

It is necessarily so

Does a graph show toleration rising, or levelling off? **Danny Dorling** read the *New York Times* and finds it all depends how you look at it.

I saw a graph in January and it made me think about how quickly views are changing. The graph was published in the *New York Times* in Paul Krugman's column¹. It showed what appeared to be the slow and steady rise in acceptance of mixed race marriages in the United States of America. The data was credited to Gallup (see <http://www.gallup.com/poll/149390/record-high-approve-black-white-marriages.aspx> for methodology and data) and the graph is shown in Figure 1. Krugman used it to illustrate how much the country has changed – and how recent those changes have been. "The big changes on the racial front are ... more recent than widely imagined," he writes. "Republicans pine for the glory days of Ronald Reagan – but that was a different country, a county with a lot more raw racism, a country in which only a minority of Americans found interracial marriage acceptable." The "glory days of Ronald Reagan" were from 1981 to 1989 – the centre, almost flat-looking part of the graph. And yes, that was just 25 years ago.

I am old enough to remember a time when the UK import of the American TV series *Different Strokes* was a big issue. It was possibly the first programme on British TV to show a mixed race couple and their children. Recent press coverage of some of the 2011 Census results in the UK showed that you only have to scratch the surface ever so gently and much of the vile racism of the 1970s still remains, especially among older journalists. But there are also good signs to see too.

When various British newspapers reported which language was the second most often spoken in Britain after English, it did not take long for many commentators to point out that, of course, it could not be English so any expression of outrage that a second language was spoken was a sign of stupidity. Few pointed out that English was also originally a language of immigrants. There was a time once when it was the second most commonly spoken across (what are now) the British Isles. (It displaced Celtic languages in the centuries after AD 500.)

As we become cleverer we become more tolerant. There is evidence that both racism and

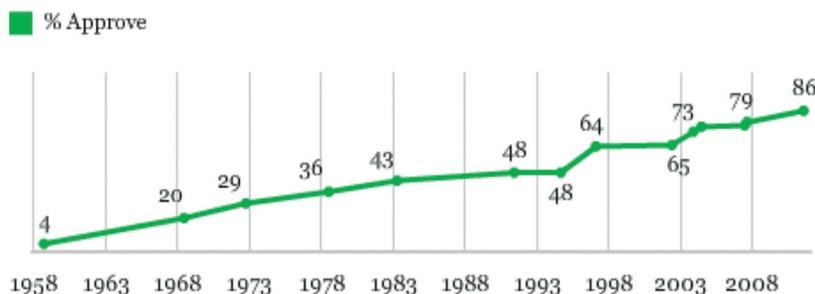
homophobia reduce as people become better educated. It could be claimed that if they did not then whatever they were receiving would be unlikely to be a better education. But how good are we at knowing what is really going on? There is something odd about the graph in Figure 1. It looks as if progress has slowed in recent years, compared to two quick hikes in earlier decades, but is that really so? And if it is, why should that be? Surely with the

Tolerance is rising – but it cannot get much higher than 100 %

election of the first president from a mixed race marriage, you would expect a greater boost in approval than a simple continuation of the trend after 2008.

And does the graph in Figure 1 really show what is happening? Of course the same graph can be made to look much more impressive in a very simple way: just by not crushing the vertical axis. Figure 2 shows the same graph with the vertical axis not compressed so much. Before, the last segment, after 2008, looked fairly flat. Now it takes on the appearance of an impressive increase – far steeper than the 1998–2003 section, which before it rather resembled; but the data of course is the same. The stretched (or uncompressed – is a glass half full or half empty?) graph also allows all the figures on it to be placed above the line. Some would say that putting the "48" and the "65" below the line in Figure 1 distorts perception, and makes us "see" the dips at those points as deeper than they really are. That is arguable; but what is certainly

Do you approve or disapprove of marriage between blacks and whites?



1958 wording: "...marriages between white and colored people."
1968-1978 wording: "...marriages between whites and non-whites."

GALLUP

Figure 1. The graph as it appeared in Paul Krugman's column, courtesy of the *New York Times*



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true is that clearly, if we want to understand what is really going on, just stretching the vertical axis is not the answer. There is another way

The same data can be graphed in different ways. Looking at data the wrong way can suggest wrong inferences

of looking at the data in the graph and that is to compare the ratios of the proportion who approve of mixed race marriage at each point in time. The reason for doing this is that any graph that shows a percentage approval rate has to taper off as that rate approaches 100%, which means that later gains automatically look less impressive.

