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Mahillon would doubtless be disappointed, but not surprised, to find that seventy years later few musicians are willing to admit to the truth of the matter, in spite of several forceful demonstrations of its validity. His analysis was quite as perspicacious with regard to human nature as it was to acoustics!

Reading this work, one is reminded of the spirit of innovation and acceptance of change in musical instrument design that was alive in the nineteenth century. The conservativeness of classical musicians today, and their unwillingness to accept anything but the most incremental changes in the instruments they employ, stands in contrast. Perhaps we must look to the world of electronic supplementation, computers, and synthesizers to point the directions for the future.

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Edwin M. Good. *Giraffes, Black Dragons, and Other Pianos*. Stanford: Stanford University Press, 1982. xvii, 305 pp.; 62 black-and-white plates, many drawings. \$29.50.

Organology students and professionals greet each new addition to the plethora of volumes on the history of the piano with hope. A strikingly bold point of view, a wealth of comparative documentation, penetrating technical analysis, and an illuminating musical perspective are all pressing current needs in the field of the history of hammered keyboard instruments.

Despite its drugstore-novel title, *Giraffes* is an important step in a total reconsideration of the history of the piano (a project that would undoubtedly require an encyclopedia of the piano, as Good himself suggests). The pianos themselves are the primary sources of information for a history such as this one, as the author tells us, and it is clear that he has inspected many of them.

The difference between invention and acceptance, commonly noted in histories of technology but seldom given attention in histories of the piano, is a major theme of Good's work. He describes his book as a history of change, noting that change is not synonymous with improvement or progress (though he does not replace the idea of evolutionary progress with another developed point of view). He is also willing to tackle the myth of the modern piano: "I admire what Steinway did, but I am not ready to suppose that where others did something else, they were misguided or out of touch with reality," he remarks (p. ix).

At many points in the book, Good describes problems of the modern piano: for example, he notes that though felt is now universally used for

hammer covering, it is far from a perfect material for the purpose; that some effects are lost on the modern piano because it lacks a true *una corda*; and that while it saves material and money to use one piece of wire for two adjacent strings, the strings do not stay in tune as well as with single looping.

Chapter 5, "Iron Enters the Piano," presents an instructive discussion of the Thom and Allen compensation frame and Babcock's metal frame patent and practice. Describing them as "innovations," Good shows that they were proposed as solutions to the problems of tension and tuning instability, especially in the English-style pianos (he had pointed out earlier that the tendency towards greater range, greater volume, and significantly higher pitch presented new problems for piano makers). He notes that Graf's successful interior bracing system indicates that there were viable solutions other than the one eventually adopted, and he suggests that American leadership in the development of the iron frame was related to the need to build things to withstand the heating of American homes.

There is enlightening material on the placement of tuning pins in square pianos and on Erard's method of hinging the hammers on the rail. Good mentions that in inventing the repetition action Erard may have wanted to combine the power of the more sluggish English type with the ease of repetition in the light Viennese action, a point that had also occurred to me. He recognizes that the Viennese action has a better leverage ratio than does the Cristofori-Silbermann, and that this accounts for the characteristic lightness of touch, responsiveness, and shallow "dip" of the Viennese action.

Several other points in his discussion of the Classic Piano must be questioned, however. The so-called predecessor of the Viennese action, the simple Prellmechanik, belongs more logically to the section on early square pianos. If Schröter's diagram relates to any later eighteenth-century action, it would be Taskin's, or possibly the tangent action, but not the German-Viennese. The escapement spring on the developed Prellmechanik was more likely to be wire than whalebone (the Schmidt is probably not the most fortunate choice to exemplify the period). The most characteristic differences between the pianos of Walter and Stein are not mentioned: while J. A. Stein used wooden kapsels, rest posts, more vertical escapement levers, and no back checks, Walter used metal kapsels, longer hammers resting on felt at key level, tilted escapement levers, and back checks. The lack of differentiation confuses the discussion of the Streichers' and André Stein's later instruments, as they apparently adopted the Walter form of action circa 1810–15 rather than J. A. Stein's.

