Fine, S. A., Harvey, R. J., & Cronshaw, S. F. (2004, April). *FJA strategies for addressing O*NET limitations in a post-DOT environment* In Fleishman, E. A. (Chair), *Things, Data, and People: Fifty years of a seminal theory.* Symposium presented at the Annual Conference of the Society for Industrial and Organizational Psychology, Chicago.

FJA Strategies for Addressing O*NET Limitations in a Post-DOT Environment

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The goal of this portion of the symposium is not to offer a detailed critique of the O*NET. Rather, we seek to advance a *proactive* and *constructive* approach based on FJA that provides an alternative strategic vision for the future of occupational analysis in the 21st century, one that specifically attempts to help former-DOT users deal with the loss of the DOT. Each author describes strategies for leveraging a half-century of FJA theory and empirical research to develop a new national occupational information infrastructure. Methods based on traditional FJA technologies, as well as innovative techniques that build on research from structured job analysis surveys, are considered.

Since before World War II, the various editions of the *Dictionary of Occupational Titles* (DOT) have served an invaluable facilitative role for the practice of I/O by providing several generations of practitioners with an occupational taxonomy and a conceptual organizing schema/common-language for talking about work. For the past 40 years, this common language was based on the Things-Data-People (TDP) taxonomy and worker-function scales embodied in Fine's Functional Job Analysis (FJA) theory (e.g., Fine, 1955; Fine & Cronshaw, 1999). Many important private- and public-sector personnel functions came to rely heavily on the DOT's occupational-title taxonomy and database of work/worker requirements, including such mission-critical applications as the US Social Security Administration (SSA) process for determining disability status and adjudicating disability claims. Each year, SSA administers tens of *billions* of dollars of worker disability claims, relying heavily on the descriptions in the DOT to determine whether a claimant should be deemed disabled.

Approximately ten years ago, the DOT's publisher (the US Department of Labor) decided to cease issuing periodic updates to the DOT, and to instead develop a new online database termed the *Occupational Information System*, or O*NET (e.g., Peterson, Mumford, Borman, Jeanneret, & Fleishman, 1999) to replace it. Unfortunately, although the initial vision (APDOT, 1992) for the O*NET was quite comprehensive in terms of the "content model" or domain of characteristics to be included, after 10 years of development the current *implementation* of O*NET has been widely criticized by former DOT users (FDUs) – especially those involved in disability and rehabilitation (e.g., IARP, 2001; Karman, 2002) – for failing to meet their needs. In particular, ONET as currently implemented arguably fails to provide (a) occupational data expressed at the appropriate level of *detail* and *defensibility* needed for many functions, and (b) an occupational title taxonomy that is sufficiently *detailed* and phrased at the desired level-of-analysis (i.e., 13,000+ *occupations* in the DOT versus fewer than 1,000 far more abstract *occupational units*, or OUs, in the O*NET).

Indeed, DOL has explicitly stated that O*NET is *not* designed to address many HR functions that are of interest to applied psychologists, rehabilitation professionals, and others (e.g., identifying worker-trait requirements, setting competency standards, determining disability status, and similar litigious functions involving job-relatedness). For example, in contrast to the sweeping goals articulated early in the development process (e.g., APDOT, 1992), the DOL now cautions that "the O*NET database was not designed, nor is it supposed to be used, as a *job selection or matching tool*" (http://www.doleta.gov/programs/onet/IA.asp, emphasis added), and that "when considering using O*NET information for selection purposes, the responsible party must keep in mind that O*NET occupations are broad categories and *should not be assumed to represent a particular job in a particular setting.* .... [instead, the] O*NET database is occupational information which may be used as a *starting point* by employers to help *develop their own particular systems*" (Bell, 2002; emphasis added).

The above review was included not for the purpose of offering a detailed critique of the O*NET, but rather as a means for presenting our rationale as to why alternatives to the O*NET need to be evaluated. In this presentation, we seek to provide an *alternative strategic vision* for the future of job and occupational analysis (JOA) in the 21st century, paying specific attention to addressing the concerns raised by FDUs in the current post-DOT environment. In the sections below, each author describes strategies for leveraging a half-century of FJA theory and research to provide the conceptual foundation for developing a national occupational information infrastructure. Although the O*NET represents an ambitious undertaking and a substantial investment of resources (e.g., Peterson et al., 1999), it comprises only one of many possible visions for the future of JOA. As we describe below, we find numerous advantages in taking an *evolutionary* approach that builds on the rich theoretical and empirical foundation of FJA.

Fine's Strategies

Future Research With TDP/FJA

The research that produced the Theory of TDP/FJA was undertaken for the practical employment objectives of the United States Employment Service (USES). These objectives included: selecting workers who fulfilled employer specifications, counseling inexperienced entrants to the labor force, guiding workers with handicaps into jobs that suited them, and designing jobs in general and new careers in particular. All of the objectives were met to one degree or another.

Beyond our efforts to meet these objectives, FJA broadened understanding of jobs. Earlier categorization of jobs as skilled, semi-skilled and unskilled was quite misleading as far as worker skills were concerned. Similarly inadequate was the separation of laboring from professional and technical jobs since the same functions could occur in jobs in all fields of work. Using the FJA job analysis technique, all work could now be understood as varying combinations of interacting Things, Data, and People functions on different levels and in varying combinations. Although some jobs might be on a low level in Things or People Functions, they could be on a high level in Data and vice versa. There was now one language to describe all work.

