### Topic Exploration Pack

# Quantitative data: Using data to support an argument Section 1

# **An Introduction to Analysing Controversial Argument**

Introduction

To be successful a student must know how to analyse controversial argument. Some people enjoy argument, some do not. But controversy is part of our lives, particularly academic life. Here we aim to help you analyse arguments, and to avoid potential pitfalls when constructing your own arguments. We shall consider ten key things to look out for when listening to or reading someone’s argument. It might be that you meet an argument, for example, in the classroom or on TV, on news programmes or in the newspaper. But sometimes you will be putting forward your own case, either when speaking or writing. Look out for these ten things.

1. Ad Hominem

Ad hominem, when translated from the Latin means “against the man” or, to be a little less accurate but more politically correct, “against the person”. When you listen to people arguing a case, perhaps a politician, you often hear them attack a person, rather than an idea. For example, you might hear someone is arguing for a National Health Service free at the point of use and he says: “These right wing politicians don’t care about the NHS, they are rich enough to have private medical care.” Can you see the weakness in the argument? Should there be a free health service paid for out of taxation or should people pay at the point of use, for example a charge to see a GP? This is not an easy issue to decide, but the political view of a person is irrelevant. We have to decide by considering the costs and benefits of providing a state health service. We don’t decide on an issue by criticising the people we don’t like. We have to examine their arguments.

An older teacher tells you that drugs are dangerous, that they can damage your brain and that all drugs should be made illegal. You don’t want to hear this so you reply, “I won’t listen to you. I know that you took drugs yourself when you were younger.” If you are not very brave, you may say something similar to your friends rather than to the teacher directly. Now, there is a legitimate debate to be had about the extent to which different kinds of drugs cause harm, but if you use such a statement as this you have fallen into the ad hominem trap.

You may think that is an easy pitfall to avoid. But is it? You may have heard of the ‘halo effect’. This is where people rate a person’s characteristics and arguments according to how much they like the person on first impression. Isn’t it easier to accept the argument of the teachers you like? We need to listen carefully to the argument, whoever the person is. A person isn’t right because they are nice. Neither are they wrong because they are horrible.

2. Ad Populum

Here is another Latin phrase. It means “to the people”.

Do you remember when your parent or guardian stopped you from doing something and you said “But everyone else is doing it”? That is an example of Ad Populum. It is an appeal that something is right because many others think it is. Think about this statement: “Millions of people smoke and it seems not to damage their health, so the claims made by the anti-smoking lobby cannot be true.” Again this is an appeal that if large numbers of people support a viewpoint, then it must be right. But it isn’t. The extent to which smoking damages health is an important question, but it cannot be decided by adding up the number of people who think it is or isn’t. Not falling for this kind of argument is harder than you might think. Most of us want to be in step with others, at least in the group with which we identify.

Advertisers often claim that everyone is buying their product with the implication that it must therefore be good. Firms won’t spend money making such claims unless the advertising is often successful. People can be fooled by an implied argument that it must be good because many others think it is. Politicians will tell you that they receive huge numbers of letters in support of their views. The number of letters doesn’t make the view correct! Don’t be fooled by advertisers or politicians, or indeed anyone, who uses this kind of appeal in an argument.

Is it another example of the ad populum fallacy when someone argues that a viewpoint has the overwhelming scientific consensus? For example, the great majority of scientists say the world is warming and that some part of the reason for this is human activity. We should recognise that scientific consensus should not claim to be true. Rather, that it is the best understanding of the people who study it. The majority view once was that the earth is flat. The members of the flat earth society are now in a minority! One must also understand that genuine scientific opinion always lays itself open to challenge. Conclusions have been reached on the basis of evidence: it accepts that further evidence may yet show the current consensus to be false.

3. Positive or Normative?

Some statements are normative, others are positive. Normative statements are those requiring a value judgement. A statement using such clauses as, “What ought to be done...”, “What should happen is…” are indicators of a normative statement.

Consider these two statements: “People should be made to wear seatbelts when in a car”; “Firms ought to do more to protect the environment”. They suggest a moral position regarding the issue. No matter what other information is examined, it need not change your view for or against the original assertion. So these are normative statements.

