activation constant was calculated, for the data from each of the seven subjects whose counting speed had increased, in order to assess the constancy of the μ value on which the biochemical clock hypothesis is based, it was found that μ had a mean value of 74,000 calories within a range over the seven subjects of 9,000 to 139,000 calories.

The eight subjects examined on the 3 taps/sec task had increases in oral temperature of 0·3° C to 1·2° C. A product moment correlation coefficient of $r = +0{\cdot}84$ ($P < 0{\cdot}05$) revealed a significant association between the extent of rise in oral temperatures and the magnitude of the changes on the tapping task. However, three subjects failed to show an increase in tapping speed with raised body temperatures, and for the five subjects whose performance changed in the predicted direction energy of activation constants ranged from 20,000 calories to 138,000 calories about a mean of $\mu = 83{,}000$ calories.

In view of the very great discrepancies between these findings and those of the original research, Arrhenius equation analyses were performed on Francois's data. It was found that with increases in axilla temperature of between 0·3° C and 1·0° C, the energy of activation constants ranged between 14,000 and 34,000 calories in sixteen experiments on three subjects.

In view, therefore, of this variability in the Arrhenius equation energy of activation value, the constancy of which is essential to the hypothesis of a potent biochemical influence on time estimation performance in humans, and because Hoagland[2] has pointed out that "a temperature range of 3·2° C is too short to enable one to say with certainty that the Arrhenius equation adequately describes the data", the position that man has demonstrated a control of his time estimation of short intervals by a chemical clock would seem to be untenable.

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MISCELLANEOUS

'Significant' and 'Highly Significant'

FREQUENTLY in scientific papers one finds the terms 'insignificant', 'significant' and 'highly significant' used in discussing the difference between control and experimental, with their ranges usually established by $P = 0{\cdot}05$ and $P = 0{\cdot}01$. Statistics text-books provide little or no guidance as to their proper usage because statisticians apparently disapprove of the convention. Yet the universality of the convention attests to the need for clearly defined, commonly accepted terms which properly weight the results of the experiment. The present convention is commonly accepted among non-statisticians, but, as will be shown here, is not clearly defined. Therefore an improved convention is proposed for the consideration of those who would benefit from it—the non-statisticians in research. Perhaps by improving the convention, it can be made more palatable to statisticians, as well as more useful to non-statisticians.

Table 1. DEFINITIONS OF PROPOSED TERMS FOR STATISTICAL SIGNIFICANCE

Term	Abbreviation	Conventional meaning	General meaning
Not significant (ly)	NS	$P \geq 0{\cdot}05$	$P \geq \alpha$
Significant (ly)	SIG	$0{\cdot}05 > P \geq 0{\cdot}01$	$\alpha > P \geq \alpha/5$
Decisive (ly)	DEC	$0{\cdot}01 > P \geq 0{\cdot}001$	$\alpha/5 > P \geq \alpha/50$
Conclusive (ly)	CON	$P < 0{\cdot}001$	$P < \alpha/50$

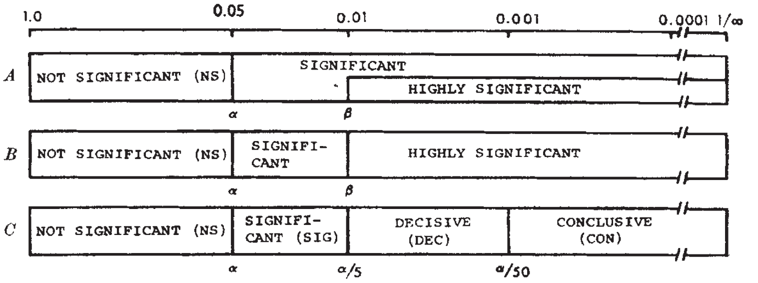

Fig. 1. Range of probabilities covered by present and proposed terms. *A*, Present convention, by definition. *B*, Present convention, as commonly used: $\alpha = 0{\cdot}05$ and $\beta = 0{\cdot}01$ unless otherwise specified (no set relation between α and β). *C*, Proposed convention: $\alpha = 0{\cdot}05$ unless otherwise specified, other values always $\alpha/5$ and $\alpha/50$

The proposed convention is as follows: The significance level, α, for rejection of the null hypothesis will be 0·05 unless otherwise specified. The significance zones will be established by the points 0·05, 0·01 and 0·001; or in general, α, α/5 and α/50. When a statistical test is not designed to distinguish, for example, a probability between α/5 and α/50 from one which is less than α/50, any P less than α/5 will be designated by the term for P between α/5 and α/50. The terms that follow are capitalized to indicate that the idiomatic definition is intended.

The abbreviations may be used in conjunction with the symbols greater than, less than and different from, as follows: $A \overset{\text{DEC}}{>} B$; $B \overset{\text{NS}}{\neq} C$, meaning A is decisively greater than B, and B is not significantly different from C.

The present convention has several defects which the proposed modification will remedy. 'Significant' at present is defined as $P < 0{\cdot}05$, and 'highly significant' as $P < 0{\cdot}01$, unless otherwise specified. Since the latter is included within the former, either term could be applied to values less than 0·01. This ambiguity is avoided in practice because, when using both terms, one never refers to values less than 0·01 as merely 'significant'. In practice, the terms are mutually exclusive, with significant restricted to P between 0·05 and 0·01. In the proposed convention, there is no overlap of definitions, and usage agrees with definition (see Fig. 1).

Flexibility in designating the chosen significance level, α, for rejection of the null hypothesis is retained, but in the proposed system the three levels of significance bear a constant relationship to each other. Since the same criteria would be used to establish each significance level these should have a constant relationship. Only in the proposed convention is this found. In addition, the present scale of probabilities is too compressed, for the two extreme terms are separated by only 5 per cent. The proposed terms, as one may see in Table 1, allow a more precise discussion of probabilities.

Finally, there are semantic difficulties with the old convention. 'Significant' and 'highly significant' sound so much alike that clarity is lost when both must be used several times. Also, the adverbial form, 'highly significantly greater than' is awkward construction. The proposed terms, by contrast, are single, easily distinguished, easily used words with meanings which suggest their idiomatic use.

The foregoing is proposed in the hope of clarifying and simplifying the use of statistics in research, and thus encouraging investigators to make use of statistics in evaluating their data.

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