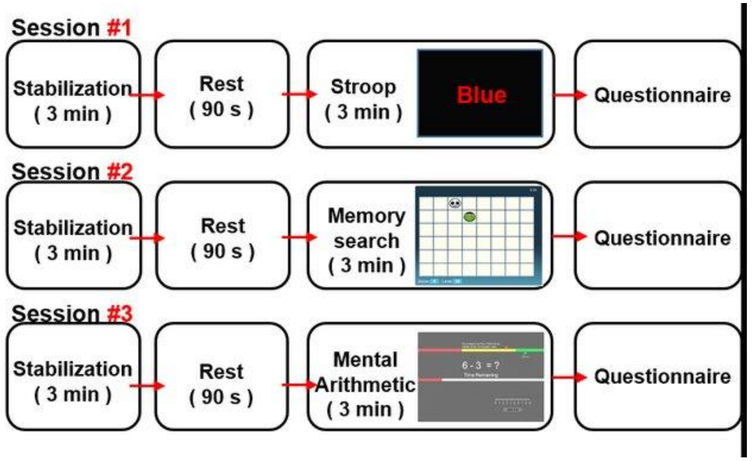
It contains all the instructions necessary to carry out the research by anyone:

- 3.1 Experiment design and determination of research methods
- 3.2 Variables
- 3.3 Equipment
- 3.4 Experiment and equipment validity
- 3.5 Data analysis methods ► Was discussed in multiple lectures of this course

Research plan

3.5 Plan for data analysis

4. Experiment protocol



* Lee, J. H., Gamper, H., Tashev, I., Dong, S., Ma, S., Remaley, J., ... & Yoon, S. H. (2020, April). Stress monitoring using multimodal bio-sensing headset. In Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems (pp. 1-7).

Research plan

4. Protocol

2nd Part: How to choose a scientific journal and write a scientific paper

1. Types of scientific papers
2. Contents of a scientific paper
3. How to choose a scientific journal
4. Practical exercise

What is the purpose of scientific publishing?

What is the purpose of scientific publishing?

To spread knowledge!

1. Types of scientific papers

Classification according to research methods and experiment design (Wieringa idr., 2006):

- Exploratory research
- Validation research
- Evaluation research

Empirical research

- Solution proposal
- Conceptual/Philosophical
- Experience paper
- Opinion paper

Non-empirical research

1. Types of scientific papers

Classification according to research methods and experiment design:

- Exploratory research
  - New method, tool, process, measurement, itd. Testing concepts, ideas, different implementation designs – prototyping.
- Validation research
  - New method, tool, process, measurement, etc. The advantages and disadvantages are verified by experiments, simulations, mathematical proofs. Implementation.
- Evaluation research
  - New method, tool, process, measurement, etc. The advantages and disadvantages are assessed with controlled experiments and use cases. Implementation and evaluation.
- Solution proposal
  - Proposal of a new method, tool, process, measurement, etc.

1. Types of scientific papers

Classification according to research methods and experiment design:

- Conceptual/Philosophical
  - Presents or sets the taxonomy of the selected research area.
- Experience paper
  - Describes experiences with (and proposes an improvement of) a particular method, tool, process, measurement, technique, etc.
- Opinion paper
  - Presents an opinion (good or bad) based on investigation on a particular method, tool, process, measurement, technique, etc.

1. Types of scientific papers

Typology COBISS:

- Original Scientific Paper
  - *An original scientific article is only the **first-time publication** of original research results in a way that allows the **research to be repeated, and the findings checked**. Scheme IMRaD.*
- Review Paper
  - *An overview of the latest works in a specific subject area, with the purpose of summarizing, analyzing, evaluating or synthesizing the information that has already been published. **It includes the results of the author's own research.***
- Short Scientific Paper
  - ***An original scientific article**, briefly summarizes the findings of a completed original research work or a research work in progress. Some of the elements of the IMRaD scheme may be omitted.*

* Source: https://home.izum.si/COBISS/bibliografije/Tipologija_eng.pdf

1. Types of scientific paper

Typology COBISS:

- Professional Paper
  - A professional article is the presentation of what is already known, with the emphasis on the applicability of original research results and the dissemination of knowledge, while the complexity of the text is adapted to the needs of the users and readers of the professional or scientific journal, in which the article is published.
- Non-scientific (Popular) Paper
  - A popular article is an article with the aim of popularizing both scientific or professional findings and the role of R&D in society. As a rule, popular articles are published in newspapers and magazines of general interest as well as other journals for the popularization of knowledge.