Positive statements are those free of value judgements: “If everyone eats at least five portions of fruit or vegetables each day, people will, on average, live longer”; “If advertising alcohol were to be banned, demand for alcoholic products would fall by ten percent and consequently there would be less pressure on hospitals.”

These are positive statements. They imply and include no moral judgment of good or bad, right or wrong. People can study these issues to discover whether they are true or not.

Now think about this statement: “Exposure to strong sunlight does not increase the risk of a melanoma.” Is this a positive or a normative statement? In fact it is a positive statement. The evidence suggests that it is almost certainly wrong, but it is still a positive statement. It is a claim that can be tested.

We need to distinguish between normative and positive statements. Over time, evidence becomes available to prove or to disprove positive statements. Normative statements cannot be disproved in this way. It is important to be able to distinguish the kind of statement being made when evaluating someone’s argument.

4. Defining Terms

Now we come to a simple but very important point. It is usually vital to define our terms so we are sure what we are agreeing or disagreeing about. Let’s take an example. Is it just for the government to redistribute income and take more in taxes from the rich and give more help to the poor? Some say yes and some say no. This is a normative issue, but one way to help such discussion is to ask what is meant by ‘justice’. To some a just distribution of income is that people receive an income based on needs. Large families, for example, should have more income than single people. To others it is just that people receive an income that reflects what they have

learned. The size of their family is irrelevant. ‘Justice,’ then, is a word that can be used in two different ways.

Being aware of the difference in meaning of the term ‘justice’ will help us in understanding argument. Defining our terms is always helpful, whether we are talking about social justice or any other issue.

5. Ceteris Paribus

This translates from the Latin as “all other things being equal”. Think about this statement: “A car firm raised its prices and a year later found it had sold more cars than ever. It drew the conclusion that people buy more of their cars when their prices go up.”

Why is this almost certainly a false argument? The answer is because during that year people’s incomes rose, interest rates fell and petrol prices fell. These are all factors that encourage people to buy more cars. So people bought more of the company’s cars that year despite the increase in price, not because of it. The argument that the higher price led to the greater volume of cars sold would only be valid if nothing else influencing car sales had changed. If we make the statement that, ceteris paribus, car sales rise when car prices rise, we are just about certain to be wrong.

People often make false arguments because they draw conclusions from evidence but fail to hold other things constant.

6. The Fallacy of Composition

The human body is made up of cells. These are not visible to the naked eye. I am made up of cells. So you can’t see me. This piece of nonsense illustrates the fallacy of composition. This says that we cannot infer that what may be true at an individual level will be necessarily true at the aggregate level. Again, the illustration makes what might seem an obvious point, but again it is easy to be misled.

Let’s take another example. Imagine you are at a football match. You are not very tall and cannot see because of the tall person in front of you. But if you stand up, then you can see. So we draw the conclusion that if everybody stands up, everyone will see the match better. But that’s a fallacy. It’s a fallacy of composition. No one gets to see the match better than if everyone sits down.

Suppose that someone decides not to buy more clothes and shoes. She saves more, keeps her money in the bank and this means that firms can borrow it, use it to invest and so society produces more goods and services. So if we all save more, then society will be much better off. Isn’t that right?

But it may not work like that. What may well be true for an individual may not be true for society as a whole. If we all save more and spend less, total demand in society falls and so firms produce less, laying off workers. Unemployment rises and so society might then be worse off! This is another example of the fallacy of composition. Don’t assume that what’s true for an individual is true in the aggregate. You cannot always make a correct leap to the whole by examining one small part.

7. Cause and Effect

It has been shown that where there are higher ice cream sales in seaside towns there are also higher numbers of accidents by drowning. The conclusion is inescapable: ban ice cream sales and save lives. We instinctively feel that something is wrong with that argument, but what is it? How do we show that such an argument is false?

Because two things occur in sequence, or possibly together, it doesn’t follow that the first causes the second. It isn’t ice cream sales that cause drowning: hot weather causes more people to come to the beach which leads to more drowning accidents and, at the same time, to higher ice cream sales. The error we have just looked at is an example of what is often called the post hoc ergo propter hoc fallacy. (This is Latin for “after this, therefore because of this”). Sometimes we abbreviate it and call it the post hoc fallacy.