The intended orientation of the book is toward technology in the history of the piano, yet the author shuns "an airtight definition of technology" (p. 23). This approach is evident in his statement that "the piano is a machine. . . . A machine accomplishes work, that is, it applies energy to some end. The piano's energy produces musical sound vibrations" (p. 2). This might be true of an automatic piano, but in other cases it is the performer, using the piano as a tool, whose application of energy to the "machine" produces the sounds.

Good points out that the immediate contribution of science to piano design (and, we might add, to histories of the piano) has been very slight. Scientific or technically oriented studies of historical pianos are notably lacking. But though he stresses technology, Good does not attempt to fill this void, and many of his categorical statements are not given the support of scientific evidence. Here are some examples: "the case of the piano is merely the box that contains the machine . . . [and] does not affect the tone or otherwise have musical value" (p. 4); "some materials have little or no effect on the instrument's sound" (p. 24); "the longer and less stiff the strings are, the more upper partials can be generated, thus enhancing the richness of tone" (p. 115); and "the volume was less, the timbre thinner, the sound very much more open and less rich and sonorous . . ." (p. 155). Such statements certainly need further support and explanation.

The book is sprinkled with statements such as the following that belie the author's intention of avoiding the evolutionary point of view: ". . . the development of cross-stringing was a signal point in the evolution of the modern piano" (p. 13); "by the time of the last piano in this chapter, at least one maker had achieved . . . a range close to that of the modern piano" (p. 69); "from 1820 on, the experiments and innovations were . . . aiming toward the modern piano" (p. 164); and "these gap-stretchers were the modest forerunners of the complete cast-iron frame . . ." (p. 62). In some sections often-quoted material available elsewhere is repeated, unwittingly reflecting the evolutionary bias. The choice of the modern piano for the initial example used to explain the parts of the piano was an infelicitous one in view of Good's avowed purpose, for it assumes that the technical functions of that instrument are common knowledge, and focusses unduly on its features.

Good's discussion of craft-shop versus factory production also exhibits a modern bias, equating efficiency with number of instruments produced. He states that in craft-shop manufacture one worker ordinarily did all the work on one instrument, and he infers from Mozart's famous letter that J. A. Stein did all the basic work himself; divisions of labor in the shops of

Erard, the Streichers, Graf, Pleyel, and even Broadwood are not considered to have achieved the desirable mass production.

The scattered references to the relationship of “touch” to the “machine” are intriguing, but disappointingly inconclusive. Descriptive adjectives such as “light,” “stiff,” and “heavy” are not precisely defined, except in one footnote (p. 141); and the fictional piano design on page 15 sets up a proportion of touch “weight” to volume that does not take speed of stroke or frequency into consideration. If “the hammer must strike the string with speed proportional to the weight of the player’s touch on the key,” how does this proportion affect the free flight discussed subsequently? The sections on the regulation of the “touch” in the English grand action and the later Viennese action could have been made more useful by the inclusion of meaningful measurements.

Despite the fact that one of the book’s most interesting sections (pp. 70ff.) relates the instrument’s expanding range specifically to the expanding range requirements of the music, for the most part the author sticks to his decision to offer little to correlate the pianos with the music written for them. The list of ranges on page 152 whets the appetite for an appendix outlining briefly all the pianos involved in this study. The index seems fairly comprehensive, and the bibliography includes some less-accessible recent publications, though it does omit a few important German-language sources listed elsewhere. Chapter numbers or titles in the “Notes” section would have facilitated the use of the copious footnotes. Some unusual items such as “down-striking squares” and Behrent’s first piano (a square piano) should have had more precise documentation, and cross references for pianos discussed in separate chapters would have been helpful.

The virtues of *Giraffes* become increasingly more evident toward its conclusion. In his eye-opening chapter 8, “The Europeans Imitate—or Do Not,” Good cracks the monolithic myth of the modern piano. Of the Steinway piano he says (p. 218): “I find no explanation for the fact that it did win the day except that Steinway and its imitators persuaded the piano-buying public throughout the world that the Steinway system was the norm. Once the public had been persuaded that it was the norm, it had become the norm.” And this “norm,” it seems clear, has prejudiced and obscured our understanding of the opulent variety of pre-twentieth-century hammered keyboard instruments and their music.

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