The Original Sources of Some Common Quotations

Notes de la SCHPM Septembre 2022 (tome 54, no. 4)

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I have always been interested in quotations, but it was not until the start of my academic career that I began to think about their sources. In particular, I noticed that works intended for a general audience tended to offer quotations without providing any information on the source of the quotation; or, if a source was provided, it was often a recently published secondary source that gave no real information on the true origin.

In my youth, tracking down original sources would have been much more challenging. But thanks to books and journals available through my campus library or through interlibrary loan, academic databases such as JSTOR, and the many digital archives freely available to the public today, even someone like myself at a small college in a rural area can locate and examine a wide range of important historical materials. In 2006, I began writing a column for the CSHPM *Bulletin*, our society's biannual newsletter, called "Quotations in Context," which presents information on original sources of selected quotations. Writing the column has been a very educational experience for me, and I have been surprised by the variety of outcomes of my investigations. In some cases, so-called quotations have turned out to be—at best—paraphrased material, in which the rewording sometimes provides a meaning very different from that intended by the original author. The tendency to rely on secondary sources has meant that a misattribution of a quotation in a single source will often continue to spread throughout other publications. Even when quotations are accurately stated and attributed, looking at the original context of a statement can provide interesting and insightful information. Not every investigation has been a success, and I have certainly found myself, either from limited knowledge of the relevant language or from lack of resources, unable to complete my search for an original source; nonetheless, I still very much enjoy doing the research and plan to continue these explorations well into the future.

This column will briefly examine three related quotations, tracing each back as far as possible in history. While the sources of these quotations are certainly well known to modern scholars, and descriptions of the sources can be found in recent academic publications aimed at specialized audiences, popular resources on the internet or in print intended for students, teachers, or a more general audience almost always fail to identify their origins (and, as noted below, frequently misidentify one of the authors).

"God ever geometrizes"

One of the works of the Greek historian Plutarch (ca 46–ca 119) was *Table Talk* (*Quaestiones Convivales*), which appears in the collection *Moralia* of his miscellaneous works. *Table Talk* contains a sequence of conversations, each focused on an organizing question or topic. One such conversation begins with the Greek grammarian Diogenianus:

> Silence following this discourse, Diogenianus began and said: Since our discourse is about the Gods, shall we, especially on his own birthday, admit Plato to the conference, and enquire upon what account he says (supposing it to be his sentence) that God always plays the geometer? I said that this sentence was not plainly set down in any of his books; yet there are good arguments that it is his, and it is very much like his expression [4, p. 402].

Plutarch's *Table Talk* was obviously written over four hundred years after the death of the Greek philosopher Plato (ca 423– ca 348 BCE), and the portion of the dialogue above makes clear that the phrase does not come from any of Plato's written works. The closest Plato appears to come to the statement "God ever geometrizes" is in the following excerpt from the dialogue *Timaeus*:

> Before that time, in truth, all these things were in a state devoid of reason or measure, but when the work of setting in order this Universe was being undertaken, fire and water and earth and air, although possessing some traces of their own nature, were yet so disposed as

> everything is likely to be in the absence of God; and inasmuch as this was then their natural condition, God began by first marking them out into shapes by means of forms and numbers [5, p. 53].

While we may lack a primary source for the quotation, it is indeed "very much like his expression" and therefore it is not entirely unreasonable to assign the quotation to Plato.

"God ever arithmetizes"

Today, this quotation is commonly misattributed to the German mathematician Carl Jacobi (1804–1851). The source of this error appears to be the Scottish-American mathematician and writer Eric Temple Bell (1883–1960), who ascribed the quotation to Jacobi in many of his works, with the earliest such reference appearing in the book *Numerology*, published in 1933 [1, p. 17].