From a selection standpoint it was clear that traits such as strength, intelligence and education were possibly less important than Adaptive Skills, the skills required to manage oneself in relation to conformity and change. Many Adaptive Skills have recently been referred to under the rubric of emotional intelligence. Included in these skills are adaptations to the environment of work; moving toward, away from, or against people; and especially the universal requirement of adapting to instructions that range from prescriptive to discretionary — here again in varying combinations. Clearly jobs requiring low levels of Specific Content Skills required significant Adaptive Skills, which had been more or less taken for granted in earlier job descriptions. With the understanding provided by FJA, taking these skills for granted was no longer acceptable. Dr.Cronshaw has developed a structured interview that generates information relevant for functional selection. The role of Adaptive Skills is an area of research that needs far more investigation. In a study carried out in a division of a large American corporation, Functional Job Analysis helped achieve new insights into the competency requirements of engineering personnel, particularly service engineers. Adaptive Skills turned out to be at least as essential as Functional and Specific Content Skills.

In the area of selection, functional job analysis provides an effective basis for synthetic validity. In my dissertation (1962), I was able to predict specific aptitude patterns for selected jobs equally as well as the empirical studies done with the General Aptitude Battery thus demonstrating that functional job analysis could be used as a criterion for the empirical determination of specific aptitude pattern, a finding that could have far reaching implications. I have made an item-by-item comparison of the functional skills of FJA and the General Work Activities (GWA) described in O*NET. They are remarkably similar, some of them having almost identical phrases despite the fact that there is at least a 20-year time span between them. It would seem that just as Things, Data, and People are underlying factors in the job spectrum, general work activities or worker-oriented variables are likewise basic in the world of work. This should be a fruitful area for research to establish whether these variables are truly universal and therefore useful as building blocks in selection and job design.

One especially attractive aspect of FJA is that it is possible to deconstruct jobs into their various functions and relate specific training components to these functions. About 40 years ago, I was urged by two New York University professors to develop guidelines for the design of new careers for entrants into the labor force. I outlined a technique for doing so in a widely circulated brochure entitled, "Guidelines for the Design of New Careers," thereby making the technique available to social service agencies throughout the country. I applied the technique in a demonstration project for the state of Utah, showing that the lower-level functions of social worker jobs, those involving limited specific content, could be incorporated into jobs for persons on welfare. Quite a few individuals were hired for these jobs. After gaining experience, a few returned to school to study and become social workers. This design aspect of FJA is also in need of further research.

FJA posits a certain balanced humaneness in the functional loading of jobs. Early in our job analysis studies we discovered how jobs were unbalanced by being under- or overloaded with functional requirements and instructions. These requirements interfered with productivity and were unreasonable for achieving the standards of both workers and employers. FJA made this quite evident. In today's work world where there is so much fluidity, downsizing and reorganizing, it would be especially useful to apply FJA to research with the objective of minimizing the chaos that is reported to occur.

One of the outstanding applications of TDP/FJA can be found in the USES publication entitled: "Guide for Occupational Exploration" (1979). This guide was widely used, and as far as I know, is still being used, as a counseling tool. It purports to describe work situations drawing not only on functional concepts but also on the extensive trait research that was carried out at the same time as the development of TDP/FJA. The traits drawn upon appeared in the publication, "Estimates of Worker Trait Requirements for 4,000 Jobs Defined in the Dictionary of Occupational Titles," published in

1956. The "Guide for Occupational Exploration" was extensively used by the Social Security Administration to make decisions associated with workers applying for disability due to illness or accident and to determine what other jobs they might perform with their residual Functional and Adaptive Skills. The most famous vocational self-help book in the world, *What Color is Your Parachute?* by Richard Bolles also makes effective use of TDP/FJA theory in guiding readers in their self-exploration. to arrive at a vocational choice.

Harvey's Strategies

What Works, What Doesn't?

When charting a course for the future of JOA in a post-DOT environment, an obvious place to start would be to ask ourselves two questions: (a) what did the DOT do *right* in terms of providing a useful national database of occupational information (i.e., aspects that we should maintain in successor systems); and (b) what did the DOT do *wrong* that we should try to avoid? Although change is necessary and useful, progress in science and technology is usually enhanced to the degree that we attempt to *build* upon past theoretical and empirical accomplishments, and avoid perpetuating past mistakes; in my view, when developing a successor to the DOT, the field of JOA would do well to follow such a plan.

Although the DOT was widely used for over a half-century, some limitations were present (e.g., see Cain & Green, 1983; Boling & Fine, 1959; Harvey, 1992; Webb, Shavelson, Shea, & Morello, 1981), particularly regarding the psychometric and legal-defensibility status of the practice of using single-item scales to holistically rate abstract worker-trait requirements. To my reading of the literature, the above DOT-focused studies, as well as those that examined holistic ratings in other JOA-relevant settings (e.g., Butler & Harvey, 1988; DeNisi & Shaw, 1977; Gibson, Harvey, & Quintela, 2004; Harvey & Hollander, 2002; Harvey, Wilson, & Blunt, 1994), argue forcefully against the use of holistic scales in the DOT's successor.

Additional research is needed to fully document the range of situations in which holistic judgments fail to converge adequately with data collected using traditional (and *defensible*) decomposed-judgment strategies; however, past research has already documented a range of cases in which low holistic-decomposed convergent validity was seen for ratings of worker-trait requirements and work-activity constructs. Regarding other psychometric issues, ample research already exists to justify the conclusion that holistic ratings often suffer from poor interrater agreement and low discriminant validity; indeed, some of the most clear-cut and disturbing studies of this type have been conducted using large samples of ratings collected with the actual O*NET rating scales, and the actual raters who provided the O*NET database (e.g., Gibson et al., 2004; Harvey & Hollander, 2002, 2004).

Such results should give pause, especially for situations in which ratings are to be used for litigation-prone functions such as disability determination or employee placement. Although the researchers who developed and revised the DOT obviously did not have the benefit of being aware of all of the research findings documenting the poor performance of holistic ratings that have emerged over the past 25 years, such results must be considered as the field of JOA goes about the ongoing process of developing replacements for the DOT that will take us through the 21st century of occupational analysis.