If you think this is always an easy mistake to spot you would be wrong: scientific studies are full of such errors. Let’s

consider one:

Did you know that the night air was responsible for malaria? Well no doubt you know that it isn’t, but it was once thought to be so. It was noticed that often those who went out at night suffered from malaria. Therefore, it was concluded, night air causes malaria. It took some time before scientists discovered that this was a classic ‘post hoc’ fallacy. Malaria was caused by mosquito bites and mosquitoes preferred the night. It’s an easy mistake to make.

Do you read your horoscope? Do you think the stars can predict your behaviour? The first serious attempt to test whether they do was a study by a famous psychologist, Professor Hans Eysenck and a well respected astrologer, Jeff Mayo.

Eysenck divided people into groups on the basis of ‘extroversion’ and ‘neuroticism’. Extroverts tend to be happy, optimistic, and have many friends. The second category measures emotional stability. Some are calm, relaxed types who cope well in a crisis, others are much less so.

Astrologists claim that those born under Aries, Aquarius, Gemini, Leo, Libra and Sagittarius tend towards extroversion and those under the other six signs of the Zodiac, Cancer, Capricorn, Pisces, Scorpio, Taurus and Virgo, tend towards introversion. Furthermore, it is claimed that those born under Capricorn, Taurus and Virgo tend to be emotionally stable. Those born under Cancer, Pisces and Scorpio tend towards the ‘neurotic’.

Eysenck and Mayo then teamed up and they got more than 2000 people to fill in a questionnaire. This contained the questions Eysenck used to discover which people fell into which of his groupings. The questionnaire also included the date of birth. Now they were able to see if there was indeed a correlation.

Do you think they found a significant link between star sign and character? The answer is that they did. But Eysenck, possibly like you, had his suspicions about the result. So he followed the experiment with two more, one with children, one with adults. This time he asked the people being surveyed if they had an interest in astrology or not. Those who claimed no great interest in astrology showed no match with their star sign. Those claiming an interest showed a positive correlation! In other words, the star sign has no effect on personality type. But those who follow their stars alter their behaviour and character to conform to what the astrologists tell them.

Again, cause and effect may seem plausible, but we have to be very sure that we are not finding false correlations.

8. The Law of unintended Consequences

When you listen to arguments or make your own there may be policy recommendations of some kind. Often it will take the form of arguing that governments should or should not do a particular thing. Here it is essential to think through all the consequences of any action you may recommend. Sometimes an action can do more harm than good because of the unintended consequences.

Be very careful not to propose a solution to a problem until you have thought through ALL the consequences. Let’s look at an example. It concerns international relationships. The U.S. government has sometimes limited imports of steel, often by taxing imports, in order to protect the American steel industry. Its proponents argue that it protects American jobs, but it has an unintended consequence: steel prices are higher than they would otherwise be. This adds to costs and therefore raises prices in many industries including the car industry. Demand in these industries is reduced......... creating unemployment! On some calculations the imposition of controls on steel imports has sometimes had the unintended consequence of increasing US unemployment!

Here is another claimed illustration of the law. You can think for yourself whether it is a believable example.

If cities make helmets compulsory in bike-hire schemes, then it seems clear that there is a benefit. Those who cycle will have protection in accidents. However, people may simply ride bikes less if they don’t like helmets. And if people don’t ride bikes so much, and take the car instead, then they are less fit and that means that more of them die of heart-attacks. A law attempting to improve people’s health may make it worse!

9. Citing the Evidence

In most cases you will never be convincing unless you know how to use statistics so that you can cite evidence in support of your argument. Don’t be frightened. You don’t need a course in mathematics. But you do need to be able to read tables and graphs to examine evidence and to present data to others in order to demonstrate that you can support your argument convincingly. It will be really helpful for you if you watch my film which gives you many ideas how to do this. You do not need any mathematics or statistics to follow it.

<http://youtu.be/HPBOTHGts6c>

So be ready to support your argument with evidence. It won’t always be easy. Indeed it’s only easy to misuse data. But do try. You will never convince without doing so.

