

Social and Cognitive Sources of Potential Inaccuracy in Job Analysis

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Although it appears that many assume job analysis information is accurate, there is considerable evidence from other fields to suggest that the types of subjective judgments often involved in job analysis may be subject to systematic sources of inaccuracy. Drawing from the social, cognitive, and industrial-organizational psychology literatures, this review develops a framework that delineates 16 potential sources of inaccuracy in job analysis. This includes such social sources as social influence and self-presentation processes as well as cognitive sources such as limited and biased information processing. For each source of inaccuracy, the relevant literature is first reviewed, its potential operation in the job analysis context is described, and propositions for future research are derived. In addition, the likelihood of these sources of inaccuracy across various job analysis facets are described, concluding with recommendations for research and practice.

As a process of obtaining information about jobs (McCormick, 1979), job analysis is one of the most widely used organizational data collection techniques. It forms the foundation upon which virtually all other human resource management systems are built (Butler & Harvey, 1988), including personnel selection, performance appraisal, training, career development, workforce planning, safety, and licensing requirements (Ash, 1988). Its use is mandated to meet legal requirements (Uniform Guidelines, 1978), and estimated annual costs for job analyses have ranged from \$150,000 to \$4,000,000 per large organization (Levine, Sistrunk, McNutt, & Gael, 1988). These examples illustrate the importance, necessity, and cost of job analysis in human resource management.

Those who work in the job analysis field often implicitly understand that numerous factors can influence the

accuracy of job analysis information. Given the relative lack of systematic research on sources of inaccuracy, however, it appears that others are unaware of these factors and simply assume that job analysis information is accurate. Yet, job analysis is often based completely on human judgment (Goldstein, Zedeck, & Schneider, 1993); other areas of research, especially in social and cognitive psychology, have demonstrated that human judgment is fallible and subject to considerable inaccuracy. Because the validity of job analysis information is rarely questioned (Harvey, 1991) and other systems are validated against it, inaccuracies can have profound effects.

The fallibility of human judgment has long been recognized in the job analysis literature (Madden, 1964), although most of this research has focused on factors such as job familiarity (Madden, 1962, 1963) and tenure (Prien & Saleh, 1963). In general, very little attention has been given to social and cognitive sources of inaccuracy. These latter sources, however, may be more pervasive and important than previously thought. For example, Arvey, Maxwell, and Abraham (1985) suggested that some differences in job evaluation point systems may not be due to differences in the jobs but may instead be due to differences in raters' judgments, whereas Goldstein et al. (1993) suggested that organizational factors may adversely affect the quality of job analysis information. These concerns are buttressed by research on other human resource systems that rely on human judgment (e.g., performance appraisal, interviewing), as they have delineated numerous sources of inaccuracy.

Inaccuracy in job analysis information may have extremely important financial and human consequences for an organization. Exaggerated job requirements could create adverse impact, increase recruiting costs, or result

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in inappropriate licensure requirements. Inaccurate job evaluations (job analyses conducted for the purpose of determining pay) could create inequities among employees or unnecessarily inflate compensation costs. The misidentification of training needs could lead to an inadequately prepared workforce and wasted training resources.

Framework for Investigating Inaccuracy in Job Analysis

The purpose of this article is to delineate potential sources of inaccuracy in job analysis. The core of our framework revolves around identifying the psychological processes that underlie inaccuracy. To do so, we draw partly on the limited industrial-organizational psychology literature. We draw more heavily, however, on the social and cognitive psychology literatures because of their contributions to understanding the forces that influence human judgment, which are central psychological processes in job analysis. Although the social and cognitive psychology literatures have little research conducted directly in job analysis, they highlight fundamental psychological processes, and the principles drawn from these literatures can be applied to the job analysis context. By doing this, previously unconsidered sources of inaccuracy in job analysis are identified. The final result is an overall conceptual framework that integrates existing literature, identifies potential sources of inaccuracy, and provides propositions for future research.

The framework, which consists of two primary sources of inaccuracy—social and cognitive—is shown in the first column of Table 1. This distinction between social and cognitive is based not only on the research literatures from which the sources of inaccuracy are derived but also on the differences between the processes that underlie the sources of inaccuracy. That is, social sources of inaccuracy are created by normative pressures from the social environment and reflect the fact that individuals act and reside in a social context. Cognitive sources, on the other hand, reflect problems that primarily result from the person as an information processor with distinct limitations. The social sources are further subdivided into inaccuracy due to social influence or self-presentation processes, whereas the cognitive sources are further subdivided into inaccuracy that results from limitations or biases in individual information-processing systems. Nested within these are 16 psychological processes that constitute the specific sources of inaccuracy. The effects of these sources are most likely cumulative, such that more sources of inaccuracy would likely further decrease data quality.

This framework provides a way to organize and understand job analysis measurement differently from traditional frameworks that usually focus on sources and meth-

ods of data collection (e.g., Gael, 1988; Harvey, 1991). Such an approach builds on the extensive research literatures found in social and cognitive psychology, offers a new perspective to previous findings, and identifies propositions about previously unconsidered types of inaccuracy in job analysis. As such, it provides a theoretical extension in the job analysis domain and answers at least one researcher's call (Harvey, 1991) to investigate cognitive aspects of the job analysis rating process.

Defining Inaccuracy

As noted, these social and cognitive processes are *sources* of inaccuracy. In turn, these sources have six different *effects* on job analysis data, and these effects represent the domain of inaccuracy in the present framework, which are as follows: interrater reliability, interrater agreement, discriminability between jobs, dimensionality of factor structures, mean ratings, and completeness of job information.

Interrater reliability refers to consistency across raters and indexes rater covariation (Shrout & Fleiss, 1979). Interrater agreement refers to the absolute level of agreement across raters and thus assesses the extent to which raters make similar ratings (Kozlowski & Hattrup, 1992). Discriminability between jobs refers to between-jobs variance and the ability to distinguish between jobs. Dimensionality of factor structures refers to the degree to which factor structure ratings are complex or multidimensional (Stone & Gueutal, 1985). Mean ratings refer to inappropriately elevated or depressed ratings. Completeness refers to the comprehensiveness of the job analysis information. These six different effects reflect underlying issues of reliability (e.g., reliability and agreement) and validity (e.g., discriminability, dimensionality, mean ratings, and completeness) in job analysis data.

The form of these effects will depend on the source of inaccuracy. Higher as well as lower levels of these effects could indicate inaccuracy. For example, some presumed measures of job information quality, such as reliability and agreement, might be artificially inflated by certain sources of inaccuracy (e.g., conformity pressure). In the past, this fact may have given some researchers an inappropriate sense of security regarding the accuracy of the job information they collected.

Integrating the sources of inaccuracy with the six possible effects on job analysis data yields the information in Table 1. Two points are apparent in the table. First, it shows that the 16 different sources of inaccuracy can be reduced to six broad types of effects on job analysis data. Second, whereas many of these inaccuracies may look the same (e.g., categorization, halo, and method bias all result in reduced dimensionality), the processes by which they occur are substantively different. Knowing the source of

Table 1

Social and Cognitive Sources of Potential Inaccuracy and Their Hypothesized Effects on Job Analysis Data

Source of inaccuracy	Likely effect on job analysis data					Completeness of job information
	Interrater reliability	Interrater agreement	Discriminability between jobs	Dimensionality of factor structures	Mean ratings	
Social sources						
Social influence processes						
Conformity pressures	✓	✓				
Extremity shifts		✓		✓	✓	✓
Motivation loss			✓	✓		✓
Self-presentation processes						
Impression management					✓	
Social desirability					✓	✓
Demand effects		✓			✓	
Cognitive sources						
Limitations in information processing systems						
Information overload	✓		✓	✓		✓
Heuristics			✓	✓	✓	✓
Categorization			✓	✓		✓
Biases in information processing systems						
Carelessness	✓		✓	✓		
Extraneous information					✓	
Inadequate information	✓					✓
Order and contrast effects						✓
Halo				✓	✓	
Leniency and severity				✓	✓	
Methods effects	✓			✓		

Note. Check marks indicate the likely effects the sources of inaccuracy will have on job analysis data.

* Refers to internal consistency reliability in this case.

such inaccuracy is critical in mitigating its influence on the job analysis data.

Inaccuracy Versus Real Differences

Any discussion of inaccuracy in job analysis requires one to distinguish between inaccuracy and real job-related differences. There has been considerable debate in the job analysis literature in terms of understanding the meaning of interrater disagreement (see Harvey, 1991). That is, does all interrater disagreement reflect inaccuracy, or does it indicate that individuals perform slightly different tasks (and thus reflect true differences)? Clearly there are differences within jobs due to differential employee assignment or varying work demands in different positions with the same job title. Harvey (1991) highlighted several different explanations to account for such differences, which include leader-member exchange (Dansereau, Graen, & Haga, 1975) and role theory explanations (Ilgen & Hollenbeck, 1991; Katz & Kahn, 1978).

There exists a body of research that has directly addressed the issue of cross-position differences (Harvey, 1986; Stutzman, 1983). This research has yielded pronounced (and apparently real) within-job differences. Understanding the cause of these differences is of great im-

portance for job analysis research, and although a complete discussion is beyond the scope of the present research, there appear to be several factors that result in greater within-job differences. For example, certain characteristics of job analysis measurement appear to make such differences more pronounced. The use of task-based surveys, coupled with relative-time-spent ratings, appear to maximize within-job differences, whereas job analyses that use more abstract rating dimensions (e.g., importance or difficulty) and apply or not apply ratings typically find fewer differences. As another example, certain aspects of jobs, such as autonomy, may influence within-job variability because they allow jobs to be performed differently. It is important to note that these differences may reflect deficiencies in existing classification systems (see Harvey, 1986) that ignore meaningful differences between jobs. Given this, observed differences should be interpreted cautiously, particularly with respect to concluding that they are due to underlying psychological processes. These are important considerations when attempting to understand within-job variability and making definitive conclusions about the extent of inaccuracy in job analysis.

Other research that indirectly addresses within-job differences has examined such demographic differences as age, sex, and race (Aamodt, Kimbrough, Keller, & Craw-

ford, 1982; Arvey, Davis, McGowen, & Dipboye, 1982; Arvey, Passino, & Lounsbury, 1977; Landy & Vasey, 1991; Naughton, 1988; Schmitt & Cohen, 1989; Schwab & Grams, 1985; Veres, Green, & Boyles, 1991) and such attribute differences as experience level (Borman, Dorsey, & Ackerman, 1992; Landy & Vasey, 1991; Mullins & Kimbrough, 1988; Sanchez & Fraser, 1992; Schmitt & Cohen, 1989; Silverman, Wexley, & Johnson, 1984), performance level (Aamodt et al., 1982; Borman et al., 1992; Conley & Sackett, 1987; Mullins & Kimbrough, 1988; Wexley & Silverman, 1978), and education or cognitive ability (Ash & Edgell, 1975; Cordery & Sevastos, 1993; Cornelius & Lyness, 1980; Fried & Ferris, 1986; Harvey, Friedman, Hakel, & Cornelius, 1988; Landy & Vasey, 1991).

