2.2 Does the author represent the evidence accurately?

1. Statistics – Hidden factors

Exercise

In a recent advertising campaign the makers of a popular breakfast cereal made the claim that 'Research shows that when they eat a cereal like ours kids are 9 per cent more alert.'

To assess the reliability of this claim we need to know at least two things: the number of children involved in the study and any hidden assumptions. What questions do we need to ask to reveal any possible hidden assumptions?

Answer:

1. We need to know whether this just means that if children eat a breakfast *at all*, of any sort, then they will not be falling asleep at their desks. Having eaten something their energy levels will be maintained so they can concentrate and perform better.

2. We also need to know what was meant by 'alert' and how it was measured.

2. Statistics – lack of uniformity

Exercise

In the middle of an argument in which our attention may be on the broader issues, it's easy to take certain things for granted, believing that we all share the same assumptions. We might assume we all mean the same thing when we use words like 'stress' and 'depression', or that our perception of a problem matches everybody else's.

Recently it was reported in the *British Medical Journal* that an 18-year study involving over 6,500 women found that those with high levels of stress were 40 per cent less likely to develop breast cancer than those who described their stress as low. But another study, this one over 24 years, published in 2003, found that women who endured high levels of stress ran twice the risk.

What do you think would explain the difference between the conclusions of each report?

Answer:

1. Comparing the two studies there seems no uniformity between what each describes as stress. It means different things to different people.

2. It is also difficult to disentangle stress from other factors that may have a significant influence, like lifestyle, diet and family history of the disease.

3. In the first study it may be that those who were better at reporting their stress levels were also better at noting other things that might lead to cancer and thus do something to lessen the danger.

To evaluate both of these findings we must be able to compare them on the same basis.

3. Statistics – absolute/relative

Example

Austerity measures

In December 2012 the British Chancellor, George Osborne, denied that the poor were having to endure the major share of his austerity cuts. He insisted that the rich were paying 'a greater share'; that 'the richest 20% are paying the most'.

Problem

His critics accuse him of unfairly targeting the poor, who are having to bear the greater 'proportion' of the cuts. So the problem is does he answer his critics relevantly by using relative, proportionate terms or is he just using absolute terms? In absolute terms a wealthy individual will pay more in tax than the poorest, but this might represent a far less significant sacrifice than that which the poorest have to bear.

Unfortunately, his answer doesn't appear to clear up the problem. He says that the rich are paying 'a greater share', which is a proportionate answer, but then he also says that 'the richest 20% are paying the most', which could be both a proportionate and an absolute answer. What does the 'most' mean: the greater share of the cuts or the larger actual amount that each individual has to bear in money terms?

Answer:

For the answer we will have to look at the actual figures. The criticism of his policies came in response to his autumn statement in which he announced plans to cut £3.75bn ($6bn) a year from the welfare bill by raising the benefits of the poorest families by just 1% a year, well under the rate of inflation.

To make the comparison we need to know how much he planned to raise through measures targeted at higher earners. These included cutting the amount they could put into their private pensions tax-free from £50,000 ($80,000) to £40,000 ($64,000), raising £1bn ($1.6bn). To raise a further £1bn he planned to increase the threshold for paying the higher rate of income tax by just 1% a year. So the chancellor would be raising just £2bn from these measures aimed at the very wealthy compared with the £3.75bn he plans to raise from the poorest.

The critics

The Resolution Foundation argued that these measures would mean that the poorest 10% would lose 1.2% of their income, while the richest 10% would lose just 0.2%. On the BBC Radio 4's Today programme, Osborne defended his measures by saying that 'We are asking all parts of the population to make a contribution. You can't deal with the biggest deficit since the Second World War without asking for a general contribution from the whole population. But as I say, the richest 20% are paying the most.'

Another problem

There is also another problem that makes it difficult to untangle the implications of the respective arguments. These are still aggregate figures: they tell us little about the significance of the cuts on individual families. To cut 5% off the income of someone earning £100,000 might mean fewer holidays each year, but to cut 5% off the income of a family earning £10,000 might mean cutting back on essentials, like food, heating and clothes. In terms of social justice and the fairest distribution of the sacrifices that have to be made this is the more useful comparison to make.

