Experimental History and Philosophy of Science

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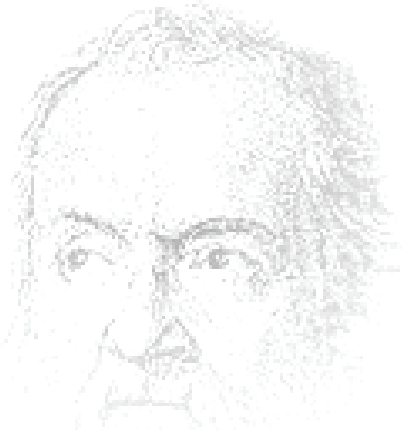

COMMENTARY ON THE PERCUSSION BALANCE EXPERIMENTS VIDEOS

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Commentary on Videos

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Video 1

In video 1, we see the various experiments run with the indifference balance. The first clip shows a full bucket of water without any alterations made to the hole in the bucket. The second clip shows a full bucket with screens covering the hole to prevent the "chugging" action exhibited by the flow of unimpeded water. The third clip shows the experiment run with the top bucket filled only 30% full with water; reducing the amount of water in the bucket decreases the ratio of weight between the water in the buckets and the water falling through the air and thus makes the oscillations more evident. The fourth clip again involves adjusting the amount of water in the bucket, this time to 60% full. The fifth and final clip shows the two adjustments together: the water is reduced to 30% and screens cover the hole. In each of these trials, no more than three oscillations, and most often only two, are required to restore the balance to equilibrium.

Video 2

In video 2, we see many of the same variations as were depicted in video 1. The major difference is that the clips in video 2 are run with the hook balance, which greatly enhances the number of oscillations. The first clip shows the full bucket of water. The second clip introduces the screens, again to reduce the "chugging" of the water. The third clip shows a reduction in the water to 30%, and in the fourth the water level is 60% of the bucket. Note that in all trials in video 2, the number of oscillations is never below four, and oftentimes more were required before the balance returned to equilibrium.

Video 3

In video 3, the experiment has been adjusted so that all of the weight is released from the top bucket in a single stroke, rather than continuously (as it is with the flowing water). This is accomplished by balancing a large lead ball against the counterpoise and releasing the ball by cutting the string that holds it. The ball then "impacts" the balance in two different ways. In the first and second clips, the ball falls into a cushion of sand within the bottom bucket. In the third clip, the ball is released and then "caught" by a second string attached to the arm of the balance. Note that in each of these cases, the oscillations develop extremely slowly. One difficulty associated with this set of experiments was releasing the weight from a certain point on the balance and then "catching" the ball on that very same point. Small differences in the suspension of the weight before the fall versus after the fall caused the balance to settle in a position slightly skewed from the level position. The final clip provides a glimpse of the grave danger that we faced for the sake of investigating the history of science.