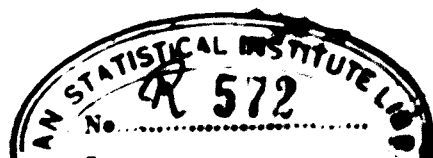


IMPORTANT KINDS OF MEANING IN QUALITY CONTROL

Look at that title: Important Kinds of Meaning in Quality Control. That's all Greek to me, you say. Why don't those fellows who talk about quality control have enough common sense to translate their technical jargon into plain everyday English? What they need to do is to remember and apply a few age-old maxims such as: "You can't get technical with the man on the street" "Use simple action words wherever possible" "By all means, never use vague or ambiguous terms". All of which sure sounds good - so simple. Just a few common sense rules to follow and even Einstein should be able to make his story intelligible to all, not to mention how easy it should be for a quality judge to tell his simple story - that is, if he has one.

Now the fly in the ointment is that such maxims, like those that tell the farmer to plant potatoes in the dark of the moon, and tell the sailor - a rainbow at night is a sailor's delight - are a lot of plain everyday bocey. For example, to talk without vagueness and ambiguity to the average man in the street is just what you must not do if you want to interest him. Why, that poor devil spends most of his waking hours talking about such things as life, liberty, and the pursuit of happiness; about personal rights, constitutional rights; about God, immortality, the right, the good, better, best; about



democrats, republicans, dictators, and so on, endlessly. In buying an R.C.A. radio, he "thinks" he is buying a "Magic Brain". He thinks of a Frigidaire as a "Meter Miser". He fights to make the world "safe for democracy", and is ready to fight any day at the drop of the hat to keep us out of "Moscow".

That there are a lot of things rotten in the State of Denmark with the way a quality judge may talk is all too true. But vagueness and ambiguity are not necessarily sins for which he should be damned. On the contrary, the fact is that in order to be "understood" (?) by the average man one must often use the same vague, ambiguous lingo as the average man. What a paradox! Now, under such conditions, what we as quality judges need is to know when to, and when not to, talk with vagueness and ambiguity. We need to examine the psychology of the situation. We need to quit kidding ourselves about getting our technical ideas across to the other fellow and think more about getting the other fellow to act as we want him to act. We need to approach this whole problem of meaning from the viewpoint of what it is that goes on in the head of the average man that makes him react as he does to spoken or written words.

Enough about the poor average man. A lot of the effort of the quality judge must be directed toward communicating with the technical man and even with highbrow scientists. Must not a quality judge be able to talk without vagueness and ambiguity to such a man in order to interest him? The answer, for the most part is a most emphatic, No! If you try to talk to most

such fellows in an operational way - the only way in which you can talk with definiteness - they will recoil from you almost as they would from a rattlesnake. They will pity you as knowing no better than to fall into the hands of philosophers. Tell one of them that there isn't such a thing as length about which one can talk definitely but instead that there are only the operations of measuring length and he will look at you as though you had lost your mind. Why, he has been talking almost all his life about length and measuring it. So did his father and his father's father and so on before him. "It's good enough for father, it's good enough for me".

Now, does a quality judge have to think and talk with definiteness even when neither Mr. Average Man nor Mr. High-Brow Pure Scientist are interested? The answer is a most emphatic, "Yes". Some one contracts to deliver a reel of wire with a tensile strength of not less than so many pounds per square inch or to deliver a car load of coal with a B.T.U. content of not less than so much and the recipient in either case claims that these specific clauses of the contract haven't been met. Here and in any one of an indefinitely large number of similar cases the quality judge must know how to talk with a meaning that is subject to definite operational verification. If thinking and acting with definiteness from an operational viewpoint make him a philosopher instead of an average man or even a physical scientist, why then he must be a philosopher, if he is to be able to do his job. (Of course, there is a possibility that

the average man and scientist both may some day throw off the veil which blinds them in this way to practical reality as they have so often done in the past. Then they may point to the philosophic act of talking with definite meaning as being a scientific act.) But even though this day never comes, the quality judge must go on thinking in an operational way when occasion demands. On the other hand, he must be careful never to try to bother others by talking thus definitely unless the occasion demands.

Now let us return to our set task of dipping into the realm of meaning enough to see what kinds there are that a quality judge should know. To start with, it is necessary to examine an important characteristic of all meaning. Presumably, meaning without a head to think with is impossible; meaning depends upon the picture in your mind. Let's examine this statement.

"Will Rogers said not so long ago: "The greatest aid that any man could give the world today would be a correct definition of 'liberty'. Everybody is running around in a circle announcing that somebody's pinched their 'liberty'. Now, what one classes as 'liberty' another might class as 'poison'." Thus in his prosaic way "Will" said a mouthful. What a thing appear to be depends a lot on our viewpoint - on the picture in our mind. To me as a layman the table before me is just a plain ordinary table - something about so long, so wide, and so high, something yellow, hard to the touch, heavy if I

try to move it, and so on indefinitely. To me as a physicist, the table evaporates into a swarm of molecules darting hither and thither with comparatively great open spaces between them. In each case the same table but different pictures.

