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The structure of a scientific article

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ABSTRACT

Different elements of the structure of an article are described. The focus is on different elements of the structure of an article, the Introduction, the Methods, the Results and the Discussion. Dependent on the journal the author will not have space for more than 2500–3500 words.

KEYWORDS:

scientific article, structure

INTRODUCTION

For many people the way articles are written is difficult, and they are not familiar with the structure required. It is important to be familiar with this structure, for reviewers use it to come to their recommendation to the editor of a journal. To put it in a different way, the correct structure is a requirement, a *conditio sine qua non*.

In this contribution, which is a continuation of previous publications[1,2], I will go into the different elements of the structure of an article.

METHODS

Most of the information used here comes from my own lectures for PhD students on this topic and from the experience of my own publications.

RESULTS

In Figure 1 the general structure of an article is displayed. An article has four main parts and four compulsory, but more secondary parts.

Figure 1 General structure of an article

(Title page)
(Abstract)
1 Introduction
2 Methods
3 Results
4 Discussion
(References)
(Tables, Figures)

Title page

The title page contains the title, but also the name of the author and if present, the name(s) of the co-author(s), affiliation(s) and the name and further details of the corresponding author.

Introduction

In this section I will highlight the general structure of the Introduction, the structure of a paragraph, some

do's and don'ts, and the most orphaned element of a manuscript, the research question.

General structure – The opening phrase should be expressive; the reader (the first reader is the reviewer) should get the idea that what follows is important. Furthermore, this sentence should indicate what this manuscript will be about. The Introduction highlights what is already known from the field of study; however, what is written should be restricted to the variables being used. If done correctly, at the end of the Introduction the reader should be able outline what is known, what is not known and which problems still exist. At this point, the author makes a choice: which of the remaining problems will he address? He then formulates the research question.

Structure of a paragraph – a paragraph should have a strong opening phrase that defines what follows. More information on the topic follows in the body of the paragraph; however, it should be kept it as concise as possible. The closing sentence is where the author makes his point, and if possible it contains a link to the next paragraph.

Do's and don'ts – Take care that you keep the attention of the reader. This means that you do not put commonplace information from textbooks here; please use your own words, and use active voice. Realise that you should not try to show by a very long introduction that you have read a lot about the subject; please stick to your variables. Also, the number of required words for the entire manuscript ranges from 2500 to 3500; this also should prevent you from writing too much.

Research Question – The research question (RQ) should be as precise as possible. Variables should be mentioned and, if possible, the direction between the variables should be in the text of RQ; like a→b; a←b; a↔b or other possibilities. Take care that the formulation of the RQ is also as concise as possible. Please keep in mind that the RQ defines the Methods section as well as the possible answers in the Results section. If the RQ contains a question on the temperature, the measure is the thermometer and the finding is framed in degrees Celsius. If the RQ contains a question on political preference, the measure is a survey and the finding is the supposed election result.

Methods

The next part, the Methods section, has a compulsory structure, consisting of a) the Sample; b) the Measures and c) the Statistical analyses. This whole section needs to be written in sufficient detail to permit replication.

Sample – under this heading the study population (including controls, if available) should be described, with the inclusion and exclusion criteria and the procedure describing how the study population was included in the study. This is the place to show, if required, the planned sample size related to power calculations.

Measures – a description of all the variables to be used should be given (well-being, use of alcohol, social support etc.) in line with the example in Box 1. It is important that the reader understands what you did, not what could be done.

Box 1 Describing a questionnaire

[some characteristic, like HRQoL] was assessed by [measure] [reference].
Give one or two questions as an example.
Mention subscales [if the total instrument has] [and if you used them].
Give answering categories.
The score ranges between from [x] to [y]; higher scores indicate [worse/better characteristic].
If a scale (questions from a questionnaire belonging together), then give reliability in your data (Cronbach's alpha); if you use subscales, give their reliability

Statistical analyses – In this part the methods of statistical analysis, preferably in the order in which the reader will be confronted with them, should be described. As an example: 'First, we described the background characteristics of the sample. Next, we performed … Then, we … Finally, we …'. It should be made clear to the reader which is the dependent variable and which are the independent ones, as well as the sequence in which they are put into the equation. In the last sentence the software used for analysis is mentioned. When the statistical method is uncommon (Lisrel, multilevel analysis etc.) it should also be described.

Results

Some journals want an author to start the Results section with a specification of the selection of persons/patients. When the selection process is very complicated, it may be wise to use a flow-chart containing this information (see Figure 1) and refer to this. If this has already been done in the Methods section, the Results section should start with a description of the basic characteristics of the respondents. If the RQ is focuses on comparing two group (males/females; younger/older; transplantation/dialysis etc.), then the description (in Table 1) should be done according to these groups.

The next step is to answer the Research Question(s) in the order of the RQ's: the same order that was used in the Statistical Analyses section. International journals do not see a correlation matrix (could be Table 2) as sufficient proof. The next statistical step, a more advanced analysis, should be taken as well (Table 3).

Make clear what the answer is; be precise: use p-values, standard errors, etc. Illustrate the text with tables or a figure, if necessary, but keep in mind that the text should be understandable without referring to the respective tables and figures. Refrain from commenting on the findings; save that for the Discussion section.

Discussion

In the Discussion section the RQ is repeated and the condensed findings are presented as an answer before discussing them: comparing them with other findings. The next part goes into the strengths and limitations of the study and the implications (for practice, for research) of the results are mentioned. Some journals want a conclusion, or have other specific requirements.

Repeating the RQ – the RQ is repeated in the first paragraph and the condensed findings are presented as an answer.

Discussion – the paper's findings are compared and contrasted with previous findings. Please show what is new, and how your results fit into the broad field you described at the beginning of the introduction. The discussion is not a place for offering your own opinion about how things could work without any references.

Strengths & Limitations – Mention both. Do not forget the strengths as is too often done; start with them. For limitations the only relevant question is: were my findings biased? Research not yet carried out is not a limitation but should be mentioned under Implications.

Implications – this section consists of two parts: one regarding the practical implications of your own findings and the second focusing on future research to solve the remaining problems.

Abstract

Most journals want a structured abstract with a length of not more than 250 words, sometimes less. This should follow the structure of the manuscript as a whole.

Aim – describe the aim of the study.

Methods – list the study subjects, the measures and the analyses.

Results – present basic results without any introduction.

Conclusion – list conclusions in a short, clear and simple manner.

Be aware that the editor will read the abstract, so your message should be understandable from this.

DISCUSSION

In this publication I have explored the different elements that form the structure of an article. The main lesson that could be learned is that an author – as dependent on the journal not having space for more than 2500–3500 words – should be as economical with his words as possible.

JP van Dijk graduated in Medicine, Law, and Public Administration, and was for 8 years a member of the University Council (comparable with the University Academic Senate); science policy belonged to his portfolio.

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