

# Competencies Through the Eyes of Psychologists: A closer look at assessing competencies

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**Competencies have become a leading construct in human resource practices. However, empirical research on competencies has lagged behind resulting in a gap between practice and science. In this study, the focus was on the nature of competencies by examining the relationships of three competency dimensions with cognitive ability, personality and performance during assessment center exercises. Data of 932 applicants participating in a 1-day selection procedure were used. Results showed that to assess the competency dimension Thinking psychologists focus on cognitive ability. To assess the competency dimension Feeling psychologists rely on performance during interview simulation exercises and on measures of personality. In assessing the dimension Power psychologists focus mainly on personality, although they also rely on cognitive ability and performance during interview simulation exercises.**

## 1. Introduction

Competencies have become the leading construct in many different human resource practices, such as recruitment and selection, career development, performance management, and the management of change. Literature on competencies has expanded rapidly (e.g., Bartram, 2005; Boyatzis, 1982; Hamel & Prahalad, 1994; Hollenbeck, McCall, & Silzer, 2006). However, empirical research on competencies has lagged behind, and a gap between practice and science has emerged (Lievens, Sanchez, & De Corte, 2004). Owing to this gap, it is still unclear what competencies are, and consequently competencies have become a construct with a wide range of definitions, causing confusion even among human resource experts (Schippmann *et al.*, 2000).

In the present study, we aim to fill part of the gap between practice and science by examining the nature of competencies. Therefore, we investigate competency ratings made by psychologists during employee selection. In assessing competencies of different applicants, do psychologists focus on cognitive ability and conscientiousness of the applicants, the main predictors of job performance (for meta-analytic reviews see, e.g., Barrick & Mount, 1991; Schmidt & Hunter, 1998)? Do they focus on other aspects of a selection procedure, such as the performance of applicants on assessment center exercises? In other words, what do psychologists consider to be the constructs underlying competencies? To answer these research questions, we use data of 932 applicants who participated in a 1-day selection procedure. We focus on the relationships between competency ratings made by psychologists and scores of

applicants on cognitive ability tests, personality tests, and assessment center exercises.

## 2. Rise of competencies

Past decades competencies have become a popular phenomenon in human resource management. Competencies were first introduced by McClelland (1973). He proposed to test for competence rather than for intelligence, because testing for competence would be more valid in predicting job performance. Technological change, globalized competition, and the need for a more strategic human resource management fueled the rise of competencies (e.g., Paulsson, Ivergård, & Hunt, 2005; Sparrow & Bognanno, 1993). Following McClelland, numerous authors have shed their light on the competency concept, creating a whole range of what appeared to be fundamentally different definitions (e.g., Boyatzis, 1982; Ulrich, Brockbank, Yeung, & Lake, 1995).

A closer look at the different definitions shows that there is confusion about the constructs that underlie competencies. Competencies are, for example, defined in terms of knowledge, skills, abilities, or personality characteristics. For an overview of different individual characteristics used in competency definitions we refer to Morgeson, Delaney-Klinger, Mayfield, Ferrara, and Campion (2004, p. 676). Spencer, McClelland, and Spencer (1992) distinguish, for example, motives, traits, self-concepts, content knowledge, and cognitive and behavioral skills as the basis of competencies. According to Bartram (2005) and Kurz and Bartram (2002) a competency is a construct that is defined in relation to its significance for performance at work. Thus, they state, 'a competency is not the behavior or performance itself, but the repertoire of capabilities, activities, processes and response available that enable a range of work demands to be met more effectively by some people than by others' (Kurz & Bartram, 2002, p. 230). In their opinion, the cluster of characteristics that defines a competency can vary from extensive to limited depending on the competency.

It is obvious that the proliferation of definitions causes confusion among practitioners and scientists, and that ambiguity is surrounding the competency concept. Additionally, the scientific community has not been particularly interested in the competency concept. As far as we know, only a few studies have investigated the nature of competencies (e.g., Baron, Bartram, & Kurz, 2003; Bartram, 2005) leaving a lot of questions unanswered. Additional empirical research is necessary to provide for a scientific underpinning of the nature of competencies. None of the studies so far has examined competencies through the eyes of psychologists or has incorporated performance on assessment center exercises. Therefore, the aim of this study is to

examine the relationships between competency ratings made by psychologists and possible predictors such as personality, cognitive ability, and performance on assessment center exercises.

## 3. Competencies and dimensions

Competencies are widely used to match a job and an individual, for example during employee selection. As Spencer *et al.* (1992) stated: 'The better the fit between the requirements of a job and competencies of a person, the higher will be the person's job performance and job satisfaction' (p. 27). One thing that different authors agree on is the fact that competencies focus on output, and that they are couched in terms of production and achievement (e.g., Sparrow & Bognanno, 1993). As a result, competencies are often formulated in terms of behavior. Owing to the emphasis on behavior, competencies can be easily used to create a wide range of assessment tools providing for agreed standards and a realistic job preview (Feltham, 1992).

In an attempt to label behavioral indicators into meaningful titles, practitioners and scientists formulated numerous competencies, such as decision making, sociability, customer focus and so on. In practice, the multitude of competencies made assessment, career planning, employee development and so forth complex and almost unfeasible. As a consequence, practitioners and scientists started to create competency taxonomies to organize the growing amount of competencies. Those taxonomies often contain constructs that make up the managerial job performance domain (e.g., Conway, 2000; Tett, Guterman, Bleier, & Murphy, 2000).

In line with Ones and Viswesvaran (1996), we argue that the use of more general dimensions provides convenient frameworks for research. Furthermore, based on assessment center research, it can be concluded that individuals are not capable of rating a large number of dimensions, and that individuals, to compensate for cognitive overload, reduce the number of dimensions during the rating process (e.g., Sagie & Magnezy, 1997; Shore, Thornton, & MacFarlane Shore, 1990). Previous research pointed out that a reduction in the number of dimensions caused, for example, an increase in dimension variance (Lievens & Conway, 2001), and a more accurate classification of behaviors (Gaugler & Thornton, 1989). Furthermore, a smaller number of dimensions may cause an adequate explanation of variance in criteria of interest (e.g., Jones & