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ABSTRACT

This report is a critical evaluation based on extended field trials and theoretical analysis of the time-span technique of measuring level of work in organizational hierarchies. It is broadly concluded that the technique does possess many of the desirable features claimed by its originator, but that earlier, less highly structured versions based on detailed job content analyses show more promise than the later "shortened" version, which appears to yield results of questionable reliability. The critique is illustrated by field case study material wherever possible. (Author)

MEASUREMENT OF RESPONSIBILITY: A CRITICAL EVALUATION OF LEVEL OF WORK MEASUREMENT BY TIME-SPAN OF DISCRETION

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1. The Need for a Measure of "Responsibility"

Over the past 18 months with Office of Naval Research support, we have tested the recently proposed technique of "time-span measurement". This is claimed to yield a measure of level of work or responsibility for any position in any organizational hierarchy. The method has many features in common with job and position evaluation schemes and serves much the same purpose apart from several additional ones. This is to provide job and position specifications enabling the setting up of rank or grade systems and determination of associated pay structures. Schemes of this kind are currently commonplace as they are indispensable for smooth functioning of the organization, especially of large, complex technologically highly developed and functionally diversified ones, whether governmental, industrial or military.

A distinguishing aspect of the time-span technique is that it seeks to counter the tendency for level-of-work specifications to be conceived in qualitative and descriptive rather than quantitative terms, particularly for higher positions. This is a consequence of the failure of job evaluations methods, which are successful at shopfloor level, to carry over into higher organizational reaches. The eight-factor evaluation or point rating plan, introduced in 1943 by the Department of the Navy to classify its civilian white collar personnel at all levels, provides a classic example. Regarded as something of a breakthrough when first published, the plan was extensively revised and changed to a six-factor scheme in 1960 [23]; still more recently it has been reduced in status to an optional check to supplement descriptive Position Classification Standards. Numerous industrial plans of the same kind have suffered the same fate.

A major drawback of such non-quantitative evaluation schemes is that they cannot be used to determine whether an organization is over-managed or over-staffed, or whether it carries an excess of positions at one level at the expense of another. Moreover there is no way of ascertaining if there is a real need for a new position about to be created. Yet sound criteria for establishing new positions are badly needed, since most organizations continually tend to become top heavy. The Navy is particularly vulnerable to charges of overmanning at higher levels, both with respect to its professional officer staff and its civilian staff, and similar remarks may be made about other branches of the Armed Forces and governmental services in general. If the claims made for it were to

prove essentially correct, the time-span instrument would thus be of substantial value in setting and justifying realistic manpower levels in the upper echelons of organizations.

A further attractive feature of the time-span instrument is that coherent conceptual structures link it to methods and guidelines relevant to personnel selection, transfer and promotions, the delineation of limits of authority, and to organizational design. In the naval context this opens up the possibility of placing many at present largely disjoint personnel practices on a single broad foundation. In this connection, we have identified certain areas as particularly suitable for trial applications. They include selection and screening of candidates for appointment to executive and command positions, long-range career planning based on previous progression records, the introduction of quantitative notions into periodic personnel appraisals by superiors, and possibly determination of manning requirements and manning policies.

Beyond this, the conceptual constructs underlying the time-span technique provide leads towards the development of a methodology for the analysis of supervisory roles and command structures in operating organizations. These have already led to the development of a theoretical model for multi-level supervisory work systems keyed directly to the dynamic time-structured manner in which each command level allocates work and reviews progress of those beneath it. Specifically, the model postulates a nested set of error-actuated closed loop control systems, with gain and lag parameters related to organizational objectives and to time-span values measured at successive levels. Thus, time-span concepts may ultimately lead to quantitative design procedures for large-scale organizations.

2. Origins of the Time-Span Technique

Time-span of discretion as a concept and as a technique for determining level of work in occupational roles was developed by Professor Elliott Jaques while serving as consultant "social analyst" to Glacier Metals Ltd., a British metal parts fabricating firm. Detailed descriptions of the concept and the technique are contained in three major published works: Measurement of Responsibility (1956), Equitable Payment (1961) and Time-Span Handbook (1964).

The motivation for its development was as follows: Like most industrial firms, Glacier Metals experienced recurrent conflicts about pay differentials, despite the sophisticated and enlightened policies of its management (Jaques, et al., 1951; Brown 1960, 1962; Brown and Jaques, 1965). The job evaluation schemes used by the firm as a basis for pay rate setting seemed to work well enough under "normal" circumstances; but they tended to fail during critical periods, and it would have been well within Jaques' terms of reference to revise them. Instead he rejected job evaluation and turned his attention to devising

a completely new method of measuring the level of work in organizational positions, technically termed roles.

In the next section, level-of-work measurement by discretionary time-span is compared and contrasted with job evaluation, while in subsequent sections we examine the basic assumptions and the underlying concepts of time-span in greater depth. This critical evaluation is based on systematic experience with, and applications of, the technique over a prolonged period in several industrial plants in the San Francisco Bay area. Additionally we have drawn freely on the data and experiences of other researchers. Our aim overall is to determine whether the definitions, concepts and criteria set forth by Jaques are adequate to support his claim to have designed a near perfect tool kit for measuring levels of work within and between organizational hierarchies. Jaques' theory of work in its narrower sense will first be restated in its relevant aspects. Other propositions forming part of his general theory of work, e.g., the so-called work-capacity-payment equilibrium hypothesis, the one-rank distance organizational hypothesis, and so forth, will be deferred for consideration in later reports.

3. Current Status and Limitations of Job Evaluation

As a means of designing and amending wage structures, job evaluation methods have been in common industrial practice for so long that little space need be devoted to their discussion. The simpler methods, used mostly by smaller establishments with a limited range of occupations, either call for subjective rank ordering, any new job as a whole being compared with already existing jobs; or they start with a standard scale of predetermined rankings or benchmarks, against which existing jobs are compared and ordered.

This approach becomes unwieldy where the number of different occupations is large, and instead of crude rankings of whole jobs, each job is broken down into and assessed on a number of indepdent "factors" derived from job analysis.† As a rule, job evaluation is not extended upwards beyond first line supervision, and most factor breakdowns are indigenous to individual firms or corporations. Although the refinement in the breakdown of the factors varies widely between organizations, our experience in California industry shows them to be reducible to four main categories:

> Qualifications and Specific Skill Requirements -- These are usually expressed in terms of formal education and experience deemed necessary for minimum competence and in terms of the more or less specific skill that goes into acceptable performance on the job.

†This, the point or factor-point method was devised by Merrill Lott in 1924. No further major advances in job evaluation have occurred since.

Effort Required -- This is spelled out in somewhat loose and impressionistic descriptions of the psychological and physical stresses with which the job incumbent is expected to cope in the course of carrying out his duties.

Responsibility Carried -- This is usually described by reference to the consequences of failures in safeguarding plant, equipment and material (sometimes detailed in dollars), and of neglect of personal safety precautions.

Environmental Conditions and Special Hazards Encountered -- Included here are enduring deviations from "normal" in the physical setting within which the job must be performed, e.g., high noise level, abnormal temperatures, vibration, excessive dirt and dust, etc.; and special safety hazards to which job performer is exposed.