Did you ever put a jig-saw puzzle together? Your speed in doing so depends a lot on the controlling picture in your mind although, of course, the theory of probability postulates that a monkey could do it without a picture if given enough time. Now both "experience" and "reality" come to each of us in much the same way as we fit a jig-saw puzzle together. We get a picture in our head and pick out here and there little bits of experience to fit into that picture and thus make what we call an intelligible whole. An important difference between the two cases is, however, that in real life we don't use up all the possible bits of experience in completing our picture as we are supposed to do in solving the jig-saw puzzle. In life, what we think we see depends not only on the picture in our head but also upon what we choose to fit into that picture.

Now that we have gotten a glimpse of the essential element of all meaning, namely, the picture in one's mind or the construct, as the epistemologist would say, the next important thing to note is that there are just four different kinds of elements that we may choose to put into that picture, - just four different kinds of elements which we may use in any picture that we have. For example, take our good old friend sugar.

As a chemist, our picture of sugar may be $C_{12}H_{22}O_{11}$ with the C's, H's and O's scattered about with short dashes between them four to each C, two to each O, and one to each H. In themselves these C's, H's, and O's are just marks on paper put together by a formal rule. Most of us who pay good money for sugar to use on our table have never been exposed to the formal picture of sugar or the mental gymnastics that go therewith. Nevertheless we "know" our sugar. It is that white crystalline lump that put in our coffee gives it the sweet taste that we like. The sweet taste is a sensory experience and the liking is a valuation experience. Of course, if we happen to have the mind of a physicist we think of sugar in terms of physical operations yielding pointer readings. Hence we see, first, how the picture of sugar always involves certain operations and second, how it always involves one or more of four elements, - a) just marks on paper, b) sensory experience, c) valuation experience, and d) pointer reading experience.

Now if we can stand a little symbolism we can soon get off our chest a few important things that we have to say about operational meaning.

$$\begin{aligned} \text{The quality of a thing} &= o_1 \text{ (marks on paper)} + o_2 \text{ (sensory} \\ &\hspace{15em} \text{experience)} + \\ &\hspace{10em} o_3 \text{ (valuational experience)} + \\ &\hspace{10em} o_4 \text{ (pointer reading experience)} \\ &= o_1M + o_2S + o_3V + o_4X \end{aligned}$$

let us say, where o_1 , o_2 , o_3 , and o_4 stand for operations.

Now the first thing to ask ourselves is: What's wrong with this picture?, for thereby hangs a tale of great importance that should keep us from saying some pretty silly things at times. The answer is that there is not enough on the right-hand side of that equation for the quality of a thing is always more than is shown there. A thing is always that which has a quality as indicated by the right-hand side and has potential qualities of each of the four types about which we know nothing. Hence we must modify our symbolism and add to the right-hand side $o_1M + o_2S + o_3V + o_4X$ standing for the great unknown with respect to the quality of that thing.

With this picture of quality in mind we see at once how nonsensical it is to talk about being able to define completely the meaning of the quality of a thing in a non-vague manner because the unknown part is always vague. Now, there is another interesting point which we should keep in mind - one may get along very well in life with a picture which involves only one of the four kinds of elements. Therefore, if you are talking to someone about significant differences in quality, it makes a whale of a difference what kind of picture the man you're talking to has in mind. Obviously before you can talk straight or in a non-ambiguous manner, you certainly have to make as sure as you can that both of you have the same picture in terms of operations and kinds of elements of

experience. Hereafter, in our discussions of quality we shall sometimes use descriptive names for the four kinds of pictures in which meaning may be expressed. These are:

$o_1M + O_1M =$ operational formal meaning

$o_2S + O_2S =$ operational sensory meaning

$o_3V + O_3V =$ operational valuational meaning

$o_4X + O_4X =$ operational pointer reading meaning.

The first of these is sometimes referred to as theory but, be it theory or something else, it is really that which makes the wheels go round in your head and which in the history of science has led to important developments. So much for the kinds of operational meaning that we have to know something about if we are going to write specifications that have a definite meaning and if we are going to interpret them after they are made.

