

not as single, discrete item, but rather in interacting combination. This research is concerned, for example, with general perceptive capabilities and accidents, and not with *just the separate abilities that contribute to perception*.

Individual personality. The other explanation for accident proneness was that it stemmed from the basic personality structure of the individual, from two characteristics in particular: impulsiveness and a desire to escape from authority. These two characteristics are determined not by heredity, but rather by interaction of the individual with society.

If this latter explanation for accident proneness were complete, one would need then only to measure personality differences through tests or inventories, disregarding physical characteristics entirely. However, research has given little evidence to support this concept, so that only one conclusion is acceptable at this time—that a minor share of accidents can be attributed to personality.

It is the function of personnel people in industry to screen candidates on the basis of all the characteristics required by the specific job for which application is made. In many cases, both physical characteristics, such as size, visual acuity, and steadiness, and personality characteristics are important, so that many individuals will not be considered because they do not have all the necessary physical qualifications. As a result, many who might be accident prone do not even get a chance to work on the job.

In the design of equipment, "human engineers" take into consideration physical limitations as well as other human characteristics in an effort to make machines as nearly perfect as possible. Where hazards cannot be eliminated, guarding provides protection against potential failure of people to utilize equipment correctly. Both safe design and guarding minimize the effect of individual differences on accident frequency and severity.

Methods of measuring characteristics

Regardless of what technique is used to screen, place, and motivate employees, a method of checking program effectiveness is necessary. Techniques used to obtain feedback range from the across-company accident

rates, to the within-a-company approach of safety sampling, or critical incident technique, described in Chapter 3.

All measuring techniques must possess the qualities of reliability and validity.

Reliability of measurement refers to the degree to which the test or instrument produces the same results over repeated uses. Reliability is simply the degree of correlation the instrument has with itself.

Reliability is expressed as a coefficient with a range of -1.00 to $+1.00$. The sign of the coefficient tells the nature of the relationship. A negative sign means that as one dimension is increased, the other dimension measured decreases; a positive value means that as one dimension is increased, the other dimension, also, increases. Because the number deals with the magnitude of relationship, a reliability of -0.60 is greater in magnitude than a coefficient of $+0.45$, although the variables are inversely related in the former.

Although it is theoretically possible to have a reliability coefficient as low as -1.00 , in practice the value rarely goes below $+0.20$. How high can a coefficient be? This is difficult to answer, since the answer depends upon the use of the testing instrument, the nature and manner in which reliability was obtained, and other factors. Generally, anything above ± 0.60 is considered adequate.

Validity refers to the test's or instrument's power or ability to measure what it is intended to measure—the degree of correlation the instrument has with the external criterion it is supposed to measure. Once again validity is expressed as a correlation coefficient. A negative sign, however, is as useful as a positive coefficient. A negative validity indicates that those possessing more of the measured trait are less desirable. An illustration might be testing for a job that requires very little mental ability—it may be negatively correlated with an IQ test so that the desirable workers for the job are those with the lower test scores.

A measurement may be reliable without being valid, but a valid measurement must also be reliable. Because reliability is self-correlation and validity is a correlation with some external criteria, a test cannot be correlated with something else and not correlate