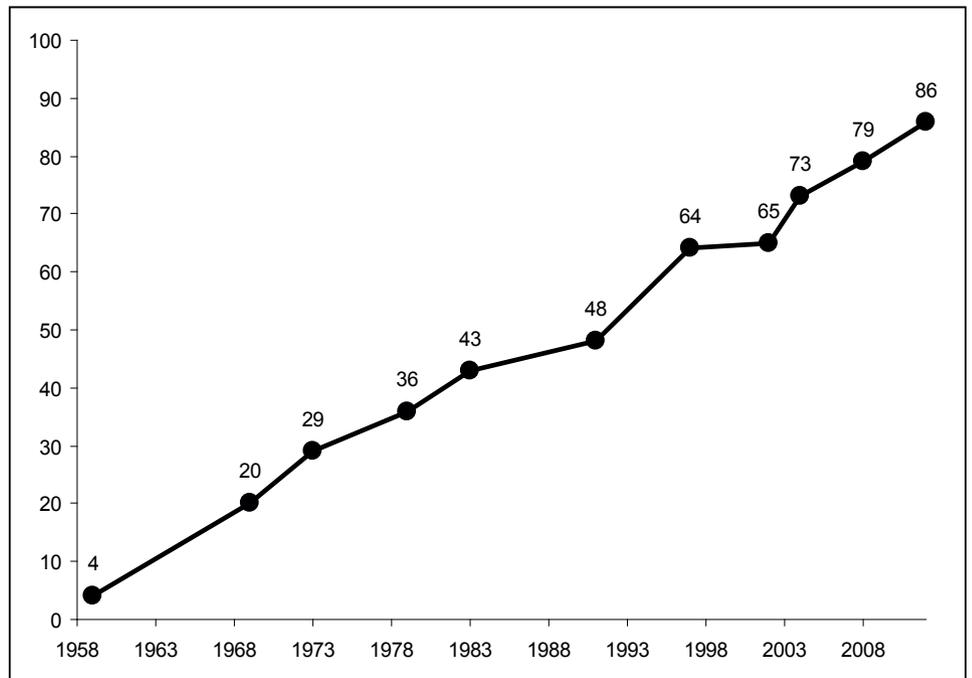


Figure 2. The same graph, with the y-axis stretched – or not compressed

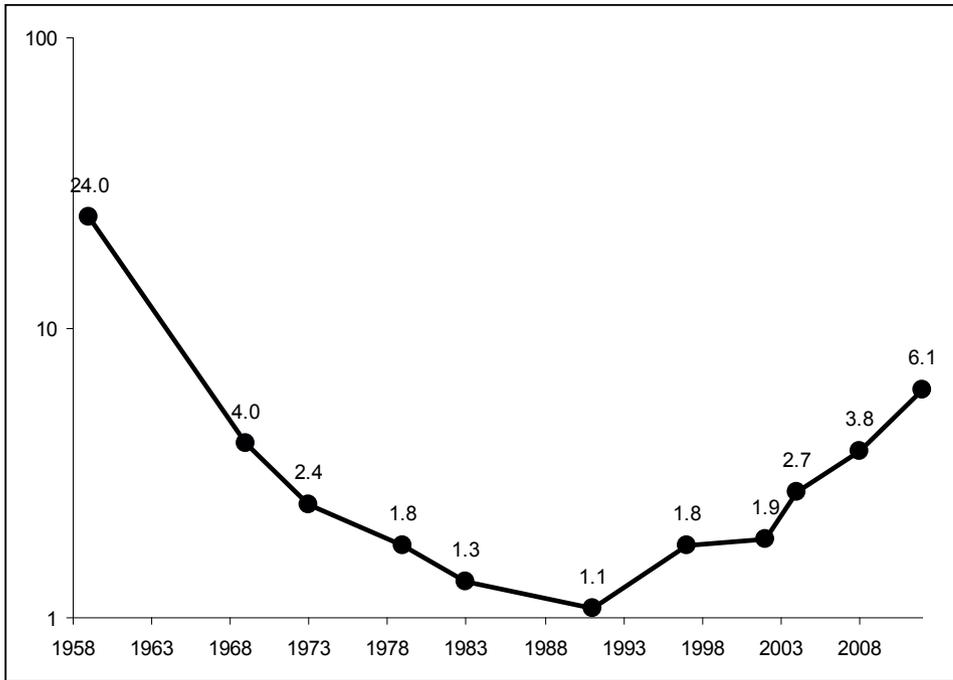


Figure 3. Ratio of proportion disapproving/approving (1958–1992) and approving/disapproving (after 1992–2012)

A different way to look at the same 11 numbers is to take each and calculate a ratio from it, either of disapproval, when that is in the

majority view, or of approval, when that is most popular. Thus in the late 1950s, 24 people disapproved of mixed race marriage for every person

Krugman’s graph plots proportion against time, and the fact that the proportion can’t go over 100% is relevant. There is no sign in his graph that the line which has already reached 86% is already almost as high as it can go.

