Qualification Accredited

OCR
Oxford Cambridge and RSA

A LEVEL
Topic Exploration Pack

ENGLISH LANGUAGE

H470
For first teaching in 2015

Quantitative data: Using data to support an argument

Version 2

www.ocr.org.uk/english

Contents

This Topic Exploration Pack should accompany the OCR resource ‘Quantitative data: Using data to support an argument’ learner activities, which you can download from the OCR website.

This activity offers an opportunity for English skills development.

Introduction

This resource deals with the topic of quantitative data, which should form part of candidates' coursework investigations for A level English Language. The intention of this pack is not to offer assessment guidance, but rather to share a series of resource materials which support teachers in delivering a rich and varied curriculum, making cross-curricular links as well as engaging students with real world topics, often beyond the remit of a traditional A level English language curriculum, in order to promote engagement, and transferability of skills. The pack offers a series of resources:

Section 1: An Introduction to Analysing Controversial Argument

This section offers 10 areas for consideration when analysing an argument. This is of use for teachers as a refresher of their own knowledge, including pitfalls students may fall into when using their data to draw conclusions in their coursework investigation, and sections may be useful in framing feedback for those students. Additionally, this section could be given to students for reference when analysing their coursework data, or simply as a rich resource to promote critical thinking skills and cross-curricular connections. This would be suitable as wider reading for those needing stretch and challenge, or those needing support in approaching data critically. The section also includes a link to a video (duration: 19:04 minutes) which looks at the ways descriptive statistics can be misleading. From another point of view, students could also use these areas as a starting point when analysing persuasive or analytical writing, to identify techniques used by writers for impact, without necessarily needing to connect with statistical data.

Section 2: a) Possible Questions for Discussion
b) Possible Questions for Discussion - Suggested Approaches to the Answers

These questions could be used in the classroom – especially if section 1 is set as independent reading, section 2 offers a way for teachers to check the work has been done, to establish how far students have understood the reading, and to clear up any lingering misconceptions. The suggested approaches to the answers provide helpful guidance regarding how the questions connect with section 1. Alternatively, part a) could be given to students along with section 1, for completion as homework, either as preparation for a classroom discussion, or for the student to bring written responses for peer or teacher marking with part b) used as guidance.

Section 3: checking out the data

This section again focusses on the ability of data to mislead, but offers three basic questions for students to ask themselves when reflecting on what they have done with their raw data (or what they might do with it). This is also a useful substitution for section 1, for students who might struggle to engage with the complexities of all 10 areas outlined in that section. The section includes a link to an online pdf which, although evidently not well proof read by its creators, offers pointers on recognising common statistical deception. The images in the resource are particularly useful for highlighting common pitfalls or issues. It is interactive, and offers a Q&A structure to engage students actively with the topics covered. This section also offers an alternative link to the video from section 1, which allows you to view the film via YouTube, or to download a high quality version (719MB).

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 earned. 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.

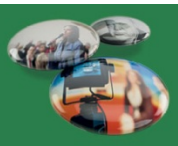
8. The Law of unintended Consequences

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 2a

Possible Questions for Discussion

1. Which of the following statements are normative and which positive?
   a) Tighter safety laws reduce workplace accidents.
   b) Advertising should be stopped to prevent the gullible being exploited by large firms.
   c) The rich should be taxed more heavily than the poor.
   d) Mathematicians are more boring than sociologists.
   e) Students who get into Oxford are brighter than those who do not.

2. 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)

3. Keep away from doctors' surgeries. It has been shown statistically that many people who go there get ill.

4. 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.)

5. 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?

6. 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 2b

Possible Questions for Discussion – Suggested Approaches to the Answers

1. Which of the following statements are normative and which positive?
   a) Tighter safety laws reduce workplace accidents.
   b) Advertising should be stopped to prevent the gullible being exploited by large firms.
   c) The rich should be taxed more heavily than the poor.
   d) Mathematicians are more boring than sociologists.
   e) Students who get into Oxford are brighter than those who do not.