2. Contents of a scientific paper

(A)IMRaD Scheme:

(A) – Abstract

I – Introduction

M – Methodology

R – Results

and

D – Discussion

2. Contents of a scientific paper

Scheme (A)IMRaD:

I – Introduction

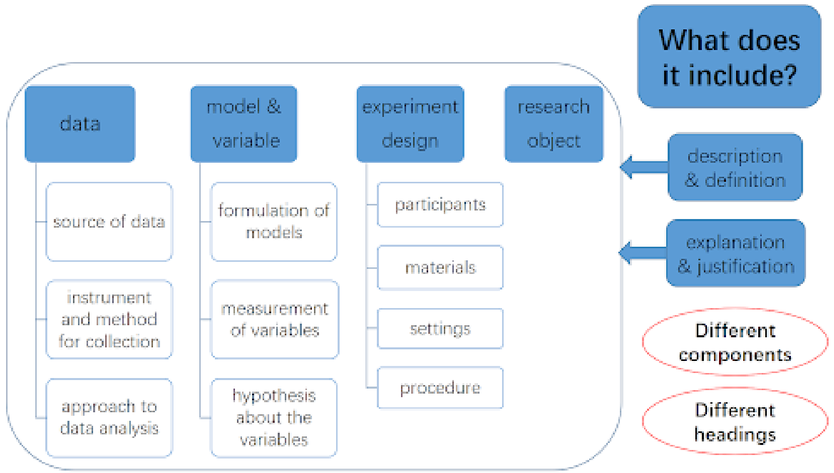
- Presentation of a (broader) problem and motivation for research;
- State-of-the-art review and identification of research gaps that our paper seeks to address;
- The importance for the development of science that our contribution will have;
- Other possible applications outside our field that our contribution will have;
- Socio-economic significance?
- Research question;
- Hypothesis;
- **Contributions to science;**

2. Contents of a scientific paper

Scheme (A)IMRaD:

M – Methodology; Methods and Materials

- The aim of this study is to…);
- Experiment design;
- Equipment description;
- Variables;
- Tests and tools for processing captured data;
- (Experiment protocol);



Materials and Methods Section Example

GOLDBIO

Subheading	Details
Cell Lines and Viruses	Sources, species, strains, type of culture medium, virus strains, and viral titers.
Protein Gel Electrophoresis and Western Blot Analysis	Treatments, duration of treatment, cell lysis procedure, gel electrophoresis procedure, Western blot procedure, buffers, antibodies, visualization procedure.
Immunofluorescence Assays	Treatments, duration of treatment, immunofluorescence procedure, buffers, antibodies, stains, visualization procedure.
Quantitative Real-Time PCR	Type of samples, RNA isolation procedure, cDNA synthesis procedure, primer sequences, quantitative RT-PCR procedure, type of data, data normalization, PCR efficiency, equipment.
Statistical Analysis	Statistical software program and statistical tests

2. Contents of a scientific paper

Scheme (A)IMRaD:

R – Results

- Presentation of results without interpretation;
- Presentation of the results of **all observed variables**;
- Subchapters for each dependent variable or group of variables;
- Accurate and credible presentation of all results, **also those that reject the hypothesis**, do not reveal statistical significance or show a contradiction with other obtained results (ours or in the literature);
- Visual and tabular presentation of results.

2. Contents of a scientific paper

Scheme (A)IMRaD:

D – Discussion:

- The purpose of the experiment or research;
- Interpretation of results - each statement must be based on results and not one's own beliefs or thoughts;
- Presentation of the connection (similarities and / or differences) with past research;
- We use the results to answer the research question(s);
- Self-critical assessment of the weaknesses and limitations of the scientific experiment and the scientific methods used;
- Presentation of contributions to science, applicability of our results for our research field (research gap our results cover);

2. Contents of a scientific paper

The remaining building blocks of the article:

Title

Author(s)

Key words

Acknowledgment

References

Figures, Tables, Appendix…

2. Contents of a scientific paper

Scheme (A)IMRaD:

(A) – Abstract:

- Write it at the end;
- An independent chapter - understandable even if we do not read the whole article;
- It has a limited length;
- It contains:
  - *Why?* Purpose of the article;
  - *How?* Experiment design and research method;
  - *What?* Main findings;
  - *How?* How do the findings contribute to understanding / solving the question “Why?”.