The results from this large body of research have been mixed, with a number of studies showing differences in job analysis information (e.g., Borman et al., 1992; Landy & Vasey, 1991; Schmitt & Cohen, 1989), and others showing no differences (e.g., Aamodt et al., 1982; Mullins & Kimbrough, 1988; Schwab & Grams, 1985). When found, these effects tend to be small and difficult to interpret. Thus, it is unclear whether attribute and demographic differences are substantively meaningful in terms of their effect on job analysis information. In addition, it is unclear whether these differences are due to perceptual differences (thus reflecting an inability to accurately report job information) or differences in task assignments (thus reflecting true job differences). These considerations make it difficult to reach definitive conclusions with respect to demographic and attribute differences. The difficulties are compounded by the fact that these studies are limited because they only examine these factors as correlates of differences in ratings. As a result, they do not directly bear on whether these differences are due to true cross-position differences.

As this brief review illustrates, within-job differences represent an intractable conceptual issue. The importance of this cannot be overstated, particularly when attempting to determine whether observed differences are due to inaccuracy or real differences. Resolution of this issue, however, is beyond the scope of the present article. That is, the present framework deals only with the psychological processes that underlie potential inaccuracy and not with reconciling the meaning of all observed differences. In fact, some of the processes we outline may result in higher interrater agreement and thus smaller within-job differences. Thus, it is incumbent upon the researcher or practitioner to guard against the processes we highlight while at the same time critically evaluating the meaning of any observed differences or inflated agreement. Nonetheless, the 16 social and cognitive sources we discuss are unlikely to reflect true job differences because they are not logically related to potential differences in job tasks and are

grounded in psychological theory that explicitly reflects processes, limitations, and biases that reduce accuracy.

Job Analysis Facets

To integrate this framework with existing job analysis conceptualizations that identify facets on which job analysis can vary (e.g., Cornelius, 1988; McCormick, 1976), we discuss the sources of inaccuracy in terms of the job analysis facets most likely to be affected (see Table 2).

The first facet concerns the type of job descriptor used. Type of job descriptor has commonly been discussed in job- versus worker-oriented terms (McCormick, 1976), where job-oriented descriptors are concerned with such things as job tasks and work procedures, whereas worker-oriented descriptors are more concerned with generalized worker requirements, including such things as knowledge, skills, abilities, and other worker characteristics (KSAOs). For example, the Position Analysis Questionnaire (PAQ; McCormick, Jeanneret, & Mecham, 1972) relies on worker-oriented descriptors and collects ratings on such things as decision making, reasoning in problem solving, educational requirements, oral communication, personal and social aspects of the job, and various job demands (e.g., attention to detail, updating job knowledge). Because more abstract inferences are needed when making worker-oriented judgments and the rating stimuli are less discrete and observable (particularly with respect to ability and other worker characteristics), these judgments are much more susceptible to the sources of inaccuracy discussed later.

Job-oriented analyses, on the other hand, are less likely to require subjective inferences, thus making inaccuracy less of an issue. For example, rating specific and concrete task statements (e.g., once a week the worker is required to change the fan blades of a jet engine) is unlikely to be influenced by the psychological processes we outline. Similarly, making "do you perform" ratings typically requires few inferences. Some job-oriented judgments, however, may entail subjective inferences, thus making inaccuracy more of an issue. As examples, inferences are often needed when judging consequences of error because (a) the respondent has never committed the error, (b) some subjectivity is needed when judgments of task importance are made, and (c) new incumbents and supervisors often have to make inferences when judging tasks they have never performed.

The second facet involves the specific analysis activity. *Generate* refers to the production of job information (e.g., generating critical incidents, task statements, and lists of KSAOs), whereas *judge* refers to the process of evaluating job information (e.g., rating frequency, importance, time spent, difficulty to learn, needed at entry, and consequences of error). The act of generating is susceptible to

Table 2
Job Analysis Facets and the Hypothesized Likelihood That Different Psychological Processes Will Produce Inaccuracy

Facet	Social influence processes				Self-presentation processes			Limitations in information processing systems			Biases in information processing systems				
	Conformity pressure	Extremity shifts	Motivation loss	Impression management	Social desirability	Demand effects	Information overload	Heuristics	Categorization	Carelessness	Extraneous information	Inadequate information	Order & contrast	Halo	Leniency & severity effects
Job descriptor ^a															
Job-oriented	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Worker-oriented	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Analysis activity															
Generate			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Judge	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Method of data collection															
Group meeting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Individual	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Interview	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Questionnaire	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Source of data															
Incumbent	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Supervisor	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Analyst															
Purpose															
Compensation		✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Selection	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Training	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note. Check marks indicate a higher likelihood that this source of inaccuracy will result.
^a The likelihood of inaccuracy is expected to be greater for worker-oriented than job-oriented descriptors.

many sources of inaccuracy, but the act of judging is susceptible to all of them. The third facet involves four different methods of data collection: group meeting, individual interview, observation, and questionnaire. The relevance of the sources of inaccuracy depends on the method. The fourth facet concerns three sources of data: incumbent, supervisor, and analyst. Again, the relevance of the sources of inaccuracy depends on the source of data. The final facet involves three different purposes of the job analysis: compensation, selection, and training. All are susceptible to inaccuracy, but the effects may be greatest if there is a personally valued outcome for the respondent (e.g., compensation).

A check mark has been placed in those cells of Table 2 where the source of inaccuracy is highly likely to occur. We predict that if steps are not taken to mitigate the inaccuracy, the quality of the data collected will be degraded. Table 2 can be used as a guide for research and practice in that they identify initial considerations when collecting data. Given a proposed method of data collection or respondent, the table can be used to alert the researcher to potential sources of inaccuracy or to suggest procedures to minimize inaccuracy. It may also aid in the interpretation of job data, once collected, either by oneself or others. Finally, it is important to note that the facets discussed represent a subset of all possible facets (see Cornelius, 1988; McCormick, 1976). These facets were chosen because they represent some common choices that must be made when conducting a job analysis.

Overview

Prior to discussing the sources of inaccuracy, it is important to note that we are not proposing a theory or model of inaccuracy. Rather, we have developed an organizing framework on the basis of the similarity of inaccuracies, in terms of both the relevant literature and the underlying processes. In addition, the intent of this article is not to prove that these inaccuracies necessarily exist or make claims about the magnitude of any particular source but instead to argue that, on the basis of the large volume of literature in other fields, they are likely to occur and thus should be a topic of future research. In this respect, it is important to take a "future research" perspective in interpreting the framework.

This review attempts to contribute to the literature in several ways. First, it draws on diverse literatures across several domains of psychology that may not be familiar to all researchers yet are relevant to the topic. Second, it goes beyond previous reviews through its unique focus on psychological processes. Third, it draws attention to a problem that has not previously been fully recognized. Fourth, it critically reviews the literature as needed. Fifth, it integrates the issues within a single conceptual frame-

work. Finally, it develops propositions to guide future research and practice.

The article is organized according to the list of potential inaccuracies presented in Table 1. Each source of inaccuracy is reviewed in terms of its relevant literature; then its potential application to the job analysis context is illustrated, followed by propositions for future research. In discussing each of the psychological processes, we highlight the type of inaccuracy that is likely to result. This information is summarized in Table 1, which represents a concise summary of the literature review. At the end of each subsection, we also discuss the facets of the job analysis process most likely to be affected. This information is summarized in Table 2, which is derived from the relevant job analysis literature reviewed and other supporting research. Finally, recommendations for research and practice are developed.

Social Sources of Inaccuracy

Social Influence Processes

McGrath (1984) suggested that groups can potentially provide more accurate judgments than individuals because of their wider range of KSAOs. It is also true, however, that process losses can occur in groups, resulting in judgments that are no better, or even worse, than the best individual judgment (Steiner, 1972). Such inaccuracies are due in part to the social dynamics that occur when groups interact. The social influence exerted by a group has been observed in a good deal of social psychology research (Hill, 1982) as well as in organizational research (J. P. Campbell, 1968). In many instances, simple statistical combination of individual inputs has been shown to be at least as, if not more, accurate than group discussion. Although these inaccuracies are most likely to occur when job analysis information is reported as a group, they can also occur when individuals report separately, if they usually work in a group and are influenced by group norms.

Conformity pressures. Considerable research in social psychology suggests that when making judgments, groups can exert considerable normative influence to reach consensus (Deutsch & Gerard, 1955; Hackman, 1992). The pioneering work on conformity was conducted by Asch (1951, 1955). He found that subject conformity was greatest when all group members, except one, agreed. Groups consisting of as few as four members could exert considerable normative pressure, and such pressure often resulted in biased output. Rules that require groups to come to a unanimous decision have been shown to produce the greatest amount of conformity pressures (Kaplan & Miller, 1987).

Conformity may occur in job analysis committees if members adhere to a perceived group opinion. Job analy-

sis committees often have implicit or explicit rules requiring the group to achieve unanimity, increasing the likelihood of conformity. This may reduce the accuracy of job analysis information by causing individuals to respond in a manner that differs from their own opinion.

Some studies in industrial-organizational psychology also bear on conformity. For example, Sackett and Wilson (1982) provided indirect evidence for conformity in assessment center group discussions. They required assessors to discuss any disagreements until consensus. They found that when a majority of the group gave the same rating, it was the best predictor of the final rating, thus indicating conformity. Schmitt (1977) found increased interrater reliabilities among members of an assessment center following group discussion, suggesting that the group converged on some normative standard. Schwab and Heneman (1986) noted that conformity has been considered problematic with consensus ratings in job evaluation contexts, although their study did not directly compare consensus and independent ratings.

Many factors could potentially moderate conformity. For example, the status of various committee members may influence the level of conformity within the group (Sackett & Wilson, 1982), with more conformity exhibited by lower status group members. In examining leader-subordinate dyads, Deluga and Perry (1994) found that subordinates engage in considerable ingratiation behaviors (e.g., opinion conformity). In this way, subordinates and lower status employees may be more likely to conform in job analysis meetings.

Benson and Hornsby (1988) examined a number of influence tactics used in job evaluation committees, such as exchange, threat, and ingratiation. Although their study suffered from methodological limitations (e.g., scale unreliability, small sample size), limiting a clear determination of relationships among the various constructs, it suggests a number of potential factors that can result in conformity. For example, the use of exchange tactics (e.g., suggesting that the sooner the group reaches agreement, the sooner they will get finished) is likely to result in members conforming or acquiescing. This type of negotiation may be particularly problematic in settings where two groups take opposing sides with respect to the appropriateness of the job information. For example, in situations where there is considerable conflict between management and labor unions, threat and negotiation may be the way job ratings are derived. In such situations, committee members may actually be instructed how to respond.

Finally, Dipboye (1985) discussed the impact of organizational norms on discrimination in subjective appraisals. He suggested that evaluation of individuals (and, by extension, jobs) is driven in part by conformity to organizational norms. Many of the experts in the qualitative

phase expressed concern that this type of organizational-level factor can contribute to conformity. As an illustration, many organizations are implementing teams and are focusing on teamwork KSAOs (Stevens & Campion, 1994). As a result, these KSAOs are prominently represented in job analysis output, often out of proportion to their actual relevance for the job. In addition, incumbents may also conform to labor union norms, particularly if there exists an adversarial relationship between the union and management. The influence of norms on conformity illustrates that social processes can operate even when data are not collected in a group setting.