Although holistic ratings constitute an aspect of the DOT's design that – in my view – should *not* be perpetuated, many aspects of the DOT's vision for occupational analysis were highly successful, and should be built-upon by its successor, including: (a) using an occupational-title taxonomy that strikes a balance between the conflicting goals of parsimony versus granularity; (b) relying on skilled occupational analysts to collect ratings to enhance confidence in data quality; (c) providing task-level descriptions in addition to more macro views; and (d) offering a conceptual foundation built on FJA's TDP taxonomy to provide a high-level common language with which to describe general work activities (GWAs) and compare occupations. The perceived absence of these characteristics in O*NET forms a common theme among criticisms raised by FDUs (e.g., IARP, 2001; Karman, 2002).

How to Move Forward?

Returning to the focus of this presentation, what forward-looking solutions do I offer to address the problems of developing a suitable replacement for the DOT and mollifying displeased FDUs? Simple: develop an online system that (a) builds upon the strengths noted above that were present in the DOT (particularly, with respect to occupational title granularity, relying on expert raters, rating verifiable aspects of work, using TDP to provide a high-level view of work, and using FJA's worker-function approach to describe work), and (b) avoids the more significant flaws in DOT (particularly, holistic ratings, the absence of a comprehensive profile of *moderate specificity* GWAs to supplement TDP, and the infrequent schedule on which updates to the database were made).

Given the ambitious nature of the above objectives, the first thing I wish to stress is that I am not opposed to the oft-repeated goal (e.g., Peterson et al., 2001) of reducing the costs associated with collecting and maintaining a nationwide database of occupational information. However, the truism that "there is no free lunch" is, in my view, directly relevant to the task of replacing the DOT. In short, if users of the information contained in a national database of JOA information lack adequate confidence regarding its accuracy, psychometric quality, relevance, comprehensibility, or legal defensibility, it arguably does not matter *how* much money was saved when collecting or updating it. "Job One" with respect to developing a worthy replacement for the DOT, in my assessment, is to be able to provide the most accurate, comprehensive, useful, defensible, and accessible database possible. Although containing costs is important, if the primary objective is not achieved, the resulting database arguably lacks value even if it cost nothing to collect.

For example, consider the SSA, an organization that continues to rely heavily on DOT-centric descriptions of work to defend its determinations regarding worker disability status in court. For SSA, a change of only a few percentage points with respect to the ratio of disability-status cases that it wins versus loses in court could translate into *billions* of dollars of yearly bottom-line impact. With stakes of this magnitude, even the costs associated with maintaining the print-based DOT look like

a bargain; given the significant advances in technology (see below) that have occurred since the last major revision of the DOT, it is likely that significant efficiencies can be achieved with respect to that cost baseline.

Finally, with respect to the goal of identifying strategies for advancing JOA in a post-DOT world, I'll conclude by offering two arguments that some may find surprising. First, the "worker oriented" standardized "xxQ" job surveys that have achieved such popularity (e.g., see Harvey, 1991a; McCormick, Jeanneret, & Mecham, 1972) have all – to varying degrees – failed to achieve their stated objective. Second, the demise of DOT and the limitations of O*NET do not constitute "problems" facing our field; rather, they offer unique opportunities and stimulus for JOA researchers to make major technological advancements.

What is "Worker-Oriented" Job Analysis?

For many years I have struggled (e.g., Harvey, 1991a, pp. 94-99) with the task of conceptually differentiating between so-called "worker-oriented" methods of JOA versus task- or "work-oriented" ones. That is, although many authors (e.g., McCormick, 1976; McCormick et al., 1972) have had no apparent difficulty in drawing fundamental qualitative distinctions between task-inventory methods versus structured surveys like the PAQ, from my perspective the main difference between CODAP-style task inventories versus structured surveys like the PAQ is not primarily a *qualitative* one at all. Rather, the distinction is primarily one of *degree*, with task-oriented methods rating items that fall toward the higher end of the behavioral-technological specificity continuum, and so-called worker-oriented methods rating items that define more moderate-specificity aspects of work (see Figure 1).

Interestingly, in both cases work activities are rated using similar – if not identical – scales (e.g., Frequency, Importance, Time Spent), and substantial similarity is often present between the items in "worker-oriented" surveys versus task inventories (especially ones designed to apply to a number of different jobs), to the point that in a blind-judgment task it is often difficult to retranslate items back into their intended "work-" versus "worker-oriented" categories. Although an obvious difference exists with respect to the fact that standardized surveys are typically used off-the-shelf (versus task inventories being customized to each situation), in terms of the basic *process* of how they analyze jobs I have been at a loss to explain how these supposedly different "philosophies" of job analysis (e.g., Cornelius, Carron, & Collins, 1979) differed qualitatively.

After conducting a dialog with Sidney Fine over the past couple of years, I'm now inclined to think – as with many things – that with respect to the issue of what "worker-oriented" job analysis really means, Sid had it right all along, and that he "got it" way before anybody else. Specifically, I'm arguing that (a) FJA deserves the title of "first worker-oriented job analysis method," and (b) later claims that have been made by a range of standardized job analysis instruments (including my structured job analysis survey, the CMQ; e.g., Harvey, 1991b) to the mantle of being "worker-oriented" are – to varying degrees – lacking with respect to fulfilling the goals of this approach as they were originally articulated (e.g., Fine, 1955).

Although often characterized as being an example of the task- or "work" oriented approach (i.e., due to its focus on *tasks*, as well as the technology of writing good task statements), one of the most important conceptual aspects of FJA is its pioneering theoretical statement to the effect that all work activity must be broken down to its basic functional elements – i.e., the levels of *Data*, *People*, and *Things* involved in performing the activity. According to FJA, the work- versus worker-oriented philosophy issue reduces to a question of differentiating between "what gets done" (i.e., work-oriented) versus "what the worker does" (i.e., worker-oriented, or the "functional skills" of FJA) to accomplish those activities. A similar definition of the different *objectives* of work- versus worker-oriented analysis was offered by McCormick (1976).