Exercise

In the following longer exercise, look for all three things:

1. Are there hidden qualifications behind the claims that are being made?
2. Is there a lack of uniformity between different sets of statistics used for comparison?

3. Does the writer confuse absolute and comparative figures?

Railway privatisation

> 'We can now be proud of the fact that the UK has one of the finest railway systems in the world. All of the main indicators support this view. It is a cheap form of transport. The modern carriages mean that it is also very comfortable. Punctuality is improving all the time. It is an increasingly popular form of transport. One billion train journeys are made in the UK every year and it is estimated that this will double by 2035. But above all it is the safest form of land transport. So, it seems, the critics have been proved wrong: the free competitive market system has shown itself to be superior to government control.'

Answers:

1. Hidden qualifications

This is probably the most common error, perhaps because it is so hard to pin down. The more we get away with it, the more likely it is that we will keep on repeating it. The first step is to get used to asking that most nagging of all questions, 'Yes, but what do you mean by X?' In the argument above the author argues 'It is a cheap form of transport.'

Step 1: What do you mean by 'cheap'? What does this take into account and what does it exclude?

Obviously the writer includes the cost of a rail ticket, which in his judgement is cheap. But are there other costs that he has not included? One obvious candidate is the cost to the taxpayer of running the railways. In 1994, its last year of operation, British Rail cost the taxpayer £950 million, compared with the £5 billion that private rail operators were costing them in 2008. For much of this time inflation was fairly moderate, but even if it were rampant it would be difficult to account for this level of increase.

As to why this has occurred, the most likely explanation seems to be that we have lost the benefits of economies of scale. With more operators running stretches of the rail network the fragmentation has led to increased costs, making the railways more expensive to run.

Step 2: Is this a comparative judgement? If so, compared to what?

2.1 to other railways?

2.2 to other forms of transport?

Alternatively this may be a comparative judgement. The writer might be arguing that British railways may be expensive, but not as expensive as other railways abroad, or not as expensive as other forms of transport, like cars or air travel.

However, examine the figures on the internet and you will see that public rail networks in Europe produce far cheaper services. In 2007 the standard single from London to Newcastle was £112 for a distance of 288 miles. In contrast, a *return* between Barcelona and Madrid, a journey of 387 miles, cost just £52. Similarly, a *return* between Rome and

Milan, a distance of 392 miles, cost just £41.56. So it can hardly be claimed that the British privatised railway system is cheaper, in terms of ticket prices, than other European networks that are publicly run. Of course, what we don't know is the level of support these get from taxpayers, but given the considerable economies of scale involved in European rail networks, it is a reasonable guess that costs per mile will be much lower.

Perhaps, then, the writer merely meant that rail travel was cheaper than other forms of transport. So, again, we need to examine this claim, particularly in relation to travel by air and by car. While air travel has always been more expensive than rail transport, with the new budget airlines and cheap fares the gap between the two has narrowed, so that now on many routes it is roughly the same, if not cheaper.

As for the car, even with the rising cost of fuel it is still cheaper than going by rail. Say the price of petrol is £1.35 per litre; this would make a gallon around £6.14. If a car has an economy rate of, say, 30 miles to a gallon, it would mean that a rail journey from London to Newcastle, even at 2007 prices, would still be more expensive than travelling by car, which would cost around £59. Even when you make allowances for depreciation and running costs, the margin between the two is still considerable.

Indeed, the picture is no different even after you have radically changed the figures in favour of rail travel. If you estimate the price of petrol as high as £1.50 and consumption as low as 20 miles per gallon, it would still be cheaper by car. And, of course, this doesn't factor in the costs at either end in the form of bus and taxi fares to take you to your final destination, which you don't incur if you go by car.

Overall it appears that we can no longer claim that travel by rail is cheaper than its alternatives. Since 1997, while the cost of rail fares has increased, the cost of road travel and airfares has fallen. In real terms the cost of train travel has increased by 13 percent, whereas over the same period the cost of road travel has fallen by 14 percent and the average price of a one-way flight from Britain has fallen by 35 percent.

You can generate all of this criticism from just asking obvious questions about the nature of the claim: what it means and what it includes and excludes. Of course, you will need to gather some information, but you don't have to become an expert and none of this involves any specialist expertise.