These statements are designed to test understanding of the issue that was raised in item 3: positive or normative?

a) may or may not be true but in principle it can be tested by reference to evidence. So it's a positive (though possibly incorrect) statement.
b) is a statement with which many, probably most, would agree, but it is a normative statement. It can be tested whether advertising is effective, but not whether people are "exploited". It can in fact be argued that advertising informs people who are then free to make their own choices.
c) is generally agreed but "should" is the clue here. It's a normative statement.
d) is the most difficult to categorise. In principle it might be established what constitutes boredom and then that can be used to test the statement but "boring " is probably too subjective a concept to categorise. It isn't open to empirical testing so normative.
e) is positive. In principle one can use measures of intelligence and randomly sample Oxford and non-Oxford students and ask them to sit an IQ test. It may be that were this to be done the statement might prove to be false, but because it's testable, the statement is positive.

2. 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)

This is another example of the issue raised in item 7: cause and effect. Correlation doesn't imply causation. People who go to the gym burn more calories and need to eat more to retain a given body weight.

Thus eating by such students doesn't lead to their being overweight. In other words one can only conclude that eating causes weight loss if one holds everything else constant (see item 5). Alas the evidence is that, ceteris paribus, eating more increases body weight.

3. Keep away from doctors' surgeries. It has been shown statistically that many people who go there get ill.

This is an illustration of the issue raised in item seven. It's easy to see that the idea is nonsense. But it needs careful thought to see why. It's an example of the cause and effect idea. It is not that doctors make people ill. Rather that sick people go to a doctor.

4. 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.)

The original studies failed to control for social class. It was later thought that HRT tended to be used by middle and upper income groups. These women tend, on average, to eat in a healthy way and take more exercise. When studies were done to control for this, it was found that HRT slightly increases the risk of heart problems. The statement "HRT, tends to protect women from heart disease." is a positive statement. When properly tested it was shown to be a false positive statement.

5. 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?

There are no 'right' answers here but it's an issue that can be fun to debate. Most people would feel that if over 50 percent think it's a good idea, it doesn't mean that increasing the speed limit on motorways would necessarily be a good change. But then this raises an issue for a democratic system. Suppose 51 percent of people decide that stealing from others is acceptable. Most would say that this doesn't make stealing right. But a democratic system is based on the principle that the majority should decide. We may feel that there are things the majority should not decide and that all should operate under the rule of law. But then if so, who should decide what that law should be?

5. In Finland the fines are determined partly by the income of the person convicting the offence. The rich can pay a huge fine for a small violation of the law. Is that just?

This is an issue that was raised in item 4: defining terms. There is a strong case for saying that fines should be relative to income in the same way that income tax is (at least to some extent).One example of this is that of Anssi Vanjoki, a director of Nokia . He was once ordered to pay a fine of 116,000 Euros (around £100,000) when he was caught breaking the speed limit on his motorbike in Helsinki. He was driving at 75 km/h (47 mph) in a 50km/h (31 mph) zone. The huge fine was, of course, because of his very high income. Whether that is fair or not is dependent on one's view of justice as we showed in section four in relation to income taxes.

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

Ken Heather, University of Portsmouth, 2014

The small print

We'd like to know your view on the resources we produce. By clicking on the 'Like' or 'Dislike' button you can help us to ensure that our resources work for you. When the email template pops up please add additional comments if you wish and then just click 'Send'. Thank you.

If you do not currently offer this OCR qualification but would like to do so, please complete the Expression of Interest Form which can be found here: www.ocr.org.uk/expression-of-interest

OCR Resources: *the small print*
OCR's resources are provided to support the teaching of OCR specifications, but in no way constitute an endorsed teaching method that is required by the Board and the decision to use them lies with the individual teacher. Whilst every effort is made to ensure the accuracy of the content, OCR cannot be held responsible for any errors or omissions within these resources. We update our resources on a regular basis, so please check the OCR website to ensure you have the most up to date version.

OCR acknowledges the use of the following content:
Square down and Square up: alexwhite/Shutterstock.com, English icon: Air0ne/Shutterstock.com

Please get in touch if you want to discuss the accessibility of resources we offer to support delivery of our qualifications: resources.feedback@ocr.org.uk

We will inform centres about any changes to the specification. We will also publish changes on our website. The latest version of our specification will always be the one on our website (www.ocr.org.uk) and this may differ from printed versions.

ocr.org.uk/alevelreform
OCR customer contact centre

General qualifications
Telephone 01223 553998
Facsimile 01223 552627
Email general.qualifications@ocr.org.uk