A Review of Gilbert's *Human Competence: Engineering Worthy Performance*¹

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Infrequently, a book is published which can dramatically effect the field of behavior analysis. Books of this sort are typically identifiable by the fact that they 1) reorganize our thinking about significant aspects of our field, 2) identify new and interesting ways to interact with our subject matter, or 3) broaden the scope of our thinking or the domain in which we intervene. Thomas Gilbert has written a book which makes contributions in each of these areas.

When Gilbert planned his book on engineering human performance, he established criteria by which he would assess the worth of his work. These criteria included the provision of a precise and unambiguous definition of human competence, methods for the precise measurement of competence, a model for engineering competence, and procedures for putting the criteria to practical and productive use. In each of these areas, Gilbert takes us a step beyond previous attempts.

Gilbert also claims to have developed a "comprehensive theory of human competence." I don't think that the term "comprehensive" should be applied to his theoretical notions. Rather, his theory should be described as one of the concatenated variety because his theoretical work consists of inductive generalizations. This does not detract from the value of his theory since his generalizations are themselves a significant advance for the field, but taken together, they do not constitute what is typically thought of as a comprehensive theory.

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¹ New York: McGraw-Hill, 1978.

An Engineering Point of View

Human Competence is an important book for our field. The book is quite consistently behavioral in its point of view and reflects Gilbert's training in behavioral psychology. But there have been a number of books and articles on behavioral approaches to businesses and organizations published in recent years which provide nothing new in methodology, techniques, measurement, or analyses likely to be useful in the organizational setting. The difference is that Gilbert has written a book from the viewpoint of the engineer. In doing so, he focused directly on the problem which an engineer faces in business and industry, not on satisfying editors, academic communities, or intellectual communities. The book is not a book about scientific approaches or behavioral approaches. It is a book about solving practical problems. It turns out that Gilbert's approach to solving practical problems incorporates a good deal from the scientific and behavioral communities. This is not a surprising fact, but the approval of these communities is not critical to the success of the book. What is critical is that the book effectively directs and controls the behavior of the intervenor in organizational and business settings. Gilbert is likely to succeed admirably in influencing the behavioral practitioner and he is to be commended for his accomplishment.

The book is important because it ignores the intellectual and academic communities. All too often we are plagued by work which is too much controlled by academic reinforcers and too little controlled by the effects secured through the intervention. The reviewer agrees with Gilbert's criticisms of the various academic and intellectual communities which divert us from a focus on achieving

results for those who request our services because it is necessary to satisfy editors who enforce the rules for the conduct of good science. Engineers, like business people, are concerned about maximization of dependent variable effects at minimal cost. Scientists are concerned with isolation of independent variable effects. Engineers do the best they can within fixed time and cost constraints. Scientists also have cost restraints that may keep them from answering questions at all, but they will (ideally) not let time or money influence the quality of the answer they provide. The engineer moves from baseline to intervention after considering cost, time, and data variables—not when the scientific community (in the form of its reviewer representatives) would agree that it is time to proceed. When the engineer introduces the element of cost, there is an implicit acceptance of the concept of obtaining the best answer for a fixed amount of money. This is contrasted with *the answer* required by the scientist. So much of the work of applied behavioral psychologists reflects the control of the academic and scientific communities and the concomitant sacrifice of good engineering practices that *Human Competence* is a refreshing change in its break with tradition. The book is extraordinarily pragmatic in its approach. Pragmatic approaches are assessed by what they produce, not how they produced it.

The Focus on Accomplishment

In Part I of the book, the author provides a general set of procedures for engineering human competence. He begins by providing his First Leisurely Theorem in Chapter I. The first theorem defines competence as a function of worthy performance which in turn is defined as a function of the ratio of valuable accomplishment to costly behavior. In taking this position on competence, Gilbert provides a behavioral vocabulary for an increasingly popular approach to management known as management for results. This approach to management stands in contrast to previous approaches to management which focused on management styles, manager behavior, or

manager traits. What Gilbert brings to this analysis is better described as an increased sophistication of concepts rather than an entirely new approach.