3. How to choose a scientific journal

Important factors:

- Impact and reputation of the journal;
- Scientific field;
- Aims and scope of the journal;
- Time - until the first review, until the decision on acceptance / rejection is made, until publication;
- Publication frequency;
- Acceptance rate;
- Access level.

3. How to choose a scientific journal

Impact and reputation of the journal:

Based on the Impact Factor:

- Science Citation Index (SCI)
- Social Sciences Citation Index (SSCI)

$$IF = \frac{A}{B}$$

A: Number of citations in JCR year L_{n+2}, which have been published in L_n in L_{n+1}

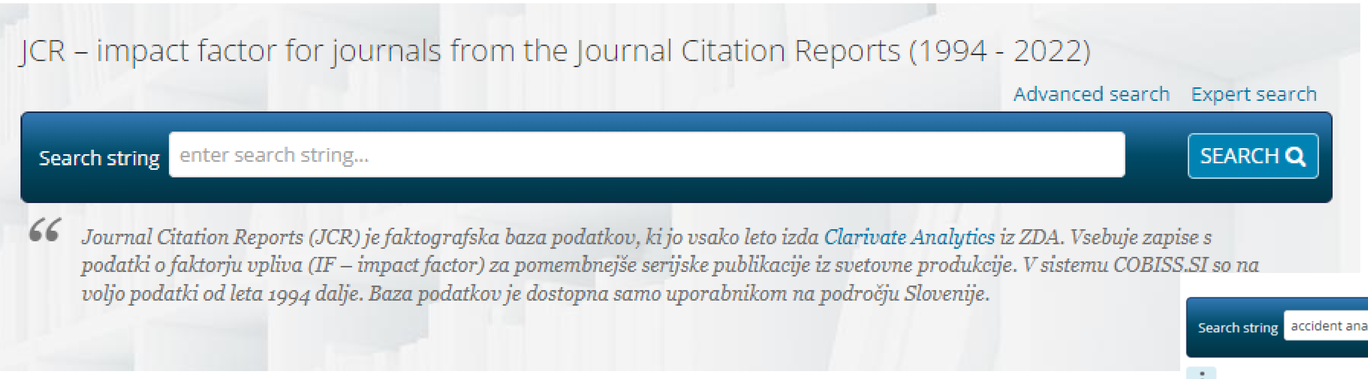
B: Number of articles that have been published in L_n in L_{n+1}

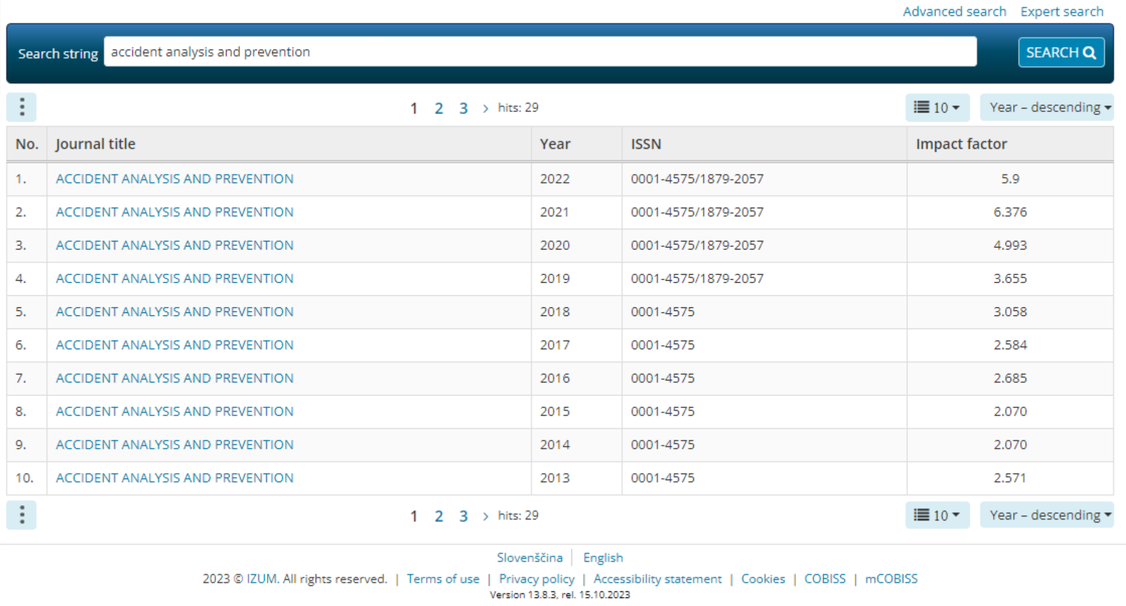
Impact factors are published annually in:

