Scientific Writing

20.109
Spring 2014

Photo credit: Theresa Walunas, http://www.keyboardbiologist.net/knitblog/

The quality of writing can affect the impact of your work.
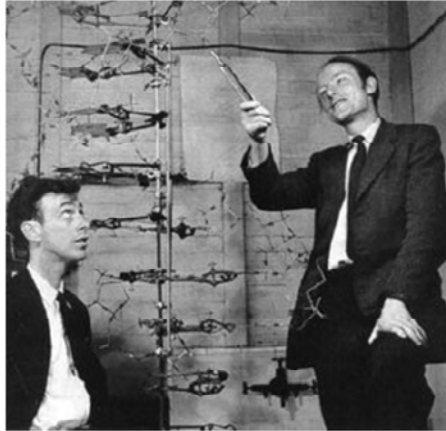
Watson & Crick, 1953: discovered the structure of DNA

Oswald Avery, Colin MacLeod, Maclyn McCarty, 1944: discovered that DNA is responsible for passing on heritable traits

-Long

-Difficult to read

-No claims of importance

-No confidence in work

The goal of scientific writing is to communicate ideas.

"The purpose of a scientific paper is to communicate results and analysis to the wider scientific community. The better a paper is written, the more readers it will attract and the more citations it is likely to receive."

Bredan & van Roy (2006) EMBO 7:846-9.

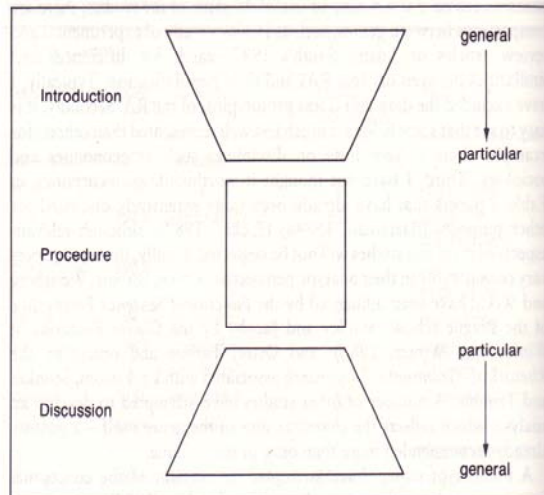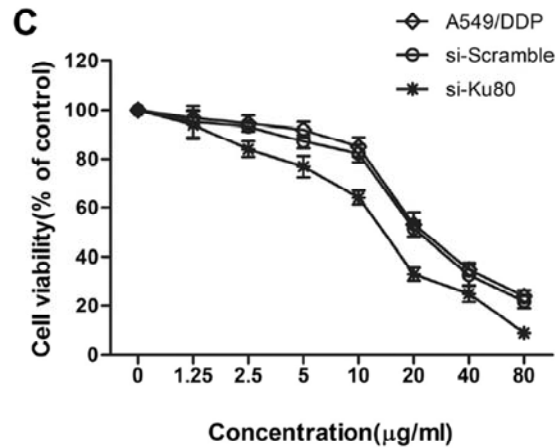# The IMRaD structure helps you communicate effectively.

Figure 7   Overall organization of the research paper (Hill et al., 1982).

Article scramble: Identify the section of each passage.

- Introduction
- Methods
- Results
- Discussion
- Figure legend

C

Cell viability(% of control) vs Concentration(μg/ml)

Legend:
- A549/DDP
- si-Scramble
- si-Ku80

Knockdown of Ku80 enhances cisplatin-induced growth inhibition and apoptosis in A549/DDP cells. (C) A549/DDP cells were transfected with siKu80 or Scramble and then treated with different concentrations of cisplatin for 24 h. Cell viability was determined by MTT assay. Data represented mean ± SD for three replicate experiments.

The MTT staining kit (Sigma-Aldrich, St. Louis, MO) was used to determine cell viability. A549/DDP cells were plated into 96-well plates (1 × 104/well) for 24 h and then treated with various concentrations of cisplatin for 24 h. Next the cells were treated with 0.5 g/l MTT solution for 4 h. The medium was removed, and 100 μl of dimethylsulphoxide was added to each well.

Downregulation of Ku80, together with cisplatin treatment, might promote apoptosis by triggering caspases cascades in apoptotic pathways. However, further studies are needed to elucidate the mechanisms by which Ku80 downregulation promotes apoptosis of chemotherapy resistant cancer cells in vivo and in vitro.

To further confirm the effects of Ku80 on cisplatin sensitivity in human lung adenocarcinoma, we used siRNA to downregulate Ku80 expression in A549/DDP cells (Figure 5A and B). Cisplatin markedly increased the viability of si-Ku80 A549/DDP cells, whereas scrambles-siRNA transfected cells were considerably less sensitive to cisplatin (Figure 5C).

Expression of Ku was shown to be upregulated in human aggressive breast cancer, lung cancer and bladder cancer [7-10]. Moreover, Ku is involved in the resistance of ovarian cancer and leukemic cells to cisplatin [11-13]. However, little is known about the expression of Ku80 and its role in cisplatin resistance in human lung adenocarcinoma. Therefore, in this study, we assessed the expression of Ku80 in lung adenocarcinoma specimens.

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What features of this excerpt identify it as belonging to the Introduction?