In summary, there may be pressures to go along with the group in a job analysis meeting, even if an individual incumbent does not agree. These pressures can result from a number of organizational, group, and individual-level factors. This false consensus could exaggerate or diminish job requirements, rendering the resultant job information less accurate. It may inflate reliability and agreement estimates, creating a false sense of accuracy. Conformity can also deceive an outside analyst, creating a picture of the job that is inaccurate and unrepresentative even though consensus is apparent.

Proposition 1: Conformity pressures may lead to inaccuracy in the form of inflated interrater reliability and agreement estimates. These pressures are more likely when the committee is required to reach consensus, when there are strong organizational norms regarding jobs, when members of the committee differ widely in status, or when individuals engage in influence tactics.

Extremity shifts. This phenomenon, also called group polarization, refers to member opinions shifting to more extreme judgments following group discussion (Meyers & Lamm, 1976). For example, opinions about job complexity may become more extreme as group members discuss the job. The direction of the shift (i.e., risk versus caution) depends on members' initial judgments. That is, if group members feel that the job is (or is not) complex prior to group discussion, then they are likely to conclude that the job is even more (or less) complex following group discussion. What results is a more extreme postdiscussion assessment, regardless of objective reality (S. Williams & Taormina, 1993).

Extremity shifts differ from conformity in two ways. First, shifts occur primarily as a result of the exchange of information, whereas conformity occurs through the influence of norms. In group settings, individuals tend not to effectively share all information (Gigone & Hastie, 1993; Stasser & Stewart, 1992; Stasser & Titus, 1985), with discussion tending to focus only on shared or commonly held information. This has a polarizing effect on subsequent judgments because the shared information becomes viewed as more representative of the job due to its frequency of discussion. Second, extremity shifts affect

mean ratings, whereas conformity has more of an effect on rating variance. As such, extremity shifts are more likely to result in the job being over- or underrated.

Sackett and Wilson (1982) documented the inordinate influence of extreme ratings in assessment center decisions. In situations where discussion is required, initially extreme ratings had a consistently stronger influence on group ratings than ratings near the midpoint of the scale. For example, in situations where three assessors provided an extreme rating of 5 (on a 5-point scale), that rating was adopted as the consensus rating 81% of the time. However, when three assessors provided a midlevel rating of 3, that rating was adopted only 61% of the time. What results is a more extreme final rating, which seems to be influenced by the initial extremity of the ratings.

In investigating unanimous versus majority rules in groups, S. Williams and Taormina (1993) found that both types of rules produced extremity shifts, with the greater shift occurring in those with unanimous rules. Further, groups that shared prediscussion opinions were more extreme in their postdiscussion judgments. Dissenters in the group tended to temper the degree of shift.

What may be occurring in these studies is that the initial level of opinion homogeneity (S. Williams & Taormina, 1993), coupled with the extremity of initial judgments (Sackett & Wilson, 1982), provides an atmosphere that is conducive to extremity shifts. Stasser and Stewart (1992) suggested that in judgment tasks, the group is motivated to reach consensus rather than to find the correct answer, presumably because there is not one. If discussion of shared information leads to agreement and eventual consensus, then the group may not fully explore unshared information because it does not facilitate the group's task of reaching consensus. As a result, if the information discussed is generally shared by all members, and this information is modestly extreme, then individual opinions are likely to be reinforced (Moscovici & Zavalloni, 1969), making this information seem more representative of the job than it actually is (see Meyers & Lamm, 1976). Such extremity shifts can be reduced somewhat by the presence of dissenters, which is consistent with Snizek and Henry's (1989) finding that the greater the initial judgment disagreement, the more accurate the group judgments.

Although little of this research has been conducted in job analysis, the principles that underlie the process are present in job analysis (e.g., group discussions, potentially extreme views, unanimous decision rules, etc.). The consequences of this source of inaccuracy are potentially high. Hornsby, Smith, and Gupta (1994) offered a striking example of how group interaction can polarize opinions in a job analysis context as well as the potential organizational cost of such polarization. With a traditional consensus method of job evaluation, which displayed an extremity shift, the final salary estimate from their study (given

a beta weight of 10 and an intercept of \$8,840) would be \$29,540. The final salary estimate for a decision reached using the Delphi technique, for which there was no extremity shift, would be \$28,600, a savings of \$940 per year per position.

Proposition 2: Extremity shifts may lead to inaccuracy in the form of either inflated or deflated job requirements or mean ratings (although inflation is more likely), incomplete job analysis information, reduced dimensionality, and inflated agreement. Such shifts are more likely when initial individual judgments are extreme, when unanimity is required, when individuals hold similar opinions prior to group discussion, when there are no dissenters in the group, and when individuals do not fully share or discuss all the information they have regarding a job.

Motivation loss. It is often observed in job analysis committees that some members participate less than other members. This failure to participate is often due to a lack of motivation (Shepperd, 1993). Both social loafing (Latané, Williams, & Harkins, 1979) and free riding (Albanese & Van Fleet, 1985; Olson, 1965) have been forwarded to account for these losses. Social loafing refers to "a decrease in individual effort due to the social presence of other persons" (Latané et al., 1979, p. 823) and appears to result from an inability to identify individual member contributions (Kerr & Bruun, 1981; K. Williams, Harkins, & Latané, 1981). Free-rider effects also refer to the tendency of individuals to withhold effort if they feel they can receive sufficient outcomes by letting others do the work (Albanese & Van Fleet, 1985). Kerr (1983; Kerr & Bruun, 1983) suggested that perceived uniqueness and value of personal contributions to the group's output is critical, such that if individuals feel that their contributions to the group are not unique and valued, they will devalue their inputs and contribute less.

Kidwell and Bennett (1993) combined both of these constructs into the more general term, propensity to withhold effort, and suggested that they are moderated by motivational and circumstantial factors. Many can be applied to job analysis. First, when individual contributions cannot be evaluated, there is no contingency on an individual's response (or nonresponse). Individuals may expend less effort because they are neither rewarded nor punished (G. R. Jones, 1984). Second, if task meaningfulness is low, an individual has no intrinsic reason to contribute. Third, if group members feel that the information they hold is redundant (i.e., their job knowledge overlaps with others), they will not contribute because it is presumed that someone else will provide the needed information. Fourth, if individual members are not accountable for the job analysis output, they are unlikely to contribute (Tetlock, 1985). Finally, as group size increases, motivation losses are more likely because individual behavior becomes less identifiable and individuals have less confidence in the value of their contribution.

Demonstrating the practical ramifications of motivation loss, Weldon and Gargano (1985) found that those who shared responsibility for evaluating job descriptions engaged in less cognitive effort, evaluated fewer descriptions, and used less of the available information than those who evaluated the descriptions individually. Such a lack of motivation can result in incomplete and inaccurate job information. George (1992) found that task visibility is a key component to motivation losses in organizational settings. Intrinsic involvement, however, moderated the effect such that the relationship between task visibility and social loafing was weak when intrinsic involvement was high. These findings suggest that when task visibility is low (e.g., as in many job analysis committees), it may be important to stimulate intrinsic involvement to minimize motivation losses. When it is not possible to increase levels of intrinsic involvement, it may be necessary to closely monitor individual output.

Proposition 3: Motivation loss may lead to inaccuracy in the form of incomplete job analysis information, reduced discriminability, and reduced dimensionality. It is more likely when individual contributions are not visible or cannot be evaluated, when the task is not meaningful to the respondents, when individual contributions are perceived as redundant, when individuals are not accountable, or when the group is large.

Effects of Social Influence Processes on Job Analysis Facets

As outlined in Table 2, social influence processes are likely to operate on both job- and worker-oriented job descriptors, although the effect is likely to be greater to the extent that less verifiable and more inference-based information is being collected. Motivation loss is likely to affect the generation of information because the lack of participation directly influences the generation process, whereas all three processes are likely to occur when making judgments.

In terms of the method, these processes are particularly problematic when data are collected in a meeting, because these sources of inaccuracy occur primarily in group settings where interpersonal dynamics often result in process losses. Conformity pressure is also likely to occur with other methods of data collection because the operation of norms does not require the group to be present. Also, motivation loss is likely to occur with anonymous, lengthy, or uninteresting questionnaires.

Regarding data source, incumbents are thought to be highly susceptible to all social influence sources of inaccuracy because they often have lower status in meetings, are more subject to group norms, and are less motivated to provide job analysis information. Supervisors are thought to be susceptible to extremity shifts, but not conformity or motivation loss because of their leadership sta-

tus, whereas analysts are less susceptible to all processes because of their more objective outsider position and the primacy of the activity to their job duties.

In terms of purpose, when job analysis is conducted for selection and training, all three social influence processes are likely to influence the data collected. This is due to the fact that individuals in these settings often have little interest in participating, and the outcome (e.g., selection requirements) often has little relevance for the respondent. When job analyses are conducted for compensation purposes, however, only extremity shifts are likely to be problematic, especially in the upward direction. Conformity and motivation loss, on the other hand, are unlikely to influence the data collected because individuals are expected to resist conformity and be highly motivated as a result of the personally valued outcome. It is important to note that these are hypothesized relationships drawn from other literatures; thus, future research is warranted.

Self-Presentation Processes

Research in social psychology has suggested that participants in laboratory experiments try to guess the hypotheses and subsequently provide responses according to different roles they might adopt (Argyris, 1968; Carlston & Cohen, 1980; Weber & Cook, 1972). Likewise, in job analysis research it is possible that respondents may (a) know or guess the reason for the analysis and intentionally provide responses that do not represent the job accurately, (b) respond in a socially desirable manner, or (c) attempt to cast themselves in a favorable light. In short, these processes involve an individual's attempt to present himself or herself in a particular manner, depending on the factors outlined below.

Impression management. Research in social psychology has examined how individuals attempt to present themselves in a favorable light by engaging in impression management behaviors (Schlenker, 1980). "Impression management is concerned with the behaviors people direct toward others to create and maintain desired perceptions of themselves" (Gardner & Martinko, 1988, p. 321). If individuals engage in impression management, the resulting job information is unlikely to reflect what their job entails. Instead, it will reflect what they want people to think their job entails. Research on this topic has not been conducted in job analysis, but it has been examined in performance appraisal and other organizational contexts (Fandt & Ferris, 1990; Gardner & Martinko, 1988; Wayne & Kacmar, 1991) and has direct implications for job analysis.

These studies suggest several factors that encourage impression management behaviors, all of which are likely to be present in job analysis situations. First, impression

management may be more likely when people are highly accountable for their actions (e.g., Tetlock, 1985). In job analysis, notwithstanding the social loafing that might occur within job analysis committees, people describe what they do in their job and accountability would be expected to be quite high. Second, impression management may be more likely when there is ambiguity such that the true state of affairs is unclear. In job analysis, by definition, there is some ambiguity, or there would be no need for the analysis. Also, individual responses in job analysis are somewhat subjective in nature, providing the incumbent an opportunity to engage in impression management. Third, impression management may be more likely when people are encouraged to self-monitor (Snyder, 1974). Job analysis would be expected to encourage self-monitoring because incumbents are asked to describe what they do for the organization and, ultimately, their individual contribution. Fourth, impression management may be more likely when the audience is high status. Because job analysis usually provides information to organizational decision makers, the audience might be viewed by respondents as high status. Finally, impression management is more likely in situations that are particularly evaluative in nature or those in which it is in the incumbent's best interest to make a good impression (e.g., job analysis for compensation purposes). Indeed, in the current climate of downsizing, it may be in the best interest of all incumbents to inflate job requirements. These factors are all present to varying degrees in job analyses, thus providing an ideal setting in which to elicit impression management behaviors.

