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CORRESPONDENCE

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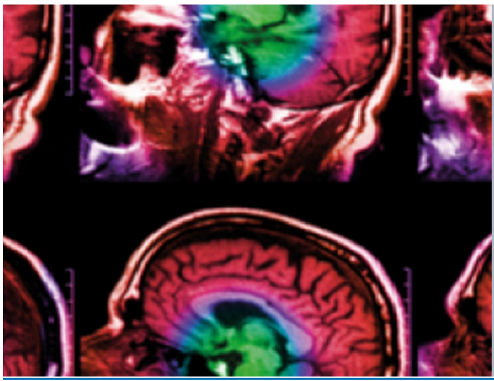

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# CORRESPONDENCE

## A Comment on the Total Unsharpness in Radiography

THE EDITOR,

Sir,

The several points raised by Day (1977) regarding the total unsharpness in radiography deserve further comment.

It seems useful to identify two distinct aspects associated with the analysis of unsharpness in radiography:

(1) the formulation of a physically plausible and mathematically tractable representation of the optical density for a specific case of interest;

(2) the identification of a suitable index which can conveniently be used by both the theoretician and the experimentalist to characterize the total unsharpness.

In our analysis (Harms and Zeilinger 1977), our primary interest was in the formulation of the optical density description; though we did describe several possible indices of total unsharpness we stated explicitly that we were not promoting any one unsharpness index in particular.

Basic to our approach is the premise that experimental observations combined with considerations of physical plausibility rather than mathematical construction should be the determining factor in unsharpness analysis. In this respect it is important to note that the Lorentzian line spread function leads to excellent agreement with experiment while still possessing mathematical features convenient and useful for both the theoretician and the experimentalist. This approach clearly circumvents the conceptual problems and analytical ambiguities associated with the empirical formula:

$$U_{\mathrm{t}} = (\sum a_i U_i^n)^{1/n}.$$

Here the $a_i$'s and $U_i$ are weighting factors and unsharpness components respectively and $n$ is an index for which different integer values have been proposed by various researchers.

We emphasize that we see no fundamental basis for the validity and use of the above unsharpness formula. However, if, for reasons such as consistency of comparing historical data, that formula must be used then the exponent $n$ should be chosen according to the correlation presented in our paper; for the special case of an isotropic radiation source and geometrical unsharpness being equal to screen unsharpness the value $n = 1{\cdot}55$ is appropriate. Other cases and non-ideal radiation sources can be incorporated as suggested in our analysis.

Notwithstanding Day's comments, we have no basic quarrel with the use of the inverse slope as an index of total unsharpness because the width of the associated line spread function appears in an inverse form. His further suggestion to truncate the spatial variable according to $xc^2 = 100$ in order to reduce undesirable fringe and weighting effects is well taken; indeed, in our experimental work we have found that $cx^2 \simeq 25$ is generally adequate.

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# Capacitance and Static Electricity in the Human Body

The Editor
Sir,

We make two comments on the Technical Note by Marble, MacDonald, McVicar and Roberts (1977) about the capacitance of the human body. Firstly, their measured values of capacitance agree quite well with an approximate theoretical estimate made below. Secondly, the maximum voltage attainable is limited only by the electric field strength which air can withstand before breaking down. Their conclusions that $6{\cdot}46 \pm 3{\cdot}26$ mJ of energy stored and $13\,802 \pm 4443$ V of potential relate to the human body are relevant only to the particular synthetic rug and the amount of scuffing (presumably fairly constant) by the volunteers used in the experiment.

Isolated objects are capable of storing electric charge. When this happens an equal and opposite charge must exist at some distant points which we conveniently designate as infinity. The capacitance in question is then the capacitance between the object and this infinity which in practice is the walls and floor of the room.

Faraday established that static charge resides on the outside surface of a conductor. This also applies to partial conductors like the human body and because of mutual repulsion and mobility the charge will be distributed on the body so that its density is proportional to the body curvature. In searching for a basis on which to calculate capacitance we note that a sphere of radius about 0·8 m is a reasonable first approximation to describe the location of charge. If we use this sphere as a model then electric fields a few metres from the body will be accurately described. Close to the body the charge clusters at extremities of the body and the total capacitance will tend to be less than that of the proposed spherical model. For an isolated conducting sphere the