For some time there has been a general movement in business towards the evaluation of managers for what they produce rather than for who they are or how they go about their business. What Gilbert is talking about here may be missed by individuals who are narrowly focused on behavior. Gilbert's model is a systems model. Gilbert's focus is on productivity, a measure of the results produced by a system. The behavior of managers, supervisors, and workers are only some of the elements of the system which can be altered to affect results. Gilbert would attend as much to such environmental factors as lighting, work lay-out, work simplification, or machine modification as he would to the behavior rates of the individual. The effects of all these factors are measured in terms of what results they generate and how much they cost.

What Gilbert's theorem adds to this notion of results oriented management is clarity and simplicity. His strong engineering focus is evident here in that the First Leisurely Theorem focuses on precisely what is to be defined and measured and nothing else. The implications of the first theorem are significant. First of all, the reduction of worthy performance to a ratio of accomplishment to cost leads us to understand immediately that results alone do not identify worthy performance. It is results at low cost which identify worthy performance. We can affect worthy performance either by increasing the value of the accomplishment or by decreasing the cost of securing the accomplishment or both. "Working smarter," not "working harder" becomes the objective. It is curious that so much of the past effort of behavioral consultants has focused on getting people to work harder. Gilbert's important contributions here are that he requires a focus on the net worth of behavior and shows that rewarding people for behavior in the absence of this further analysis may result in the reinforcement of incompetent behavior (high work rates with minimal

payoff). Gilbert further states that accomplishment must be measured in economic terms. This delimitation seems unnecessary though it is likely that economic measures will typically prove to be the most useful in business.

Gilbert's first chapter alone makes the book worth reading because of 1) the strong focus which he places on accomplishment rather than behavior, 2) the provision of a concept of accomplishment which incorporates the notion of cost, 3) the focus on amount of accomplishment rather than on isolation of independent variable effects, and 4) the notion that measures of behavior are premature, if not harmful, prior to the measurement of accomplishment. Each of these notions proceeds from a behavioral engineering point of view, a point of view consistent with but not the same as the point of view necessary for the work of the behavioral scientist.

The Measurement System

Gilbert's Chapter 2 is devoted to ways of measuring the competence of an individual. Several important points are made in the chapter. First, Gilbert rejects any concept of the general competence of an individual, thus ruling out the notion of competence as a personal trait. Instead, he advocates the development of another ratio of two measures. The numerator consists of a measure of exemplary performance. Exemplary performance is identified as the value of the historically best instances of performance available. The denominator consists of a measure of the typical performance of the person who is to be rated. The resultant ratio of exemplary performance to typical performance is called a PIP, the potential for improving performance. It is the PIP which Gilbert offers as a universal measure of competence. As an example of a PIP ratio, assume that we have a worker who produces 40 widgets per hour. If the best worker produces widgets at the rate of 100 per hour, then our PIP ratio would be $100/40$ or 2.5. If another worker produced 75 widgets per hour, his PIP would be 1.33.

The PIP has a number of desirable features. Its principal advantage is that it

is a quantified measure of the results of work useful in assessing personnel. Heretofore, most quantifiable measures of personnel have been personal trait measures. More recently, we have developed quantified measures of the behavior of personnel, but we have not seen much significant work in the area of quantified measures of the effects produced by work activity. Such a measure has been sorely needed in order to begin the development of sophisticated people management systems which can complement the financial management systems which have been developed by accountants and financial managers. The development of technologies for the management of people has lagged behind financial management techniques, but the PIP concept stands as a significant measurement contribution which will support the eventual development of sophisticated data-based approaches to the management of personnel.