- Journal Citation Reports (JCR) – Thomas Reuters, ZDA (multiple databases).
- Source Normalized Impact per Paper (SNIP) – Centre for Science and Technology Studies (CWTS), University of Leiden in collaboration with Elsevier (Scopus database).

3. How to choose a scientific journal

The impact factor can be found in [COBISS](https://plus.cobiss.net/cobiss/si/sl/jcr) (https://plus.cobiss.net/cobiss/si/sl/jcr):





No.	Journal title	Year	ISSN	Impact factor
1.	ACCIDENT ANALYSIS AND PREVENTION	2022	0001-4575/1879-2057	5.9
2.	ACCIDENT ANALYSIS AND PREVENTION	2021	0001-4575/1879-2057	6.376
3.	ACCIDENT ANALYSIS AND PREVENTION	2020	0001-4575/1879-2057	4.993
4.	ACCIDENT ANALYSIS AND PREVENTION	2019	0001-4575/1879-2057	3.655
5.	ACCIDENT ANALYSIS AND PREVENTION	2018	0001-4575	3.058
6.	ACCIDENT ANALYSIS AND PREVENTION	2017	0001-4575	2.584
7.	ACCIDENT ANALYSIS AND PREVENTION	2016	0001-4575	2.685
8.	ACCIDENT ANALYSIS AND PREVENTION	2015	0001-4575	2.070
9.	ACCIDENT ANALYSIS AND PREVENTION	2014	0001-4575	2.070
10.	ACCIDENT ANALYSIS AND PREVENTION	2013	0001-4575	2.571

3. How to choose a scientific journal

Scientific fields - list of international databases COBISS

(https://home.izum.si/COBISS/bibliografije/seznami_za_mednarodne_baze/2024/ser-SCIE-tuje.html):

**Mednarodne bibliografske baze podatkov,
ki se upoštevajo pri kategorizaciji znanstvenih publikacij (BIBLIO-A)
2024**

Slovenske revije v mednarodnih bazah podatkov

Baza podatkov	Področje	Vključene revije: Slovenske	Tuje	A'', A', A1/2
Web of Science				
Science Citation Index Expanded (SCI-EXPANDED)	za naravoslovne vede			
Social Sciences Citation Index (SSCI)	za družboslovne vede			
Arts & Humanities Citation Index (A&HCI)	za humanistične vede			Vse
Emerging Sources Citation Index	za vse vede			
Scopus				
Scopus	za naravoslovne vede			
Scopus (d)	za družboslovne vede			
Scopus (h)	za humanistične vede			
Humanistika				
Abstracts of Music Literature (RILM)	za muzikologijo			
Anthropology Plus	za antropologijo			
BrillOnline (Linguistic Bibliography)	za jezikoslovje			
Current Geographical publications	za geografijo			
European Reference Index for the Humanities and Social Sciences (ERIH PLUS)	za vsa področja			
Historical Abstracts	za zgodovinopisje			
IBZ Online (Internationale Bibliographie der geistes- und sozialwissenschaftlichen Zeitschriftenliteratur)	za vsa področja			
International Bibliography of the Social Sciences (IBSS)	za vsa področja			
MLA International Bibliography	za literarne vede			
Philosopher's Index	za filozofijo			
Religious and Theological Abstracts	za teologijo			
Sociological Abstracts	za sociologijo			
Naravoslovje				
Aquatic Sciences and Fisheries Abstracts (ASFA)	za biologijo			

