

THE H.G. WELLS QUOTE ON STATISTICS:
A QUESTION OF ACCURACY

BY JAMES W. TANKARD, JR.,
THE UNIVERSITY OF TEXAS AT AUSTIN,
AUSTIN, TX 78712

SUMMARIES

A widely disseminated quotation by H.G. Wells on the importance of statistics is shown to have been misrepresented.

Es wird gezeigt, dass ein oft wiederholtes Zitat von H.G. Wells über die Bedeutung der Statistik falsch gegeben ist.

Una muy conocida frase de H.G. Wells sobre lo importancia estadísticas ha sido mal interpretada.

One of the most frequently cited quotations championing statistics is a remark usually attributed to H.G. Wells. The quotation appears in various forms by various authors, and in fact is not even always attributed to Wells. It now appears that the quotation was taken out of context, and later generously paraphrased, and that there is considerable doubt that Wells ever gave much attention to statistics, much less an enthusiastic endorsement.

The earliest occurrence of the quotation in writings about statistics is as an epigraph at the beginning of Helen M. Walker's *Studies in the History of Statistical Method*, where it appears in this form:

"The time may not be very remote when it will be understood that for complete initiation as an efficient citizen of one of the new great complex world wide states that are now developing, it is as necessary to be able to compute, to think in averages and maxima and minima, as it is now to be able to read and to write."

H.G. Wells, *Mankind in the Making*
[Walker 1929, v]

A book chapter on the history of statistics that appeared in 1940 concluded with the following paraphrase of the Wells quotation, but this time without even giving credit to Wells:

The time is perhaps at hand when it will be recognized that for intelligent living in modern society it is as necessary to be able to think in averages, percentages, and deviations as it is to be able to read and write.

[Lundberg 1940, 140]

Still a different version of the quotation was used in the presidential address to the American Statistical Association in 1950. Samuel S. Wilks, addressing the 110th annual meeting on December 28, 1950 in Chicago, said the following:

Perhaps H.G. Wells was right when he said "Statistical thinking will one day be as necessary for efficient citizenship as the ability to read and write."

[Wilks 1951, 5]

Walker used the quotation again in 1951 when she made it the basis for a plea for statistical as well as verbal literacy [1951, 7].

Essentially the same version used by Wilks also appeared in 1952 in a statistics textbook by Simpson and Kafka [1952, 3] and as the epigraph of an article on statistics in *Scientific American* by Warren Weaver [1952, 60]. Simpson and Kafka attributed it to Wells and gave Wilks' speech as the source. Weaver attributed it to Wells but gave no source. He later said (personal communication, November 19, 1977) that he could not recall the source. It seems likely that it was the Wilks speech, since it appeared the year before and contained exactly the same wording.

An examination of *Mankind in the Making* reveals what Wells actually wrote. The quotation comes from a paragraph dealing with the importance of teaching mathematics, not statistics. The quotation that Walker presented in 1929 is part of a long sentence that reads in its entirety:

The great body of physical science, a great deal of the essential fact of financial science, and endless social and political problems are only accessible and only thinkable to those who have had a sound training in mathematical analysis, and the time may not be very remote when it will be understood that for complete initiation as an efficient citizen of one of the new great complex world-wide States that are now developing, it is as necessary to be able to compute,

to think in averages and maxima and minima, as it is now to be able to read and write.

[Wells 1911, 204]

It might be argued that statistics and mathematics were closely related in Wells' mind, and that when he wrote this passage he was to some extent thinking of procedures we would now regard as statistics. That is conjecture, however. Earlier sections of the paragraph deal with arithmetic and geometry, and its literal topic is mathematics. It doesn't contain the word "statistics," even though the term was clearly in use at the time of Wells' writing [Yule 1905].

Further evidence of Wells' lack of attention to statistics comes from biographies of the man by Vallentin [1950], Brome [1951], and Dickson [1969], none of which mentions statistics in its index. Dickson indicated recently (personal communication, December 5, 1977) that he could not recall another place in Wells' writings where he dealt specifically with statistics. Dickson pointed out, however, that Wells wrote more than 100 books, as well as a great deal of journalism, and that there could be some reference to statistics in this vast material.

H.G. Wells foresaw the power of science to revolutionize war, the coming emergence of the middle class, and the need for a World State. He was a prophet on many matters, but it now appears the future role of statistics was not one of them.

REFERENCES

- Brome, Vincent 1951 *H.G. Wells: A Biography* London (Longmans, Green)
- Dickson, Lovat 1969 *H.G. Wells: His Turbulent Life and Times* New York (Atheneum)
- Lundberg, George A 1940 *Statistics in modern social thought Contemporary Social Theory* 110-140 ed. H E Barnes et al. New York (Appleton-Century)
- Simpson, George & Kafka, Fritz 1952 *Basic Statistics: A Text-book with Special Reference to Economics and Business* New York (W W Norton)
- Vallentin, Antonina 1950 *H.G. Wells: Prophet of Our Day* New York (John Day)
- Walker, Helen M 1929 *Studies in the History of Statistical Method, with Special Reference to Certain Educational Problems* Baltimore (Williams & Wilkins)
- 1951 *Statistical literacy in the social sciences Amer. Statistician* 5:1, 6-12
- Weaver, Warren 1952 *Statistics Sci. Amer.* 186:1, 60-63
- Wells, H G 1911 *Mankind in the Making*, 5th ed. London (Chapman and Hall) [originally published in 1903]

- Wilks, S S 1951 Undergraduate statistical education *Amer. Statist. Assoc.* 46, 1-18
- Yule, G Udny 1905 The introduction of the words "statistics," "statistical" into the English language *Roy. Statist. Soc.* 68, 391-396

precision and accuracy can be synonymous in colloquial use, they are deliberately contrasted in the context of the scientific method. The field of statistics, where the interpretation of measurements plays a central role, prefers to use the terms bias and variability instead of accuracy and precision: bias is the amount of inaccuracy and variability is the amount of imprecision. A measurement system can be accurate but not precise, precise but not accurate, neither, or both. Accuracy is also used as a statistical measure of how well a binary classification test correctly identifies or excludes a condition. For some reason, when I get the history (the parameter returned from `model.fit`), the validation accuracy is higher than the training accuracy, which is really odd, but if I check the score when I evaluate the model, I get a higher training accuracy than test accuracy. This happens every time, no matter the parameters of the model. Also, if I use a custom callback and access the parameters 'acc' and 'val_acc', I find the same problem (the numbers are the same as the ones returned in the history). Please help me! What am I doing wrong? Why is the validation accuracy higher th