

regarding relationships between many predictors and work performance currently exists (Schmidt & Hunter, 1998).

An extremely large sample or replication is required to give full credence to unusual findings. Such findings include, but are not limited to, suppressor or moderator effects, nonlinear regression, and benefits of configural scoring. *Post hoc* hypotheses in multivariate studies and differential weightings of highly correlated predictors are particularly suspect and should be replicated before they are accepted and results implemented.

Evidence for Validity Based on Content

Evidence for validity based on content typically consists of a demonstration of a strong linkage between the content of the selection procedure and important work behaviors, activities, worker requirements, or outcomes on the job. This linkage also supports construct interpretation. When the selection procedure is designed explicitly as a sample of important elements in the work domain, the validation study should provide evidence that the selection procedure samples the important work behaviors, activities, and/or worker KSAOs necessary for performance on the job, in job training, or on specified aspects of either. This provides the rationale for the generalization of the results from the validation study to prediction of work behaviors (Goldstein, Zedeck, & Schneider, 1993).

The content-based selection procedures discussed here are those designed as representative samples of the most important work behaviors, activities, and/or worker KSAOs drawn from the work domain and defined by the analysis of work. The content of the selection procedure includes the questions, tasks, themes, format, wording, and meaning of items, response formats, and guidelines regarding the administration and scoring of the selection procedure. The following provides guidance for the development or choice of procedures based primarily on content.

Feasibility of a Content-Based Validation Study

A number of issues may affect the feasibility of a content-based validation study and should be evaluated before beginning such a study. Among these issues are the stability of the work and the worker requirements, the interference of irrelevant content, the availability of qualified and unbiased subject matter experts, and cost and time constraints.

The researcher should consider whether the work and the worker requirements are reasonably stable. When feasible, a content-based selection procedure should remove or minimize content that is irrelevant to the domain sampled. Virtually any content-based procedure includes some elements that are not part of the work domain (e.g., standardization of the selection procedure or use of response formats that are not part of the job content, such as multiple choice formats or written responses when the job does not require writing).

The success of the content-based validation study is closely related to the qualifications of the subject matter experts (SMEs). SMEs define the work domain and participate in the analysis of work by identifying the important work behaviors, activities, and worker KSAOs. The experts should have thorough knowledge of the work behaviors and activities, responsibilities of the job incumbents, and the KSAOs prerequisite to effective performance on the job. The SMEs should include persons who are fully knowledgeable about relevant organizational characteristics such as shift, location, type of equipment used, and so forth. A method for translating subject matter expert judgments into the selection procedure should be selected or developed and documented. If SME ratings are used to evaluate the match of the content-based procedure to the work and worker requirements, procedures and criteria for rating each aspect should be standardized and delineated.

Cost and time constraints can affect the feasibility of some content-based procedures. In some situations, designing and implementing a simulation that replicates the work setting or type of work may be too costly. In others, developing and assessing the reliability of the procedure may take too long because samples are too small or the behavior is not easily measured using this strategy.

Design and Conduct of Content-Based Strategies

The content-based validation study specifically demonstrates that the content of the selection procedure represents an adequate sample of the important work behaviors, activities, and/or worker KSAOs defined by the analysis of work. This involves choosing subject matter experts, defining the content to be included in the selection procedure, developing the selection procedure, establishing the guidelines for administration and scoring, and evaluating the effectiveness of the validation effort.

Defining the Content Domain

The characterization of the work domain should be based on accurate and thorough information about the work including analysis of work behaviors and activities, responsibilities of the job incumbents, and/or the KSAOs prerequisite to effective performance on the job. In addition, definition of the content to be included in the domain is based on an understanding of the work, and may consider organizational needs, labor markets, and other factors that are relevant to personnel specifications and relevant to the organization's purposes. The domain need not include everything that is done on the job. The researcher should indicate what important work behaviors, activities, and worker KSAOs are included in the domain, describe how the content of the work domain is linked to the selection procedure, and explain why certain parts of the domain were or were not included in the selection procedure.

The fact that the construct assessed by a selection procedure is labeled an ability does not *per se* preclude the reliance on a content-oriented strategy. When selection procedure content is linked to job content, content-oriented strategies are useful. When selection procedure content is less clearly linked to job content, other sources of validity evidence take precedence.

The selection procedure content should be based on an analysis of work that specifies whether the employee is expected to have all the important work behaviors, activities, and/or KSAOs before selection into the job or whether basic or advanced training will be provided after selection. If the intended purpose of the selection procedure is to hire or promote individuals into jobs for which no advanced training is provided, the researcher should define the selection procedure in terms of the work behaviors, activities, and/or KSAOs an employee is expected to have before placement on the job. If the intent of the content-based procedure is to select individuals for a training program, the work behaviors, activities, and/or worker KSAOs would be those needed to succeed in a training program. **Because the intended purpose is to hire or promote individuals who have the prerequisite work behaviors, activities, and/or KSAOs to learn the work as well as to perform the work, the selection procedure should be based on an analysis of work that defines the balance between the work behaviors, activities, and/or KSAOs the applicant is expected to have before placement on the job and the amount of training the organization will provide.** For example, the fact that an employee will be taught to interpret company technical manuals may mean that the job applicant should be evaluated for reading ability. A selection procedure that assesses the individual's ability to read at a level required for understanding the technical manuals would likely be predictive of work performance.