Job evaluation scores are computed as follows: Each factor has a range of numerical values ("points") assigned to it, allowing for different levels of job demand or requirement. From these the analyst subjectively selects the values judged appropriate to the weight that factor has relative to the given job. Individual point scores are summed to yield the total score, and straight conversion tables are used to determine the dollar compensation for each point total, and thus the level of compensation or so-called "rate for the job."

The essentially subjective nature of job evaluation will be clear from this outline description. Rejection on this score alone is, however, unwarranted in the face of extensive evidence testifying not merely to its usefulness in practice, but to remarkable reliability and consistency between and within trained and experienced raters (Lawshe and Sutter 1944, Lawshe and Maleski 1946, Lawshe and Alessi 1946, Lawshe and Wilson 1946, Chesler 1948, Crossman and Laner 1966, 1969). There are even indications that the job evaluation systems in different companies are not as idiosyncratic as might be assumed (see especially Chesler 1948, who shows the intercorrelations among the companies studied to be in the range 0.89 to 0.97). But perhaps one ought not to be too surprised: job evaluation would hardly have survived if it were as unreliable and defective as some detractors, Jaques (1956) amongst them, assert.

The limits of usefulness of job evaluation appear to be set not by subjectivity, but by changing job structure at foreman level and above. Here standardized routine jobs shade into ones which cannot be described in standard terms because standard performance is not defined, such definition in any case being undesirable. Taking the above factors in order, skill requirements at managerial, scientific and technical level is for conceptualization, creativity, decision-making capacity, and information processing capability; Speed is often irrelevant and quality cannot be assessed on short-term criteria; Qualifications and experience required often defy exact specification;

Level of effort is not necessarily related to output; Responsibility has an active and outgoing connotation rather than requiring strict observance of rules; Environmental conditions are normally comfortable, with special hazards rare or nonexistent. Further, the precise job content and the manner of performance is frequently under the incumbent's own control, the component duties being spelled out only in general terms.

Organizationally, the lack of dependable methods for evaluating jobs in the higher echelons has numerous drawbacks.

1) Compensation cannot be rationally planned since there can be no rate for a job that cannot be evaluated, only a rate for the job holder. In this connection, the conviction that it will never be possible to determine the levels of work of managerial, professional and engineering positions in industry has led to the development of the so-called Maturity Curve Method (Torrance 1962, Shaw 1962, Chandler, Foster and McCormack 1963, Kellogg 1964, Belcher 1964).

2) Rational criteria for filling vacant positions cannot be developed. Promotion must remain a matter of subjective judgment, with a large margin for error. An uneasy atmosphere of semi-secrecy is liable to surround individual compensation.

3) Manpower planning is difficult, there being no way of determining whether the organization is overstaffed at some levels, understaffed at others.

4) It is difficult to assess the cost of supervision and administration.

In this vacuum left by the unavailability of job evaluation, any reasonable method of measuring level of work should make a disproportionately large impact, even if it did not meet the highest standard of quantitative rigor. In this context, the Jaquesian time-span instrument has great potential. Recognition of this is overdue, and it is a plausible suggestion that the delay would have been avoided but for the prolonged controversy over the relative merits and demerits of time-span as a substitute for job evaluation.

4. Outline of the Time-Span Technique

In effect the time-span technique may be regarded as a job-evaluation method with only a single factor, viz., level of responsibility. Unfortunately, Jaques' term responsibility is open to misinterpretation, and careful adherence to the definition is required.

The argument runs as follows: Responsibility arises from the observed fact that every high level task entails freedom, in the sense

that its execution cannot be specified in every detail, as in a computer program. Stated differently, part of the task must always be left to the individual's discretion. It is commonly realized that the amount of discretion varies between jobs, tends to increase with experience, is greater in a vice-president's than in a foreman's job, etc. Unfortunately, the amount of discretion cannot be determined directly; hence it would seem to be impossible to compare the job of vice-president with that of foreman.

Faced with this difficulty, Jaques noted that both in the minds of job holders and of their supervisors, the notion of discretion implies an absence of intervention in the form of monitoring, supervision, or frequent spot checks. He proceeded to a quantitative conclusion arguing that if the amount of discretion is related to duration of supervisory non-intervention, a measure of duration should yield a valid index of amount of discretion. Thus duration, or time-span, of non-intervention prima facie provides an index of level of work.

It is apparent that, interpreted in this sense, the concepts of responsibility or discretion refer not so much to a factor as to a structural parameter which, Jaques believes, uniquely determines the demands made by a given job. As such it subsumes skill requirements, qualifications and experience, and other psychological demands of a job, including the demands for care and circumspection in the use of plant, equipment and material -- in short, the first three categories of factors in job evaluation schemes (see Section 3). It omits the fourth category, environmental conditions and special hazards, which are in any case largely extraneous and only marginally related to task performance. Hence, the omission of explicit reference to other factors does not necessarily bring the validity of the time-span instrument into question.

At a quantitative level, the key issue is the implied proportionality between duration of freedom from supervisory check and amount of discretion. At present this can only be regarded as a working hypothesis, but evidence in support of it does not necessarily require a direct way of determining amount of discretion. Indirect empirical support might be sufficient, and Jaques has clearly perceived this requirement in advancing evidence of the following kind:

-- Time-span values increase, as presumably does level of work, with level in the organizational hierarchy.

-- Employees in jobs having similar time-spans, though with dissimilar job contents, indicate very similar amounts of compensation to constitute "fair pay" both within and between industries. This phenomenon even seems to transcend national boundaries (Laner and Caplan 1968).

-- Anomalies in organizational role structures, associated with conflicts, tensions and employee disatisfactions are reflected in irregular time-span relationships.

These lines of evidence do indeed support the claimed relationship. The asserted status of time-span technique as an objective measure of level of work is a distinct question from its validity discussed above. A claim of this kind implies different criteria. For this it is not sufficient to demonstrate inter-observer reliability. As already mentioned, many subjectively based job evaluation schemes provide such reliability and consistency; moreover, since they use rating scales, they may even be referred to as measurement techniques. For true objectivity, it must further be established that judgment does not enter into the procedures at any substantive point, and that measurement is expressed on a scale not subject to differences in interpretation.

On both these counts the claim made by the time-span instrument to objectivity appears prima facie to be sound. Resort to judgment in the form of ratings is not required at any stage, although judgment enters into the decision on what is to be measured. The units in which the time-spans of discretion of individual tasks, and the levels of work in roles, are expressed in standard clock and calendar units; they have the same meaning for everybody and comparisons carried out in terms of them rely on straightforward arithmetic unaffected by differences in opinion. As shown below, this is not enough, however, to overcome all criticism.

5. Main Concepts

The fundamental concept in Jaques' theory is his definition of the technical term "employment work" as the application of knolwedge and the exercise of discretion within the limits set by the manager and higher authority in carrying out the tasks allocated by the manager, this going on in time, for salary or wages. It may be noted that this definition with the exclusive emphasis on the judgmental aspects of jobs, emphasizes that aspect of the colloquial term "work," which is increasingly coming to be regarded as the main human contribution to increasingly mechanized and automated industry, and hence the chief variable determining compensation differentials.†

Implicit in this definition is the need to establish criteria enabling one to separate the discretionary from the non-discretionary content of a given job. Jaques supplies definitions for each:

1. The discretionary content is that part of work for which external controls eliminating choice cannot be identified.

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†cf. Norbert Wiener in the Human Use of Human Beings: "In all important respects, the man who has nothing but his physical power to sell has nothing to sell which is worth anyone's money to buy."