Proposition 4: Impression management may lead to inaccuracy in the form of inflated job requirements and ratings. It is more likely when individuals are accountable for the information, when there is ambiguity, when individuals are encouraged to self-monitor, when the audience is high status, when the situation is evaluative in nature, or when the outcome is personally valued.

Social desirability. Social desirability refers to "a need for social approval and acceptance and the belief that this can be attained by means of culturally acceptable and appropriate behaviors" (Marlowe & Crowne, 1961, p. 109). In job analysis, such behaviors can be thought of as organizationally appropriate behaviors, often reflecting the organization's culture. The job analyst, the supervisor, or the organization itself can be viewed as the object from which the job incumbent is attempting to gain approval. In so doing, people may distort responses in such a way as to portray their job as having relatively more socially desirable features or relatively fewer socially undesirable features.

An early examination of such bias was conducted by Wiley and Jenkins (1963), who found uniformly high ratings on a "precision scale," which reflected "social

censure against anything less than careful work" (p. 21). Since then, socially desirable responding has been investigated in a wide variety of research areas in industrial-organizational psychology (Arnold & Feldman, 1981; Arnold, Feldman, & Purbhoo, 1985; K. W. Thomas & Kilmann, 1975; Zerbe & Paulhus, 1987) as well as in job analysis itself (Anderson, Warner, & Spencer, 1984; J. E. Smith & Hakel, 1979).

For example, Arnold and Feldman (1981) offered evidence that intrinsic job characteristics may be overstated in terms of job importance because of their socially desirable nature. This has clear implications for job analysis when incumbents are asked to rate the importance of job tasks. That is, complex and high-ability tasks may be overstated, and routine and mundane tasks may be understated. As more direct evidence, J. E. Smith and Hakel (1979) found that supervisors and incumbents tend to inflate their responses compared with analysts on socially desirable items in a job analysis questionnaire. Anderson et al. (1984) also found that job applicants extensively inflated (i.e., responded in a socially desirable manner) their ratings on a self-assessed task inventory.

The degree to which job analysis information is a reflection of the individual providing the information, and his or her unique value to the organization, may moderate the level of socially desirable responding. Organizational culture may moderate socially desirable responding as well. For example, because many organizations are currently emphasizing quality and customer service, they may find that employees overestimate these socially desirable aspects of their jobs.

The job analysis experts in the qualitative study brought up two other issues that have not been well investigated in the literature. One concerns the general social desirability of certain jobs. That is, when different jobs are compared, some may be seen as having higher organizational value (see Milkovich & Newman, 1993). For example, in some settings, line jobs may be viewed as more important and difficult than staff jobs. This may be reflected in the compensable factors chosen by management (e.g., responsibility for equipment or products, rather than technical knowledge), thus creating an a priori bias toward higher evaluations of these jobs.

The second issue concerns the differences in social desirability of certain types of job analysis information. The experts' view was that task statements will evidence less social desirability than KSAO statements. This may be due to the fact that attribute statements sound more socially desirable, are more personally evaluative, and are less verifiable. The experts felt that this could result in more socially desirable responding when rating KSAOs as opposed to tasks. As an illustration, one expert had seen self-esteem rated higher than typing skills for a sample of secretaries, even though typing skills are a fundamental

aspect of the job. The social desirability of self-esteem appeared to inflate the ratings.

Proposition 5: Socially desirable responding may lead to inaccuracy in the form of increased reporting of desirable job information and decreased reporting of undesirable job information, resulting in incomplete job information and inaccurate mean ratings. This is more likely when the job information is a reflection of the respondent's value to the organization (e.g., most likely from incumbents, next most likely from supervisors, and least likely from analysts); when there are strong organizational norms regarding the importance of certain tasks, KSAOs, or jobs; and when KSAOs (as opposed to tasks) are being generated or judged.

Demand effects. Demand effects refer to the tendency of individuals involved in research to play the role of a "good participant" and respond in such a manner as to validate the experimenter's expectations (Orne, 1962, 1969). Aside from having different literatures, demand effects differ from social desirability in several ways. First, the object of self-presentation is different. That is, the job analyst or researcher is the object of the demand effects as opposed to the larger social environment. Second, the motivation for the effect is somewhat different. Demand effects are an attempt to meet the expectations of others, whereas social desirability effects are an attempt to gain social approval. Third, demand effects do not have to be socially desirable, such as when the demand effects motivate the reporting of quality or efficiency problems on the job. In short, although demand effects and social desirability may be the same in many situations, they do not have to be.

In a job analysis context, there may be a variety of cues that also cause individuals to become aware of the roles they are to adopt during data collection and the responses they think are expected of them (Page, 1981). Although most of the research on demand effects has occurred in the laboratory, some evidence has been gathered in organizations. It seems likely that demand effects will occur in many job analysis contexts.

Probably the first documented demand effect in an organization was the well-known Hawthorn effect (Adair, 1984; Mayo, 1933). As another illustration, King (1974) investigated the influence of supervisory expectations on productivity. He found that increased productivity was not a function of job enrichment but instead a function of supervisory expectations. These expectations act as subtle demand effects, whereby the managers who expected performance improvement successfully communicated this to the workers. Eden's (1990) Pygmalion effect in organizational settings is another example of how such expectations can serve as self-fulfilling prophecies, with an attendant influence on subordinate perceptions and behavior. However, expectations do not have to be communicated for demand effects to operate (Orne, 1962). Individuals

may attempt to guess the expectations and respond in a manner consistent with these assumed expectations.

Although not yet researched, the prevalence of demand effects in job analysis is likely to be high. It may be difficult to analyze jobs without inadvertently influencing the information obtained. This can occur in a number of ways. First, respondents may be made to think about their jobs in ways they had not thought about them before. In choosing certain task and KSAO statements, the incumbent is effectively told what the organization thinks is important, thus creating a demand effect. Second, the manner in which the job analysis is explained to the incumbent may act as a demand effect. For example, analysts might indirectly indicate to the respondent the job requirements expected for a particular position or emphasize the importance of the job information. A common example is when conducting a job analysis to validate the job relatedness of a selection procedure. The analyst might prefer that the job be judged to have high ability requirements to justify the use of a test, and this might be inadvertently (or overtly) communicated to respondents. Third, showing incumbents a seed list of requirements or previous job analysis results at the start of a job analysis meeting is likely to foster demand effects, especially if the illustrative information is complex. Finally, the mere fact that jobs are being analyzed can lead to demand effects because it signals the job's importance. Because jobs often become more complex over time, it is implicitly assumed that the job has become more complex.

Proposition 6: Demand effects may lead to inaccuracy in the form of job requirements that are inflated in a manner consistent with the analyst's and the organization's expectations as well as producing greater agreement among respondents. Demand effects are more likely if supervisory or organizational expectations are directly or indirectly conveyed to incumbents, if the importance of certain task or KSAO statements are overemphasized, if seed lists of tasks and KSAOs are provided, or if incumbents are led to believe that their jobs have become more complex since the last job analysis.

Effects of Self-Presentation Processes on Job Analysis Facets

As outlined in Table 2, self-presentation sources of inaccuracy are likely to occur with both job- and worker-oriented job descriptors, but they are most likely to occur with worker-oriented job descriptors because these descriptors tend to elicit socially desirable responses (J. E. Smith & Hakel, 1979). They are also likely to influence both the generation and judgment of job analysis data, although the judgment process may allow larger effects because of the inherent subjectivity in providing "judgments" of any kind. Self-presentation processes could potentially apply to all methods of data collection, sug-

gesting that these sources of inaccuracy are nearly always problematic.

With respect to the source of data, incumbents are considered to be highly susceptible to these sources of inaccuracy. Supervisors are less likely to engage in self-presentation because of their higher status and less presumed benefit from engaging in impression management or ingratiation behaviors. Compared with subordinates, they are less likely to personally profit from judging a job inordinately high (however, in situations where supervisors are likely to personally benefit, they may be prone to self-presentation inaccuracies as well). Analysts are also expected to be low across all three sources of inaccuracy because they are expected to be relatively autonomous and objective assessors of jobs.

In terms of purpose, impression management and social desirability are likely to be particularly problematic when job analyses are done for compensation purposes because the outcomes of the job analysis are highly valued by the incumbent. Demand effects, however, are likely to be problematic only in situations where the job analysis is done for selection and training purposes because the analyst or organization may communicate its expectations and the respondent may have less vested interest in responding accurately.

Cognitive Sources of Inaccuracy

Limitations in Information-Processing Systems

Limitations in the ability to process information were brought to the attention of industrial-organizational psychologists in part through such classic works as Simon's (1957) description of bounded rationality in managerial behavior and Tversky and Kahneman's (1974) description of heuristics and biases in decision making. Several ramifications of people's limited information-processing capacities are described below in terms of their potential influence on job analysis data.

Information overload. When confronted with large amounts of information or complex judgment tasks, individual respondents are less likely to respond in a reliable and accurate manner because of limitations in human information processing. Evidence from the cognitive literature suggests that a symbolic architecture underlies the process of providing job judgments (Lord & Maher, 1991). In these memory-based architectures, individuals retrieve information, transform it, and then store this transformed information (Wyer & Srull, 1980). Because this is a sequentially based model of information processing and occurs in "real time," as the amount or complexity of the information requiring transformation increases, the likelihood of information overload also increases.

Information overload is likely to occur when the amount of information is very large. Many job analysis contexts require respondents to rate large numbers of tasks on numerous dimensions (e.g., importance, time spent, difficulty). Such ratings may take hours to complete. Researchers investigating redundancy among task ratings suggest that respondents may be simplifying the rating process. For example, Friedman (1990) found that relative time-spent and frequency ratings were redundant, whereas Sanchez and Fraser (1992) found redundancy between task criticality and task importance ratings.

Factor analyses of attribute ratings in large job analysis databases such as the *Dictionary of Occupational Titles* (DOT; U.S. Department of Labor, 1991) have also revealed considerable redundancy. Cain and Treiman (1981) found that 44 DOT variables could be reduced to six factors, and Campion (1989) found that 31 variables could be reduced to five factors. Such findings may reflect the inability of respondents to process large amounts of information. As a result, they may simplify the rating process and view the job only in terms of broader dimensions such as overall complexity. Respondents may not be able to make fine distinctions among subtle aspects of the job or rating scales, especially when the amounts of information are very large.

Information overload may also occur when the information-processing task is complex. Gaugler and Thornton (1989) found that the number of dimensions rated in an assessment center influenced classification and rating accuracy such that accuracy increased as the number of dimensions rated decreased. They concluded that task complexity increases the likelihood of cognitive biases, resulting in reduced judgment accuracy. In job analysis, making judgments of an entire job (i.e., holistic judgments) is more complex than making judgments of specific tasks (i.e., decomposed judgments), because more recall and integration of information is required. In short, decomposed judgments simplify the rating stimuli, making ratings potentially more accurate. Job analysis studies suggest that decomposed judgments yield more reliable and accurate data than holistic judgments (Butler & Harvey, 1988; Sanchez & Levine, 1989, 1994).