FJA achieves the objectives of worker-oriented analysis via identifying the tasks that are performed on each job, then scaling each with respect to how it ranks on the TDP functions. Thus, the essential question with respect to determining the degree of worker-oriented-ness of a given JOA approach is not one of *what* behaviors are performed or rated on the job (be they low-, moderate-, or high-specificity), but rather one of how those activities are *rated* and linked-back to identify their standing with respect to the underlying general dimensions of work.

Hence, my conclusion that the so-called worker-oriented JOA surveys in widespread use today are deficient with respect to achieving the true worker-oriented goal of describing work activities in terms of the underlying worker-functions involved in performing them. Two fundamental issues can be identified, given that most existing "worker-oriented" questionnaires actually comprise a mix of items describing both work- and worker-oriented content. First, for rated items that define work-oriented aspects of work (e.g., PAQ item 52, using "long handled tools," or 74, operating "air/space vehicles"), the *scales* used to rate these activities do not describe the *worker-functions* involved in performing the work. Second, for cases in which the items actually do define content dealing with required worker-functions (e.g., PAQ item 42, "coding/decoding," or 37, "reasoning in problem solving"), (a) the rating scale is often difficult to use or *relativistic* (see Harvey, 1991a), and (b) the rating task becomes a *holistic* one in which the analyst is required to attempt the daunting task of making a single-item rating that accurately describes the overall level of the worker-function required to perform the job.

Regarding the first issue, JOA surveys that focus on rating moderate-specificity work-activity items using the same types of scales seen in the task-inventory approach (e.g., PAQ, JEI) arguably represent the highest level of departure from the philosophical goals of worker-oriented job analysis. That is, task-inventory style rating scales (e.g., Time-Spent, Importance, Criticality) say nothing with respect to directly defining the *levels* of the underlying worker-functions involved in performing each activity. For example, consider PAQ item 55, which describes the use of "powered nonprecision tools/ instruments;" it is rated using a single scale to describe how "Important to this job" the activity is (ranging from "Does not apply" to "Extreme"). This judgment task is arguably quite similar to the judgments involved in rating similar items in the task inventory method (e.g., using an Importance scale to rate the use of tools such as "Weed eater," "Grass edger," "Leaf blower," and "Air chisel").

It is certainly useful to know how often such activities are

performed, and to assess their perceived importance to the job as a whole. However, such ratings do not address the worker-oriented goal of identifying the *functions* the worker needs to use to accomplish the activity. For example, with respect to the tool-focused items above, it may be critical to know whether (a) workers simply tend or handle such tools versus being required to perform advanced repair and troubleshooting activities, or (b) workers operate the tool or instrument under the close supervision of someone else versus directing and evaluating the use of the tool or instrument by others.

Of course, one might attempt to achieve the worker-oriented goal by intermingling worker-function content with the work-oriented descriptions of each activity. For example, one might form separate items for each type of tool used on the job (with an item for tending the tool, handling the tool, operating the tool, starting/stopping the tool, repairing the tool, setting-up the tool, supervising others using the tool, training others to use the tool, etc.), and then rate each item using a Time-Spent or Importance scale. However, such an approach is arguably much less conceptually and administratively parsimonious than the FJA practice of taking a *matrix* approach that clearly separates "row" work-oriented activities from "column" worker-oriented ratings specifying the TDP functional level required for the row.

Regarding the second issue, it is important to note that I am *not* arguing that instruments based on the S-O-R model (e.g., Jeanneret, Borman, Kubisiak, & Hanson, 1999) lack *any* items defining worker-oriented content. Although instruments like the PAQ contain many items that focus on *work*-oriented inputs, outputs, and contextual characteristics, they clearly contain others that focus on the worker-oriented "mediating processes" that occur between inputs, outputs, and context. For example, the PAQ's Mental Processes section rates characteristics that are highly similar to the levels of FJA's *Data* function (e.g., "compiling," "coding/decoding," "transcribing," "analyzing").

Unfortunately, such worker-oriented content ratings fall squarely in the category of holistic judgment. That is, because the worker-oriented content is contained in the *rated activity* (as opposed to being described via the *rating scales*, as in FJA), raters must make a single-item judgment that describes the required level of each worker-function (e.g., "analyzing") for the job as a holistic, undifferentiated entity. As was noted earlier, a sizable and growing literature raises fundamental questions regarding the degree to which holistic judgments can produce ratings that exhibit acceptable levels of convergent validity, discriminant validity, and interrater agreement.

How do we overcome these limitations as we develop JOA measurement technologies for the post-DOT era? My suggestion is that we should return to the theoretical clarity offered by FJA, and construct JOA surveys using a matrix approach that (a) stops the practice of intermingling work- and worker-oriented content in the rated items of the surveys (i.e., the "row" elements that are rated should define job activities, not worker-functions); and (b) rates each work activity using "column" scales that define the worker-functions associated with each activity. In effect, we should stick with the basic logic that FJA has employed for over a half-century to achieve its worker-oriented objectives; however, to produce standardized surveys that will be applicable to all jobs and occupations, we need to define the rated row elements using moderate-specificity GWA content rather than the molecular tasks typically seen in FJA.

Although I included the CMQ (Harvey, 1991b) in the above list of standardized JOA surveys that fail to fully achieve the goals of worker-oriented analysis, I hasten to add that the matrix structure used in CMQ – in particular, the fact that FJA-type content is included in the column ratings of most of the row activities – arguably makes it much less problematic than surveys that rate a hodgepodge of work- and worker-oriented content using task-inventory-type scales. Figures 2-4 present rating screens from the online version of CMQ; in it, each screen corresponds to one logical row of the matrix structure of the instrument, whereas the various rating scales in each screen operationalize the columns. As an inspection of Figures 2-4 indicates, CMQ borrowed directly from the functional-level scales in FJA when determining the column ratings; not surprisingly, factor analyses (Harvey, 2004a) have demonstrated that the *combination* of the rated work activity plus the specific functional-level rating provides critical data (e.g., depending on the particular rated function, a given work activity row might load on very different underlying work dimensions). Such analyses have also shown that the hypothesized TDP latent structure of work is indeed manifest in the higher-order factors underlying ratings collected using the CMQ.

