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Science is contaminated by misquotes, misunderstandings and academic urban legends

## Are 72 % of all Norwegian doctors depressed?

I was really excited when I discovered that my first scientific article in an international journal had been cited. I found the article on the Internet, and started reading. It started out just fine. The authors ascertained that depression is a risk factor for suicide among doctors, and that the prevalence of depressive symptoms varies from one study to another. But then I suddenly read: «Seventy-two per cent of Norwegian physicians self-reported symptoms consistent with depression» (1). What on earth was this? Did the authors really claim that three-quarters of all Norwegian doctors are depressed? I had to check my own article (2) and the misunderstanding became clear. They had confused the response rate (72 %) with the proportion they believed to be depressed. But there was more: in this study we had not investigated the prevalence of depression at all – its topic was self-reported suicidal behaviour.

But how should we react? My seasoned mentor told me: «You will see this repeatedly, and you will have your work really cut out for you if you want to check that you are always correctly quoted.» We found this to be sufficiently serious to write a letter to the editor of the journal in question to clear up the misunderstanding (3).

I learned a lot from this incident. Misquotes are common, and articles in scientific journals are replete with misunderstandings and undocumented assertions. In this case the authors were Austrians; perhaps they seriously believed that more than 70 % of all Norwegian doctors are depressed? Someone (i.e. the peer reviewers) ought to have told them, however, that a 72 % prevalence of depression is not very likely in any profession.

Another problem consists in misspellings and other forms of sloppiness in the reference lists, making it difficult for readers to find the reference. It has been shown on numerous occasions that references are rendered inaccurately, in small specialist journals as well as in the large and prestigious scientific journals (4, 5). This type of error is probably less widespread than before, since we now have reference management software that keep the references in order and ensure that they are listed correctly. Many scientific journals are currently using such aids, including the Journal of the Norwegian Medical Association, which has used the software program eXtyles since 2010. Such applications check that the references are listed correctly and link them automatically to the PubMed database. The referenced article is available at a keystroke.

Misspellings and other forms of negligence are, however, a far smaller problem than erroneous and misleading reporting of the *content* of research articles, as I have described in the introduction. It is especially unfortunate to cite articles that have been retracted, for example because of research misconduct (6, 7). These may

include articles that are simply fraudulent, numerous examples of which we have unfortunately seen in recent years (8). Citing such articles as though they remained valid is impermissible, but happens nevertheless.

Perhaps the most widespread problem with references is that many researchers copy each other's lists of references, without looking at the sources (9, 10). The variants are rife: an author may fail to read, or understand, or even care about what the original articles say (10). Recently, Ole Bjørn Rekdal described such an example (11). It is commonly assumed that spinach is rich in iron – but there are numerous references stating that this is false. This «myth» is said to have arisen in the 1930s because of a malpositioned decimal point that resulted in a tenfold overestimation of the iron content. When a researcher recently attempted to clarify this issue, it turned out that the malpositioned decimal point could not be detected in the literature. In other words, the fallacious decimal point was itself a myth. This has turned into an academic urban legend, but this does not prevent it from being cited over and over again (11).

Reading and understanding complicated scientific articles take time. It may be tempting to cut some corners. How many misquotes and urban legends are circulating in medical science? The answer is likely to be depressing.

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