About this point, however, some people including several logicians and students of scientific method who ought to know and do better come up for air with the cry: You can't limit meaningful communication to the use of operational meaning. To do so, for example, would be to frustrate much of the research scientist's speculations, because he chatters away about such things as the other side of the moon and perpetual motion, neither of which are presumably verifiable operationally. It is just too bad that the one who utters such a warning didn't take time to note that to be operationally verifiable doesn't necessarily imply that it is feasible or even possible to commit the act of verification. In fact, there are three important

classes of operations, namely,

1. Those that can be carried out at will either now or at some future time, as is the case with most physical measurements - those verifiable at will.
2. Those for which the act of verification is problematic, as is the case in testing a new invention, design or physical theory by crucial experiment - those problematically verifiable.
3. Those for which the act of verification can in the present state of our knowledge only be imagined as, for example, a perpetual motion machine - those imaginatively verifiable.

These three kinds of operation give us plenty of elbow room to say what we want to say definitely.

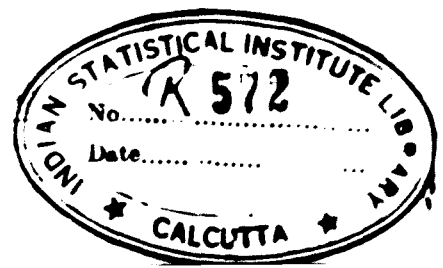
There is, however, one more point which we should get clearly in mind before we pass on to another kind of meaning. Let us take for consideration the pointer reading meaning. It is obvious that the quality of a thing has certain continuity. Thus the capacity of a condenser sitting on a desk before you continues to exist in a certain sense as a capacity. Nevertheless, as I have indicated in I.E.B. 5 and elsewhere, it is not humanly possible to specify this continuity in an operational way. In other words, it is generally impossible to specify in a definite operational way even the simplest kind of pointer reading quality characteristic over the potential life of the thing. Hence it is that there must always be a certain kind of vagueness in talking about quality so long as we remain the human beings that we are and if we are to try to make our talk correspond to the reality

which we think we are talking about. Of course, we may, as we do in writing inspection specifications, take a definite operational technique and say tacitly, "Let's just agree to take this much of the real thing which we would like to talk about."

Now we are at a point where we may profitably pass to a consideration of another kind of meaning, namely, the meaning of a statement, proposition, or judgment of quality. For example, we may say that the quality of a particular thing is significantly different from the specified standard in terms of pointer readings. Here, however, we are implying something about what we will find out about the quality in question if we do something to the thing or operate on it in a certain way. In other words, we are making a prediction or, as we say, in our technical jargon, making a probable inference. Now, in order to get at the meaning of a probable inference, two things are essential: first, we must know the technical meaning of the statement in the sense that we know what kind of operations would have to be gone through in order to verify the statement, and second, we must have some definite operational picture, or of the evidence upon which the judgment is based.

Here, let us return for a moment to the statement made above that in order to be understood by the average man it is more or less necessary to talk in his vague, ambiguous lingo. Thus far we have not indicated how we are going to make

sure that the picture that the other fellow to whom we are talking has in mind is the same as ours. In fact, we cannot get at this picture except through the reactions of the other fellow. I may see red but I don't know what you see except as I infer it from your reactions. This situation is important in many ways that are quite obvious but there is one way in which it's importance is perhaps not quite so obvious. It appears that God made us with human wants and in this respect perhaps no two of us are exactly alike. One of us wants certainty, assurance, or the like in everything that he does, and the other is always in search of novelty or newness of experience. Let us consider from this viewpoint the use of the term "Magic Brain" to describe the radio. What is it that the fellow who buys a "Magic Brain" "thinks" he is getting? I venture the suggestion that at least a goodly number of people that are influenced by an ad containing the term "Magic Brain" to the extent that it leads to the purchase of an instrument thus described, are led by an appeal to the unknown - the somewhat mystical unknown, if you please - that must play a large part in making up any operational meaning that one may have of "Magic Brain". Literally thousands of people a few years ago read books on relativity. Why? Certainly most of them could not understand what they read in any definite way. Possibly, and there are considerable grounds for this belief, it was largely due to a



craving for experience of the previously unknown. What does this mean from the viewpoint of judging the reactions of people to statements about the quality of things. It means for one thing that we must take into account the fact that the incentive to read a good Philo Vance detective story is taken away if someone gives you the leading clue. If this be true, however, it means that many of us are so constituted that we shall never want to talk in an operationally definite way about the quality of a thing from the viewpoint of specifications even assuming that we could do so with ease. Under such conditions, it would be impossible for consumers and producers to get together on a definite operational verifiable specification simply because the consumer doesn't want to do so even though it were possible to make such a specification. This is particularly true in the case of the ultimate consumer who controls in the last analysis, what is SADE-Q. Here is an important element in this problem of judging quality that deserves a lot of consideration, - an element which perhaps by its very nature cannot be covered by definite meaningful specifications!!!!

With this preliminary introduction to some general principles which govern the ability to talk and act in a straightforward definite meaningful way, we can proceed to talk with better understanding in succeeding memoranda about some of the important problems in quality jurisprudence.

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