'This is what my constituents tell me' is one of the rhetorical boltholes MP's rush for when their assertions are called into question- arguing, in effect, that 'It's the people I represent who are saying this so I don't need to provide any evidence to back it up '.

There was a good example of this on BBC1's *Sunday Politics* last weekend, when the Conservative MP for Shipley Philip Davies and Kate Bell from the Child Poverty Action Group discussed the latest proposals to cut child benefit for out-of-work families with more than two children. Kate stated that there was no evidence that people on benefits were choosing to have more children, and the presenter challenged Mr Davies to provide the evidence. First the MP appealed to the popular press, which even its greatest fans would hesitate to describe as an authoritative source on these matters, then he played his 'get-out-of-jail –free card':

Andrew Neil: '*Where's the evidence*?' Phil Davies '*We do see this happening, I mean we read reports in the papers of families with eight, nine ten kids who are all on benefits expecting to be housed in bigger and bigger houses. My constituents come to me in my surgery and talk about these people living next door to them, living down the same street as them that they object to, and it's building up huge resentments among many working class voters who actually are going out, doing the right thing making sensible responsible decisions and yet they see other people living down the same street who don't seem to have to make any of these tough decisions, any of the same decisions...*'

Now it's pretty clear that somebody has got it wrong here: whether it is Mr Davies' constituents or Mr Davies himself, it's impossible to say. There is no reason to doubt that some of Mr Davies's constituents complain about families with 'eight, nine or ten kids' living on benefits. But he says that these constituents are complaining about families of this size *living on the same street as them,* and that's a different matter, because there is no reason to believe that there is any significant number of such families in his constituency.

This is because there are very few families on benefits with eight or more children- about 1,600 in all of Great Britain - and there are no obvious grounds for expecting there to be a high concentration of these statistically rare families in Shipley.

There are only 90 benefit families with four or more children in Shipley[1]: obviously the number with eight or more is going to be a lot lower than that. Based on the number of families with children claiming benefits in Shipley and the national frequency of families of this size among claimant households with children[2], and assuming that Shipley does not depart greatly from the national average, the expected number of claimant families with eight children in Shipley is one, and the expected number of claimant families with more than eight children is zero. (To be spuriously

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[1] Data for May 2011 (for consistency with DWP data on frequencies used below) downloaded from Nomis. Data for working age client group in receipt of out-of-work benefits.
[2] Data from DWP response to Freedom of Information request 2012- 3222 available at http://statistics.dwp.gov.uk/asd/PQ_FOI/foi/2012/foi_3222_2012.pdf The frequency data is at household level while the benefits data from Nomis is at benefit unit level. There is no reason to expect this to make a major difference to the results.

precise, it is 0.46, but as a number less than one doesn't make sense in this context, I'm calling it zero.)[3]

Of course these are simply expectations based on limited data, and random variation alone could well lead to the number of large families on benefits being substantially higher (or lower) than expected in Mr Davies's constituency. That might explain the anomaly in a single case. But Mr Davies does not seem to saying that he has an unusual cluster of these families (or unusually ill-informed constituents) : he clearly believes that this is a general pattern, and he is far from being the only MP to appeal to constituents' concerns in this area. The Prime Minister himself has asked 'Are constituents working hard to give benefits so people can live in homes that they can only dream of?' http://www.guardian.co.uk/politics/2010/oct/27/government-committed-to-housing-benefit-cap Indeed one of the main arguments offered for policies such as the benefit cap has been that they address concerns spontaneously raised with MP's by constituents on the basis of their own personal experience.

What is the likelihood that large numbers of constituents have well-founded concerns about large families on benefits in their area? Put another way, the average adult population for a UK parliamentary constituency is about 80,000: how does this compare to the likely number of large families on benefits in each constituency? Using the same data as above we can calculate a prior probability as to whether the number of benefit families with a given number of children in a constituency exceeds a certain level- more than one, more than 100 and so on.[4] Think of this as an aid to judging, in the event that a constituent raises this as an issue, how likely it is that their complaint has a basis in fact rather than hearsay; or if an MP offers constituents' complaints as evidence of how serious the problem is, how much credence should be placed in that evidence.

