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Book review

Measured Tones: The Interplay of Physics and Music by Ian Johnston, Institute of Physics Publishing, Bristol and Philadelphia, 2002, xiv + 406pp, price £24.99, ISBN 0-7503-0762-5

This is the second edition of a book whose first edition has rightly earned its place on library shelves everywhere as an engaging introduction to all areas where physics and music overlap. There are several other such books available but since they serve to enthuse young readers and convey the excitement and wonder of science there cannot be too many. It is an ideal book for a secondary school library, so a hardback edition would be desirable, but is not available. It also makes a useful supplementary text for the undergraduate module in musical instrument acoustics that we run at the ISVR. Indeed, I have several times noticed a suspiciously strong echo of its text when marking student assignments for that module. What distinguishes this book from others like it is its strong narrative; the scientific story is bound to the history of its discovery, and with the history of its discoverers. Between the chapters that follow this story are interludes that examine particular families of instruments. Along the way a few canards are perpetuated (Galileo's blindness was caused by his observations, Newton was modest, Franklin was foolhardy, the word node comes from 'no displacement') and a not entirely convincing case is made for the idea of a historical synchronicity between movements in art and science. These quibbles matter much less, however, than the fact that the scientific explanations are, for the most part, clear and no more technical than is necessary, and written in a way that will simultaneously satisfy and provoke curiosity in a student or an intelligent child. A particular strength is the detailed discussion of the development of musical scales and temperaments, a subject which is so often glossed over. For those who would like more convincing the first three chapters and two interludes can be downloaded from the accompanying website www.measuredtones.iop.org, as can a selection of musical examples.

For this second edition the font has been changed, many of the pictures have been redrawn and a further appendix (the sixth) on pentatonic scales has been added. The sections on recording, synthesis and computers have also been updated, but not to the extent one might have hoped for. Fractals are given a brief glance but the reason for the term '$1/f$ noise' is, as in the first edition, swept under the carpet; a missed opportunity, I feel. The chapter on recording technology now includes computer sound files but compression is only mentioned in passing and is not related to the existing discussion of information theory, and the treatment of sampling is quite limited (aliasing isn't mentioned, for example). Regrettably, this edition does not correct an error from the first where it is claimed that the volume of air in a partially filled glass of water determines its natural frequency when struck (p. 7). This might be more forgiveable if it didn't occur in a paragraph that begins by complaining about 'the bad habit of not checking things

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experimentally'. A final word of warning: to those tempted to follow the author's suggestion that you 'fill your lungs with the gas from a helium-filled balloon' (p. 188) I would recommend a prior perusal of the article 'Inhaling helium, party fun or deadly menace?' by H.G. Wickes in Professional Safety Vol. 41, No. 12, December 1996, pp. 37–38, helpfully provided online by the Compressed Gas Association at www.cganet.com/N2O/heliumsafety.htm. It would be a shame if a book that provides so much inspiration were to inadvertently provide a risk of expiration.

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