2. The prescribed content is composed of those aspects of performance which the individual has to carry out according to defined, objectively verifiable specifications laid down by his supervisor, by higher authority, or by other external constraints.

This distinction can best be clarified by reference to an actual example. Suppose a foreman wishes to send a recently hired junior operator to purchase a special wrench to replace one which was accidentally destroyed. To get the item he wants, the foreman will go to some length specifying the characteristics (quality, size, price range, possibly the actual make, etc.) of the wrench required. In addition, he may specify the time when he wants the wrench, and the actual route and possibly the means of transportation to be used in obtaining it. Each prescription is clearly intended to reduce the operator's discretion by eliminating the need and the opportunity for making choices. Whether it actually does so is critically dependent on the extent to which adherence to the prescription is capable of being objectively checked. If the type of tool required or the source where it is to be obtained could not be unambiguously laid down, the foreman would have no option but to send a more experienced man or to go and get it himself. Prescription being impossible, the successful execution of the mission intrinsically demands the exercise of judgment. The foreman who nevertheless sent a junior operator would himself be falling down on his job; it would be a marginal failure of his discretion if he were to dispatch an operator having just slighly less experience than is required for the selection of the desired replacement.

Failure to adhere to task prescription is easily (though not necessarily immediately) detectable, and in most instances amounts to negligence, dereliction of duty, or breach of contract. For example, it is easy to determine whether a plant manager ordered to close down a facility has or has not complied. Similarly, it is easy to determine whether the janitor is or is not making hourly rounds as laid down by regulations.

However, no such direct criteria can be applied to determine satisfactory exercise of discretion. To track down errors in judgment -- faulty discretion -- the superior must devise procedures and set up mechanisms for comparing his subordinates' judgments with his expectations. These include quality and time standards and procedures for ensuring that accumulations of marginal departures from these standards are brought to his attention. Such standards exist for every task assigned by a manager, though it is not always easy to obtain explicit statements.

The concept of task is central to the time-span technique. Measurement cannot begin until the analyst has discovered the set of tasks allocated into a role, which engender the various activities

involved. The accuracy of the results obtained depends critically on the precision of this job breakdown. However, the number and type of activities comprising a task are secondary.

The main components of the task definition are:

1) Its prescribed objective.

2) The time of its allocation or initiation.

3) The targeted (not actual) completion time.†

Taken together these features are necessary and sufficient conditions for task determination. Once the task has been specified in these terms, its time-span of discretion is immediately evident: it is simply the time interval between the assignment (or initiation) and scheduled targeted completion.

In many work roles, especially at managerial levels, incumbents must watch the relative progress of all tasks assigned to them, including those which they delegate to their subordinates. If their progress is allowed to get out of line, some of them will be ready too soon, while the completion of others may lag behind. It is the manager's responsibility to prevent this happening and a long time-span implies considerable judgment in regulating progress. The concepts of single task role and multiple task role were specifically developed to distinguish between roles which contain or do not contain the additional load of discretion described.

A single-task role is one where decisions regarding the order and sequence of task execution as well as the setting of their starting time and targeted completion times are made by the role occupant's superior and not left to his own judgment. This amounts to curtailment of discretion, since the individual need not keep reassessing whether he has the task priorities right or should change them. In single-task roles discretion lies only in balancing pace against quality on the task presently being executed, aiming to ensure that output is just acceptable and is delivered just on time. It should be noted that, as a rule, marginally substandard quality will come to light later and sometimes very much later than marginally slow pacing.

In contrast decisions about priorities, about "borrowing" time from a long task to advance or complete other, shorter tasks, -- in

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†"Targeted completion time" has replaced "review point" of Jaques' original formulation. The review point was in fact something of a misnomer. It refers not to the time or frequency with which a manager formally approves the overall performance of a subordinate, which is the common usage of the word. Rather it refers to the point in time when the accumulation of marginal departures from expected standards would come to the attention of the manager.

brief time management -- constitutes the major area of discretion in multi-task roles. The incumbent of a multi-task role may have several tasks allocated simultaneously and further tasks added while other tasks are still in progress. The decisions about when any one of these tasks should be started, interrupted, or replaced by another, when it should be resumed, the intensity of effort to be put into it, the rate at which it should be worked on at any given time, are all his responsibility, i.e., at his discretion. Whether or not marginal misjudgment has been made in scheduling and balancing time and resource allocations to progress individual tasks cannot become manifest sooner than the target completion time of the longer extened tasks.

The time-span analyst must clearly distinguish between single- and multi-task roles. With some jobs, especially those of highly skilled operators and high grade clerical and technical personnel, this may require a very careful appraisal of the discretion exercised. Once a role is identified as single-task, the final step of determining the level of work is nearly automatic, being simply the time-span of the longest task allocated. The level of work of a multi-task role is determined by the so-called longest extended task; it is arrived at by first finding all extended tasks; i.e., tasks targeted for completion later than all preceding tasks, and then singling out the longest from among them.

It may be noted here that reliance on the longest extended task involves selecting a single extreme value from a distribution and constitutes a methodological weakness of the time-span technique. Discussion of this point will be resumed later in the report.

Some subsidiary issues of importance for the practical application of time-span deserve mention. Most of these relate the determination of the component tasks in a role and their interrelationship in the time domain.

It is uncommon in practice for a supervisor to assign one task at a time into a single-task role, and wait for its completion before assigning the next. As a rule a series of tasks will be assigned, i.e., several tasks will be allocated at the same time with the proviso that they must be carried out in a prescribed sequence, each being referred to the superior for review as soon as completed. In other instances review may not follow immediately after completing, the subordinate being allowed to finish several tasks before a review is scheduled. Such a set of consecutive tasks, carried out in a predetermined order, but subject to delayed review, constitutes a task-sequence, and implies a significant increment in discretion. Here, the superior would only become aware of marginally substandard discretion after, say, the first, second and third tasks were already completed, and the fourth task halfway to completion. He must then decide whether to let the subordinate continue until the next scheduled review point, when several more tasks may have been

completed in a substandard manner, or whether to stop the subordinate, review work done to date, and if necessary curtail discretion by reverting to work assignment by task-series, or individual tasks.

A complicating factor is frequently encountered in multi-task roles. The subordinate is assigned one or more areas of general responsibility. These are conditional tasks of the form "Do X, when Y," where Y are contingencies that may arise and X is discretionary action. The starting times of tasks are not then specified directly by the superior but by some form of demand. An example of this would be the service manager of a local car dealership who is answerable to the dealer. Targeted completion times are in effect agreed upon between the service manager and each customer seeking repair of his vehicle, and as in any other multi-task role, the service manager has to exercise judgment in programming, scheduling, and progressing the repairs. The starting point of each repair job (task) would be the point in time when the customer has agreed to commission the repairs. In other instances the starting point may be ill-defined. Thus, for example, the tasks of a legal advisor employed by a corporation to represent it in court "whenever required" do not begin when he actually appears before the judge, but when each case is initially encountered as a brief.