Unfortunately, the CMQ was developed long before my recent conversations with Sidney Fine convinced me of the correctness of his long-stated claim that surveys from the PAQ onward (including mine) had missed the most important point of FJA (i.e., its strategy for operationalizing the goal of worker-oriented analysis). Had CMQ been developed after my recent epiphany, it would have incorporated one critical design change – namely, rather than including column information on only the FJA worker-function domain that seemed most relevant to the work activity being rated (e.g., *Things* functions for activities dealing with tools, *People* functions for interpersonal), each activity would be rated using the full profile of TDP functions.

Demise of the DOT: Problem or Opportunity?

My final point concerns the way in which we should view the loss of the DOT. Although many FDUs have viewed the loss of the DOT as constituting a major *problem*, I prefer to view the present situation as one that offers unparalleled *opportunities* for JOA researchers to make dramatic improvements in our data-collection technologies. That is, since the 1930's the DOT defined *the* standard for occupational analysis in this country, and it has exerted considerable impact elsewhere by virtue of its dominant status here. Through decades of revision, despite the fact that significant concerns were raised (e.g., Cain & Green, 1983; Webb et al., 1981) the DOT came to occupy a position of unquestioned dominance for public as well as private employers, and for researchers as well as practitioners.

However, the DOT has now been officially "replaced" by the O*NET (Dye & Silver, 1999), and although the point of this presentation is not to dwell on limitations of the O*NET, by all accounts its current mission does not include addressing many applied functions, particularly potentially litigious ones (e.g., disability determination, setting worker-trait requirements; see IARP, 2001; Karman, 2002). In my assessment, the relatively sudden replacement of the DOT with a system that many FDUs find to be fundamentally lacking has created a vacuum regarding the question of which measurement technologies will

dominate in 21st century JOA.

In short, the field of occupational analysis stands at a crossroads; the O*NET offers one possible path that some have embraced enthusiastically (e.g., Peterson et al., 1999, 2001). However, it is my prediction that the net effect of the conceptual and technological vacuum that has been formed by the demise of the DOT will be to stimulate researchers to develop a range of *alternative paths* to the future of JOA.

In terms of specifics, as was noted earlier one can identify a list of DOT design-characteristics that were arguably quite successful in meeting the needs of FDUs (e.g., occupational title specificity, behaviorally specific content, linkage to TDP taxonomy) that are not incorporated into O*NET. As a means to facilitate the task of developing an occupational information database that includes these desired features, researchers have the unique opportunity to integrate a number of diverse lines of recent research that offer the promise of yielding data-collection technologies that are dramatically more powerful than current ones. Examples of technologies that have yet to find their way into large-scale occupational information systems include: (a) web-based data collection using computer-adaptive testing (CAT; e.g., Keller & Harvey, 1999), which may substantially reduce data-collection time (and expense); (b) item-response theory (IRT) scoring of JOA dimensions (e.g., Harvey, 2003), which offers the potential for increased measurement precision when estimating GWA scores; (c) IRT-based indices of person-fit or appropriateness (e.g., Craig & Harvey, 2004; Harvey, 2004b), which can be used to enhance data quality by spotting potentially aberrant response profiles; and (d) hierarchical structures (see Figure 1; Harvey, 2004a) that allow a system to provide a wide range of behavioral specificity to practitioners for each occupation while avoiding the serious limitations concerning data quality, rater agreement, discriminant validity, and convergent validity that occur when holistic scales are used to directly rate abstract work- or worker-trait characteristics.

By combining these innovative measurement technologies with the above-discussed expansion of standardized data-collection surveys so that they realize the full potential of worker-oriented job analysis (i.e., by incorporating the range of FJA worker-function information when rating work activities), a substantially different path to the future of JOA can be offered. This *evolutionary* path offers the advantages of having both a strong theoretical basis in FJA, as well as a strong measurement-technological foundation that should produce benefits with respect to both data-collection efficiencies and, more important, database quality and user confidence.

Cronshaw's Strategies

The perennial challenge to job analysis and occupational classification (JAOC) is to provide the means needed to describe the work performed in a way that will resource the eventual user as fully as possible. If this is done in a theoretically sound manner, the innumerable details inherent in, and surrounding, the work in that unique job-worker situation recede into the background to be replaced, however momentarily, by a sharp picture of the essentials of work structure and dynamics. This theory of work serves the end user by offering the means to detect, define, and harness the underlying order that is inherent in an otherwise chaotic picture of work that can present itself at the local level.

The most powerful tool for extracting order from the apparent chaos of everyday work activity is *language*. The TDP scales, as well as other measurements in Functional Job Analysis, recognize this fact through the thoroughness and detail of the conceptual and operational definitions built into the Functional Job Analysis system. For example, take Things functional complexity. The conceptual coverage of the Things complexity construct is carefully outlined in an overall construct definition and then the degrees of complexity in Things involvement are carefully and defined in their behavioral essentials at each of four levels. The requirements of the work within the user's context in turn are captured in task statements or other job documents through the careful, systematic, and theory-driven use of job descriptive language. Only then is this work descriptive material assessed for TDP complexity. Furthermore, each and every TDP rating using this system requires the testing of job descriptive inferences back and forth between the work descriptive materials and the TDP rating scales until the raters are assured that a meaningful match has been made on conceptual and empirical (i.e., language-evidential) grounds. Compare this approach to usual rating of tasks on vague numerically-anchored scales of importance, criticality, or time spent.