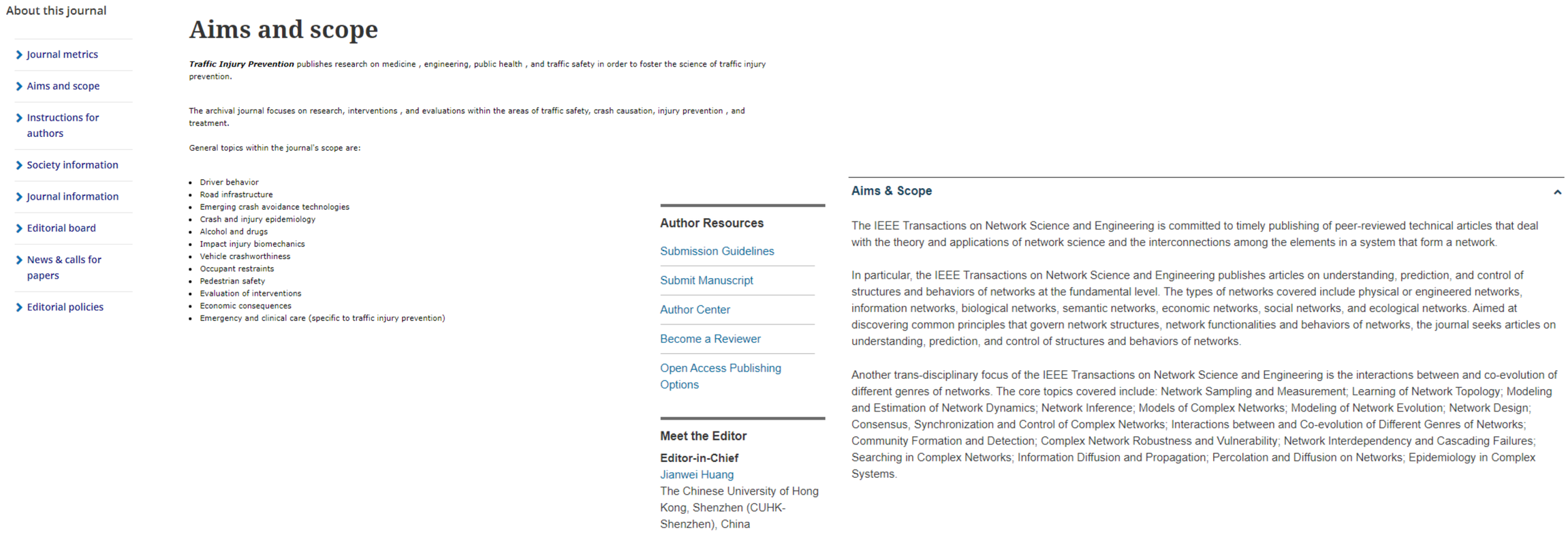
**Seznam tujih revij, ki so vključene v mednarodno bazo podatkov
Science Citation Index Expanded (SCI-EXPANDED)
2024**

ISSN	Revija	Založnik/Izdajatelj	Št. čl. v COBIB.SI (od 2024)	Četrtina (JCR 2023)	A''	A'	A1/2	Odprti dostop
2053-1583	2D materials (e-vir)	IOP Publishing	1	2			✓	✓
2190-572X	3 biotech	Springer	0	3				✓
2190-5738	3 biotech (e-vir)	Springer	0	3				✓
2329-7662	3D printing and additive manufacturing	Mary Ann Liebert, Inc.	0	3				✓
2329-7670	3D printing and additive manufacturing (e-vir)	Mary Ann Liebert, Inc.	1	3				✓
1614-2411	4OR	Springer	0	3				✓
1619-4500	4OR	Springer	0	3				✓
1232-1966	AAEM. Annals of Agricultural and Environmental Medicine	Institute of Agricultural Medicine.; Instytut Medycyny Wsi im. Witolda Chodźki (Lublin)	0	4				
0149-1423	AAPG bulletin	American Association of Petroleum Geologists	0	2			✓	✓
1558-9153	AAPG bulletin (e-vir)	American Association of Petroleum Geologists,	0	2			✓	
1530-9932	AAPS PharmSciTech (e-vir)	American Association of Pharmaceutical Scientists	0	2			✓	✓
2330-5517	AATCC journal of research (e-vir)	American Association of Textile Chemists and Colorists	0	3				✓
2472-3444	AATCC journal of research	American Association of Textile Chemists and Colorists	0	3				✓
1532-8813	AATCC review	American Association of Textile Chemists and Colorists	0	4				
2366-004X	Abdominal radiology	Springer	0	2			✓	✓
2366-0058	Abdominal radiology (e-vir)		0	2			✓	✓
0025-5858	Abhandlungen aus dem Mathematischen Seminar der Universität Hamburg	Vandenhoeck und Ruprecht	0	4				✓
1865-8784	Abhandlungen aus dem Mathematischen Seminar der Universität Hamburg (e-vir)	Springer	0	4				✓
1069-6563	Academic emergency medicine	Hanley & Belfus, Inc.	0	1		✓	✓	✓
1553-2712	Academic emergency medicine (e-vir)	Published for the Society for Academic Emergency Medicine by Hanley & Belfus	0	1		✓	✓	✓
1040-2446	Academic medicine	Hanley & Belfus	0	1		✓	✓	✓
1938-808X	Academic medicine (e-vir)	Lippincott Williams & Wilkins	0	1		✓	✓	✓
1876-2859	Academic pediatrics	Elsevier	0	1		✓	✓	✓
1876-2867	Academic pediatrics (e-vir)	Academic Pediatric Association; Elsevier	0	1		✓	✓	
1076-6332	Academic radiology	Association of University Radiologists	0	1		✓	✓	✓
1878-4046	Academic radiology (e-vir)	Association of University Radiologists.; Society of Chairmen of Academic Radiology Departments.; Association of Program	0	1		✓	✓	