2. Lack of uniformity

The writer then goes on to argue that 'Punctuality is improving all the time.' Although this may be the case, many commuters would argue that some train operators have a particularly poor record and have shown very little improvement.

The problem is that to evaluate the writer's claim we need to see the figures that support it. While there is a lot of anecdotal evidence of commuters who see no improvement at all, if not a significant deterioration on some lines, the statistics may in fact show marginal improvements. There is an obvious disparity between the two. So we have to uncover the lack of uniformity between the figures referred to by the train operators and those that are used by the commuters.

On one line, for example, there was a growing chorus of commuter complaints at the ever-worsening record of punctuality. Nonetheless, the operator was still able to demonstrate that they had met their targets, so they were in no danger of being fined or, worse still, losing their licence. However, when the figures were examined they showed that the operator's results had been improved by being aggregated with the separate fast train service, which had shown improvements in punctuality. As this travelled through the different regions, each region's operator was able to aggregate the results with their own and lift their performance to show improved punctuality.

Frequently the lack of uniformity between the figures used in this way to make a case, allows people to use them to their advantage, while obscuring the actual situation. So we have to ask, 'Are these figures reliable if taken at face value? What assumptions do they take for granted? Are there significant differences between the sets of figures available?'

'Comfortable'

Similarly, although not a question of uniformity between the statistics employed, the argument that, 'The modern carriages mean that it is also very comfortable', illustrates the same point. Again, we need to know what is meant by 'comfortable' and how it is measured.

If it means that the modern carriages are more comfortable than those that operated 50 years ago and this is measured in terms of the padded seats and leg space, then the argument seems well supported by good evidence. Even so, the supporters of a publicly

operated railway could argue that the same improvements introduced since privatisation would have been introduced anyway if the railways had been left under public ownership.

But ask yourself, again, 'What do we mean by 'comfort' in this context?' If we were passengers, would we be talking about something different from the writer of this argument? Is it just a question of leg space and padded seats, important though these are? For example, if you were a commuter in overcrowded carriages each morning, unable ever to get a seat, you would no doubt argue that overcrowding is the key factor that makes your journey uncomfortable. Indeed, as long as the overcrowding persists you would never get to enjoy any of the comforts that the writer might have in mind.

3. Absolute and comparative figures

The third problem, you would think, is the most obvious and, therefore, the easiest to avoid. But still, it's surprising how often we read reports in which simple totals are given to indicate trends over a certain period.

In the argument about the privatised railways the writer argues that, 'It is an increasingly popular form of transport' and 'One billion train journeys are made in the UK every year and it is estimated that this will double by 2035.' To evaluate this we need to know if this is a relative, or an absolute, figure. And for this we need answers to a number of questions:

3.1 How fast has it been growing in previous years?

'One billion train journeys … every year' is an absolute figure, which doesn't tell us if it is falling or increasing and, if it is increasing, whether it is increasing at a faster or slower rate. If the number of train journeys made this year has grown more slowly than in previous years, then it is becoming relatively less popular.

3.2 How fast has it been growing in relation to the growth in population?

If it has been growing less that the growth in population, then we can infer that there has been a relative fall in its popularity. A more reliable indicator is the number of train journeys per 100,000 people.

3.3 The same applies to our next question: how fast has it been growing in relation to the growth in disposable income?

If it has been growing less than the growth in disposable income, then we could infer that as people have become wealthier they have turned to other forms of transport. But to make this claim, we need the answer to yet another question:

3.4 How fast has it been growing in relation to other forms of transport?

To answer this question, as we've just seen, the most reliable figure is the number of journeys per 100,000 people, broken down into different forms of transport. Although this is important, it is still not enough: we need to ask one further question:

3.5 What factors are influencing the increasing or decreasing popularity of different forms of transport?

If these figures were to show that rail journeys were increasing relative to other forms of transport, this still might not indicate the increasing popularity of railways, but rather the increasing unpopularity of other forms of transport. For example, the Department of Transport has predicted that the period 2008 to 2033 will see the following increases in forms of travel:

Flights 178%
Car journeys 43%
Train journeys 150%

These figures, of course, suggest a number of different interpretations. The relative unpopularity of car journeys might reflect the increasing difficulties of making car journeys on overcrowded roads. The growth in popularity of flights in contrast to cars and trains might suggest the growing affluence of a population that can afford to take more journeys abroad and more holidays each year.

