

May 7, 1982

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Dear Bill,

Thank you for the interesting letter and thoughtful reviews sent to me on April 16. It arrived just before a hectic 4 lecture trip to the Sacramento area, preparations for and attendance at the ASA meeting in Chicago, visits by Erik Jansson (Stockholm) and Rene Causse (Paris), and now exam week! Here is my response, if you still care about it.

The basic physics of the larynx regeneration as described in my book is sort of right. To begin with, it is mixed up because of some reversed signs in the explanations, as you have already noticed. Enclosed is a Xerox copy of the scribbled-on pages of my own copy, a little more fix-up is still needed. Things are still a little complicated, and this is what may have sucked Hall into his trouble. It is very easy to forget that dissipative effects in the valve (which give it the valve action) dilute but do not eliminate the Bernoulli phenomena. All in all, simple Bernoulli will not maintain oscillation, one needs upstream reactance to get a net energy input. As Rayleigh was fond of pointing out, the net driving effort in the direction of motion must predominate over that which acts against the motion during the remainder of each cycle of a damped oscillator if it is to be kept running! Rossing must find some way to keep the vocal folds in oscillation.

The timpani question is more than a little messy. First of all, I stand by the accuracy of my frequency measurements, made on the instrument of one of the (if not the) leading players in the world. Lesser players can be spotted at once from the "whack" they get instead of a "bong" when the drum is struck. That is, lesser players do not know how to tune out the inharmonicity very well. In this regard then, Rossing's measurements do not have to be considered in conflict with my own. The fact that he did not see any effect of a vent hole on the damping is mysterious to me. As you say it certainly makes a difference in the tone.

Rough estimates of the numbers involved point to a non trivial amount of first mode damping through the vent. We may remind ourselves further that turbulent losses during the impulse can give very large dissipation

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at the start. Thus we may expect that a burst of dissipation during the blow eats most of the energy, leaving an unmodified free ringing afterward that starts at reduced amplitude. I must confess to a general operating assumption that Rossing misses subtleties with great ease, so that I tend to believe only the fraction of his work which fits with notions acquired elsewhere. You should know one additional fact which must be taken into account in your own assessment of the entire picture. I am not entirely unbiased in this case. Rossing's measurements on the timpani were made immediately after, and in response to his reading in the paste-up dummy of my book which was passed around at a Catgut Acoustical Society Meeting. A number of people present at that meeting were quite shocked to see the almost complete parallelism between what Tom read, and what he reported very shortly thereafter, with no mention of the direct connection between the two. He even told me (pre publication) that he had come out with a different result than mine. Naturally I'm a bit grouchy about it.

The enclosed Xerox of some scribbles of mine on the Berg and Stork book will perhaps be of help to you. I've seldom seen anything worse.

Overall I would concur in your judgements of the Hall, Rossing and White books. Erik Jansson and I would put Hall's far above the other two. Erik considers them to be unusable. He surprised me by calling them "bad". In Sacramento I gently teased Hall about his reference to edge tones in connection with flutes and Bernoulli effects as primary influences in the reeds and got a graceful smile from him. He is a solid citizen.

Yours sincerely,

A. H. Benade

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