6. Requirements for Successful Application

Our field experience with time-span measurement has shown that the process through which levels of work are obtained within individual interviews does not conform to the usual paradigm: data acquisition → analysis → conclusions. We have only gradually come to realize the significance of Jaques' repeated reference to the need for conducting measurement within the framework of "social-analytic relationships." This strictly implies that the analyst is engaged as an active member of the organization though outside its normal authority structure, and indicates both that he is sanctioned to conduct confidential interviews on behalf of the organization as a whole and that he is familiar with organizational objectives and structure. An external researcher cannot normally achieve this degree of participation. Instead he must set up his own frame of reference for the measurement process by continued interaction with those he is authorized to contact.

We visualize the establishment of this necessary framework as occurring in three stages:

1) Acquire general understanding of the organization, its objectives, function and structure.

2) Introduce each manager to the leading time-span concepts.

3) With cooperation from managers, determine task-sets for each role.

The measurement process of ascertaining task extensions and determining levels of work then follows.

Step 1 is not specifically considered in any of Jaques' writings; but is clearly prerequisite to the procedure he advocates. Skimping it reduces the efficiency of the whole measurement process. In particular a good appreciation of the organization's objectives, technology and procedures must be developed. Descriptions of such aspects as the command hierarchy, the flow of work, communication and control channels, technical details of process and product, provide the essential background to the actual measurements performed later.

Step 2 is also important since time-span measurements depend on discovering exactly how each manager envisages the task-breakdown and allocates duties into his subordinate roles. Accuracy requires that tasks be defined in the precise terms of the method. Since only a manager himself knows how he assigns work to his subordinates, he is the analyst's chief source of information, and to communicate it, must understand the principles of task-definition and allocation of discretion. Thus no valid level-of-work measurement can be accomplished until the manager of that role is able to describe his allocation of tasks to that role under time-span definitions.

In Step 3 the manager and analyst together formally define the task assignment of each role. At this stage the analyst's contribution lies mainly in ensuring that the manager generates an appropriate and exhaustive set of tasks. Subsequently, the analyst ascertains the extension of all the defined tasks and selects the longest extended one to obtain the level of work for the role.

The relationship between manager and analyst takes on great importance at Steps 2 and 3. Evans (1969) has argued that accuracy requires that the manager in question perceive the activity of producing an accurate description of the tasks allocated to the subordinate as itself a task for which he is accountable. He goes on to mention a number of ways in which this requirement can be satisfied. Jaques (1964) implies a relationship where the analyst is vested with the authority of the manager's manager and as such can require the manager to come to "firm decisions" about how he allocates work to his subordinates.

Though Evans adduces no evidence to support his contention, if he is correct, research studies such as our own can only produce valid results if the research team has secured high-level authorization for the study, and if the authorization has been communicated to subordinates being interviewed as an explicit part of organizational policy. This requires sound initial preparation, but by no means invalidates research time-span determinations as a class. Evans indeed stresses that firms wishing to try out the time-span method have generally preferred analysts in a consultant

capacity. This preference should be no cause for surprise. Engagement of a consultant itself indicates to all staff that the investigator must be taken seriously. However, experience has also shown that for effective cooperation with consultants, who are often less than welcome at lower management and shopfloor levels, the announcement of their engagement has to be backed up by sanctions. Telling individuals that they will be held accountable for their responsiveness is a common form these sanctions take. But whether they ensure accurate information being given is questionable.

From the point of view of freedom from bias in results, there are thus grounds for actually preferring the analyst to be perceived as an independent researcher. It may take somewhat longer to create a favorable climate for his inquiries, but we have found that once the conceptual bases of time-span are grasped by the interviewee (often after a series of arguments with the analyst), they usually enlist genuine interest and involvement. Sanctions must be regarded as a weak substitute for such interest. They militate against the "social-analytic relationship" on which Jaques places so much emphasis.

7. Evidence Against the Time-Span Technique as Applied at Wage Earn-Levels

The evidence most strikingly at variance with Jaques theoretical time-span postulates has emerged at the lower levels of organizations. There one finds many "single-task" roles, the jobs being in the wage earner category, with rates fixed through collective bargaining with partial reference to job descriptions, analyses and job evaluation. Jaques expected these to yield to his approach as readily as those at higher levels. The adverse evidence accumulated to date may be summarized as follows:

Despite considerable persuasion on the part of the management, the workers in the wage-earning category at Glacier Metals, Ltd. (the firm which employed Jaques as consultant) refused to sanction substitution of wage rates based on level of work measurement for those arrived at through collective bargaining; and they rejected the proposal that level of work measurement replace job evaluation even on a trial basis. Similar reactions have reportedly occurred in other firms as well (including one in the U.S.). Overall, the time-span technique has not shown any notable tendency to supersede job evaluation at those levels where it is applicable.

This failure to make an impact at wage-earning levels has been "explained" by such factors as resistance to change, the fear, justified or otherwise, of some workers that they might lose a comparative pay or status advantage, apprehensions concerning loss of influence on the part of unions, etc. These assertions appear somewhat partisan and come dangerously close to suggesting that workers prefer an

unfair and irrational scheme over a fair and rational one. In any event, the attitudes of rejection have been maintained up to the present.

The second line of contrary evidence derives from reports of inter-observer unreliability, that is discrepancies between "readings" reported by different but equally competent time-span analysts on the same population of positions. Our own experience bears this out. Moreover, we do not know a single analyst prepared to defend even his own results with complete confidence where single-task roles are concerned.

But perhaps the clearest negative evidence is contained in graphs plotting "felt-fair" pay against measured time-span. Data of this type have been provided by Jaques' direct collaborators. They indicate that scatter in the "felt-fair" pay rates decreases as a function of level of-work itself, the dispersion being greatest at the lower levels in organizations and diminishing past the point where salaried roles replace wage earning roles -- i.e., the point at which the roles become clearly supervisory, managerial, or technical. The latter findings are particularly damaging since they cast doubt on the method with respect to the very criterion on which its claim to validity chiefly rests.

Taken together, the above lines of evidence certainly prompt a search for the reason why the method fails. Several avenues of inquiry are indicated. One of these concerns the distinction drawn by Jaques between the nature of discretion in single-task and multiple-task roles. In the first case, it will be recalled, discretion is postulated to consist essentially in balancing pace against quality in the performance of successively assigned tasks: the sequencing and programming of the tasks remains in the hands of the assigner, i.e., the supervisor. The discretionary content of multi-task roles, conversely, resides basically in balancing and progressing the tasks of subordinates in such a way that they are completed on time.

While it is possible that the major area of discretion in single-task roles is in something other than balancing pace and quality, the point that needs to be made is different. Distinguishing between the two kinds of discretion would be of small consequence if the distinction were not reflected in the measuring instrument. But it is so reflected to the extent that the methods of determining time-spans in single-task roles and in multiple-task roles are not identical. In fact there is even some divergence in the method applied to single-task roles having the form of a set of task sequences. At a minimum, this must raise doubts about the assumed continuity of the scale. Instead of a single scale, the time-span instrument may well be a

composite of two, possibly even three scales. At single-task role level the time-span scale may not cohere with the incumbents' subjective scale of extent of discretion.

