Communicating risk

David Spiegelhalter looks at how institutions communicate with publics and argues that the presentation of health risks frames their perception.

Whenever I talk about risk I ask the audience to pretend that I am an omniscient being (which I am not) and can tell them when they are going to die, and then ask how many would like to know? My subjective estimate is that around 1 in 20 put their hands up, across all ages, and these people would like to have everything planned and sorted before they say goodbye, perhaps propped up on crisp white pillows surrounded by tearful loved ones.

Clearly the great majority prefer to live with uncertainty about the circumstances of their inevitable decline and death. Nevertheless we are constantly reminded of the risks we face, both in general as a member of a population and, increasingly, at an individual level. How those personal risks can be communicated, and what the impact might be, is one of the topics being examined by the Winton programme for the public understanding of risk at the University of Cambridge.

I shall use myself as an example. Last year I went to my GP and had the usual blood tests and examination, and he put me through an algorithm on his computer and out popped the conclusion that I had a 10 per cent chance of a heart attack or stroke in the next 10 years. I was fairly taken aback by this bald statement, although as a statistician I could easily check that an average 55 year old man (my age) has a 9 per cent chance of dying before his 65th birthday, and in fact I cheered up considerably when I found my risk of a heart attack or stroke was less than average. Which goes to show I am as subject to the more emotive responses to risk as everyone else.

If my risk were 20 per cent or more then NICE guidelines suggest I go onto statins, but even my fairly low risk could be reduced by around 30 per cent if I were to take statins every day. This decision led us to develop an animated programme, *Spinning the Risk*, which explores the ways these risks might be communicated.

The simplest *relative risk* statement could be expressed as:

Statins reduce your chance of experiencing a heart attack or stroke in 10 years by 30 per cent.

This makes the statins sound quite attractive. But if we consider the *absolute risks* then it does not sound such a good option:

Your chance of experiencing a heart attack or stroke in 10 years without statins is 10 per cent, which is reduced to 7 per cent with statins.

Psychologists have found that terms such as 'chance', and the use of percentages, can be off-putting and so a popular format is to use natural frequencies within a population, say:

10 out of 100 people like you will experience a heart attack or stroke in 10 years without statins, which is reduced to 7 out of 100 with statins.

An issue with this format is known as the *ratio bias*, which is a very consistent finding that many people view '10 out of 100' as a higher risk than '1 out of 10', and so it's vital to keep the denominator constant. But we can also change the framing of the statement from a negative to a positive frame, to produce an equivalent statement such as:

90 out of 100 people like you will be free of a heart attack or stroke in 10 years without statins, which is increased to 93 out of 100 with statins.

which makes statins look even less attractive. Framing can be very effective: a recent *Nature Genetics* paper that reported a gene variant associated with a reduced risk of hypertension in 10 per cent of people received international coverage when a clever press officer realised they could report it as a gene that increased the risk of hypertension in 90 per cent of people.

Graphics provide another medium to manipulate the risk message, and we have provided pie charts and bar charts that can alter the impression by changing the scaling and framing. However our main emphasis has been on the use of icons, since these are being increasingly recommended for risk communication. For example, Figure 1 shows a 'smiley' image for my decision problem.

Our programme provides the option of scattering the icons and changing their colour, since it's been shown that such adjustments can affect the perception of the magnitude of a risk.

Personally, I am not keen on the artifice of embedding me in a population of similar people in order to explain risk. I am a unique individual, and the mental image of me being just one of the smileys encourages me to believe that I will be one of the lucky ones. My own preference is to be upfront about the fact that we are thinking about the unique me and, out of all the possible ways things may turn out for me in the future, some will involve me having a heart attack or stroke before I am 65, and some won't.

We have developed two ways of making this idea concrete. First is to use the language of 'possible futures', so that we say:

Out of 100 possible outcomes for you, 10 will involve experiencing a heart attack or stroke in 10 years without statins, which is reduced to 7 out of 100 with statins.

Second, we have enabled the programme to use images of the individual, as in Figure 2 which shows 100 possible versions of me in 10 years time.