The TDP concept offers a structural theory of work that has proven to be remarkably robust. As Dr. Fine points out, it has found widespread use in applications such as vocational counseling and rehabilitation. My review of the research literature on TDP for this presentation has demonstrated that the construct of TDP complexity has been widely and fruitfully used in research disciplines as disparate as economics, occupational medicine, sociology, and vocation psychology, not to mention industrial/organizational psychology. But what accounts for the power and longevity of this concept?

Sidney Fine has made important contributions, including the TDP concept, to the fields of job analysis and occupational classification (JAOC). Through my work with him, I have come to appreciate the extent to which all of these developments have relied on the unerring application of an underlying principle: That language is, and always will be, the primary tool through which work is described, measured, and understood. Many of the persistent problems in JAOC (e.g., the bridging of specific context with universal categories, the parsimony vs. granularity problem discussed by Dr. Harvey) can only be resolved if we pay much more attention to job language – its disciplined, controlled, and theory-driven use throughout all aspects of JAOC, including scaling and measurement. This issue has been generally neglected in current JAOC with its emphasis on questionnaire construction and quantification, but I believe it is pivotal to the advancement of JAOC in the Post-DOT era.

Dr. Harvey has asked: What can we do right in the Post-DOT environment? In my opinion, we need to get back to basics. JAOC users need the strength of rigorously derived linguistic formulations of work every bit as much, or perhaps more, than they need the extensive JAOC questionnaire-based measurement and scaling that has dominated the field in recent decades. These language-based formulations, combined with their associated FJA-type ratings, will provide much of the richness and detail that users find lacking in the O*NET. The road ahead is clear and Sidney Fine has shown us the way. We

should get down to this task.

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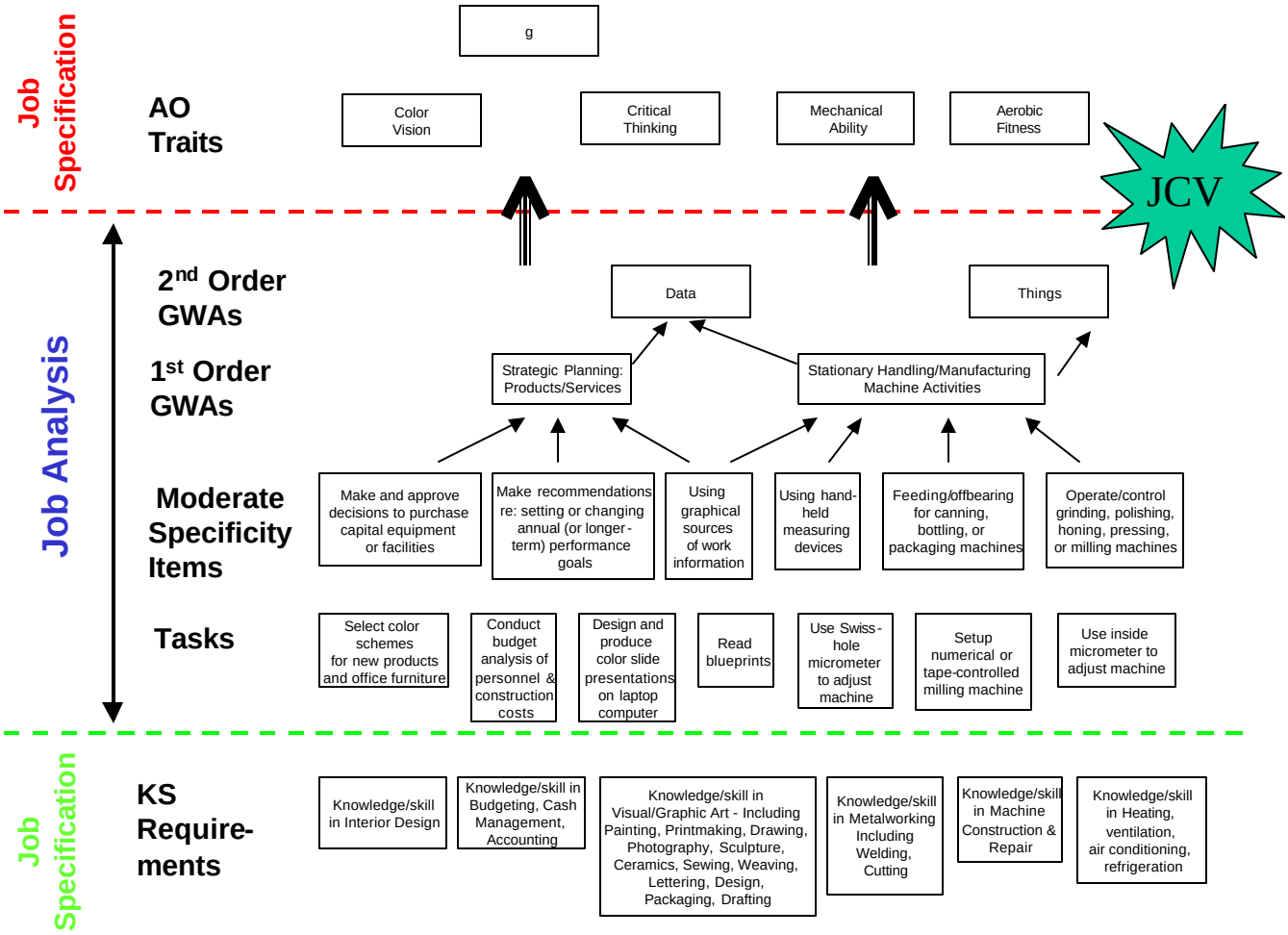

Figure 1. Relationships between various types of occupational information.

