Tidsskriftet Tidsskrift for Den norske legeforening

More than a thousand words

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To publish is to communicate. Good graphs and tables help bring the message to the readers.

On 28 January 1986 the *Challenger* exploded. All those on board perished. Why? On nine previous occasions the space shuttle had been launched – what went wrong this time? Part of the cause of the tragedy may simply have been tables and graphs that were hard to decipher (1). Prior to the launch, some engineers were concerned that the cold weather could harm the space shuttle. They had observed an association between low outdoor temperatures and previous problems, and on the day before the launch they attempted to communicate this to NASA. They sent over comprehensive data material in the form of 13 graphs and tables. These were difficult to read, and NASA remained unconvinced.

It is of course only rarely that poorly designed graphs and tables have such grave consequences. Nevertheless, there can be no doubt that they play an important role in all communication. In our journal, we often see that the editors and authors devote much effort to the text of the articles, while graphs and tables tend to be less well prepared or even totally absent. This is unfortunate. We know how articles are read – most readers browse through the title and the summary and throw a glance at the graphs and tables. You only have a moment to get the reader hooked!

During the past year, the editors have made a more concentrated effort to improve the illustrations in our journal. «Illustrations» can be used as an umbrella term for graphs, tables, text boxes, photos and drawings (2), but we have perceived a need to improve the graphical presentations and tables in particular.

Why are graphs and tables so important? There are at least four reasons: They should serve to make the text inviting, catch the reader's attention, convey a message and enhance the reader's comprehension of the data. Moreover, producing graphs and tables forces the researcher to undertake an even more rigid review of the data. This may be a demanding exercise – first the data to be shown must be selected, followed by a consideration of the best way to display them. This calls for systematisation and identification of what is essential.

When our journal launched its visualisation project, we first envisaged some fancy and complex graphs. We wanted to have fewer tables, and replace them with illustrations of the kind used by the New York Times (3). Gradually, however, we realised that plain graphs and tables often represent the best solution (4). By «plain» graphs and tables we refer to elements that are easily comprehensible. Producing them, however, can be difficult and time-consuming! There are several excellent sources to show us how to proceed (1, 5, 6). A good rule of thumb is to reduce the amount of data and remove all superfluous elements (1, 2). The development of the London Tube Map is a good example. The first versions were overloaded with detail and nearly illegible. It is fascinating to compare them to Harry Beck's transparent 1933 design, which is still in use (7). Another key rule is to ensure that all graphs and tables are self-explanatory. For them to be readable independently of the text, the table heading must provide sufficient information. Abbreviations should be avoided.

What is best – a graphical presentation or a table? Tables may seem boring, and preferring graphs is not far removed. A more appropriate answer is that each of them has its uses. Graphs should be reserved for fairly simple messages, while complex data are best rendered in a table (1, 8, 9). Tables come in two main forms: reference tables and demonstration tables (8). A reference table is like a timetable – all the information must be included. Such tables can have a place in scientific articles, either as a source of reference or to allow others to verify the data. One possible solution could be to publish such tables only online. So-called demonstration tables will often be more relevant, however. These have a plainer format and convey a clear message. By sorting the key figures and arranging them by size, patterns and irregularities become easier to spot (8, 10).

Using rounding of figures to improve readability is probably a more controversial device. With rounding comes lower accuracy. What should be given priority – communication or accuracy? There is no simple answer. Clearly, rounding increases readability and the chance that someone will remember the figures. Since most calculations return figures with many digits, the question is not *whether*, but *how much* to round off. There are some who claim that hardly ever is any information lost by rounding off to two effective digits (10).

Every day, we are inundated with information. Many readers turn first to articles within their own specialisation or field of interest. What is read beyond this is largely determined by what captures their attention. Who would want to dig into a four-page article with nothing but text? It matters little that the text is outstanding if nobody reads it. In our journal we will seek to review all manuscripts systematically to strike an appropriate balance between the text and its illustrations and to ensure that all graphs and tables convey the intended message in the plainest manner possible. The editors, the authors and the readers have a shared interest in these efforts to provide good graphical presentations and tables. Their design may decide whether the article is read or ignored.

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Publisert: 30. April 2012. Tidsskr Nor Legeforen. DOI: 10.4045/tidsskr.12.0460