The PIP has several other desirable features. It does not imply a limitation of potential, a concept implicit in trait notions such as the IQ. Gilbert actually identifies the PIP as potential for performance improvement. Thus, the higher the PIP, the greater the potential for change. The notion here is that it is typically more difficult and costly to get a performer to move from a 95% level to the 100% level of performance than to get the 65% performer to move to 80% or 85%. High PIP's, therefore, are the focus of intervention for the behavioral engineer, since such a focus is likely to produce the most improvement for the least cost.

The PIP concept is sufficiently flexible to allow not only for the measurement of the performance of the individual but for the performance of departments or groups in organizations. We can get precise measures of the performance of supervisors and managers as well as line-workers. Thus, pyramided measures of PIPs (individual, group, department, etc.) are possible which allow the identification of levels at which interventions should be directed. The PIP is most likely to prove valuable when a single exemplar can be used as a standard against which to

assess the performance of many workers and when the typical performance of one group of workers can be compared directly to the typical performance of another group, thereby allowing the measurement of supervisor performance, etc. Thus, the PIP concept can be turned back upon itself, a sort of PIP of PIPs. The concept is very general and Gilbert provides many examples and a number of units of measurement that might be relevant to PIP calculations.

The PIP concept is not entirely free of difficulties, however. Finding an appropriate unit for PIP measurement can be extraordinarily difficult. Furthermore, the selection of an appropriate exemplar often seems close to impossible. Many businesses have positions which are not comparable to any other positions in the organization. Thus, some performance of the individual in question must be used as the exemplar. How is the exemplary performance to be judged in terms of the standard which it sets? Furthermore, what about the variety of circumstances in which most jobs are carried out? Might these not lead to the selection of inappropriately high or low PIPs? In Chapter 2 and later chapters, Gilbert spends considerable time dealing with these and similar criticisms of the PIP. He maintains (probably accurately) that the argument is often voiced unnecessarily and offers examples of many common conditions in which the PIP could have been identified, but was not, due to the inexperience of the observer and not to the nature of the work. Yet, this reviewer does not find his argument entirely convincing. When the value of the PIP is measured against the time and dollar costs associated with generating it (especially under circumstances where separate exemplars must be established for every performance or every performer) it simply may not be worth the time and dollar costs involved.

Nevertheless, the PIP concept is an important contribution to the field and is likely to prove valuable under many, perhaps even most, circumstances. The PIP may be the first of a series of approaches to the measure of human com-

petence that will emerge in the field. While the measure has identifiable deficiencies, it does provide a valuable solution to a number of performance measurement problems.

The Engineering Model

Chapter 3 is devoted to an explication of the behavior engineering model. The basic theorem around which the chapter is built states that performance deficiencies are a product of deficient repertoires or environmental supports or both, and that their ultimate cause is a deficiency in the management system. The model for behavior engineering which Gilbert articulates is very similar to the model known to most behavior analysts, except that Gilbert places more emphasis on the importance of environmental interventions which affect performance but which are not direct attempts at behavioral manipulation. Providing an employer with improved tools is an example of this kind of intervention. If productivity were poor in a lathe cutting operation, we might solve the problem by getting a better lathe rather than by designing a behavior modification program for the lathe worker. Too often behavior analysts focus too narrowly on behavior change techniques, and the result is that too little attention is paid to other factors which have a significant effect on accomplishment. I recall with some chagrin an instance in which a colleague engaged in environmental change interventions of the sort described by Gilbert secured a result for which I had been striving for some time through a direct-change (behavior modification) approach. Furthermore, he did so at a fraction of the time and dollar costs involved. An attempt was being made to reduce the population of the state hospital. The behavioral intervention programs were working, but the successful lobbying efforts of our colleague secured a change in the state commitment laws and had a far greater impact. There is a valuable lesson to be learned from Gilbert's emphasis on analysis and intervention not directly focused on behavior change itself. In several places in his book, Gilbert is quite critical of those who overgeneralize about the importance

of behavior manipulation strategies, and his criticisms are on target.