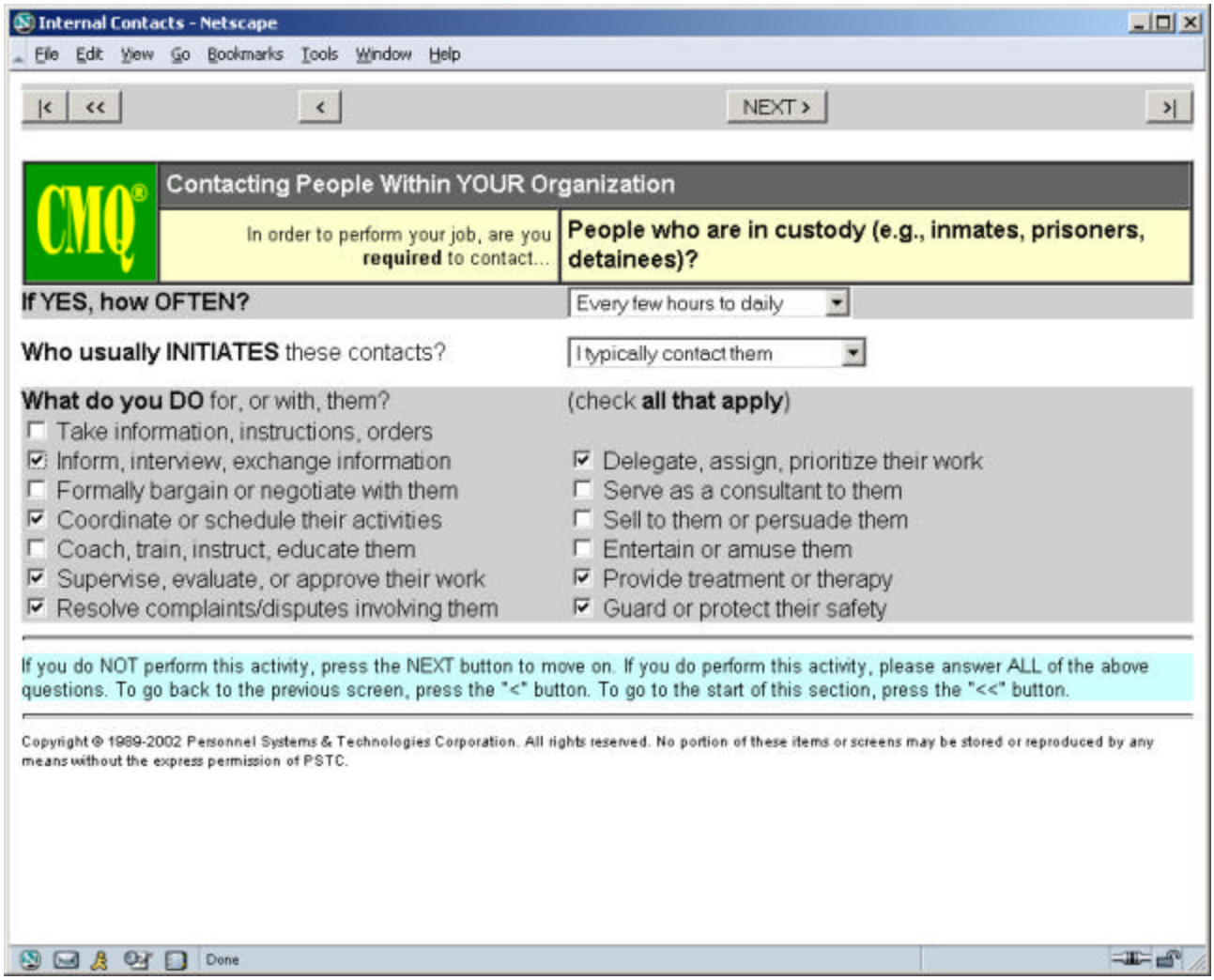

Figure 2. CMQ rating screen illustrating *People* functional level information ratings.