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[3] Even if we make allowance for possible faulty counting of children by Mr Davies' constituents, things are not much better: on the basis of the same data, we would expect three families with seven children and eight with six children. So we should expect a total of something like fifteen families on benefits with more than five children in Shipley. This would suggest, given what Mr Davies says, that these families are extremely unfortunate in their neighbours. There are over 80,000 adults in Shipley, and these fifteen families have wound up living on the same street as people willing to take the unusual step of complaining about their existence to the local MP.

[4] We simply apply the national data on the frequency of families of a given size to the total number of families with children on benefits in the constituency. Then we group the resulting estimates in numerical ranges, and divide these groups by the total number of constituencies.

Probability that number of benefit families is greater than a given number, by number of children								
	Number of families							
Number of children	1 or more	>5	>10	>20	>40	>80	>100	
5	1.00	1.00	0.98	0.77	0.33	0.03	0.01	
6	1.00	0.88	0.53	0.13	0.00	0.00	0.00	
7	1.00	0.26	0.02	0.00	0.00	0.00	0.00	
8	0.67	0.00	0.00	0.00	0.00	0.00	0.00	
9	0.04	0.00	0.00	0.00	0.00	0.00	0.00	
10	0.01	0.00	0.00	0.00	0.00	0.00	0.00	
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Based on these calculations, there is a very high probability that any constituency has more than ten families on benefits with five children (reading along the top row) but there is a very low probability that it contains more than 80 (0.03, or a 97% chance against). Reading along the second row, there is about an even chance a constituency will have more than ten families on benefits with six children, but a low chance it will have more than 20 (0.13, or a 67% chance against). For families with seven children, there is a 74% chance against there being more than *five* in the constituency. For larger families again, the probability of more than five is vanishingly small: this is because once we reach eight children there simply aren't enough such families to allow more than one in most constituencies, while once we reach nine children there are far fewer families than constituencies, so any constituency is more likely to have no such families than to have even one. [5]

David Hume gave a rule for how we should judge the credibility of an assertion which on the face of it has a low probability of being true: we should believe it only if we believe the probability that the person making the assertion might be incorrect is even lower than the probability of the statement. I don't think the claim that Mr Davies' constituents are worked up about claimant families with 'eight, nine, ten kids' living on their street comes anywhere near passing Hume's test.

It's not unlikely that some constituents have raised complaints about large families on benefits with Mr Davies and with many other MPs. What I don't believe is that MPs are hearing large numbers of complaints grounded in personal experience, as they like to claim. Rather, constituents are

[5] It might seem that given that there are *some* families with more than ten children on benefits (about 60 according to DWP) the probability of at least one family this size in a constituency should always be positive: however once we spread this number across all constituencies we wind up not with a number of constituencies which are expected to have one such family, but with a lot of constituencies expected to have a fraction of such a family, which really doesn't make sense, as pointed out above. The interpretation is this: in the event that someone in a constituency complains about a family with ten or more children on benefits, you have no reason (given the prior probability) to give any *more* credence to their assertion than your own estimate of the likelihood that they may be mistaken would suggest- there is zero additional evidence to support their complaint. (Alternatively, in more frequentist terms, the probability is just too small and the confidence interval too wide to provide any serious support.)

expressing grievances based on what they read in the popular press and what they hear from politicians like Mr Davies. When an MP claims to be just repeating what his constituents are saying, a version of Hume's test should be brought to bear: which is more improbable- that the MP has some solid evidence to support his or her assertions which for some reason he or she has decided not to present, or that there is in fact no such evidence and the MP is just trying to play the 'get-out-of-jail free' card?