



FIG. 2. Proposed 180-degree scale.

administration of an anesthetic as a work situation and our swivel chair as part of a workbench. Because of the extent of our field of observation and the number of independent pieces of our equipment, it is impossible to arrange them together on a single dashboard, as in a car, but dials should be of a size and location such that they "look" at the operator instead of the operator's looking for them. Specifically, the pressure gauges and flowmeter should be close enough together so that they can receive simultaneous attention.

Ergonomic principles are particularly important when pieces of equipment manufactured by various companies are used alternately. One can look again to aircraft for an example. The incidence of serious accidents could be related to the shift of pilots from one plane to another, with different control layouts in the cockpits of the two planes. As a consequence, "great care is taken to standardize the positions of controls to avoid the potential disastrous effect of negative transfer"; negative transfer implies that the execution of a specific maneuver may be influenced or even overridden by previously established patterns. Anesthesiologists may get annoyed when they have to interchange equipment of different manufacturers, but each manufacturer will continue to produce its own design, until there is a re-evalua-

tion of responsibilities and recognition of the importance of ergonomic principles.

It is time for the anesthesiologist to realize that human perception and reaction can influence the effectiveness of his equipment, and to recognize that appropriate guidelines from behavioral sciences can assure the most fundamental form of safeguard.² The crucial consideration is not that a particular operator is more astute or more familiar with the equipment, but that our equipment should be built as an extension of our nervous system and appendages, so that it can be totally at our command. Human components in a man-machine system, by their very nature, are far from constant. We must make sure that the price for the health of the patient is not paid by the well-being of the anesthesiologist. It is fundamentally a matter of properly adjusted equipment.

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REFERENCES

1. Fitts PM, Jones E: Psychological aspects of instrument display. Analysis of 270 "pilot error" experiences in reading and interpreting aircraft instruments. U.S.A.F., Air Command, Wright Patterson A. F. Base Rep. #TSEAA-694-12A, 1947
2. Blum LL: Safety factors of anesthesia equipment and the components of man-machine interface (Introduction into ergonomics). Proc III, Europ Congr Anesth, Prague, 1970 (in publication)
3. Kendler HH: Basic Psychology. Design of Controls. New York, Appleton-Century-Crofts, 1963 p 653

Obstetrics

VASOPRESSORS IN OBSTETRICS Metaraminol was used to correct spinal hypotension in eleven pregnant ewes near term. Uterine blood flow, which had decreased 45 per cent, was returned to within 10 per cent of control values by metaraminol. Infusion of the drug improved fetal P_{O_2} and P_{CO_2} , slightly, indicating better placental perfusion, but did not check progressive metabolic acidosis of the fetus as reflected by continued declines in fetal pH and base excess. Metaraminol ranks between ephedrine and methoxamine in its effectiveness in correcting fetal deterioration due to spinal hypotension. (Shnider, S., DeLorimier, A., and Steffenson, J.: Vasopressors in Obstetrics. III. Fetal Effects of Metaraminol Infusion during Obstetric Spinal Hypotension, *Amer. J. Obstet. Gynec.* 108: 1017 (Dec.) 1970.)