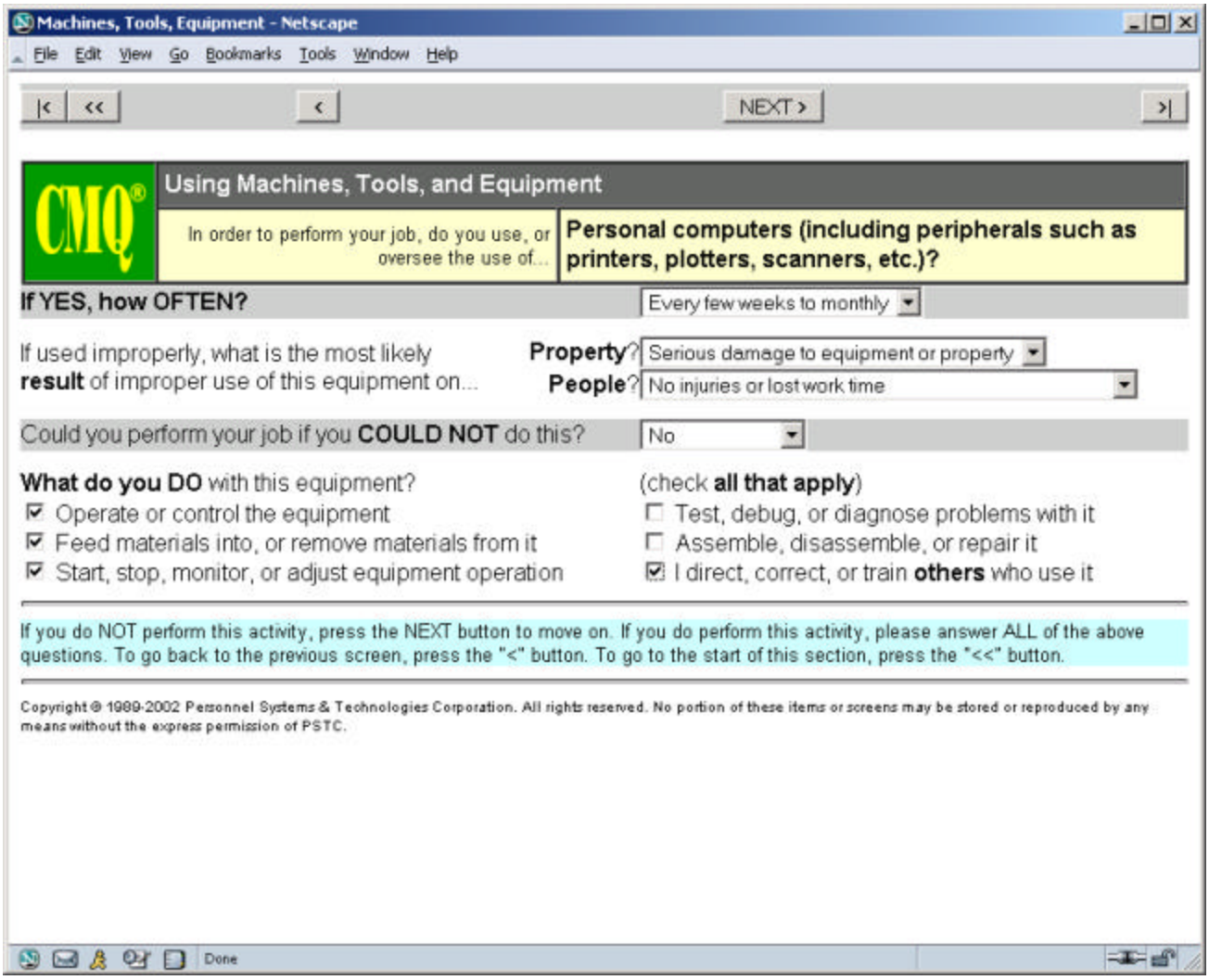

Figure 3. CMQ rating screen illustrating *Things* functional level information ratings.

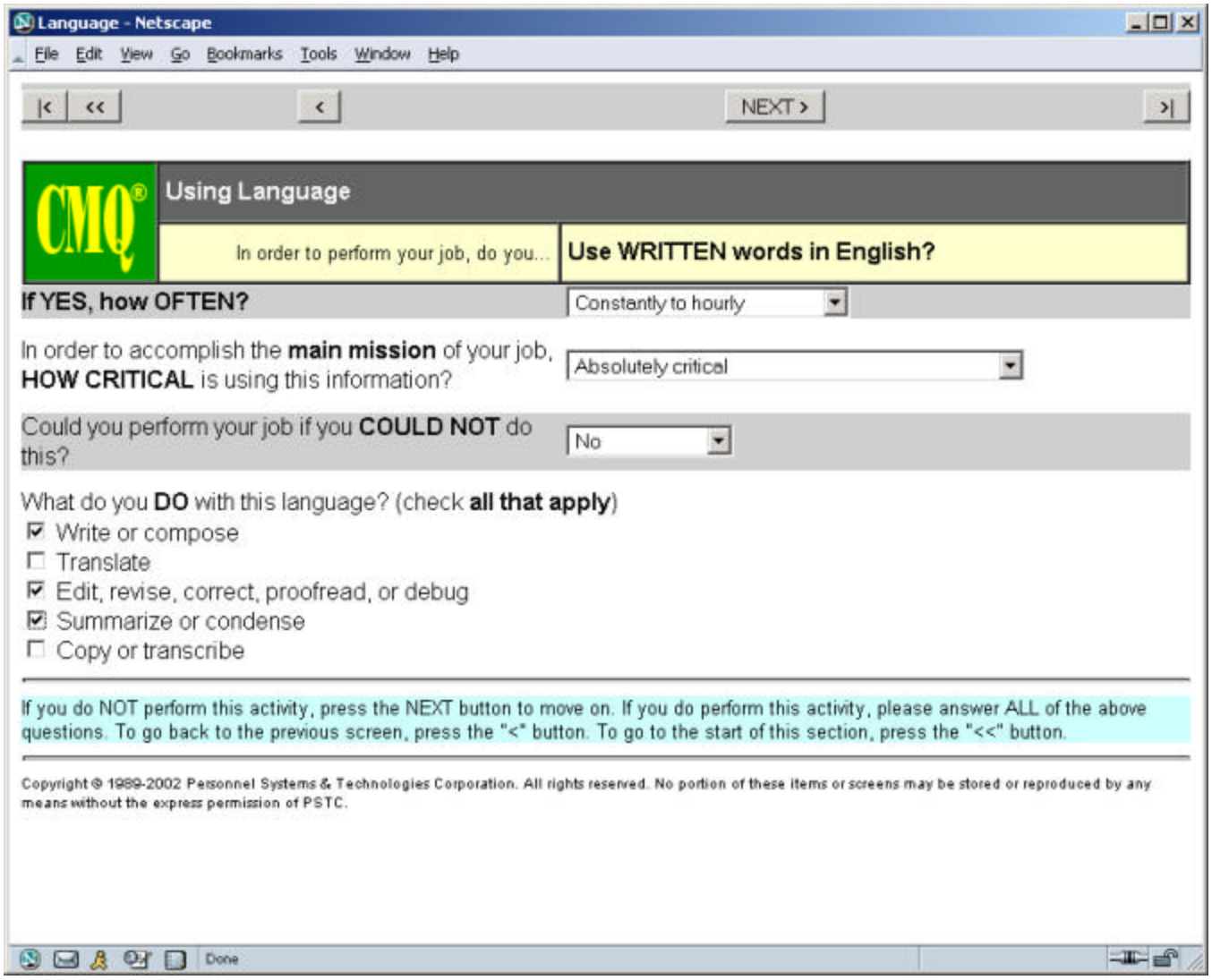

Figure 4. CMQ rating screen illustrating *Data* functional level information ratings.