Beyond the simplified nature of decomposed judgments, Sanchez and Fraser (1992) also noted that decomposed judgments are more amenable to statistical combination (as opposed to the clinical method used when rendering holistic judgments). Such decomposed mechanical approaches tend to produce more stable as well as more systematic ratings. For example, Butler and Harvey (1988) found that regardless of past experience with the job analysis instrument, raters were unable to make accurate and reliable holistic judgments. They concluded that this was primarily due to information overload. Thus, it

seems likely that overload can lead to simplifying strategies and reduced accuracy.

Proposition 7: Information overload may lead to inaccuracy in the form of reduced reliability, incomplete job analysis information, reduced dimensionality, and lessened ability to discriminate between jobs. It will increase as the number of judgments required increases, as the number of dimensions rated increases, when holistic judgments are required, or when the overall amount of information is large.

Heuristics. There is evidence to suggest that when individuals render a judgment, they rely on simplifying heuristics that imperfectly mirror reality (Kahneman, Slovic, & Tversky, 1982; Nisbett & Ross, 1980). These simplifying strategies are a function of limited information-processing capabilities and have been found to occur when making job analysis judgments. For example, Sanchez and Levine (1989) found that when judging task importance, job incumbents adopted a simplifying heuristic on the basis of task criticality and difficulty of learning the task. Tversky and Kahneman (1974) outlined three different heuristics: (a) representativeness, (b) availability, and (c) anchoring and adjustment. Reliance on heuristics can potentially bias job analysis judgments and undermine accuracy.

Representativeness refers to the tendency for people to judge whether two objects or events are related by the extent to which they are similar to each other. Although representativeness often correctly captures the relationship between two stimuli, in other situations relevant information is underused. This could potentially occur in job analysis contexts. For example, suppose a compensation analyst was assessing two different jobs. If the characteristics of the jobs were similar to one another, and one of the jobs was high-paying, then the analyst might assume that the other job should be high-paying as well. This could upwardly bias the ratings of the compensable factors for the latter job. Overall, representativeness heuristics are likely to lead to inaccuracy if jobs are incorrectly judged to be similar on the basis of irrelevant information or if the operation of the heuristic prevents relevant information from being adequately considered.

Availability refers to the judged frequency of an event, which is determined by the ease with which examples can be recalled. Thus, events more easily recalled will appear to be more frequently occurring. As a result, recent or salient job tasks may be judged to be more frequently occurring. If a job requires some unusual, but relatively infrequent tasks, they might be recalled and reported as more frequently occurring because of their unusual and memorable nature. Likewise, tasks that are extremely complex, important to the mission of the organization, or dangerous will tend to be more easily recalled and may be rated as more frequently occurring than appropriate.

In addition, as one of the experts in the qualitative study noted, there is a tendency for recently learned tasks to be more richly described. This again may be a function of an availability heuristic because the recently learned tasks are more accessible in memory.

Anchoring and adjustment refers to the manner in which people arrive at final judgments. They start at an initial value or anchor, and then adjust from this point to arrive at a final judgment. Tversky and Kahneman (1974) showed that individuals tend to inadequately adjust from this initial starting value, resulting in inaccuracy. This heuristic has been observed in the decision-making literature (Payne, Bettman, & Johnson, 1992), has been found to occur in both individual and group settings (Rutledge, 1993), and has been shown to alter judgments of future effort and performance (Switzer & Sniezek, 1991). Its influence has been discussed in the job analysis literature as well. For example, B. N. Smith, Hornsby, Benson, and Wesolowski (1989) found that job title status influenced final job evaluation ratings such that high-status job titles received higher evaluations. Smith et al. concluded that job titles served as anchors in that they created expectations or stimulated stereotypes about the job. After reading the job title, raters made insufficient adjustments from this starting point when faced with contradictory information.

Inaccuracies that result from insufficient adjustment and representativeness may be particularly likely for analysts who have evaluated similar jobs in the past and therefore have a number of implicit expectations concerning salaries, job titles, or the status accorded different jobs. In some instances, the starting anchors may be predictable. For example, it seems likely that compensation analysts would start with a low anchor and adjust upward to save the organization money. This might have the biasing effect of compressing the resulting wage differentials among jobs.

Kulik and Perry (1994) outlined a number of instances in which the use of cognitive heuristics are more likely. First, individuals who are unmotivated to systematically process information are likely to rely on heuristics. In many job analysis situations, there may be a low investment and little incentive on the part of participants to provide accurate information. Low motivation in the job analysis task may result in the expenditure of little cognitive effort and subsequent reliance on heuristics. Second, there may be external or internal constraints on how individuals process information. Internally, individuals may not have the requisite knowledge with which to systematically process and, as a consequence, rely on more superficial aspects of the job such as the extent to which jobs are similar to each other. Externally, constraints such as time pressures or multiple cognitive demands may inhibit systematic processing by forcing individuals to adopt an

information-processing strategy that minimizes effort or facilitates rapid processing.

Proposition 8: Heuristics may lead to inaccuracy in the form of reduced discrimination among jobs, reduced factorial dimensionality within jobs, inaccurate mean ratings, and incomplete job information. The influence of heuristics is more likely when irrelevant aspects of different jobs become more similar (representativeness), when there are memorable or otherwise salient tasks (availability), when jobs differ from respondent expectations (anchoring and adjustment), when respondents have experience with similar jobs (representativeness, anchoring and adjustment), or when respondents are unmotivated or cannot systematically process information because of lack of knowledge, time pressures, or competing cognitive demands.

Categorization. By reducing the complexity of the external world, categorization serves to minimize cognitive effort and maximize information intake (Rosch, 1978) and can be viewed as an outcome of basic perceptual and memory processes (Ilgen & Feldman, 1983). There is evidence to suggest that once an object is categorized, subsequent inferences about the object are made in terms of the category, with unique features of the object unavailable (Wyer & Srull, 1981). Recall is also influenced such that information that was never presented is "recalled" (Cantor & Mischel, 1977; Wyer & Srull, 1980), with category-inconsistent information generating better recall (Hastie, 1981).

Although categorization has been researched in organizational contexts primarily with respect to performance appraisal (DeNisi & Williams, 1988; Feldman, 1981; Ilgen & Feldman, 1983) and leadership (Lord & Maher, 1989; Phillips & Lord, 1982), it is likely that categorization inaccuracies occur in job analysis as well. When rendering job-related judgments, individuals may recall the category instead of actual facts about the job. Job-related judgments are then made with respect to the recalled category, rather than the details of the job, thus yielding inaccurate job information. It was suggested by one of the experts in the qualitative study that when a job becomes routinized, incumbents tend to categorize the job (e.g., the job is simple) and respond accordingly.

Evidence from the job design literature suggests that individuals categorize jobs in broad terms. For example, Stone and Gueutal (1985) found that jobs could be represented by a single, summary dimension of job complexity in a multidimensional scaling analysis instead of the five job characteristics posited by Hackman and Oldham (1975). Incumbents may not innately perceive their jobs as varying along a large number of dimensions. Instead, they may assess their job, draw global conclusions, and respond accordingly when asked to report on the job. This has implications for job analysis. For example, when asked to provide multiple dimension ratings, respondents may be unable to do so. As a result, they provide highly

correlated ratings because the job has been categorized along fewer or simpler dimensions.

Kulik (1989) found that job categorization is especially likely when there are a large number of tasks to be performed. This may have implications for how analysts assess jobs because once a job is categorized, the generation or judgment of subsequent tasks would be biased toward general characteristics of the category (Feldman, 1981). Such category-based processing (Kulik, 1989) might also influence how an analyst processes job-related information. If an analyst receives category-consistent information, then he or she is more likely to rely on categorization to generate job impressions (Jacobs, Kulik, & Fichman, 1993).

Category-consistent information elicits both job categories and representative examples, and category-based processing has resulted in biased or inaccurate impressions in performance appraisal settings (Favero & Ilgen, 1989). In job analysis, this could include the reporting of unnecessary job requirements. For example, when completing a job analysis instrument that contains hundreds of items, an analyst may not actually remember the specific KSAOs required to perform the job. If he or she had concluded that the job was complex, subsequent judgments may inflate importance ratings, thus reducing the accuracy of the job information.

The distinction between automatic and controlled information processing, noted by Schneider and Shiffrin (1977), also provides insight into how job analysis responding might be influenced by categorization. Automatic processing is a learned sequence that does not require attention or monitoring and operates fairly independently of the individual's control. Controlled processing requires attention and active mental effort and is under the individual's conscious control. In job analysis situations, individuals automatically process certain features of their job, such as the sequence of activities in a routine task. As job features become automatic, they are added to the job categorization. It is only when work behaviors diverge from the existing category, such as a novel task or situation, that controlled processing is invoked. This divergence is likely to be recalled in job analyses because of its salience and uniqueness. As a result, when incumbents are asked to provide job analysis information, they are likely to better remember tasks or instances that were unique or otherwise processed in a controlled rather than automatic fashion. Such differential recall could result in the overestimation of infrequently occurring but unusual tasks and the underestimation of more typical tasks. This would bias the job analysis information by influencing relative time-spent ratings or frequency ratings in the direction of these job features, much like an availability heuristic.

Proposition 9: Categorization of jobs may result in less discrimination among jobs, incomplete job information, and reduced dimensionality in job analysis data. It is more likely to do so when jobs become routine, when information-processing demands are high, when there is a small amount of information available about the job, when information provided is category consistent, or when respondents automatically process information.

Effects of Limitations in Information-Processing Systems on Job Analysis Facets

As noted in Table 2, limitations in information-processing systems are likely to result in inaccuracy with both job- and worker-oriented descriptors, but the effects are again expected to be stronger with the latter because they are more complex and contain more abstract kinds of information. These processes are problematic when judging job information because they reflect limitations in the ability to accurately judge stimuli. Heuristics and categorization are also problematic when generating information because they alter the ability to recall category-inconsistent information and information that is not readily available in memory.

In terms of methods, information-processing limitations are especially troublesome with questionnaire methods because there are few constraints on the information demands placed on respondents. Observation methods are also highly susceptible to these cognitive limitations because of the inherent complexity in analyzing jobs by watching incumbents perform them. That is, excessive cognitive demands may be created by the wide array of both relevant and irrelevant stimuli on many job sites and the inherent difficulty of inferring worker attributes and mental tasks by observing job behaviors. Meetings and interviews are less susceptible to these inaccuracies because exchanging information orally slows the rate of information flow and likelihood of overload. Additionally, the opportunity for explanation, questions, and discussion may prevent oversimplifications such as heuristics and categorization.

Regarding sources of data, analysts may be more susceptible to heuristics and categorization than incumbents and supervisors because they have less knowledge of the job, and the job is less differentiated to them. Supervisors would only be subject to these inaccuracies if they had a large number of subordinates or were inexperienced. On the other hand, incumbents and supervisors may be more susceptible than analysts to information overload because analysts are accustomed to dealing with large amounts of job information and are usually responsible for doing a very thorough and detailed report.