http://home.izum.si/COBISS/bibliografije/Formule.pdf
https://home.izum.si/COBISS/bibliografije/Kateg-medn-bibl-baze.html

3. How to choose a scientific journal

Aims and scope of the journal are provided on their websites:



About this journal

- Journal metrics
- Aims and scope
- Instructions for authors
- Society information
- Journal information
- Editorial board
- News & calls for papers
- Editorial policies

Aims and scope

Traffic Injury Prevention publishes research on medicine , engineering, public health , and traffic safety in order to foster the science of traffic injury prevention.

The archival journal focuses on research, interventions , and evaluations within the areas of traffic safety, crash causation, injury prevention , and treatment.

General topics within the journal's scope are:

- Driver behavior
- Road infrastructure
- Emerging crash avoidance technologies
- Crash and injury epidemiology
- Alcohol and drugs
- Impact injury biomechanics
- Vehicle crashworthiness
- Occupant restraints
- Pedestrian safety
- Evaluation of interventions
- Economic consequences
- Emergency and clinical care (specific to traffic injury prevention)

Author Resources

Submission Guidelines

Submit Manuscript

Author Center

Become a Reviewer

Open Access Publishing Options

Meet the Editor

Editor-in-Chief
Jianwei Huang
The Chinese University of Hong Kong, Shenzhen (CUHK-Shenzhen), China

Aims & Scope

The IEEE Transactions on Network Science and Engineering is committed to timely publishing of peer-reviewed technical articles that deal with the theory and applications of network science and the interconnections among the elements in a system that form a network.

In particular, the IEEE Transactions on Network Science and Engineering publishes articles on understanding, prediction, and control of structures and behaviors of networks at the fundamental level. The types of networks covered include physical or engineered networks, information networks, biological networks, semantic networks, economic networks, social networks, and ecological networks. Aimed at discovering common principles that govern network structures, network functionalities and behaviors of networks, the journal seeks articles on understanding, prediction, and control of structures and behaviors of networks.

Another trans-disciplinary focus of the IEEE Transactions on Network Science and Engineering is the interactions between and co-evolution of different genres of networks. The core topics covered include: Network Sampling and Measurement; Learning of Network Topology; Modeling and Estimation of Network Dynamics; Network Inference; Models of Complex Networks; Modeling of Network Evolution; Network Design; Consensus, Synchronization and Control of Complex Networks; Interactions between and Co-evolution of Different Genres of Networks; Community Formation and Detection; Complex Network Robustness and Vulnerability; Network Interdependency and Cascading Failures; Searching in Complex Networks; Information Diffusion and Propagation; Percolation and Diffusion on Networks; Epidemiology in Complex Systems.