These problems have been compounded by Jaques' recent reformulation of his technique substituting targeted task-completion time for review points, the latter being points in time when the accumulation of marginally substandard discretion crosses the threshold of a supervisor's attention. Since the precise determination of review points frequently proves troublesome, any simplification in this area would admittedly have been an advantage. But conversely, targeted completion times are difficult to determine for many single-task roles, and when determined, often appear arbitrary. One may thus finish with several different time-spans, some (for managerial, multi-task roles) computed in terms of targeted completion times, and others (for single-task roles) in terms of review points.

Assuming that the above diagnosis of the time-span instrument's defects is correct, a reformulation and some redesign might be expected to remove them, and reinstate the claim to generality. Though considerable, the labor involved might be worthwhile even if the final product were more useful for organizational analysis than for wage and salary determination. However, the shortcomings may be found to lie deeper.

The issue may be illuminated by examining the fundamental concept of Jaques' theory, his definition of economic employment work (Section 4). He equates this type of work with the application of knowledge and the exercise of discretion, and subsequently proceeds to measure it by time-span. In support he cites the views of employees at all levels to the effect that the exercise of discretion, or judgment, is actually experienced by them as constituting the main burden of their work. However, the question arises whether the exercise of discretion is felt to be the <u>whole</u> burden of work, in the sense that job holders consider it fair for their pay or/and status to depend on this factor alone. It seems likely that they do not -- that they expect other demands of the job, such as physical effort, special qualifications and amount of experience required, as well as more intangible demands, for instance ingenuity, initiative, meticulousness, etc., to be expressly taken into account. It would be surprising if this were not so.

If evidence is needed, the scatter observed in the felt-fair pay estimates of wage earners in jobs with the same measured time-spans provides it. The simplest hypothesis for this scatter is that discretionary time-span accounts for only part of the variance in the felt-fair payment data. The rest of the dispersion must be assumed due to other sources, i.e., other work demands which job holders feel important in relation to their compensation.

For an explanation of this puzzling oversight, we must refer to Jaques' writings, especially those parts where he discussed the question of equity. A normative approach may be detected here. Since from Jaques' viewpoint the judgment an employee has to use is the only thing that really matters in the execution of tasks, discretion is all that employee and employer should regard as relevant where either compensation or position are concerned. Hence, only a reward structure based on differences in the required amounts of judgment could aspire to being equitable. While ethically this proposition may be correct, the fact is that wage earners do not see it that way.

Few labor relations experts at least in the U.S. would allow Jaques' assumption that, if adopted, an objective means of measuring level of work would remove all difficulties and conflicts attending collective bargaining, to go unchallenged. Aside from its manifest purpose, collective bargaining affords both sides the opportunity of rallying support and reinforcing loyalties. It is this consideration which led Gomberg (1951) with his extensive trade union background, to dismiss job evaluation, regardless of the system used, as at best secondary in wage negotiations. It is surprising that a psychologist, especially of the psychoanalytic persuasion, should have consistently missed this point.

If this is really the problem, adjusting details of the time-span scale would be futile, and it might as well be abandoned in favor of job evaluation and collective bargaining

8. Limitations of the Time-Span Measure at Higher Levels

As a means of assessing levels of work above first line supervision, aside from having no competitors, time-span enjoys the substantial advantage that discretion and responsibility are more readily associated with managerial work, and their centrality is more readily acknowledged in the managerial context. Moreover, as technological advances remove more and more production and clerical labor (unskilled, semi-skilled and even highly skilled), and specialized technical personnel takes its place, the scope of time-span should increase. All this, however, is subject to the important qualification that the instrument's technical defects should be either minor or capable of correction.

The conceptual analysis of the applications of time-span to multi-task roles -- the kind of roles we are concerned with in this section -- is complicated by differences between the original method first advanced in Measurement of Responsibility (later elaborated in Equitable Payment) and the newer method, explained in the Time-Span Handbook. These differences are much more radical than Jaques appears to admit (or realize) when he represents the revised technique as no more than a simplified and time-saving version of its precursor.

Four features of the newer method are particularly noteworthy:

(i) All details of the tasks assigned into a role are to be obtained from the manager in charge of that role alone.

(ii) The laborious process of determining the review points for each task is eliminated. Review points are replaced by points in time where a task is due for completion (targeted completion times).

(iii) The level of work in a given role is equated to the duration of the longest extended task, a concept which did not occur in the original formulation.

(iv) Instead of covering the whole spectrum of tasks assigned into a role, the search is confined to three task areas likely to throw up the longest extended task (regularly recurring work; development projects; induction and training of new subordinates).

Only the second revision is explicitly mentioned by Jaques and it happens to be the least critical. Yet it is the remaining simplifications which significantly affect the reliability of the results obtained. Thus (iii) places the entire burden of measurement on extreme values which have always been viewed by statisticians with suspicion. This weakness is further aggravated by the elimination of the requirement for completeness in the task set implicit in (i) and (iv). This has been a troublesome feature of the time-span method from the start, there being no way of checking on the degree to which task-set completeness has been achieved, and thus ensuring that the search will be continued until the key tasks have been discovered. The consequent uncertainty leaves the decision on the termination of an interview almost entirely in the hands of the manager.

Consider, for example, the case of a plant manager or chief production manager described in the Handbook (p. 88) whom Jaques has found to have extended tasks of two, three and five years. None of these extended tasks lie within what the role occupant himself†, or his superior, or the superior once removed, views as his main or his most time-consuming area of activity -- the managing of the plant. Our own findings show no extended tasks in the latter area having time-span values in excess of 1½ years at the most. The two, three and five year tasks mentioned by Jaques have to do with planning, development, installation of new equipment, implementation of plant extensions, etc. Relative to the time, energy, application, and attention absorbed by activities concerned with running the plant, those devoted to planning and project work are small and intermittent. For

† Interviewing this role incumbent is now regarded as optional, since his superior is supposed to have full knowledge of all his work by dint of having complete control over task assignments.

this reason they might well not be mentioned during the interviews. But this highly probable omission would cause the final level of work to err by no less than 70%.

A further limitation on the reliability of the outcomes is imposed by the requirement that only tasks currently assigned into a role should be considered. The term "currently" is highly ambiguous. If it is meant to refer only to those tasks on which the role occupants are presently engaged, the results are liable to be vitiated by fluctuations in work load. On the other hand, if "currently" is used synonymously with "customarily," the manager interviewed invariably falls back on recall. Even ignoring the undependability of recall, how far into the past should the analyst press his inquiries? In our own interviews we have adopted the notion of a "data window" commonly employed in time series analysis. It involves examining a specific time-sample of a system's past behavior. But it is difficult to decide on the correct width of data window, since managers are apt to change the levels of work in roles from time to time, depending on the demonstrated or estimated capacities of actual role incumbents. In other words, the process generating the data is frequently non-stationary† and hence no single reliable level of work index can emerge.