10. You may even be wrong!

Over time, with the advance of scientific knowledge, disagreement turns to agreement on many positive issues even if not on normative ones. And you may find that you are the one who is wrong. No one is infallible. This is well illustrated in an anecdote regarding the famous economist J M Keynes. When being questioned about a particular issue, a comment was made that he had previously said something different about that issue, to which he responded: “When someone persuades me that I am wrong, I change my mind. What do you do?”

So sometimes it is wise to have a little humility. State your case firmly, present your evidence where appropriate but avoid phrases like “Everybody knows” or “Only an idiot could fail to see” and so on. Better to say “There is a clear case for” or “It seems that” or “Given our present state of knowledge we conclude ….”

Conclusion

If you think these ten things through and use them it will really help you to listen to argument. But whatever the risks of falling into these traps yourself, do take part in discussion. The way to learn how to engage in debate is to take part in it. If you are shy, the rewards to overcoming it are tremendous. However, if you talk too much, then you might try to listen more. Listen to see if you can spot where people fall into these logical traps. You might learn something, and when you do speak it will be even more valuable to the listeners.

# Section 2 **Possible Questions for Discussion**

1. Which of the following statements are normative and which positive?
2. Tighter safety laws reduce workplace accidents.
3. Advertising should be stopped to prevent the gullible being exploited by large firms.
4. The rich should be taxed more heavily than the poor.
5. Mathematicians are more boring than sociologists.
6. Students who get into Oxford are brighter than those who do not.
7. A study of students who were members of a gymnasium found that those who ate more tended to be the ones who were thinner. Does this show that eating more is a good way to lose weight? (Hint: Consider the influence of exercise)
8. Keep away from doctors’ surgeries. It has been shown statistically that many people who go there get ill.
9. It was once thought that hormone replacement therapy, HRT, tended to protect women from heart disease. Subsequently it was found that this was untrue. Can you think why the original studies were wrong? (Hint: Women who take HRT tend to be from higher socio-economic groups.)
10. Most voters think the speed limit on motorways should be higher. Does that make it a good idea? If you don’t think it does, do you think democracy is a bad idea?
11. In Finland the fines are determined partly by the income of the person committing the offence. The rich can pay a huge fine for a small violation of the law. Is that just?

# Section 3

# **Checking out the Data**

Data can be presented in many forms: tables, bar charts, graphs and pie charts. In each one it is possible to be misled unless you look at the data carefully. Here are three basic questions to ask of yourself.

1. Does the data directly support an argument?

There is an argument presented and it seems impressive because it gives tables of figures to support it. But wait. Does it do so? Commonly data is given that is on the same sort of topic but doesn’t really support the argument at all. For example, someone is arguing that there is a growing problem with increased tobacco consumption in a particular country. The data is presented showing that over time consumption of cigarettes is indeed increasing there. But wait. What is happening to the country’s population over that period? If it is increasing then it may well be that cigarette consumption per head nay not be rising at all or even falling.

2. Where does the data originate?

Sometimes data is given that seems to support an argument. But what is its source? Many studies are funded by bodies with a particular interest to encourage. This may mean that the data is far from objective. An argument is that a particular product has been proven to help control your weight. The data looks impressive. If you check where the data has come from you may find that the research has been funded by companies that produce the product!

3. Is the form of the data being presented appropriate?

Data can be from an independent source and still be misleading. The form of data presentation can mislead. A good place to illustrate this is

<http://faculty.atu.edu/mfinan/2043/section31.pdf>

It is very simple to follow and requires no great statistical skills.

Understanding the arguments of others and presenting your own arguments involves many different skills. But it is a very valuable skill to be able to understand, and indeed use, statistics to support arguments. To develop this skill does not involve undertaking a course in statistics or mathematics, useful though that is. But it does mean learning how information can be used or misused. Once you have become well versed in this skill, it will be possible to construct arguments yourself which can be supported by the presentation of appropriate data.

There are still other issues concerning the way that data is presented. You can learn about these things by watching a short film that I have made. I hope you find it instructive. It is at:

<http://www.economicsnetwork.ac.uk/statistics/videos/1_interpreting_and_using_data>

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