3. How to choose a scientific journal

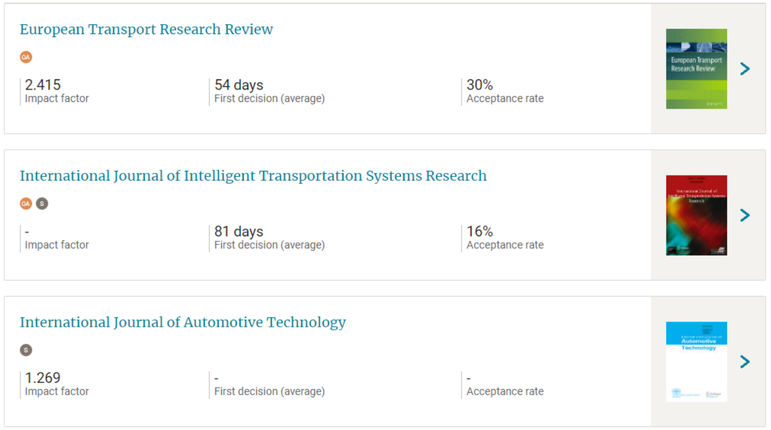
Access:

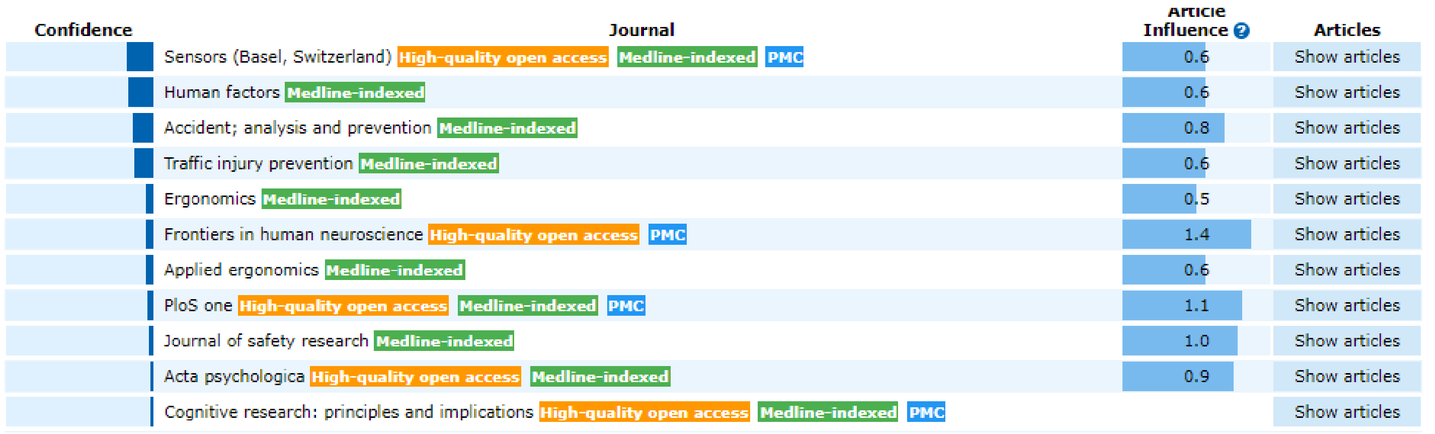
- Closed access (paid access, free publication)
- Open access:
  - Golden Open Access (open access journal; free access, paid publication)
  - Green Open Access (publication of a copy of the article on a selected repository; paid access, free publication)
- Advantages of open access:
  - Greater visibility
  - Higher citations (conditioned by the quality of the article!)
- Possible funding for Open access: ARIS, Horizon Europe, Interreg, …

3. How to choose a scientific journal

Journal search engines:

- Global Journal Database (https://researcher.life/journal)
- Elsevier Journal Finder (https://journalfinder.elsevier.com/)
- Journal/Author Name Estimator (https://jane.biosemantics.org/)





4. Practical exercise

1. Prepare an abstract based on your PhD thesis (or use the one from your Masters):
    - *Why?* Purpose of the article
    - *How?* Experiment design and research method
    - *What?* Main findings
    - *How?* How do the findings contribute to understanding / solving the question “Why?”
2. Define key words
3. Using the search engines, find a journal based on your abstract and/or keywords
4. Find and compare for the first 3 journals:
    - Their Impact factor (in year 2023 and the past 5 years)
    - Aims and scope
    - (In average) Time to publication and access options
5. Choose the journal where you will submit your article and argument your choice