Though not wholly free from these defects, Jaques' original method contained a number of compensatory and corrective features. For one, cross-checking the set of tasks obtained from the superiors against the role incumbent's account of the tasks assigned to him was made mandatory, and a final reconciliation of the two sets of data was an unconditional requirement. Again, the time-span yardstick could only be applied after data on two or more complete cycles of tasks or extended tasks had been compiled; the "data window" concept is implied in this treatment. Finally, levels of work derived by the older method are not expressed as single values, but in terms of ranges or brackets, which remove exclusive reliance on extreme values and attenuate errors caused by omissions from the completeness of the task set. It also contributes to realism, allowing for a certain amount of variance in the levels of work of identical roles.

It may well be asked why the initial relatively adequate method was abandoned in favor of an inferior one. There is a simple explanation. Exploring the complete task content of a role is time-consuming and becomes prohibitive when higher organizational positions are reached; here even one full cycle of tasks may occupy several years -- five to seven years would not be exceptional in a vice-presidential role. Yet the confidence that can be placed in the results derived by time-span measurement falls off rapidly as the analysis of tasks assigned into a multi-task role is abridged. By introducing his revised techniques Jaques has certainly not resolved the speed/precision

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†For a definition of stationary processes see for example, J.R. Pierce: Symbols, Signals and Noise. New York: Harper and Row, 1961.

dilemma facing the time-span analyst. The gain in rapidity has been achieved by accepting a loss of reliability.

9. An Alternative Approach to the Measurement of Responsibility

Despite Jaques' spirited defense, most students of the time-span technique have expressed reservations about the exclusive use of the time dimension as a means of determining the amount of discretion in organizational positions or roles. While it is generally agreed that the length of time over which an individual is free to use his judgment does bear a significant relationship to his level of work as experienced subjectively and by consensus of his peers, it is also felt the salary and status attaching to a position are co-determined by other factors, such as importance and complexity and organizational significance of decisions made, variety and type of responsibility, the losses incurred by possible misuse of discretion etc. Yet the degree to which the analyst is capable of routinely suppressing them and of conditioning the manager supervising the role to do the same, are regarded as the touchstone of technical sophistication in the use of the time-span instrument.

The objections described are quite evidently actuated by misgivings about the validity of time-span, which have been neither removed nor assuaged by the two standard lines of argument employed (see especially Jaques, 1964). The first refers to the opinion by individuals whose time-span had been measured and who confirm that their self-ratings of the subjective feeling of responsibility in their position corresponds closely with that yielded by the time-span measure. The second points to high correlation between subjective "felt-fair pay" estimates and the remuneration rate derived from the so-called equitable work-payment scale. The amount of data adduced in evidence has been meager, but this is beside the point. To lend force to the case for including other aspects of responsibility in a measure of level of work, requires criteria to be set up different from, or additional to, those implicit in the above evidence. Otherwise the gain accruing would be merely one of enhanced face validity.

By contrast, the defect in reliability of the time-span technique discussed in the preceding section provides a more solid and legitimate base for a search for a better instrument. An effort to discover other measurable dimensions of discretion may prove more economical and rewarding way of improving reliability than attempts at modifying the established procedure.

The only initiative in this direction of which we are aware has come from Crossman (1969) who has pursued some suggestive clues put forward by Jaques himself. The relevant passages occur in Chapter VIII of Measurement of Responsibility, where Jaques advances the hypothesis that

> "...the wages and salaries generated (note: in employment work) are a fixed percentage of the resources put under employees' discretionary control, and that percentage is identical with the rate of interest at which the employing organization can borrow money."

This hypothesis is derived from computations of the discretionary resources controlled during the maximum time-span period in several positions with levels of work (in time-span units) from 1 day to 10 years, in a national organization which borrows money at 5% interest. (Table on p. 111 in Measurement of Responsibility). But we are not here concerned with the plausibility of the hypothesis or of the estimate of the resources controlled, beyond noting that these estimates allow expression of levels of work in different positions in dollars instead of chronological time units. It seems likely that this would be more meaningful and therefore more acceptable to managements.

Instead of indirectly estimating the resources assigned to roles for discretionary disposal, they can be assessed directly, indeed with relative ease. Developing this lead, Crossman has introduced a two-component measure of responsibility termed the span of (discretionary) resource deployment. This is defined as the total amount of organizational resources which a manager allows his subordinate to commit before checking for possible departures from optimal deployment. The resources in question include the time of the role incumbent and all of his own subordinates whose work is directly and indirectly controlled; the value of staff and auxiliary functions which he may utilize; the equipment, premises, buildings and other capital items which he may employ; and the supplies (e.g., power) available to him for effecting the conversion of inputs into outputs. It should be noted that the derivation of resource deployment span entails measurement of a review interval. However, Crossman's definition of the review point (as also of the task) differs very substantially from Jaques'.

While many of the details of this alternative technique remain to be elaborated in the light of experience in its application, it has many favorable features aside from expressing levels of work in dollars. In particular, because every resource component and every activity (not just, e.g., the longest extended task) is taken into account in arriving at a final figure, doubts over possible omissions, such as are met with in assessing the completeness of the task set by the time-span method, do not arise. This in turn reduces, and possibly eliminates, the problem of ensuring reliability. Finally, there is every prospect that the method will prove equally applicable to any position in an organizational hierarchy, whether managerial, technical and professional, or shopfloor and clerical, whether hourly-paid or salaried.

In its present state, this potential method cannot be considered a practical alternative to time-span, and indeed it may depend heavily on time-span for validation. In the final analysis, the time-span and the resource deployment span may even turn out to be complementary.

10. Some Operational Problems

Before he confronts the conceptual problems discussed above, the analyst will commonly have encountered several more immediate difficulties as he tries to apply the time-span method in actual work systems.

Unlike other interviews, the time-span interview is not one where one party asks questions and the other answers them. Handled this way, it produces no results worth having. A basic error from which no inexperienced analyst seems to be immune is to shortcut the "preliminary" requirement of explaining the precise technical meanings he wishes the manager to attach to the terms responsibility, discretion, task, review, etc. during the interview. The familiarity of these terms, and their apparently clear connotations in common parlance, make such a requirement appear unreasonable. A single explanation is normally insufficient. Therefore a major function of the analyst throughout the interview is to monitor how the terminology is being used and to ensure that the information given conforms to his definitions and has the requisite precision.

For example, nothing might seem to be easier than to invite a manager to report how he assigns work to his subordinates. It may seem inconceivable that he should be unable to fully answer inquiries in an area that he himself recognizes as a prominent component of his duties. Yet frequently the simple enumeration of subordinates' tasks requires much effort. Evidently managers do not think of the work they allocate as tasks, or even as discrete blocks of activity. They seem to view these activities much more as continuous processes or flows calling for occasional intervention but not, except in emergency situations, for continuous attention. Certainly they do not conform to the analyst's concept that a definite point in time reflects targeted task completion. Most activities performed by subordinates are cyclical and individual tasks do not require repeated assignment. They have acquired the characteristics of "programs" which the subordinate calls up as required.

Thus when the manager is asked to talk about tasks, he tends to come out with such descriptions as "to take care of maintenance," "to deal with customers," "to sell our product," "to supervise operations in the shipping department," "to keep an eye open for new ideas in our field," etc. If the analyst is content with these broad categories and proceeds to inquire when the manager in charge reviews the "task" of "selling our product," he has allowed himself to be diverted from the correct path. The intervals between these reviews do not decide the time-span of that task, and the longest inter-review cannot be taken as the level of work in the subordinate role. Unfortunately, Jaques' Time-Span Handbook nowhere cautions against this error.

