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Lawrence Radiation Laboratory
Berkeley, California

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COMMENT ON SYSTEMATIC SCALING OF GRADES

Lawrence Ruby

January 12, 1959

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COMMENT ON SYSTEMATIC SCALING OF GRADES

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In a recent note (Am. J. Phys. 26, 643 (1958)), D.H. White discusses the desirability of proper scaling of grades when the mean is shifted to some predetermined value. Although I concur in the intent, I would nevertheless like to take exception to the system proposed by the author. His function for determining grades revised upward has an unacceptable behavior for very low initial grades. In particular, no matter how much easier an exam is made, a zero score is never raised. It is plausible to expect that in the limit of infinite simplicity--approximated by the request merely to sign the paper and hand it in--all grades should transform to 100, and in more realistic situations, the lowest grades should make the greatest gain. Similarly, the author's curves, used in reverse--as he recommends--for exams made more difficult, exhibit the wrong behavior at very high grades, so that a score of 100 is never reduced.

The difficulty lies in the author's assumption that the student's ability to improve is, in part, proportional to his grade, G. This results in a function which remains within the bounds of 0-100 for any exam of increasing ease ($E > 0$) or of increasing difficulty ($E < 0$). However, it has the deficiency cited above. An equally well-bounded transformation, which has the desired behavior, is plotted in the figure below and is derived from the following simple assumptions:

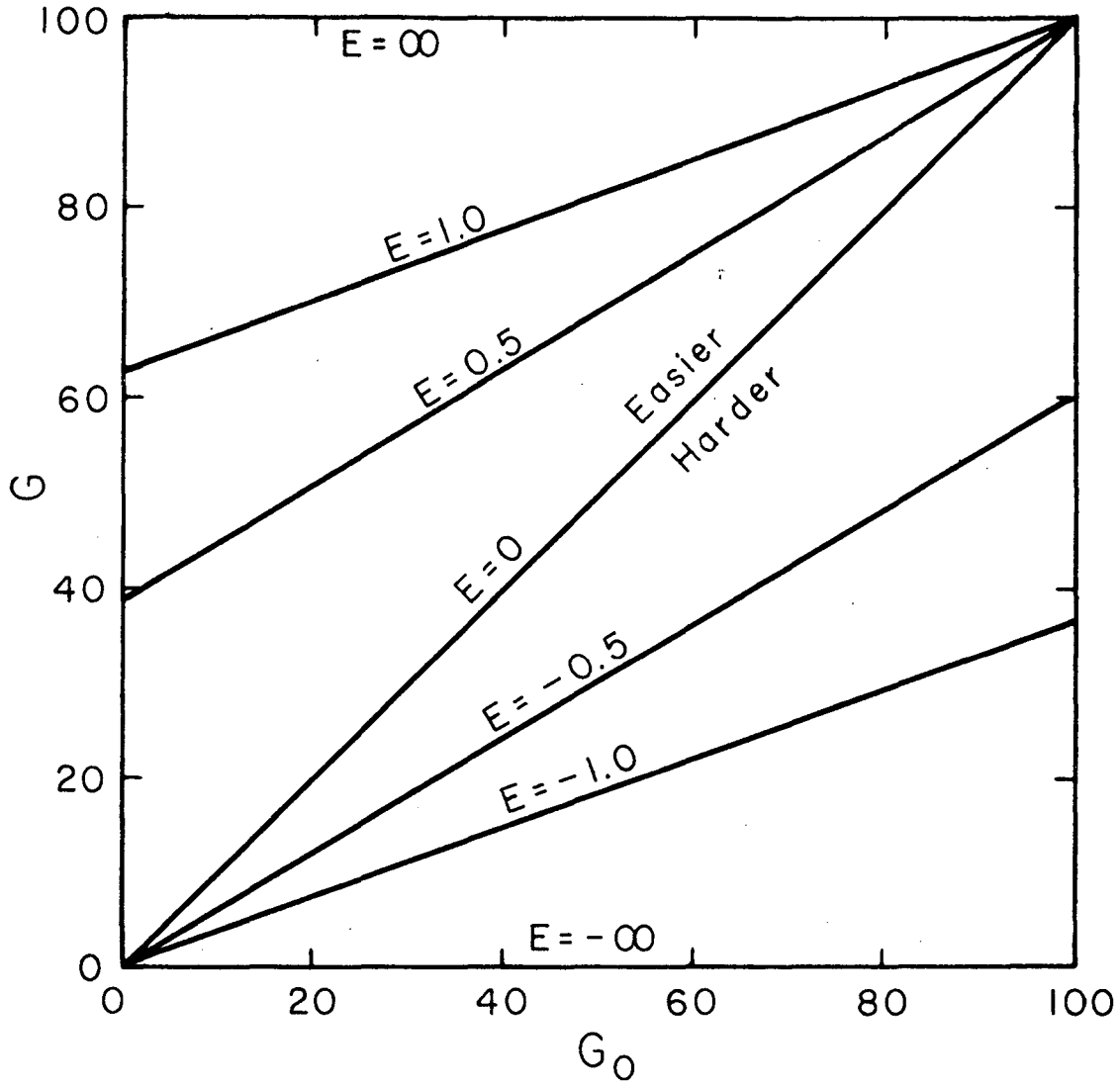
For $0 < E < \infty$, assume $dG/dE = 100 - G$, so that $G = 100(1 - e^{-E}) + G_0 e^{-E}$;

For $0 > E > -\infty$, assume $dE/dG = G$, so that $G = G_0 e^{E}$.

I am indebted to Dr. Robert V. Pyle for a valuable criticism.

LEGEND

Fig. 1. Readjusted grade vs initial grade, for various values of the relaxation parameter.


100
80
60
40
20
0
G
0
20
40
60
80
100
G_0
E = ∞
E = 1.0
E = 0.5
E = 0
E = −0.5
E = −1.0
E = −∞
Easier
Harder