In terms of purpose, information overload is likely to influence job analyses conducted for all reasons, but heuristics and categorization will be most problematic when

job analyses are conducted for selection and training purposes. Because of the heightened precision required for compensation, as well as the personal importance of the outcomes, less reliance on heuristics and categorization is expected.

Biases in Information-Processing Systems

In addition to limitations in information processing, there are a number of biases in individual information processing. That is, job information may be inaccurate because of a variety of intentional or unintentional reasons, including carelessness, extraneous information, inadequate information, order and contrast effects, halo, leniency and severity, and method effects.

Carelessness. Carelessness refers to those instances where incumbents intentionally respond inaccurately because they do not read each item closely enough (e.g., do not realize the task is unrelated to their job), respond inappropriately given the wording of the question (e.g., do not realize it is a reverse-scored item), or respond when they fail to attend to the rating task (e.g., as with fine distinctions between KSAOs). The result is reduced job analysis accuracy.

The influence of carelessness in job analysis has been examined in a number of studies. Green and Stutzman (1986) used the inclusion of bogus tasks as a means of screening out careless respondents to a task inventory. They included 115 relevant and five irrelevant task statements on a task inventory. Of 290 incumbents, only half rated the irrelevant tasks as "not important" or "no time spent." In addition, Green and Stutzman found that 57% of incumbents reported spending some time performing tasks that they could not have performed, and 72% indicated that these tasks were "somewhat important" aspects of the job. The authors speculated that this could be due to three things: (a) carelessness in making responses, (b) difficulty in reading task statements, or (c) a desire to project an image that their job was complex and required them to perform many tasks. Their research design did not allow a test of these competing explanations directly; however, other findings provide additional insight. For example, those who scored a zero on the carelessness index had higher interrater reliability than raters in general. Alternatively, the carelessness index appeared to be unrelated to job knowledge.

Green and Veres (1990) used a similar methodology and found that 70% of incumbents rated infrequent tasks as important to their job. Respondents who were more careless tended to rate job-relevant tasks higher. Using an infrequency index that allowed them to identify respondents who systematically inflated their responses on the task statements, Green and Veres found slight evidence that carelessness decreased as educational level increased,

whereas carelessness increased as the questionnaire became longer and more complex.

Carelessness is a particular threat for multiposition job analysis questionnaires that include many tasks not relevant for any given position. Although such questionnaires save time in terms of creating only one questionnaire for the entire sample, this may produce problems in terms of contamination due to careless responding. That is, individuals may carelessly indicate that they perform certain tasks when they do not. As one of the experts in the qualitative study noted, this can have the unfortunate consequence of finding that there are "more clerks who type than typists who type."

Wilson, Harvey, and Macy (1990) used repeated items to identify inconsistent respondents in a job analysis survey. Wilson et al. reported significant improvements in the average reliability for three different rating scales when inconsistent respondents were excluded from the calculations. They also found that inconsistent responding was less problematic on shorter questionnaires.

Finally, aside from simple inflation of means, Schmitt and Stults (1985) found that respondent carelessness in surveys containing negatively keyed items can result in factor structure artifacts. They found that results can be influenced if only 10% of the respondents are careless. In the preceding studies, the percentage of careless respondents was almost always much greater than 10%. This may account for some of the inconsistent factor structure findings in job analysis research.

Proposition 10: Carelessness may result in reduced reliability, less discrimination among jobs, and reduced factor structure dimensionality. It is more likely if job analysis instruments are long and complex, if respondents do not fully comprehend what is being asked, or if questionnaires include numerous items that do not apply to a particular job.

Extraneous information. Research has demonstrated that biased information processing in job analysis can result from extraneous information not relevant to the analysis. Extraneous information can include such things as incumbent interest in the job, satisfaction, and compensation level. Early support for the suggestion that extraneous information can bias job analysis comes from Prien and Saleh (1963). They hypothesized that factors such as tenure, job difficulty, and estimated performance of the incumbent can bias analyst evaluations. Arvey et al. (1982) found that the degree of interest an incumbent exhibits in his or her job can bias the ratings given by job analysts. Staw (1975) demonstrated the marked influence that knowledge of performance had on self-report measures of intragroup processes. If individuals were told they were in a high-performing group, they rated the group higher in cohesiveness, influence, communication, and motivation. Thus, extraneous information can alter

respondent perceptions and potentially influence job analysis information.

Biasing effects of extraneous information have been well documented in job design research, such as the influence of social cues on job perceptions (Griffin, 1983; Griffin, Bateman, Wayne, & Head, 1987; O'Reilly & Caldwell, 1979; Salanick & Pfeffer, 1978; J. Thomas & Griffin, 1983; Weiss & Shaw, 1979; White & Mitchell, 1979). For example, the apparent job satisfaction of incumbents has been repeatedly shown to bias incumbent perceptions of job enrichment, with jobs viewed as more enriched if other incumbents appear satisfied (Weiss & Shaw, 1979; White & Mitchell, 1979). Likewise, incumbents who appear satisfied may be viewed by an analyst as having more enriched jobs, and the analysts will then tend to report more enriched job characteristics (Adler, Skov, & Salvemini, 1985; Caldwell & O'Reilly, 1982; O'Reilly & Caldwell, 1979). These cues can come from either supervisors or coworkers (Griffin, 1983). Thus, social information could directly influence job analysis results by influencing incumbent and analyst perceptions of the job.

In job evaluation, knowledge of current pay levels has a biasing effect such that higher paid jobs typically receive more positive job evaluations (Mount & Ellis, 1987; Rynes, Weber, & Milkovich, 1989; Schwab & Grams, 1985). For example, Grams and Schwab (1985) found that when a banking representative job was reported as paying a higher salary than an auditor job, it received higher evaluation scores. When the banking representative job paid a lower salary than the auditor job, however, it received lower evaluations. This suggests that existing compensation structures, if known by the analyst, can influence the job evaluation.

The influence of extraneous information can be viewed within an attributional framework as well (Staw, 1975). If an incumbent appears satisfied, an attribution is made that he or she must have an enriched job because of the relationship between job enrichment and job satisfaction. Likewise, if a job is highly paid, an attribution that it must be a complex job is made. Otherwise, why would the incumbent be paid so much? Attributions become more likely when incumbents are similar on the extraneous information (e.g., all high on job satisfaction) because the attributional evidence appears stronger. Such attributions seem particularly likely among analysts, because they have more implicit theories about relationships among jobs and other job factors and may have less in-depth job information.

The social environment, pay levels, and KSAO requirements all influence one another in various ways, and each, no doubt, biases perceptions of the others. They may not, however, always be biasing forces but instead may be relevant cues in many job analysis situations. For example,

current pay level is an important source of information when fitting a formal job evaluation system to a set of jobs. Current pay levels are logically and empirically related to many job attributes because of the underlying influence of skill levels and market forces (Campion & Berger, 1990).

Proposition 11: Extraneous information may lead to inaccurate mean ratings. Whether the bias inflates or deflates the job requirements or other job information will depend on the nature of the extraneous information. It is more likely to bias job analysis results when incumbents are homogeneous on the extraneous information (e.g., all high performers, all satisfied, all highly paid) or when analysts are used.

Inadequate information. In addition to the influence of extraneous information on job analysis responding, inadequate information can lead to inaccuracies. Situations where the rater has incomplete job information usually arise with analysts or naive raters. Having limited information about the job has been shown to influence the reliability and validity of job analysis information. Naive analysts, or those with less information, produce ratings that are less reliable and valid than those of expert raters (Cornelius, DeNisi, & Blencoe, 1984; DeNisi, Cornelius, & Blencoe, 1987; Friedman & Harvey, 1986; Hahn & Dipboye, 1988; Harvey & Lozada-Larsen, 1988; Richman & Quiñones, 1996). Inadequate information is considered a cognitive source of inaccuracy because it fundamentally biases the processing of information. It is not an individual differences variable because it could occur to different people in different jobs.

In an initial study on this topic, J. E. Smith and Hakel (1979) found little difference between expert and naive raters on judgments of 25 different jobs on a structured job analysis inventory. The amount of job knowledge had little practical influence on job analysis results. Other research has also questioned the importance of extensive rater job knowledge by showing that quantitative ratings with acceptable agreement could be made on the basis of job descriptions alone (A. P. Jones, Main, Butler, & Johnson, 1982).

Cornelius et al. (1984) criticized the Smith and Hakel study on several methodological grounds, such as the analysis of convergent validities using aggregated data and the inclusion of "does not apply" responses in the calculations of reliability. They conducted their own study comparing expert and naive raters across nine different jobs and found an average validity between naive and expert raters of .41, indicating only modest convergence. Average reliability for the naive raters was .54, compared with .65 for expert raters. Additionally, correlations between reported job familiarity and reliability and validity were .58 and .48, respectively. They concluded that job knowl-

edge increases both rating reliability and validity. A later study by DeNisi et al. (1987) confirmed these findings and highlighted the importance of excluding "does not apply" ratings when analyzing the reliability of structured job analysis surveys.

Friedman and Harvey (1986) and Harvey and Lozada-Larsen (1988) examined how differences in levels of job information (e.g., job title, job title with short narrative summary, and extensive task-based description of the job) influence job analysis ratings made by naive raters. These naive raters were then compared with expert raters to assess their convergent validity. Friedman and Harvey (1986) found that expert raters evidenced higher interrater reliability (mean $r = .90$) than naive raters (highest mean $r = .45$). Also, low convergent validities (highest mean $r = .43$) were found, although the amount of information did not improve the accuracy of the naive raters.

Harvey and Lozada-Larsen (1988) used a more sophisticated multidimensional measure of accuracy comprised of four components: elevation, differential elevation, stereotype accuracy, and differential accuracy. They found that elevation (i.e., the ability to match the true overall rating average) and differential accuracy (i.e., the ability to predict differences among jobs on the questionnaire items) were the most prominent aspects of job analysis accuracy, and the amount of job information improved differential accuracy for naive raters. Thus, a more precise measure of accuracy allowed them to demonstrate the value of additional information on job analysis rating accuracy. Both studies were in agreement, however, that naive raters were unable to accurately substitute for expert raters (Friedman & Harvey, 1986) or job incumbents (Harvey & Lozada-Larsen, 1988).

Similar findings have been demonstrated in a job evaluation context (Hahn & Dipboye, 1988). Hahn and Dipboye found that both the amount of job information (e.g., title, job description, etc.) and the amount of training influenced the reliability and accuracy of job evaluation ratings. It should be noted, however, that the literature cited typically involved students who have never worked on the job they are rating. Thus, naive refers to truly naive raters and not those with some experience on the job or a similar job. Nevertheless, this research demonstrates that the amount of information held by the rater does influence the reliability and accuracy of ratings. Thus, the weight of the evidence for all these studies suggests that the amount of information held by the job analyst or other respondent is important for job analysis. Incomplete or inadequate information appears to influence the ability to render accurate job analysis judgments.

Proposition 12: Inadequate information among job analysis respondents may lead to inaccuracy in the form of reduced reliability and completeness of job analysis information.

