
How to make science easily understood

Tiina Raevaara 2016. *Tajuaako kukaan? Opas tieteen yleistajuistajalle*. Tampere: Vastapaino. 202 pp. ISBN 978-951-768-546-7.

Tiina Raevaara's book *Tajuaako kukaan? Opas tieteen yleistajuistajalle* (*Does anybody understand? A guide for a populariser of science*) is an excellent guide for those who want to popularise scientific research and its results for non-academics understandably, responsively and ethically. Especially, it benefits novices but also gives new ideas to experienced popularisers.

Beginning with discovering an idea, she guides the reader in writing non-fiction books or essays in newspapers and magazines. She illustrates her subject with examples from authentic texts. She also explains current trends

in popular writing. Although the book is written for Finnish audience, most instructions are valid in any language.

The author has a Ph.D. in genetics but she is also a well-known fiction and non-fiction writer. Furthermore, she frequently publishes on the Internet and appears on TV. In her work, she concentrates on scientific and textual themes that interest her, and she intentionally aims at blurring the boundaries of journalism, fiction and non-fiction.

Tajuaako kukaan? inspires, agitates and forces the reader to argue. It is not only written for research colleagues but also for scholars and other specialists who want to tell about their own fields to wider audiences. Of course, not every researcher is necessarily the best populariser of her/his own works, or (s)he does not even want to write for laypersons. (S)he who has a burning

desire to write can, however, try to take a distance from her/his topic or pick up another, not so familiar theme.

Raevaara writes in a colourful and inspired way. She believes that popularised science can be as intensive as entertainment programs and as beautiful as art. It can spread new knowledge as exactly as a real scholarly essay – provided that the populariser works within the guidelines given in the book.

The author begins with the present state of popularising science (in Finland) and ends up with populariser's identity. She also writes about creating and constructing essays, levels of popularisation and writing a non-fiction book. She does not forget either that something can go wrong. In addition to the main text, Raevaara has written 17 data boxes with hilarious titles, e.g. "The first sentence in a non-fiction book", "How to receive obscenities", "The great chocolate sham". Throughout the book, she stresses the ethics of writing.

Popular science is based on research but it is written for non-academics. Today more and more laypersons are interested in it. So far, science is published in written form, and popularised science also starts as a text, although it may be produced on different levels and through different channels, e.g. in print, on TV and radio, in documentary films, blogs, etc.

Today, journalistic science is doing well in Finland: it gets plenty of space in newspapers and magazines. Besides, websites and the social media are effective ways to spread information. They can also be good ways to experiment with popularisation. Facebook, Twitter, Instagram and LinkedIn give you feedback immediately but are suited for different purposes because of their own practices, audiences and contents.

There is no shortage of inspiring scientific ideas; one must only pick them out. A willing writer finds them in everyday life or gets them from colleagues and other people nearby. News, events, seminars or handouts are flooded with ideas. Even old themes can be interesting if one looks at them from a new angle.

However, a good theme is not enough; a fresh viewpoint is also needed. To find the approach

one should ask if the theme is topical, funny or strange, how it touches people's lives, if certain interesting persons or events are connected with it or if scientists have contradictory opinions about it. Particularly, the natural sciences must be simplified, and this is best done with dramatisation or via the researcher or another interested party.

If you want to popularise science, don't start with a book, start with shorter texts, e.g. summaries of your own research or press releases. Even with that you may need an editor's help to clarify the terminology, find synonyms, make sharper arguments, put the details in a logical order or make a good story. And remember that the same essay cannot be published in any forum because every newspaper or magazine wants texts that especially interest their readers. One paper publishes essays connected with the latest news; another one publishes articles based on interviews, etc.

Raevaara explains how different types of popular articles are constructed. A piece of news is the basic type and it tells about a fresh discovery or result that is important or unexpected. It is concise and effectual. In an easily understandable way, it answers these questions: what happened, why, where, how and who is responsible for the information. It must be linked with the available data and presented in its scientific context. The writer should also show its meaning for people's worldview or the history of science.

Another type of scientific essay deals with phenomena. Because it handles them analytically, it requires expertise, a lot of background work and a certain approach. It may focus on the field of research, subject, history, methods used, changing ideas or science politics. This type of essay is easy to illustrate: photos, drawings, maps, tables and diagrams may be used.

The two previous types can also be combined in one essay, but the "murderer" should always be revealed as early as possible, even in the title. You must first tell the most essential ideas and conclusions; then you may reveal how they were reached and what was known earlier.

Several other types of writing might also be chosen: portraits, reports, columns and blogs.

Personal portraits with plenty of pictures can explain wider phenomena, and reports may open the theme with individual destinies, emotions, moods or narratives. Columns in newspapers and magazines are often expected to be subjective. A blog in a newspaper's online version is a quickly produced text on a topical theme that is spread widely, but it lives for a longer time than print. Universities and scientific institutions often publish blogs.

Popularised science must always be correct and understandable. But it is the realisation that makes the text interesting. Even a dull theme can turn fascinating if the author defines it clearly, looks at it from a new angle and chooses a suitable narrative style. In fiction, Raevaara aims at layered, compact, intensive and aesthetic quality but she also recommends them in non-fiction.

A layered text is rich in contents, information, emotions, observations and impressions, but not too many elements and viewpoints should be used together. The message must remain clear. In a compact text, all parts are linked with each other, and the contents and form are in harmony. An intensive text catches the reader and keeps hold of her/him till the end. People love to read fluent, entertaining and absorbing essays in any field of science if they have connections with people's everyday life. Especially historians have produced splendid texts that also sell well without compromising the rules of research.

Raevaara divides non-fiction books into four categories: collections of essays by several authors, collections of essays by one author, textbooks and narrative books. Scientific literature and academic textbooks are often collections of articles by several authors and may sometimes offer conflicting views. A collection of essays by one author either concentrates on the same theme throughout or contains separate essays. Textbooks contain chapters logically connected with each other. Their structure may easily fall into pieces because they often have plenty

of illustrative material. Some Finnish journalists have in the 2010s become distinguished in narrative non-fiction where the author is clearly present.

Writing a book requires a lot of background work and resembles research but is more flexible. A populariser is not bound by scientific practices, authority struggles or exacerbated relations. (S)he can be daring and without prejudice build bridges between disciplines. With a multidisciplinary approach, (s)he can give the book depth and layers. Benevolent humour is an excellent way to hook the reader but satire and jokes require caution.

Raevaara urges popularisers to test various narrative ways and to find shocking, ridiculous or inspiring viewpoints. One can immerse fiction or even her/himself into the text. However, the story should be kept an integrated whole. A good narrative text builds on expectations and tension, but the conflicts must always be solved before the end. And regardless of the topic, the end must be happy or at least positive.

Unfortunately, popularisation can sometimes go wrong although the research has been correctly carried out. This happens if the populariser reports the results unclearly, distortedly or completely erroneously, if (s)he misunderstands the terms or other important words and does not contextualise the results. The writer is doomed to fail if (s)he tries to make news only to raise discussion or if (s)he tries to find contradictions where none exist.

Raevaara is convinced that one's mother tongue is the language a person is most strongly influenced by. She also believes that a person can never learn all the hues and idioms of a language as profoundly as in her/his mother tongue. Therefore, it is important to make scientific results understandable for non-academic audience as well. A language that cannot express the latest achievements of science is a dying language.

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