A satisfactory task description must, as a minimum, include a precise statement of its terminal objective and of the time allowed for reading this objective. "His task is to sell our product and

report to me every three months on how sales are going" -- does not qualify as an adequate task description; and the time component of the statement merely confuses the issue. The description lacks any indication of what the salesman is expected to accomplish. Without such an objective, the reporting that takes place cannot be regarded as a review in the time-span sense. Similarly the description "one of his duties is to train new operators" is insufficient to identify a task. An acceptable formulation would be "one of his duties is to train X new operators per year to the minimum standards required in Department Y." It is up to the analyst to persist in his inquiries until each sequence of activities listed meets the criteria of the task definition.

Further difficulties arise in determining the review points in many single task roles where task assignment is not in terms of target completion times. These arise from the fact that managers find it hard to distinguish between occasions when they seek or receive feedback on subordinate performance, and the much less frequent occasions when they use this feedback to appraise performance with a view to assessing how well discretion is being exercised. In the context of the time-span measurement technique, the term "review" refers only to occasions when marginal failures in the exercise of discretion would accumulate sufficiently to come to a superior's attention. Jaques makes the assumption (and our experience confirms it) that managers cannot do this except by reference to the end result or outcome of a task -- hence our insistence that a task specification is defective unless it includes a prescription of what the task should accomplish and when. The practical implication is that a check, inspection or intervention of any other kind made by a supervisor while a task is still in the process of execution, does not constitute a review of discretion and is therefore irrelevant for purposes of time-span measurement. By extension, this also applies to institutionalized periodic reviews, since it is the general progress towards the organizational goals rather than the use of discretion by individuals which are normally assessed through such reviews.

From these considerations it follows that the analyst will become confused if he simply asks a manager to tell him when each set of activities listed is reviewed. To be sure, answers will be readily forthcoming -- no manager is prepared to concede that he leaves his subordinates unsupervised once he has allocated tasks. Moreover, the cultural norm prevalent in industry demands that a manager keep his system under more or less continuous surveillance. Quite understandably, the manager will interpret the analyst's query as referring to the frequency with which he monitors the system or confers with a subordinate to keep himself informed about progress in that part of the system. But the analyst is after something else, and his route to it is roundabout.

The first step consists in ascertaining the standards against which the supervisor judges the performance of the subordinate. At what rate is he expected to produce? What are the tolerances to

which he must adhere? How many defective items per batch are just acceptable? How long may a customer be left unattended? Pressed to such degrees of precision, managers often experience difficulties in answering. It is the recognition of these legitimate difficulties which has led to the design of the technique of successive approximation. How this technique is applied can perhaps best be clarified by an example taken from Equitable Payment, referring to a manager of an accounting firm who is asked how many invoices he expects a clerk to check per day:

> He may reply that that is a very difficult question to answer. Sometimes it takes only seconds to check an invoice, others may take an hour or more of scrutiny and inquiry. There are, say some 700 invoices per month, but he could not state how many a day would constitute slow work. If one proceeds by means of successive approximation, the margins of the standards can soon be determined. One might ask if one per day is slow. Yes. One thousand per day? Impossibly fast. Five per day? Very slow. Fifty? Very good. Thirty? Wouldn't want less. Thirty five? Couldn't expect more! Somewhere between thirty and thirty five appears to be the targeted rate.

The method is applicable regardless of whether the standards used by the supervisor are in terms of quantity, quality, speed of working or task completion time, or combinations of these. Once the standards have been specified it becomes immediately evident what kind of performance or output is regarded by the supervising manager as marginally substandard -- an average of 28-29 invoices checked per day in the above example. Such marginal slippage would not be noticed by the supervisor until it had continued for some time -- it would take two working weeks before the above invoicing clerk was 10 to 20 invoices behind, having checked say 285 instead of the expected 300-350. This accumulation of marginally substandard discretion may just be noticed by the supervisor, but it may have to go on for say another one or two working weeks before the manager would be certain enough that something is amiss to call the subordinate to account. Hence the review point (in its specific technical meaning) is four working weeks removed from the day when the clerk started to marginally slow down in his recurring task of checking invoices. It need hardly be emphasized how readily one can fail correctly to determine the review point.

In the overwhelming majority of cases it would not be the supervisor who would discern the occurrence of marginal failures in judgment through direct and deliberate review, and this needs to be pointed out to him. Rather, indirect review mechanisms are much more likely to alert him: another department might report being slowed down, customers might complain about quality of product or lateness of delivery, the shipping department would disclaim responsibility for incomplete consignments, more of the product than usual might be returned for rework, the secretary might convey a committee's

displeasure about the unavailability of a promised report, etc. It is surprising how quickly and precisely managers are able, on the basis of such information, to diagnose the source of marginal failures in judgment or discretion in actual practice. It is not too much to suggest that whether he is consciously aware of it or not, every manager operates a "warning" system which helps him to exercise control over the activities in his area of responsibility. Unless the analyst knows enough about these activities to propose some potential review mechanisms to the supervisor interviewed, he may well carry away with him an exaggerated estimate of the period of time over which a subordinate is free to exercise discretion.

It should be clear by now that time-span measurement is not easily performed. The analyst must secure a manager's willingness to participate in a process of semantic re-education. He must understand in some detail the nature and interrelations of the activities in the manager's department. Somehow he must persuade the manager to expend the effort necessary for reanalyzing and reclassifying the activities in his charge into categories conforming to the analyst's criteria, and making explicit the standards he applies to the work of his subordinates, and the review mechanisms on which he relies for information vital to the control of his department -- without clearly realizing it. Even then the chances are great that important aspects will evade him.

How can the dangers of oversight be avoided or at least reduced? In our experience Jaques is wrong in his latest claim that all the information required can be obtained from the manager in charge of an incumbent or of a role† as long as it is explained to him that three main areas of work have to be explored (Regularly recurring work; Development projects, Induction and training of new subordinates) and the analyst persists in their exploration.

In the case of a subordinate whose assignments are largely in terms of "areas of general responsibility," the task composition of which has to be elicited for measurement purposes, it is quite obviously impossible to get all that is needed from the manager in charge. He does not know and cannot be expected to know. But in every other case too, we find that supplementation by direct observation and by discussion with the subordinate yields information without which the analyst cannot build up in his mind an adequate picture of the task structure. With extended experience it may be possible to reduce the duration of contact with the subordinate, but it can never be dispensed with altogether. What is more, the analyst must next present his findings to the manager in charge of the role. For it is he who is decisive in laying down both the prescriptive framework and the discretionary content of that role, he who must make up his mind

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†Handbook, p. 26: "It should be noted however, that discussion with C (i.e., the subordinate whose level of work is being measured) is not an essential part of the technique...The measurement can be carried out in discussion solely with B (i.e., the supervisor)..."

if the way in which the work is performed corresponds to his ideas.

