

### 3 SAMPLES, SAMPLES EVERYWHERE ...

*"25% of Americans Don't Know the Earth Orbits the Sun"* – Jezebel.com, 15 February 2014

*"15% of British Men ... Would Have Sex with a Robot"* – *The Sun*, 2 September 2015

In the thousands of pages of fact and opinion churned out by the media every day, headlines like this are ten a penny. You can't swing a cat (GIF) on the internet without hitting some fact about 20% of dog owners or 60% of conservatives or 1 in 10 millennials.

But how do the headline writers *know* these things? How do they know that a quarter of Americans are living with a model of the solar system that is 500 years out date? How do they know that 15% of British men saw *Ex Machina* and took away *entirely the wrong message*? We covered some of the answer to this question in Chapter 1, but here we're going to delve a bit deeper.

Let's say that, for some no doubt excellent reason, I really wanted to know what proportion of British men would sleep with an artificially intelligent robot. The only way to find this out definitively would be to speak to every single man in the country – all 25 million of them. This is ... impractical to say the least. I'm not going to sidle up to every man in Britain and ask them if they wish Amazon's Alexa was more than just a disembodied voice. Aside from being unlikely to end well, it would simply take too long.

What *Sky News* (the people behind the robot number) did instead was to speak to 500 men and use their answers as an indication of what all British men would say.<sup>1</sup> 75 (15%) of the men *Sky* spoke to indicated that 'if the technology was sufficiently advanced' they would be willing to sleep with a robot.\* *The Sun* took this 15% and generalised it to the entire male population of Britain.

As I mentioned in Chapter 1, this idea – taking the answers of a small number of people as indicative of what the whole population

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\* In fact, the actual question was 'To what extent, if at all, do you agree or disagree that if the technology was sufficiently advanced, it would be possible to have a fulfilling sexual relationship with an artificially intelligent robot?' This is not exactly the same as asking 'Would you personally have sex with a robot?' Just as with the 'one in five Muslims' story in Chapter 1, *The Sun* have twisted the statistics to make a better story.

think – strikes a lot of people as just obviously wrong. How can you say something about 25 million men after having talked to just 500 of them? *Sky News* didn't ask me if *I* would have sex with a robot; and (even if you're a British man) they probably didn't ask you either. It's tempting to draw the line there: if you haven't spoken to everyone in the group you're interested in, you shouldn't make sweeping generalisations about what all of them think.

This sounds fair, but it leaves us with a pretty big problem. We (governments, charities, researchers, companies, and society in general) need information we can only get by asking people direct questions. OK, maybe it's not *essential* for us to know how many people would have sex with a robot, but there are plenty of other things we *do* need to know. Things like what proportion of students are happy with their degrees, or what percentage of women have experienced sex discrimination, or how many older people are struggling to heat their homes – the list goes on and on.

Given that it's basically impossible to speak to every member of a large population (like all students, or all women, or all older people), we are left with only one option: we have to speak to a small selection of people (a sample of say 500, or 1,000 or 10,000) and hope that what they say tells us something useful about the population as a whole. Researchers do this all the time. In fact, most of the facts and figures you will ever see will not be precise, definitive answers from a whole population – they will be estimates (educated guesses) based on small samples. This is true even for statistics that sound very concrete and official.

## It's samples all the way down ...

Below is a list of real statistics, some of which are rock-solid, precise figures, and some of which are estimates (guesses) based on small samples of people. Which do you think is which?

1. One in five Australians don't believe in climate change. *Source*: Research by academics at the University of Tasmania, Australia.<sup>2</sup>
2. There are 1.4 million unemployed people in the UK, and 771,000 job vacancies. That's 1.8 unemployed people for every vacancy. *Source*: UK Office for National Statistics (2017).
3. In 2013/14, 28% of people convicted of homicide in Canada were not given prison sentences. *Source*: Statistics Canada.<sup>3</sup>
4. 8.9 million people in the USA watched the Season 6 finale of *Game of Thrones*. *Source*: Nielsen Television Ratings (as reported in the *New York Times*).<sup>4</sup>