Tidsskriftet Tidsskrift for Den norske legeforening

# Numbers are not neutral information

MEDICINE AND NUMBERS

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The author has completed the ICMJE form and declares no conflicts of interest.

## There is no such thing as a neutral presentation of numbers and statistics.

When I moved to London as a student, I found myself a new favourite number: 17. I was seated in row 17 on the plane over, and the address of the apartment where I was going to live was 17 New Road in East London. I saw the number 17 everywhere, and bought myself a pair of slippers on which I painted the number 17. I was deeply disappointed when I discovered that having '17' as your favourite number was incredibly *un*-unique.

## Numbers mean something


**Figure 1** Slippers with the author's favourite number. Photo: Jo Røislien.

In informal surveys where people are asked to choose a random number between 1 and 20, the number 17 is chosen significantly more often than others. Of the numbers from 1 to 10, the number 7 is chosen most frequently, and in a large, global survey asking people to choose any number they wanted, '7' was named the world's favourite number (1). *All* numbers between 1 and 100 was someone's favourite number, while nobody chose '110'. Quite naturally so; in a base-10 system, numbers divisible by 10 are perceived as particularly systematic – and hence less unique.

The fact that most people have a favourite number, and that there is something systematic about the numbers we choose, may seem trivial, but it tells us something important. It tells us that numbers are not the neutral quantities we like to think that they are. Numbers mean something to us, and we attach various emotions and qualities to them. And research studies show that what numbers we present and the way in which we present them have an effect on people's judgements and decisions.

## Risk and COVID-19

During the COVID-19 pandemic, communication of figures and statistics has been essential. We tend to think that by handing over figures and statistics, we have delivered neutral information, but it's not that simple.

In a study conducted by the Winton Centre for Risk and Evidence Communication at the University of Cambridge, people were asked how risky a given chance of dying from COVID-19 felt (2). If the number was presented as, for example, 5 percent, the participants tended to perceive this as a fairly low risk. However, if '5 percent' was presented as '5 out of 100', the risk was perceived as *higher*. Reformulated as '1 out of 20', it was perceived as a *much* higher risk. And this difference between percentages, proportions of 100, and proportions as 1-out-of-something was consistent: '1 out of 5' was perceived as a higher risk than '20 out of 100', which in turn was perceived as a higher risk than '20 percent'. These are three representations of the same number, but they are *perceived* differently.

## The risk of violent behaviour

It might be tempting to blame low numeracy in the population, but people with long academic training make similar judgements.

In a study, researchers asked experienced forensic psychologists and psychiatrists to assess the risk that a mentally ill patient would commit an act of violence within six months after discharge from hospital (3). The experienced experts were divided into two groups, where one group was given key background information in the form of percentages, i.e. that there was, for example, a 20 percent chance that a mentally ill patient would commit an act of violence after discharge from hospital, whereas the other group was presented with the same information as relative frequencies, i.e. that typically, 20 out of 100 mentally ill patients would commit an act of violence after discharge from hospital.

In the group that had the numbers presented to them as percentages, 21 percent of the forensic psychologists and psychiatrists refused to discharge the patient from hospital. In the group that had the numbers presented as relative frequencies, 41 percent refused – nearly twice as many.

## Numbers and decisions

We humans are emotional beings, and we tend to look to our feelings when making decisions (4). And, since different numbers make us feel different things, different presentations of the same numbers will lead us to making different decisions.

Frequencies, percentages, decimals, fractions. The way in which we present numbers matters, and in marketing, this tip crops up in various blogs at irregular intervals. If you wish to tone down a risk, use percentages. If you wish to make people more aware of it, use frequencies.

The communication of numbers is an important extension of the statistical analysis.

## The slippers

I still have my old slippers, and the painted number '17' is still clearly visible. But the number has changed its meaning. Previously, the slippers represented my favourite number. Now, they represent the story of numbers and emotions, and of what happens when objective information is used by subjective individuals. The number is the same, but its meaning is different.

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Publisert: 2. March 2022. Tidsskr Nor Legeforen. DOI: 10.4045/tidsskr.21.0883