

## CORRESPONDENCE

## IQ jump or trend?

SIR — Lynn<sup>1</sup> reported evidence of significantly higher IQ in Japan than in the United States. However, his assertion that Japanese IQ shows a "rising trend" which has resulted in a "growing disparity" is not entirely supported by his data. Statistically, a better fit is obtained by assuming that a discrete jump in IQ has occurred among Japanese born after 1945.

In his analysis, Lynn used the product moment correlation coefficient to test for trend. This implicitly supposes a linear trend. The least-squares estimate of the trend line is shown in Fig. 1 (dashed line). In fact, Lynn was prepared to discount the 1910 data point as showing the greatest discrepancy and being possibly subject to error. The trend line without the 1910 result is shown as a dotted line. Neither of these lines seems very satisfactory. In the first place, the fitted IQ for 1910 is unreasonably low, being either 98.6 or 94.7 depending upon which line is used. Second, the deviations of the data points around the lines do not show the random pattern which a genuine trend should imply. In

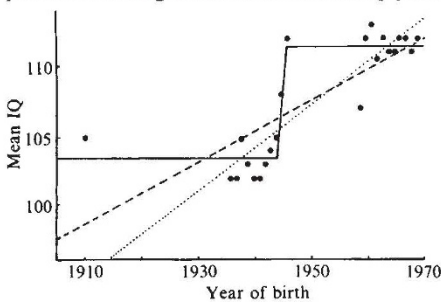


Fig. 1 Mean IQ and year of birth for 23 Japanese cohorts (data from ref. 1). The dashed line is the least-squares regression line fitted to all data points; the dotted line is the least-squares regression line fitted excluding the point for 1910. The unbroken line represents a "jump" model in which IQ is constant prior to and following 1945, but increases by a discrete step during 1945.

particular, for the 1959–69 data (mainly from a single study; see ref. 1), even though the 1959 point is low, there is little sign of a trend. If the trend was as steep as the lines suggest, it should be apparent even over a ten-year time span.

One alternative is that, instead of rising steadily, IQ has risen in a discrete jump around 1945, a time of considerable change in Japan. When the data from all cohorts are considered, the jump model (see Fig. 1) explains 89 per cent of the total variance in IQ while the linear trend accounts only for 61 per cent. If the exclusion of one outlier is permitted (jump model: 1959; trend model: 1910) these figures rise to 95 and 78 per cent, respectively. Thus, the data are much better described by a jump than by a linear trend.

Factors capable of producing a jump in the IQ results may be quite different from those which might cause a trend. In seeking reasons for the apparent rise in Japanese IQ, it may therefore be a mistake to direct too much attention to the latter.

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## . . . as I was saying

SIR — On 6 July 1882, I sent you a letter about "The solar commercial cycle" and I promised further elucidation about the "difficulties and objections" to my theory<sup>1</sup>. My hope was to answer my detractors who made my theory "the subject of inconsiderate ridicule"<sup>2</sup>. I was prevented from doing so by the events of 13 August 1882. On that day, intending to join my family bathing at Galley Hill beach in Sussex, I chose to descend the right side of the cliff instead of the customary left side. In the cold water I suffered a stroke and my family being on the other side of the cliff were unable to come to my aid; thus I drowned.

One hundred years have passed and all attempts to prove my correlations wrong have failed. The last three to attempt it were obliged to acknowledge that my theory should be considered as a serious hypothesis<sup>3–5</sup>. After more decades of silence, a few months ago two econometricians tried their new tools and also failed. They reported whimsically: "We conclude that economic activity has an important influence on the Sun. Thus Jevons . . . was right but for the wrong reason"<sup>6</sup>.

As the acknowledged father of econometrics<sup>7</sup>, let me clarify the result of their test. The seemingly absurd conclusion is due to the autoregressive mechanism of the econometric model. The sunspot influence enters through the disturbance function. The model acts as a spectral filter on the now strong frequency existing in the disturbance (the sunspot cycle). But, as it is an asymmetric filter, it produces a shift in the phase of the predominant frequency, so that the output phase reading shows up *ahead* of the input reading.

I also heard lately that the American SMM (Solar Maximum Mission) satellite, kept aloft for the whole year 1980, has proved through accurate instruments that the solar "constant" varies<sup>8</sup>. This is very exciting to me since it confirms the hunch I had in 1878 when I suggested, in your journal, that "solar observatories should be established" high in the mountains to ask the Sun himself "whether he varies or not"<sup>9</sup>.

For one hundred years orthodox science has been insisting that the radiation of the Sun was a "constant". Now all must agree with my 1878 hunch: it is a variable and there are significant changes from day to day, week to week, month to month . . . A spectral analysis made of the SMM satellite data suggests periodicities<sup>10</sup>, and after a few more years of data, it should be possible to unravel them for forecasting purposes.

The opposition to the factual basis of my theory will crumble some day. Stubborn anomalies cannot be kept in the scientific closet forever, for sooner or later they will out.

Concerning the linking mechanism of my theory, I have very little to add. Linking solar radiation to crop yields was the obvious first choice, but I was never satisfied with it because it did not fit the data well. I have explained how, out of sheer desperation, I thought of the psychological link: "I went so far as to form the rather fanciful hypothesis that the commercial world might be a body so mentally constituted, as Mr John Mills must hold, as to be capable of vibrating in a period

of ten years. . ."<sup>11</sup>.

I mentioned this idea in all my articles in the form of an inverted rhetorical question. After so much ridicule I had to be careful. My fellow scientists had barely accepted the Darwinian theory that they had vestigial parts of lower animals in their anatomy, but my fellow economists would never accept the idea that "*Homo oeconomicus*" might not have a perfectly rational psychology and is therefore somehow at the mercy of cosmic waves.

At the end of one of my articles in your esteemed journal, I forecast that the solar constant measurement was so crucial to business that, in the future, it would be "the most important news" in the daily paper<sup>12</sup>. Living in the Victorian era, I could only insinuate my real thoughts. It is obvious that I was not referring to the effect of these daily fluctuations on crop yields but in a direct action on the solar waves on the psychological "constant" of the population. But now, after the exciting discoveries of the SMM satellite, anybody, by reading my work carefully, can get the full extent of my intuition.

A time will come when the economists will achieve the forecasting ability of the meteorologists and the vulgar will refer to us respectfully as the practitioners of the "dismal" science, the science of calculating "*dies mali*" to advise the politician and businessman properly, not so much what to do but *when* to do it.

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## Weapons treaties

SIR — Alastair Hay (*Nature* 8 July, p.205) confuses the international treaties on chemical and biological weapons.

The 1925 Geneva Protocol outlaws the use of both chemical and biological weapons (in practice, first use, because the major parties reserved the right to use them if attacked by them).

The 1972 Biological Weapons Convention — result of a British initiative taken in 1968 — bans the development, production and stockpiling of bacteriological and toxin weapons. The Committee on Disarmament is now discussing the elements of a similar convention banning chemical weapons, in which the UK delegation has made a major contribution with a draft treaty and a working paper on verification.

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