Ratios suggest logs. A natural way to look at changes in proportions is odds ratios since it seems logical that the rate of change depends on (a) how much has been achieved and (b) how much remains to be done. Both of these are automatically incorporated in an odds ratio. The log odds are plotted in the graph below (Figure 4). It resembles Figure 3, but it does not have the positive–negative change of sign around 1990. Now the overall trend looks pretty straight, with obvious levelling-off around the year 2000 and steep acceleration in toleration immediately after that. Remember of course that there are sampling errors in these data.

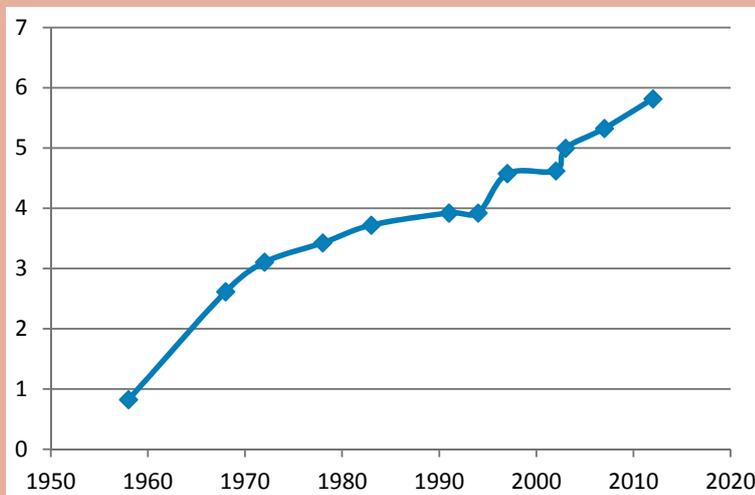


Figure 4. The data expressed as a log-odds graph

who approved: 24 is 96 (i.e. 100 – 4) divided by 4. By the late 1960s that ratio had plummeted to 4 : 1, calculated as 80 divided by 20. Today the approval ratio is 6 : 1. That is, some 86% of people approve of mixed marriages and 14% do not (6 : 1 = 86/14). The redrawn graph on the left shows all the ratios, and is drawn using a log scale to ensure we take all the chances as seriously as I think we should.

There are dozens of ways of looking at data, and looking at the data the wrong way is always likely to suggest wrong inferences. Look at the graph in Figure 3 and compare it to Krugman’s original. Figure 3 shows how disapproval plummeted from the late 1950s through to the late 1980s. The greatest gains were made in the 1960s era of civil rights. The tide was slow to turn in the 1990s, faltering as George W. Bush came to power in 2000, before beginning to rise rapidly during his second term of office as the conservative thinking associated with his era became less palatable to a wide public. The most recent rise, the rise from 3.8 people approving of mixed race marriage for every one who did not, to 6.1 approving for every one who did not, has been almost the fastest recorded rise, when measured and shown in this way. America is changing.

When President Obama called it a “privilege” to swear in his second term of office using Martin Luther King’s bible it was not as much a privilege as he may have believed². Tolerance is now rising in the USA almost as fast as intolerance was falling when King was shot in April 1968. The tide has fully turned, and there is now no good reason to assume that the next increase in tolerance that Gallup records in the future in the USA will not be even greater again. No reason other than the old one of what always happens when good people do not do enough.

I think it might sometimes help to see what happens when good people have done enough, and then to see just how much more there is still to be done.

References

1. Krugman, P. (2013) Seneca, Selma, and Stonewall. *New York Times*, January 22nd. <http://krugman.blogs.nytimes.com/2013/01/22/seneca-salem-and-stonewall/>
2. Lavender, P. (2013) Obama Inauguration Bible: President, John Roberts Inscribe Travelling King Family Bible. *Huffington Post*, January 21st. http://www.huffingtonpost.com/2013/01/21/obama-inauguration-bible_n_2523130.html

Danny Dorling’s latest book is *The 32 Stops* (http://dannydorling.org/books/centralline/Further_Resources.html)