Scientific method

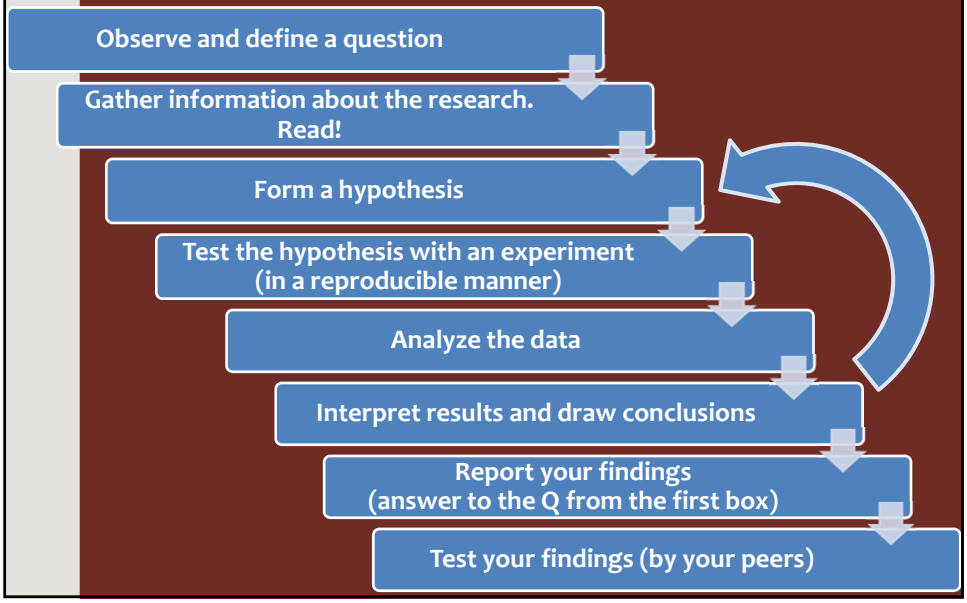
Hypothesis – proposed testable explanation for an observed phenomenon.
Statement about causality of events based on prior knowledge.

Theory – hypothesis (hypotheses), strenghtened (confirmed) through repeated experimental tests.

Natural selection can act only by the preservation and accumulation of infinitesimally small inherited modifications …

Natura non facit salta

Schematic of the main steps of scientific method



Problem - why doesn't the grass grow uniformly?

Observe the (environmental) difference between a normal and a stunted lawn
e.g. stunted grass is near growing evergreens
What does this mean for the grass ???

What do we know (about the impact of coniferous trees on the environment)?

1. create shade,
2. cool the area,
3. acidify the soil,
4. reduce evaporation

Hypothesis: ???

Hypothesis:
Reduced pH causes slower growth of the grass

Experiment: ???
Same: soil, number of seeds, water regime ...
Variable pH (2, 4, 6, 8, 10, 12)

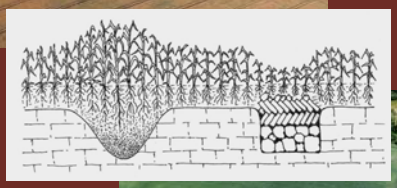
Results & the analysis thereof:

2 and 4 - no grass,
6 - poor,
8 and 10 - excellent,
12 - poor

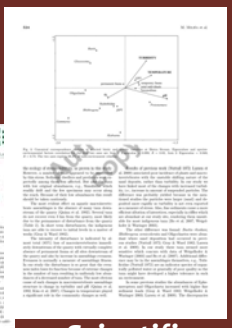
New hypothesis: ???
The pH lower than 6 and higher than 11 inhibits the growth of the grass

New experiment

Hypotheses ?



Scientific work
(action)



Scientific work
(act/result)
=
Scientific publication

Scientific work: book, paper, thesis...

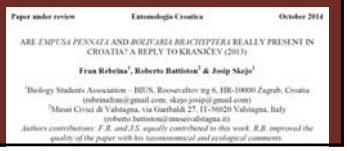
Paper types:

Original scientific paper or article
Short communication
a short work, (not?) to distinguish from OSP
Review
not necessarily new results, but new analysis or synthesis

Professional paper
deals with a known issue depicting applications etc.
Preliminary communication

Conference/symposium ~ paper/communication/report
questionable assessment/review
invited lecture

Letters, comments, reactions


Paper under review | Entomologia Croatica | October 2014

ARE *EMPUSA PENNATA* AND *BOLIVARIA BRACHYPTERA* REALLY PRESENT IN CROATIA? A REPLY TO KRANČEV (2013)

Fran Rebrina[1], Roberto Battiston[2] & Josip Skejo[1]

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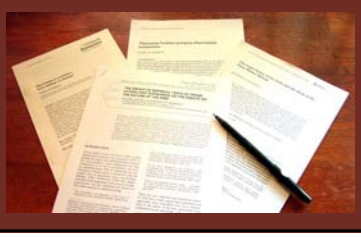
Authors contributions: F.R. and J.S. equally contributed to this work. R.B. improved the quality of the paper with his taxonomomical and ecological comments.