The actual source of the quotation appears to be the German mathematician Carl Friedrich Gauss (1777–1855), although, as with the previous quotation, the phrase "God ever arithmetizes" never actually appeared in any of Gauss's writings. But in this case, we have witnesses who knew Gauss quite well and could personally attest that he originated the phrase. One such witness is the German geologist Wolfgang Sartorius von Waltershausen (1809–1876), who worked alongside Gauss at the University of Göttingen for nearly three decades. Waltershausen addressed the quotation in his biography, *Gauss: A Memorial* (*Gauss zum Gedächtniss*), published in 1856. The relevant paragraph is shown below, together with an English translation from Helen Worthington Gauss, the mathematician's great-granddaughter:

> Unter Wissenschaft verstand er allein jenes streng in sich abgeschlossene logische Gebäude, dessen Fundamente auf gewissen vom menschlichen Geist allgemein anerkannten Wahrheiten beruhe, die ein Mal zugegeben ein unabsehbares Feld der verwickeltsten durch eine eiserne Gedankenkette mit einander zusammenhängenden Forschungen gestate. Er stellte daher wie schon bemerkt die Arithmetik an die Spitze und pflegte in Bezug auf Fragen die für uns wissenschaftlich nicht zu ergründen sind die Worte zu gebrauchen: Ὁ Θεὸς ἀριθμετίζει, womit er die durchs ganze Weltall gehende Logik auch für solche Gebiete anerkannte, in welche einzudringen unserm Geiste nicht verstattet ist [6, pp. 97–98].

> Under science he understood that logical, strictly unique structure of which the foundations rest on certain truths universally recognized by the human mind. This once admitted provides an immeasurably wide field for the most complicated investigations strung together on an iron chain of thought. He therefore, as already noted, gave to mathematics the topmost place, and when it came to questions which could not be scientifically resolved he used to say "God arithmetizes," thus acknowledging those fields into which our minds are not permitted to penetrate [7, p. 81].

Figure 1. Carl Jacobi. *Convergence* Portrait Gallery.

Figure 2. Carl Friedrich Gauss. *Convergence* Portrait Gallery.

"Man ever arithmetizes"

Unlike the two previous examples, we can find this quotation in a publication by its author. In 1888, the German mathematician Richard Dedekind (1831–1916) published *What Are Numbers and What Should They Be?* (*Was sind und was sollen die Zahlen?*), a short work which includes axiomatic set theory and other foundational topics in arithmetic. While the majority of the work is written in German, the phrase "Man ever arithmetizes" appears in Greek on the title page, directly below the author's name, as well as in the preface. The relevant paragraph of the preface is shown below, in the original languages and in an English translation:

> In diesem Sinne, den ich durch die, einem bekannten Spruche nachgebildeten Worte ἀεὶ ὁ ἄνθρωπος ἀριθμητίζει bereidne, migen die folgender Blätter als ein Bersuch, die Wissenschaft der Zahlen auf einheitlicher Grundlage zu errichten, wohlwollende Aufnahme finden, und mögen sie andere Mathematiker dazu anregen, die langen Reihen von Schlüssen auf ein bescheideneres, angenehmeres Maß zurückzuführen [2, p. x].

> In this sense, which I express by words formed after a well-known saying 'humanity always arithmetizes', I hope that the following pages, as an attempt to establish the science of numbers upon a uniform foundation, will find a generous welcome, and that other mathematicians will be led to reduce the long series of inferences to more moderate and attractive proportions [3, p. 792].

Dedekind's remark that the motto is "formed after a well-known saying" suggests that he took his inspiration from the phrase attributed to Gauss, although he may also have been aware of the earlier version attributed to Plato.

Figure 3. Richard Dedekind. *Convergence* Portrait Gallery.

As these three examples hopefully show, there is much to be gained by examining the original sources of the quotations we circulate in the modern world. Perhaps the next time you run across a familiar quotation, you may find it rewarding to spend a bit of time tracking down its origins.

References

[1]Bell, E. T. (1933) *Numerology*. Baltimore, MD: The Williams & Wilkins Company.

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[3] Ewald, W. B. (1999) *From Kant to Hilbert*. Vol. 2. Oxford, UK: Oxford University Press.

[4]Goodwin, W, W. (1871) *Plutarch's Morals*. Vol. 3. London, 1870. Reprint; Boston, MA: Little, Brown and Company.

[5] Lamb, W. R. M. (1925) *Plato in Twelve Volumes*. Vol. 9. Cambridge, MA: Harvard University Press. Reprinted in Perseus Digital Library: http://www.perseus.tufts.edu/hopper/text?doc=urn:cts:greekLit:tlg0059.tlg031.perseus-eng1.

[6] von Waltershausen, W. S. (1856) *Gauss zum Gedächtniss*. Leipzig: S. Hirzel.

[7] von Waltershausen, W. S. (1966) *Gauss: A Memorial*. Translated by H. Gauss. Colorado Springs, CO: Colorado College.