What might this mean for organizations that wish to communicate with a range of audiences? It is well known that the way in which risk is perceived depends on both the topic and the subject, and that numerical statements about probabilities can have minimal impact relative to the feelings the individual has regarding the threat, based on their personal experience, their trust in the source of information, their dread of the event in question and so on. But the fact that people (including
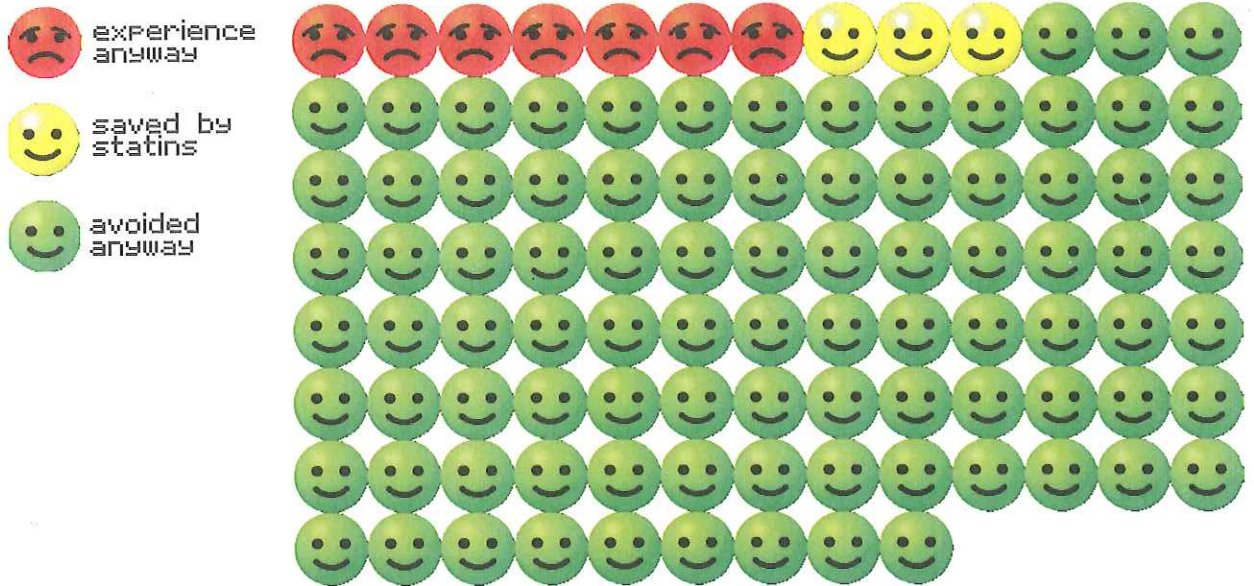
Figure 1. 'Smileys' for my decision problem as to whether to take statins or not: only 3 out of 100 people like me will benefit from taking tablets every day for 10 years.

myself) have immediate responses based more on emotion than 'rational' weighing of evidence does not mean that quantitative assessments of risks are pointless: rather it is an argument for *more* attention to be paid to risk presentations in order to make sure, as far as is possible, that a fully informed decision is made, even if the individual exercises their right to take little notice of the information being provided.

We are currently working with a number of organizations that wish to feature these type of graphics – these include healthcare providers, patient-support groups, and official agencies. These ideas are particularly valuable when risk information needs to be tailored to individual circumstances, such as in genetic counselling or predicting survival after severe head injury. We are also working with experimental psychologists to see whether the 'possible futures' representation is (a) attractive to users, (b) enables them to understand and remember the risks, and (c) changes their behaviour. However, a number of studies have shown that these three objectives are not necessarily related and that people vary greatly in their preferences and understanding for alternative risk representations – for example, in some experiments it has been found that a majority favour bar charts to 'smileys'. Therefore it is unreasonable to expect that any single format can either satisfy the majority of people or the multiple objectives. That is why we believe that any tool for communicating risk must be capable of using a variety of representations, from text to tables to graphics to animations.

So far I have only dealt with applications from health, but the basic idea of 'possible futures' is of course applicable to any context. For example, we are developing animations to display the possible weather tomorrow and the relative likelihood of different results of a football match. Possible futures for an organization, community or even the world could also be displayed in order to bring home the potential consequences of our actions, while also making clear what is very unlikely to occur. A pressing issue is how uncertainty about risks would best be displayed. This could be done using density of colour or dynamic changes in the display. Psychological experiments have suggested that while some people may welcome such a forthright expression of uncertainty, for some it can further decrease the trust in the source.

All our animations can be adapted by users to their own area and embedded on external websites using their own icons and language – it will be interesting to see whether there is an enthusiastic audience for this type of exercise.

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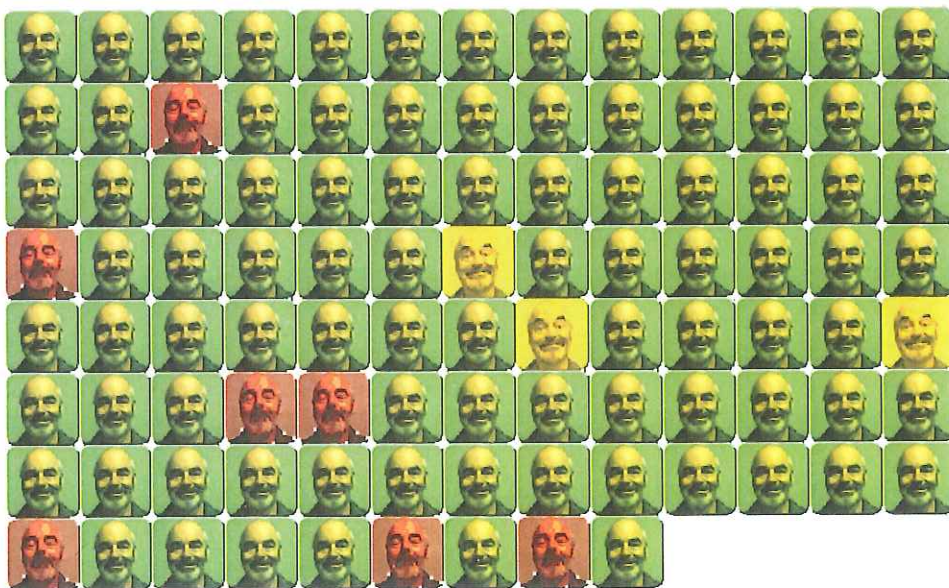
Figure 2. Images of 100 possible ways things may turn out for me in 10 years time.