Intervention Strategies

Parts II and III of *Human Competence* contain additional valuable material, though the most important section of the book is Part I. In Part II, the author introduces a performance matrix in which he identifies six levels of analysis (philosophical, cultural, policy, strategies, tactical, and logistic) and three stages of analysis, (accomplishment models, measures of opportunity, and methods of improvement). This matrix provides a systematic approach for decision making. Fortunately, Gilbert does not provide a rigid format for conducting analyses, an approach which has led to superficial, by-the-numbers-analysis in some other descriptive models. Gilbert's matrix concepts place an emphasis on the complex ecological system in which accomplishment is produced in contrast to the rather simplistic models which behaviorists have generally used. Analyses of the complex interactions in an ecological system—analyses which have many components and which can be carried out at a number of different levels—provide a much more powerful approach to the solution of performance problems. Gilbert also provides a number of strategies to be used in troubleshooting performance in Part II, and his proposals are clear and concise.

Part III of the text seems less consistent than Parts I and II. Chapter 6 on Information and Competence is very well done. There are excellent sections on information about competence, confirmation of competence, and a section on directing competence through queries (a complex form of guidance leading to a particular conclusion), directories (of which an example is a duties checklist), and something called an ensampler (written guidelines in which the exact product cannot be specified). This section on directing competence is not thoroughly developed and the query example, though detailed, seems unrealistic. There are two chapters on training, another on Knowledge Policy at Work which provides good suggestions for action but nothing new, and a chapter

on Knowledge Policy in School which makes valuable points even though the materials seem somehow unrelated to the rest of the book.

In the chapter on Motivation and Human Capital, Gilbert presents rather cursory coverage of a number of issues in motivation followed by a somewhat idealized section on selection and promotion. I do not find his proposals for succession planning, selection, and promotion realistic. Basically, he suggests that anyone should be allowed the opportunity to learn a job and that a detailed specification of accomplishments, requirements, performance measures, and standards should be provided for a job. I have no argument with the provision of complete job descriptions, but the notion that anyone should be allowed to enter into competition for a position seems fraught with difficulties. What if too many people apply? How could a company afford such a program? Who would have the time to review all the candidates and how costly would it be? How could people outside the organization be brought in? There are many more questions to ask on these matters.

The book is quite inadequate in dealing with the managerial functions of recruitment, selection, succession planning, etc. Behavior analysts have never done well in this area, and Gilbert's FAIR program is only a small improvement. Some people are likely to do better jobs as bank presidents than others. This is not a problem of capacity or potential as behaviorists often view it. It is a problem of cost effectiveness. Can we find an appropriate candidate for bank president among those who cannot pass the second grade? Of course we can't. If we could provide the training for them (which we can't), the cost would not be worth the company's investment. Selection and hiring decisions are as costly to corporations as are training and development decisions, and our field needs to address such problems if we are to secure a satisfactory role in the business and organizational community.

Conclusion

Gilbert's book provides us with *an* ap-

proach to analysis and intervention. It is not *the* approach; it is a currently valuable approach to problem solution. Perhaps other works developed from an engineering perspective will now result. Perhaps more books will be written which reflect the understanding of business and organization that this book does. Perhaps new books will reflect and appreciate the importance of the corporate and organizational environment not only as a source of behavioral control, but as a source of direct control over productivity. The book is not without its faults. Under some circumstances difficulties are likely to arise with a number of the procedures and measures suggested in its various

chapters. But Gilbert has considerably advanced a useful approach to problem identification, measurement, and intervention in the organizational environment. His most important contribution, however, is his performance engineering perspective. In that light, the measure of *Human Competence* as a valuable accomplishment will be determined not by laudatory reviews or other indicators of acceptance by the scientific community, but by the extent to which behavior analysts and others produce worthwhile results under the influence of its concepts, methods, and techniques. My prediction is that *Human Competence* will fare well.