The introduction provides a framework for the story you are about to tell, and accordingly you have two primary goals here: include sufficient background information to make the forthcoming results comprehensible, and motivate the audience to keep reading! How do you do the latter? Reveal the significance of the work through connections to both prior scientific accomplishments and interesting future knowledge and applications. (20.109 guidelines for scientific writing)
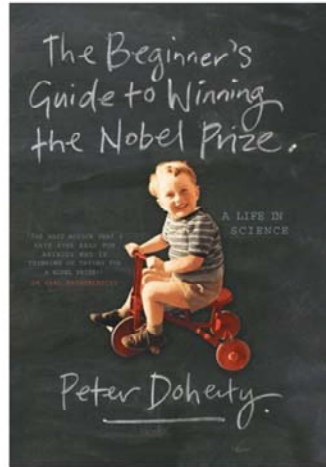
TR responses:

-Background info on Ku

-Has citations

-Includes the aim of the paper

-States problem to be solved

WF responses:

-States problem

-High number of references; establishes background

-Excerpt most likely towards the end of the Intro

Introduction gives the context, justification, and focus.

Start broadly; end with your goal

Identify what is (un)known

Explain how you will address the unknown

The MTT staining kit (Sigma-Aldrich, St. Louis, MO) was used to determine cell viability. A549/DDP cells were plated into 96-well plates (1 × 104/well) for 24 h and then treated with various concentrations of cisplatin for 24 h. Next the cells were treated with 0.5 g/l MTT solution for 4 h. The medium was removed, and 100 µl of dimethylsulphoxide was added to each well.

What features of this excerpt identify it as belonging to the Materials & Methods?

The methods section should allow an independent investigator to repeat any of your experiments. Use sub-section headings to allow readers to quickly identify experiments of interest to them...The key to a good methods section is developing your judgement for what information is essential and what is extraneous. Note that the methods section should be written in the past tense,...in complete sentences and paragraphs, not in bullet point form. (20.109 guidelines for scientific writing)

TR responses:

-Includes information on the materials and the procedure, in steps

-Provides specific measurements, amounts of what was added, etc.

-Written in the past tense: describes what you did.

-Sources of key reagents

WF responses:

-Details what you did, e.g. make & model

-"Next..." – conveys sequence of steps

The M&M allows replication or interpretation of your work.

- Provide the right level of detail

- List the methods in logical order

- Use proper grammar

Knockdown of Ku80 enhances cisplatin-induced growth inhibition and apoptosis in A549/DDP cells. (C) A549/DDP cells were transfected with siKu80 or Scramble and then treated with different concentrations of cisplatin for 24 h. Cell viability was determined by MTT assay. Data represented mean ± SD for three replicate experiments.

What features of this excerpt identify it as a Figure Legend?

Legends to the figures and tables explain the elements that appear in the illustration. Conclusions about the data are usually NOT included in the legends... As you write your first draft, you might state in a short simple sentence what the point of the figure or table is. In later drafts, make sure each element of the figure or table is explained. Your figure legends should be written in the present tense since you are explaining elements that still exist at the time that you are writing the paper. (20.109 guidelines for scientific writing)

TR responses:

-Title summarizes what the figure shows.

-Contains information on how the experiment was performed, but last sentence explains an aspect of the figure.

WF responses:

-Has part (C)

-Explains something about the figure: std dev.

-First phrase is the figure title

Legends allow illustrations to stand on their own.

- Describe experiment

- Explain abbrev, symbols

- Do not interpret or describe data

To further confirm the effects of Ku80 on cisplatin sensitivity in human lung adenocarcinoma, we used siRNA to downregulate Ku80 expression in A549/DDP cells (Figure 5A and B). Cisplatin markedly increased the viability of si-Ku80 A549/DDP cells, whereas scrambles-siRNA transfected cells were considerably less sensitive to cisplatin (Figure 5C).

What features of this excerpt identify it as belonging to the Results?

The purpose of the results section is to present your data in a relatively unbiased way, but with some guiding framework. Begin with a short description of the goal and strategy of your overall experiment, and then delve into specific sub-sections that describe each piece of the work…Ultimately, each sub-section should begin with an overview sentence that motivates and introduces the present experiment and end with a sentence stating the primary conclusion reached from that experiment… Note that verbs in the results section are usually in the past tense. (20.109 guidelines for scientific writing)

TR responses:

-References figures, and explains the data.

-States the aim of that specific experiment

WF responses:

-Cites figure

-Describes data

-Describes motivation for experiment

The Results tells a story about your data.

- Select data carefully

- Describe illustrations

- Provide context & conclusion

Downregulation of Ku80, together with cisplatin treatment, might promote apoptosis by triggering caspases cascades in apoptotic pathways. However, further studies are needed to elucidate the mechanisms by which Ku80 downregulation promotes apoptosis of chemotherapy resistant cancer cells in vivo and in vitro.

What features of this excerpt identify it as belonging to the Discussion?

The purpose of the discussion section is to interpret and contextualize your data...[C]onnect your findings to other research (published or that of your peers); describe any ambiguities and sources of error in the data, and suggest future experiments to resolve uncertainties; explain where you expect your work may lead, and suggest specific experiments for extending your findings; describe any conceptual or technical limitations of the research. (20.109 guidelines for scientific writing)

TR responses:

-Mentions future studies to expand the present study.
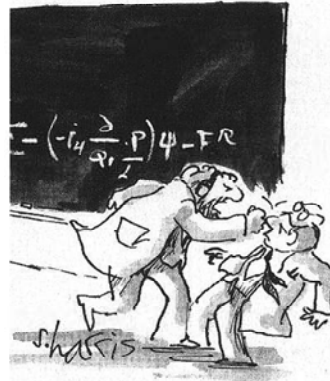
-States implications of the results

WF responses:

-Future plans

-Interpretation of data

-Implication of restuls

-Speculations

The Discussion is an argument about your data.

- Interpret data

- Explain contribution to field

- Admit limitations and flaws

"YOU WANT PROOF? I'LL GIVE YOU PROOF!"

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