Order and contrast effects. Contextual rating inaccuracies such as order effects (i.e., primacy and recency) and contrast effects have been investigated primarily in the performance appraisal (Gaugler & Rudolph, 1992; Grey & Kipnis, 1976; Latham, Wexley, & Pursell, 1975) and interviewing (Farr, 1973; Schmitt, 1976) literatures. Primacy effects refer to the exaggerated influence of initial or first-impression information, whereas recency effects refer to the exaggerated influence recent information can have on judgments. For example, B. N. Smith, Benson, and Hornsby (1990) found that information placed at the beginning of a job description is more influential (primacy effect) on job evaluation results. It is also possible that recently performed job tasks could overly influence incumbent judgments or that recently conducted observations or interviews could overly influence analyst judgments because they are more available in memory.

Contrast effects refer to distortions that are caused by the differences between stimuli. For example, it has been frequently found in the selection interview literature that after an interviewer consecutively rates several unfavorable candidates, subsequent average candidates are evaluated more favorably (Carlson, 1970; Wexley, Sanders, & Yukl, 1973; Wexley, Yukl, Kovacs, & Sanders, 1972). In performance appraisal, Grey and Kipnis (1976) found that as the proportion of noncompliant subordinates increased (i.e., those that deliberately refused to follow orders), managerial ratings of compliant subordinates rose. The inflated ratings due to contrast between workers accounted for up to 26% of the variance in performance ratings. Contrast effects have been found in multiple-rater and multiple-situation assessment center settings as well (Gaugler & Rudolph, 1992).

In the job analysis context, after evaluating a number of lower level jobs, an analyst might give overly high ratings to an average-level job because of contrast effects. Likewise, recently transferred or promoted incumbents, or incumbents who have been on special or unusual assignments, may suffer potential contrast effects. These effects, however, may decay over time. Smither, Reilly, and Buda (1988) found contrast effects in performance appraisal when the interval between observation and evaluation was short (1 hr) but not when the interval was longer (3 weeks). It may be that the manner in which a job analysis is conducted, such as the timing between each job, can reduce contrast effects.

Proposition 13: Order and contrast effects may lead to inaccuracy in the form of incomplete ratings. Primacy effects are more likely than recency effects, and contrast effects may decay over time.

Halo. Inaccuracy due to halo occurs when ratings are assigned on the basis of global impressions or highly salient features instead of systematically distinguishing

among dimensions (Borman, 1991; Thorndike, 1920). There are two types of halo: true and illusory. True halo represents the extent to which dimensions are correlated in reality, whereas illusory halo refers to artificially inflated relationships among dimensions (Cooper, 1981; Murphy & Anhalt, 1992; Murphy, Jako, & Anhalt, 1993). The latter type of halo is of concern here because it is a source of inaccuracy. When a person's performance is especially high or low on one dimension, ratings may "spill over" or create halo on the ratings of other dimensions. Although it has been examined primarily in the performance appraisal literature (Borman, 1975, 1977; Kozlowski, Kirsch, & Chao, 1986; Murphy & Anhalt, 1992), halo can be logically extended to job analysis if ratings across dimensions are biased by noteworthy aspects or overall impressions of the jobs.

Incumbents, supervisors, and analysts could all potentially commit halo inaccuracies during a job analysis. Cooper (1981) identified several sources of halo that may be relevant for job analysis measurement. First, if analysts do not sample the incumbent's work behavior comprehensively enough, then he or she is likely to rely on global impressions. Second, questionnaire instruments that are abstract and have nonconcrete or nonspecific descriptors are likely to produce overlapping dimensions. Third, if raters are not sufficiently motivated, they may respond in such a way that they do not distinguish among various job dimensions, resulting in uniform ratings. Finally, cognitive categorization can (as discussed previously) contribute to halo because details that might distinguish among job dimensions are lost, and beliefs about category covariance are created.

Evidence of these inaccuracies, and the factors that moderate their influence, has been demonstrated in recent research. For example, in a performance appraisal context, Kozlowski et al. (1986) found that halo is greater under conditions of low job knowledge. High-knowledge raters were more sensitive to actual performance covariation when rating familiar individuals and tended to rely on conceptual similarity schemata when rating unfamiliar individuals. Low knowledge raters, however, relied on their conceptual similarity schemata regardless of familiarity with those being rated. Thus, when raters lack sufficient knowledge, judgments are based on factors unrelated to actual performance. In a similar manner, halo may account for what appears to be stereotypical responding in job analysis measures.

It should also be noted, however, that halo does not always result in reduced rating accuracy (Murphy & Balzer, 1989; Murphy et al., 1993). In fact, halo may contribute to certain kinds of rating accuracy (Murphy & Balzer, 1986). That is, it may represent true covariation among dimensions and not inaccuracy at all.

Proposition 14: Halo may lead to inaccuracy in the form of inflated ratings and reduced dimensionality in the job analysis data. It is more likely with incomplete sampling of work information, abstract questionnaire items, low rater motivation, reliance on cognitive categorization, low job knowledge, or a job that is particularly high or low on some dimension.

Leniency and severity. Tendencies on the part of respondents to give consistently high ratings are termed leniency, and tendencies to give consistently low ratings are termed severity. Considerable evidence as to the nature of these inaccuracies has been documented in the performance appraisal context (Bass, 1956; Bernardin & Beatty, 1984).

Although there has been little investigation into the effects of leniency or severity inaccuracy in job analysis, it seems clear that leniency occurs in job analysis for several reasons. It may be due to an unwillingness to be critical (Benedict & Levine, 1988) such that the rater does not want to downgrade the position. There may be a greater likelihood for leniency in situations where the use of job analysis information is linked to important personnel decisions such as compensation levels (Bernardin & Beatty, 1984). When self-ratings are used, as is commonly done in incumbent-completed questionnaires, there is a tendency for inflated ratings (Harris & Schaubroeck, 1988; Mabe & West, 1982), suggesting that incumbent-completed questionnaires may evidence more leniency than analyst-completed questionnaires.

Leniency is particularly problematic in job analysis because it tends to overestimate the job duties and requirements. From an organizational perspective, such overestimation has important implications if it occurs in job evaluation because it could lead to excessive compensation costs. Leniency is also problematic if the job analysis information is to be used for selection purposes because it may overestimate KSAO requirements, thus making recruiting more difficult and possibly increasing levels of adverse impact.

Severity is less likely to occur in job analysis situations. When severity does occur, it will be in isolated situations such as when a compensation analyst tries to conserve organizational resources.

Proposition 15: Leniency may lead to inaccuracy in the form of overestimated job duties and requirements as well as reduced dimensionality and restricted variance. It will be greater when there is an unwillingness to be critical, when information is linked to important personnel decisions, or when incumbent-completed questionnaires are used. Severity is unlikely to occur.

Method effects. It has long been recognized that data collected through a single method can lead to problems with common-method variance (D. T. Campbell & Fiske, 1959; Fiske, 1982). When data are collected with the

same instrument, there can be spurious covariation among responses. As a result, observed correlations reflect shared method variance as well as shared trait variance (Spector, 1992).

Although there has been little discussion of method effects in job analysis research, there has been considerable discussion in job design research. For example, Salanick and Pfeffer (1977) suggested there are two potential underlying causal mechanisms: consistency and priming. Consistency refers to the tendency of individuals to remember and maintain consistency with prior responses, whereas priming refers to the influence a questionnaire can have in orienting an individual's attention to certain responses. In job analysis, the respondent may try to maintain logical consistency among various job factors such that if he or she rates one task as important, then it may seem to follow that other tasks should be rated as important or that the KSAOs should be rated as high. Priming effects are particularly likely to occur in job analysis situations because certain job features may be highlighted or suggested (e.g., complexity, difficulty, danger, etc.) which, in turn, can influence or direct subsequent responding. Such dynamic psychological processes can have a profound influence on self-reported beliefs, attitudes, intentions, and behaviors (Feldman & Lynch, 1988; Tourangeau & Rasinski, 1988).

There has been a good deal of debate as to the magnitude of method effects in organizational research. Some have downplayed its influence (Fried & Ferris, 1987; Spector, 1987), whereas others have been very critical (Buckley, Cote, & Comstock, 1990; Mitchell, 1985; Roberts & Glick, 1981). For example, in examining previous studies, Buckley et al. (1990) estimated mean variance due to method effects at over 21%, with a range of 4% to 56%. Clearly, method effects can have a pronounced influence on questionnaire responses and subsequent decisions that are based on such data.

Job analyses are particularly susceptible to method effects because of the use of incumbent completed questionnaires where incumbents provide all the relevant data. They are completed by the same person, at the same time, with the same questionnaire, all conditions under which method effects are most likely to influence the data. Spector (1994) noted that self-reports in other areas of research are criticized primarily when they are used as indicators of the objective job environment, and this is precisely the case in job analysis. That problems with method effects have not been acknowledged in job analysis is surprising, given what is known about the problem and the admonition against conducting such research (J. P. Campbell, 1982).

Aside from the common source for the data, a number of other typical methodological practices in job analysis may further enhance method effects. For example, the use

of a common response format, excessively long questionnaires, and fine or subtle distinctions among items may further enhance covariation among items.

Method effects can have a number of different effects on job analysis data. For example, they can artificially increase internal consistency reliability. Method effects can also exaggerate relationships between various job dimensions (Roberts & Glick, 1981), such as between task and KSAO ratings. Relatedly, inflated correlations among items can reduce factorial complexity.

Proposition 16: Method effects may artificially increase estimates of internal consistency reliability and decrease the dimensionality of the data. It is more likely when a common response format is used, the questionnaire is long, or the items make very fine distinctions.

Effects of Biases in Information-Processing Systems on Job Analysis Facets

As with the previous sources of inaccuracy (Table 2), biases in information-processing systems are likely to influence both job- and worker-oriented descriptors, but the effect will be larger with the latter because they are less objective, more abstract, and require greater inferences. Also, all sources of inaccuracy are likely when judging job information, whereas only extraneous and inadequate information are likely when generating information.

Regarding method, carelessness has been mainly shown to be a problem with questionnaires, whereas extraneous information can be a problem with all methods. Inadequate information is highly problematic with observational methods because of the likelihood that the observer will not adequately sample the full domain of work behavior. Order and contrast effects are most applicable when individual respondents are measured in the context of other respondents, such as often occurs with interviews or observations. Halo, leniency and severity, and method effects are potential sources of inaccuracy for questionnaires because most of the research demonstrating these effects have been conducted with questionnaires. They are also likely with observation as they have been shown to be significant problems in performance appraisal research, which is highly dependent on observation.

In terms of source, incumbents are the least susceptible to extraneous and inadequate information because they have the most job knowledge, whereas analysts are the most susceptible because they have the least job knowledge. Conversely, analysts may be the least careless because it is their job responsibility. Incumbents may be the most careless because the job analysis may not influence them or their jobs in any way and the methodology may be unfamiliar to them. It may simply seem like a bureaucratic exercise. Analysts may be the most influenced by order and contrast effects because of the widest exposure to

different jobs. Incumbents and supervisors are likely to be lenient. All three types of respondents are expected to show halo and method effects.

In terms of purpose, virtually all biases in information processing are problematic in job analyses conducted for compensation, selection, and training purposes. This is due to the fact that these biases are subtle and relatively ubiquitous. Only carelessness is unlikely to affect the data when analyses are conducted for compensation purposes because respondents are more likely to attend to the rating task.