A content-based selection procedure may also include evidence of specific prior training, experience, or achievement. This evidence is judged on the basis of the relationship between the content of the experience and the content of the work requiring that experience. To justify such relationships, more than a superficial resemblance between the content of the experience variables and the content of the work is required. For example, course titles and job titles may not give an adequate indication of the content of the course or the job or the level of proficiency an applicant has developed in some important area. What should be evaluated is the similarity between the behaviors, activities, processes performed, or the KSAOs required by the work.

Choosing the Selection Procedure

The development or choice of a selection procedure usually is restricted to important or frequent behaviors and activities or to prerequisite KSAOs. The researcher should have adequate coverage of work behaviors and activities and/or worker requirements from this restricted domain to provide sufficient evidence to support the validity of the inference. The fidelity of the

selection procedure content to important work behaviors forms the basis for the inference.

Sampling the content domain. The process of constructing or choosing the selection procedure requires sampling the work content domain. Not every element of the work domain needs to be assessed. Rather, a sample of the work behaviors, activities, and worker KSAOs can provide a good estimate of the predicted work performance. Sampling should have a rationale based on the professional judgment of the researcher and an analysis of work that details important work behaviors and activities, important components of the work context, and KSAOs needed to perform the work. Random sampling of the content of the work domain is usually not feasible or appropriate. The rationale underlying the sampling should be documented.

Describing the level of specificity. In defining the work content domain, the degree of specificity needed in a work analysis and a selection procedure should be described in advance. The more a selection procedure has fidelity to exact job components, the more likely it is that the content-based evidence will be demonstrated. However, when the work changes and fidelity drops, the selection procedure is less likely to remain appropriate. Thus, considering the extent to which the work is likely to change is important. If changes are likely to be frequent, the researcher may wish to develop a selection procedure that has less specificity. For example, in developing a selection procedure for the job of word processor, the procedure may exclude content such as “demonstrates proficiency with a particular word processing program” and instead include content that is less specific, such as “demonstrates proficiency with word processing principles and techniques.”

The degree to which the results of validation studies can be generalized depends in part on the specificity of the selection procedure and its applicability across settings, time, and jobs. While general measures may be more resilient to work changes and more transferable to other, similar work, they also may be subject to more scrutiny because the correspondence between the measure and the work content is less detailed.

Procedural Considerations

The researcher needs to establish the guidelines for administering and scoring the content-based procedure. Typically, defining the administration and scoring guidelines for a paper-based procedure that measures job-related knowledge or cognitive skills is relatively uncomplicated. On the other hand, including a work behavior or activity in the content-based selection procedure may introduce administration and scoring challenges, which should be evaluated in advance. Generally, the more closely a selection procedure replicates a work behavior, the more accurate the content-based inference. Yet, the more closely a selection procedure replicates a work behavior, the more difficult the procedure may be to administer and score.

For example, troubleshooting multistep computer problems may be an important part of a technical support person's work. It may be difficult, however, to develop and score a multistep troubleshooting simulation or work sample, because examinees may not use the same steps or strategy when attempting to solve the problem. A lower fidelity alternative such as single-step problems could be used so that important aspects of the work domain are still included in the selection procedure. In all cases, the researcher should ensure that the procedures are measuring skills and knowledge that are important in the work rather than irrelevant content.

Evaluating Content-Related Evidence

Evidence for validity based on content rests on demonstrating that the selection procedure adequately samples and is linked to the important work behaviors, activities, and/or worker KSAOs defined by the analysis of work. The documented methods used in developing the selection procedure constitute the primary evidence for the inference that scores from the selection procedure can be generalized to the work behaviors and can be interpreted in terms of predicted work performance. The sufficiency of the match between selection procedure and work domain is a matter of professional judgment based on evidence collected in the validation effort (Goldstein et al., 1993).

Reliability of performance on content-based selection procedures should be determined when feasible. If ratings from more than one rater are used to evaluate performance on a simulation or work sample, the researcher should evaluate inter-rater agreement in operational use.

Evidence of Validity Based on Internal Structure

Information about the internal structure of any selection procedure can also support validation arguments. Internal structure evidence alone is not sufficient evidence to establish the usefulness of a selection procedure in predicting future work performance. However, internal structure is important in planning the development of a selection procedure. The specific analyses that are relevant depend on the conceptual framework of the selection procedure, which in turn is typically established by the proposed use of the procedure.

When evidence of validity is based on internal structure, the researcher may consider the relationships among items, components of the selection procedures, or scales measuring constructs. Inclusion of items in a selection procedure should be based primarily on their relevance to a construct or content domain and secondarily on their intercorrelations. Well-constructed components or scales that have near-zero correlations with other components or scales, or a total score, should not necessarily be eliminated. For example, if the selection procedure purposely contains components relevant to different construct or content domains (e.g., a selection battery composed

of a reading test, an in-basket, and an interview), the scores on these components may not be highly correlated.

However, if the conceptual framework posits a single dimension or construct, one should strive for a high level of homogeneity among the components, which can be evaluated in terms of various internal consistency estimates of reliability. If the intent of the conceptual framework requires a more complex internal structure, overall internal consistency might not be an appropriate measure. For example, the internal consistency reliability estimate for a performance rating form involving several supposedly unrelated scales might only represent halo effect.

When scoring involves a high level of judgment on the part of those doing the scoring, indices of inter-rater or scorer consistency, such as generalizability coefficients or measures of inter-rater agreement, may be more appropriate than internal consistency estimates.