Deccan cultivator. I must further bear witness that in my opinion the recent undeniable advance in village opinion concerning the practical issues is of enormous significance. Congress has taught the villager non-co-operation. Unless he is given a fair hearing the weapon will assuredly prove a boomerang to those who will have to accept responsibility for the governance of the new India. The problem is: Who is to speak for the villager? Exactly how much, or how little, do we know of rural India? Is anyone qualified to clothe the official statistics with life and individuality?

Anthropology is the knowledge of *life as it is lived*, which is also the only foundation for sound politics.

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Summation Methods in Noise Problems

THE method of assessing the overall loudness of a complex noise by taking into account the frequencies and amplitudes of the component notes, and weighting and summing them, by calculation or instrumentally, has always been open to the suspicion that it may not apply to all types of noise. This suspicion has been confirmed as a result of noise measurements on electromagnetic apparatus such as transformers. Apparatus of this type constitutes a special case, as all the components have frequencies which are harmonically related. In contrast to this, the frequencies of the components of most other noises have no such special relation, being distributed irregularly over the audible range. This relation often exists, however, between a few components of other types of noise, such as that emitted by rotating machinery.

Source of Noise	Equivalent 800-cycle level in decibels above threshold		
	Calculated	Measured	Difference
Geared Turbo Alternator Set, 225 kw.	89·8	91	1
A. C. Motor, 120 h.p., 1,500 r.p.m.			
No load ..	79·1	84	5
,, ,, ,, Full load ..	82·2	89	7
Transformer, 110 kva., 3-ph. 50 cycles	45·2	76	31
,, 150 ,, ,, ,,	57·8	86	28

With the object of investigating the validity of the summation methods as applied to engineering noise problems, summation measurements have been made on typical noises and the values compared with those obtained by direct aural comparison with an 800-cycle reference tone. The same effect has been observed with reference tones of other frequencies.

In the summation method the procedure was as follows. The components of the noise were determined by an accurate sound analyser giving acoustical pressures in absolute units. The levels of the components in decibels were then calculated in terms of their respective threshold pressures[1]. These levels were then converted to a common 800-cycle basis, using Kingsbury's equal loudness relations. The energies of these equivalent components were then summed and expressed in decibels above the 800-cycle threshold. In the reference tone measurements a pure 800-cycle note of adjustable amplitude was applied to one ear by means of a telephone receiver and the other ear turned towards the noise under observation. The results in the accompanying table are typical of those obtained.

It is seen that in the first example, in which there are no special relations between component frequencies, there is close agreement between the two methods. In the case of the induction motor examples there are known to be a few harmonically related components and the agreement, while substantial, is not so good. However, in the case of a transformer, where all the components form a harmonic range having a fundamental frequency of 100, there is marked disagreement. The reason for this peculiarity of the harmonic range is not known with certainty but it is probably associated with the non-linear response of the ear, which gives rise to subjective sum and difference tones. There is clearly the possibility of the reinforcement of physically existing components by subjectively formed tones of the same frequencies, giving a directly additive effect. Where no such relation exists, the subjectively formed tones are not directly additive to those already present and so have a minor effect. It is hoped to discuss this matter in more detail elsewhere.

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[1] NATURE, **131**, 760, May 27, 1933.

A New Spectrohelioscope and Spectroheliograph

THE spectrohelioscope of Dr. G. E. Hale[1] allows one to observe in the light of a single spectral line the extremely rapid variations occurring on the sun's surface. But this spectral line has to belong to the visible region of the solar spectrum. ($H\alpha$ especially is used.) The spectroheliograph on the other hand allows one to photograph solar phenomena in the light of any photographically active spectral line, but it is not able to record the very rapid changes.

In the apparatus which I have designed, the light emitted by the sun, instead of producing the observable image itself in the monochromatic light of the spectral line chosen, controls only by way of electro-optical methods, as used in the technique of television, the light of a second artificial light-source.

The image of the sun produced by a sufficiently powerful optical system is divided into a grid of little surface elements by the help of a rotating wheel, say, a 'Spiegelrad'. The white light modulated in time by this device passes through a monochromator of large dispersion. The monochromatic light leaving its second slit enters a photocell, the currents from which, after being amplified, act on a Kerr cell. This latter controls the light of an artificial light source of any intensity and colour suitably chosen for visual observation or photographic record. The light of this source, thus varying synchronously in intensity with the light-beams entering and leaving the monochromator, may be recombined by means of a second or the same rotating wheel arrangement to form an image which represents the structure of the sun's surface in the monochromatic light chosen.

A detailed theory of this apparatus has been worked out.

In this way the sun's surface may be made visible in the monochromatic light of a spectral line, even