Recommendations for Research and Practice

In this final section, further suggestions for research are provided along with concrete recommendations for reducing the sources of inaccuracy in the practice of job analysis. It is important to note that these recommendations are drawn from the logic and propositions in the preceding discussion, as most of these issues have not been researched in job analysis. It is also important to note that experienced analysts likely engage in some of the recommendations we outline. For example, analysts often obtain information from a large number of respondents, use multiple methods, and obtain data from multiple sources. Our purpose is to explicitly identify and compile recommendations in one place for the benefit of both more and less experienced analysts. Finally, we conclude with a brief discussion concerning the implications of this model for job analysis accuracy and other practical considerations.

Social Influence Processes

Much of the research on social influence processes has been conducted in experimental settings in social psychology. Research is needed with respect to how these processes operate within the job analysis context. For example, are there pressures to conform, and what is the most typical source of this pressure? Do extremity shifts occur, and what are the consequences in practical terms? Does motivation loss reduce the accuracy of job information?

In terms of practice, if ratings or task statements are collected individually before the committee meets, as well as following group discussion, it may be possible to determine whether conformity or extremity shifts have occurred. Collected data should always be verified by other respondents to minimize extremity and motivation loss (e.g., analysts, supervisors, or another group of incumbents). Where possible, committees should be composed of equal-status members. Alternatives to unanimous decision rules (e.g., anonymous responding, averaging decision rule) should be explored to minimize conformity and extremity shifts. Group member diversity may help

mitigate conformity and extremity shifts by decreasing homogeneity of opinions and perhaps by increasing the number of dissenters. Meetings can be structured so that individuals participate fully by taking turns, collecting judgments individually, ensuring accountability, or emphasizing the importance of individual contributions. Finally, group size should be moderate to avoid the motivation losses that can occur in large groups.

Self-Presentation Processes

Research on this topic has occurred in organizations, but little has been conducted in job analysis contexts. It appears that the motivation to adopt these roles is greater if the respondent realizes some potential gain or loss from the job analysis results. If the effects are as large as in other areas of psychology, then it is extremely important that future job analysis research address these issues.

Some practical recommendations for reducing the biasing effects of self-presentation processes include collecting data from multiple sources, particularly from those with different motivations such as incumbents versus analysts, as well as using more objective measures, such as archival records or counts of observable behaviors. Also, the effects of self-presentation processes may be reduced by communicating to respondents that all answers will be verified against the input of others and that outliers will not be used, focusing attention on the job rather than the persons performing the job, clarifying the nature of the judgments to be made, and explaining the need for accurate information.

Limitations in Information-Processing Systems

Some research has occurred on organizational topics, but much more is needed in job analysis because information-processing limitations are likely to be very relevant. For example, how long can a job analysis instrument be before fatigue and simplified response heuristics degrade the quality of the data? How many independent job dimensions can respondents reliably distinguish? What impact do heuristics and categorization have on the accuracy of job information? Are there differences between potential respondents (e.g., incumbents, supervisors, and analysts) in terms of their resistance to information overload? Also, more needs to be known about the relative merits of using decomposed versus holistic judgments. The evidence reviewed above suggests that decomposed judgments may be more reliable, but other evidence suggests that interdependencies among tasks must also be considered to more accurately estimate job ability requirements (Wong & Campion, 1991). Research should determine how to develop job analysis measures to avoid these inaccuracies because they are not intentional and instructions cannot minimize them, unlike some other sources of inaccuracy.

In terms of practice, the goal should be to reduce the amount and complexity of the information-processing demands on respondents to whatever extent possible. For example, shorter job analysis questionnaires might be used, or perhaps longer questionnaires could be broken into smaller ones that can be completed by different random samples of respondents. It is also important to ensure that respondents have enough time to complete their ratings and are sufficiently motivated. This should encourage controlled processing and minimize the use of heuristics and categorization. Rater training might be used to reduce reliance on heuristics in making inferential judgments (Sanchez & Levine, 1994). Fewer ratings of each task may be possible; however, the purpose of the job analysis should be the primary determinant of the use of fewer scales because not all scales provide equivalent information.

Biases in Information-Processing Systems

Some research has already been conducted in job analysis, but much more is needed. For example, are the use of bogus or repeated tasks adequate for detecting carelessness? How can carelessness be prevented or reduced? What other sources of extraneous information are important other than incumbent attitudes and pay levels (e.g., the social status of the job, stereotypes regarding the industry, etc.)? Are different respondents influenced by different sources of extraneous information? With respect to inadequate information, how much information is sufficient to reliably and accurately conduct job analyses? Finally, more research is needed on the advantages of using different respondents and whether incumbents are better for some judgments (e.g., time spent) and supervisors and analysts better for others (e.g., relative skill levels among jobs).

There are many potential practical approaches to reducing carelessness. Possibilities include developing questionnaire layouts and instructions that are very simple and user-friendly, checking interrater reliability, including a carelessness index, performing checks on the logicity of the data, eliminating outliers, and debriefing respondents to probe for potential carelessness.

With regard to inadequate and extraneous information, always ensure that respondents have adequate job information or job knowledge. This is especially important when involving supervisors or analysts who have only limited job familiarity. It is also important to use only incumbents and supervisors who have experience with all the job tasks. Extraneous information should be controlled where possible. Training may also help in directing the respondent's attention toward relevant information and away from extraneous information.

In terms of biases, such as order and contrast, halo,

leniency and severity, and method effects, much more research is needed on the degree to which they threaten accuracy and the ways in which they can be mitigated. Because of their unknown origin and ubiquitous nature, these biases are harder to distinguish from other sources of inaccuracy. Therefore, future research might also determine how much inaccuracy in job analysis is due to these sources, separate from the other sources.

Research on practical approaches to reducing these biases has been most extensive in performance appraisal (Borman, 1991). Approaches include carefully developing instructions, anchoring rating scales, and providing training. An important finding in this research is that reducing the appearance of rating inaccuracies does not necessarily improve accuracy (Bernardin & Pence, 1980). Instead, respondents must be given the proper frame of reference from which to make judgments (Bernardin & Buckley, 1981). Another practical recommendation is to include analysts in addition to other respondents, because research suggests that analysts give ratings with less leniency than incumbents or supervisors (J. E. Smith & Hakel, 1979). Clearly distinguishing among job dimensions and writing questionnaire items that are concrete and understandable may help minimize many of these inaccuracies, and simple awareness of these inaccuracies may reduce their occurrence. Strategies used to reduce method bias include varying question order (Campion, 1988; Spector & Michaels, 1983), collecting data from multiple sources (Algera, 1983; Campion & McClelland, 1991; Campion, Medsker, & Higgs, 1993; Glick, Jenkins, & Gupta, 1986), using separate subsamples per job (Campion, 1988), and collecting data longitudinally (Campion & McClelland, 1993).

Other Recommendations

There are several other recommendations that cut across potential sources of inaccuracy. First, job information should always be obtained from multiple perspectives. This includes multiple types of respondents and multiple respondents of each type. As Table 2 suggests, each type of respondent has particular strengths and weaknesses. This strategy will yield the fullest possible information, and the convergence between the various respondents is likely to be more accurate than any one alone (Goldstein et al., 1993). One caveat to this recommendation is when incumbents have unusually low levels of education or when incumbent or supervisory motivation to distort is high. In these instances, it is best to rely on analysts.

Second, a variety of research methods should be used (Prien, 1977). Multiple operationalism is good practice in any research context but is especially important when numerous potential sources of inaccuracy exist. For example, job evaluation research has found that classification

decisions tend to be method dependent (Madigan, 1985). Different methods have different strengths (e.g., quantitative indexes vs. qualitative depth) and susceptibilities to inaccuracy (see Table 2). More confidence can be placed in findings corroborated by independent methods, and use of multiple methods is likely to result in superior job information (Levine, Ash, Hall, & Sistrunk, 1983). For example, Veres, Lahey, and Buckley (1987) outlined an approach that combines observation, group interviews, and questionnaires.

Third, because many of the sources of inaccuracy are unintentional and merely reflect people's limitations, special care should always be taken to structure the data collection process to be clear and understandable for the respondent. Conversely, because many other sources of inaccuracy are intentional, special care should always be taken to ensure that the respondent understands the purpose and importance of the study and is motivated to provide accurate and unbiased information.

Fourth, many of these sources of inaccuracy can be detected and remedied by close supervision of the data collection. For example, pilot studies, monitoring questionnaire completion, and debriefing respondents can help identify potential sources of inaccuracy while the study is in progress or before, so that inaccuracies can be addressed and accurate data obtained. Colton, Kane, Kingsbury, and Estes (1991) outlined one possible strategy for examining the validity of job analysis data that revolves around testing hypotheses regarding expected consistencies both within the data as well as between the data and independent sources of information.

Conclusion

Given this litany of potential inaccuracies, one might wonder whether all job analyses are subjective and error-prone exercises. Clearly they are not, and we do not wish to imply that all job analyses are rife with inaccuracy. We do believe, however, that it is time to stop and take a critical look at job analysis. Throughout the paper we have identified those practices that are more likely to be influenced by the different psychological processes. For clarity, it is important to broadly summarize the situations in which these processes are most likely to occur and the situations in which these processes are unlikely to be a concern. First, when rating discrete and observable tasks, it is unlikely that any of the processes we outline will influence the data collected. On the other hand, ratings of subjective and diffuse attributes, such as many KSAOs, are more likely to be influenced. Second, the nature of the rating task will influence the extent to which inaccuracy will result. For example, ratings of "do you perform" are much more likely to be accurate than "criticality" ratings, because less subjectivity and judgment is

involved. These are important considerations when assessing the accuracy of job analysis data or determining how best to mitigate these processes.

It has often been noted that performance appraisal research on cognitive processes has made only limited contributions to the practice of performance appraisal in organizations (e.g., Banks & Murphy, 1985; Ilgen, Barnes-Farrell, & McKellin, 1993). This suggests that research on job analysis inaccuracy should focus on the practical influence these inaccuracies have on job analysis information. As noted previously, we are not asserting that these inaccuracies will always occur and materially affect job analysis information. What we are suggesting, however, is that many of these inaccuracies have the potential to occur (on the basis of other literature), that they may influence the quality of job analysis information, and that they may influence decisions that are based on these data. This is clearly an area that requires further research focused on the practical implications of inaccuracy.

Research into these potential inaccuracies should be a high priority. Job analysis forms the basis for virtually all human resource activities, and inaccuracy negatively affects all subsequent systems and decisions. Yet, little research has been conducted in job analysis that explicitly examines inaccuracy. Research on this topic could progress quickly and easily because many of the propositions and questions can be examined within the context of a typical job analysis study. As such, both practice and science could conceivably be advanced with each future job analysis conducted.

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The Publications and Communications Board has opened nominations for the editorships of **Experimental and Clinical Psychopharmacology**, **Journal of Experimental Psychology: Human Perception and Performance (JEP:HPP)**, **Journal of Counseling Psychology**, and **Clinician's Research Digest** for the years 2000–2005. Charles R. Schuster, PhD, Thomas H. Carr, PhD, Clara E. Hill, PhD, and Douglas K. Snyder, PhD, respectively, are the incumbent editors.

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