This brings us to the main and most pervasive operational difficulty, one which is as hard to demonstrate adequately by description as it is certain to impress the analyst as soon as he starts to apply the method. Invariably he will sit down opposite the manager in the belief that the job in hand is to obtain interview material to be followed later, possibly much later, by time-span measurement. However, as long as this is his frame of mind, unaccountably things will keep going wrong. And they will continue to go wrong until he comes to realize that the interview is not separate from measurement -- that measurement has begun as soon as he has asked the first question or offered the first explanation and clarification, and that it is the manager rather than himself who carries it out.

11. Applications, Potential and Prospects of Time-Span Measurement

In attempting to summarize our evaluation of Jaques' time-span of discretion technique, it has to be emphasized that our initial interest lay primarily in its potential as a research tool. Although our experience in its use is still incomplete, we can certainly confirm the originator's claim that it permits measurement and not merely rating. Since the technique consists simply in determining a time-interval -- viz., the length of time over which occupants of roles are expected by their superiors to exercise discretion across the tasks assigned into the role -- the analyst is in principle not required to make subjective judgments. Also, task extension is expressed in entirely public units -- calendar days, weeks, months, etc. These features do indeed constitute an advance in job measurement technique with wide applicability.

This much being established, a number of relatively secondary problems were found to arise regarding the status of the measurements obtained through the use of the time-span instrument. Together these imply that as currently implemented the time-span instrument can achieve only moderate standards of precision. The originator recognizes this as evidenced by the following passage from the Handbook:

> "Accuracy to the week in high-level roles, or to the day, the hour or the minute in others, is not required. You will find that tasks of time-spans of 5 years and over are commonly assigned to be taken to the nearest year; time-spans of 2 years to 5 years, to the nearest half year; time-spans of 6 months to a year, to the nearest week; 1 to 4 weeks, to the nearest day; under a week, to the nearest hour, or half day; and under 1 hour, to the nearest 5-10 minutes."

Numerically speaking these probable errors represent around ±20 percent of a given (nominal) time-span value.

However, this level of precision is not always easy to achieve due to difficulties in obtaining unambiguous formulations of the entities measured, i.e., task extensions. Especially in many so-called single-task roles, whose occupants are required to exercise discretion in the execution of one task at a time, the review of discretion often occurs indirectly, through mechanisms built into the process, rather than directly by the superior. Indeed the supervisor is often not explicitly aware of these mechanisms. The burden of identifying them falls on the analyst whose determinations depend partly on his analytic skill, partly on the extent of his familiarity with the tasks involved and the context in which they are carried out.

The difficulties connected with time-span measurement of multi-task roles occur not at the level of individual tasks but of the role as a whole. The longest extended task, which is critical for the accuracy of the level of work determination, may be infrequent, and hence easy to miss. The likelihood of such an oversight can be reduced, but only at the cost of extended interviewing. There is no other way of increasing the precision of a method which relies throughout on extreme values rather than on means or medians.

Similar considerations affect the reliability of the time-span technique. Different observers can obtain time-span values varying beyond the range allowed by the above passage, especially where single task roles are concerned. However, inter-observer reliability is much better with higher level jobs, partly because the margin of error allowed is wider, but probably also because the structure of the work itself more directly reflects time-span principles.

Despite some lack of precision, the time-span technique must be rated a valuable tool for organizational analysis: it is the only means yet devised for dimensioning the relative responsibility of "level" of positions on a single rational scale up to the top of managerial hierarchies, and across enterprises and institutions, including governmental agencies. Thus, its usefulness extends into the fields of organization planning, promotion policy, and related application areas, as well as its primary area of salary determination.

For positions beyond the wage earning level it enjoys the advantage of having no serious competitors. Because the main content of these positions is generally accepted to be the discharge of responsibility, and because responsibility was not thought to be measurable, existing methods of evaluation have focussed on the personal characteristics of the occupant rather than the demands of the job; compensation has consequently tended to be conceived in terms of a rate for the job holder rather than a rate for the job. Among many drawbacks to this method, a major consequence is organizational inflexibility and undue increase in number of administrative positions, due to lack of an absolute yardstick for organization structure. When each component of an organization can only be judged by reference to itself, no coherent analysis is possible, nor can a salary scale be devised whose equity is open for anyone to verify.

At wage earning levels, by contrast, the prospects for application of the time-span instrument are less promising. Over the years methods of job evaluation, and the associated methods of salary determination, have attained a high standard of sophistication and seem to be well attuned to the needs of both managements and employees. By taking into account a variety of job characteristics, they are perceived by workers to possess a degree of relevance which the one dimensional time-span measure could not claim. Even the shortcomings of job evaluation schemes are functional, inasmuch as they provide the framework and pretext for collective bargaining. By dismissing these established procedures as purely "ritualistic", Jaques clearly underestimated the value of institutional stabilizers. Against this background, the apparent rationality of the time-span technique may even be a drawback for low level job evaluation. This is compounded by the relatively low precision of the measurements obtained.

Yet it does not necessarily follow that the effort involved in measuring the time-spans of hourly paid blue collar or white collar personnel is wasted. Some unsuspected benefits have been reported by organizations which undertook time-span studies at these levels initially as an academic exercise. One of these benefits was the realization that the excessive fractionation of jobs -- a not infrequent by-product of time and motion analysis -- has had the effect of stripping away all, or almost all, discretion. Even more instructive was the discovery that the job holders affected are keenly aware of having been virtually turned into machines with consequent low morale. By revealing such a state of affairs, time-span measurements can point up both the need for the redesign of some jobs and mechanization of others -- a not negligible contribution at a time when many organizations are perplexed by motivational problems.

Due to technological convergence, the armed services also encounter these problems first noted in industry. But because profit-making is not one of their goals, the armed forces lack the cost reduction impetus geared to earnings, which in industry act as a powerful restraint on the expansion of administrative functions. While time-span measurement cannot be regarded as a direct substitute, it does offer a rational method for uncovering excessive overlaps between roles in terms of the discretion allocated to the tasks composing these roles. That it can deliver the necessary data base for the gradual pruning of enterprises burdened by too many management levels has been demonstrated. There is nothing in military organization to preclude the compilation of a similar base, or its use for comparable purposes.

From the above critical notes the reader of this report may be led to conclude that the time-span technique contributes a significant breakthrough towards the design of more highly effective organization. The reduction of the concept of responsibility to measurable proportions alone certainly warrants such a conclusion. That the specific techniques for quantification are relatively crude, and the measurements derived by their aid consequently deficient in precision and reliability

is only to be expected. But in our view the main thrust of further development will not lie in the direction of more refined techniques of measuring the single dimension of time-span of discretion. Rather it will consist in identification of other measurable dimensions of discretion and responsibility. The chances of success in this direction appear excellent.

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13. ABSTRACT

The present report gives a critical evaluation based on extended field trials and theoretical analysis of the time-span technique of measuring level of work in organizational hierarchies. It is broadly concluded that the technique does possess many of the desirable features claimed by its originator, but that the earlier, less highly structured versions based on detailed job content analyses show more promise than the later "shortened" version, which appears to yield results of questionable reliability. The critique is illustrated by field case study material wherever possible.

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
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Job analysis						
Work measurement						
Measurement of responsibility						
Time-span of discretion						