But whatever the right interpretation, it reveals just how inadequate it is to quote absolute figures to support the claim that rail travel is becoming more popular.

Loose descriptions

Get used to picking up all those synonyms that are designed to give the writer the same freedom of loose thought, phrases like 'greater or lesser extent'. Ask the writer what he means by the phrase. As you can see, the phrase 'greater or lesser extent' effectively says nothing, because it leaves all the doors open. On occasions, you may come across the description of a claim as a 'reasoned rule of thumb', which is usually a good indication that the writer has no evidence to back it up.

Exercise

In an article on electoral reform, a journalist criticised the arguments of those who are opposed to electoral reform, arguing:

'Supporters of the status quo will insist that the current voting system has the great merit of producing reliable parliamentary majorities for single party governments. (That it does – except on those quite frequent occasions when it doesn't, as it didn't at the last election.)'

Explain how you would critically evaluate this argument.

Answer:

The obvious place to start is to ask what he means by 'quite frequent occasions'? In the 68 years since the end of the Second World War there have been only two occasions when a government failed to gain a majority and had to govern as a minority or coalition government: Feb 1974 – a minority government – and 2010 – a coalition. So only once in every 30 to 35 years have governments not gained a majority, which hardly supports the contention that it happens on 'quite frequent occasions'.

Still, perhaps the weight of the argument rests on the equally vague notion of a 'reliable majority', which means we must be clear what he might mean by this. The clearest indication of whether or not a majority is 'reliable' would be if it maintains a government in power, so that it serves out its full term of office.

On these grounds, the only unreliable majority was the majority of 4 won by the Labour government in 1964, which then went back to the electorate in 1966 to gain a 'reliable' majority. In October 1974 the minority government that was elected in February of that year held another general election and gained a majority of 3. However, although small, the government lasted until 1979: its full term. Here, perhaps, the writer wanted to make use of his other caveat, 'for single party governments', because the Labour government had to rely on an agreement, though not a coalition, with the Liberal Party to get its legislation passed.

So, as you can see, this is hardly a persuasive argument. On only two occasions (1974 and 2010) has the electoral system produced minority governments in 18 elections over 65 years. This hardly seems to be 'frequent'. As for unreliable majorities, even including

1974 on the grounds that, although it was a 'single party government', it relied on the support of a third party, it has only produced two of these (1964 and 1974).

Averages

To avoid these imprecise methods of describing evidence, we should, of course, resort to more precise methods. Statistics is one of these, but, as we've seen, there are still problems. So, too, is the use of averages. But this can create almost as much confusion. We have to be clear what we have in mind: mean, median or mode?

In most cases we seem to imply the mean average (usually 'arithmetical mean', not 'simple mean'), calculated by adding up all the figures in a series and then dividing the total by the number of figures. In contrast, the median is the middle number in the series, while the mode is the most common figure among them.

The mean average may be misleading, because it doesn't give us information as to how the results are distributed. If you were talking about the average income of a country, where there was a considerable difference between the poorest and the wealthiest, the mean average is likely to exaggerate the income that most people might be living on. It would be distorted by high incomes of the wealthiest.

So, for this the mode average is more useful. When the range of distribution is considerable it represents the group better, because, as it identifies the item that occurs most frequently, it indicates the largest sub-group in the whole series. For this reason it is often regarded as the 'typical' representative of the series. In our everyday speech the average usually means mode: the thing you are most likely to run into; the 'mode' or

'model person'. It's not affected by being pulled up or down by the extremes on one side or the other like the mean average.

Exercise

You are a teacher and your students have produced the following set of exam results, what is the mean, median and mode averages? And which would be the most useful average for you as a teacher?

92%, 87, 86, 85, 84, 84, 82, 81, 81, 81, 81, 79, 76, 72, 70, 70, 70, 68, 65, 62, 59, 55, 53, 47, 43, 38, 26, 20, 14.

Answer:

Mean: 65.9%

Median: 70%

Mode: 81