Scientific paper is a published description of original research results

The main characteristics of the scientific article:

1. availability: dissertations, conference papers, assessment studies, papers in local journals ... not considered SP,
2. originality / authenticity: previously unknown data, 'first description'
3. comprehensiveness: contains all the information to enable evaluation of the results and the flow of thinking and repetition of the experiment/work
4. peer review: proces of keen evaluation by expert colleagues



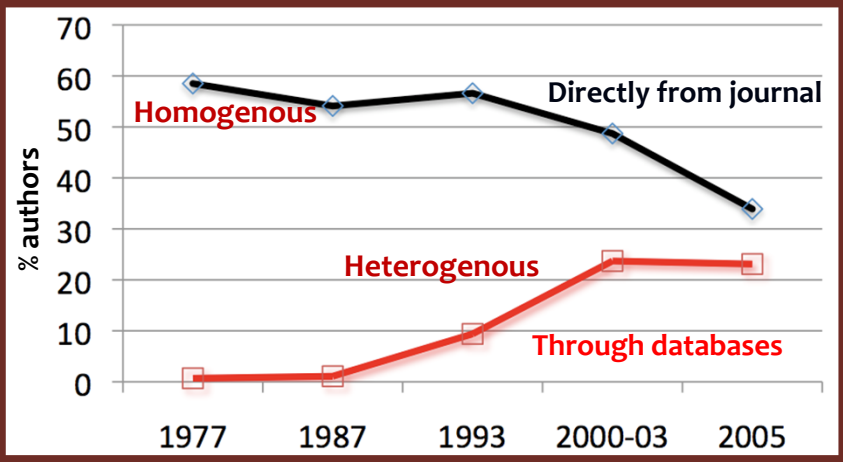
New, true and understandable

Audience

Homogenous

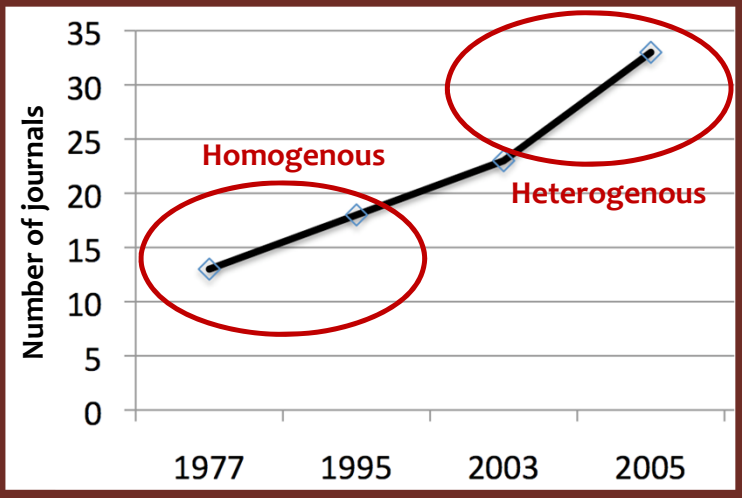
Heterogenous

How did you get the last paper you read?



40% of readers come to journals and papers through Google.
75% of readers come to journals and papers through Google, and specialized databases

From how many journals have you read papers in the last year?



'The most common and most easily fixed error by professional scientists is to assume too much knowledge of their audience.'

Leslie Sage
Senior Editor, *Nature*

'Avoid jargon; explain obscure terms and define acronyms (keep in mind that many potential readers of your work will not be specialists in your field).'

"Instructions to Authors"
Science

How to reach wider audience?

1. Use common and clear language and simple style,
2. Provide brief explanations and definitions,
3. Use exact and concrete examples and descriptions.

?

EXPLANATIONS

CONCRETE EXAMPLE

AVOIDING JARGON

Examples:

In aquatic habitats of karst regions (carbonate based geological substrate) a phenomenon of calcite deposition may occur. In temperate zones and non-thermal (flowing) waters the deposit that forms is called tufa. It is a porous calcium carbonate deposit that develops in carbonate-supersaturated waters (Chafetz and Folk, 1984), where calcite crystals are deposited on immersed objects including organisms such as algae and mosses and animal-originating structures

Furthermore, some quarries utilize water in the exploitation process and are situated near natural water supplies that could be affected. Diabase (used for asphalt mixture) quarries are a typical example.

An accurate understanding of the spatial relationships between the structures of the head is essential for anthropological methods concerned with the comparison of faces to skulls (superimposition) or the prediction of faces from them (facial approximation).

Bad papers are easy to write, and almost inevitably a bad paper will be longer than a good one. In order to write a good paper, you need to look carefully at what you want to accomplish: what important message do you want readers to take away from the paper? Once you have made that decision, it is easier to write with a tight focus.

Leslie Sage
Senior Editor, *Nature*

Styles of conveying the essence of the message

Who, what, when, where, why and how

Problem
↓
Solution
(Elevator speech)

Topic and its importance
What void are you filling
(poster)

A guide for conveying the essesnce

1. What is the topic and why is it worth studying
2. How does your work fill a gap in that topic
3. Key methods and results
4. How is your work helping the development of the topic

Several studies to identify medicinaly important plants have been conducted in Northern and Western Europe. Here we conduct such a study in Southeast Europe…

Try improving this text?

Many plant-cataloguing studies have been conducted in in Northern and Western Europe, but these have uncovered less than 5% of the suspected diversity of medicinal plants. Here we conduct a similar study in Croatia, Montenegro, Macedonia and Greece to identify […] the region has been known for its endemism […]

Common elements of a scientific paper

Title
Authors
Abstract, Summary
Keywords
Introduction
Materials and methods (or just Methods)
Results
Discussion
(Conclusion)
(Acknowledgements)
References

Extras:
- Figures
- Tables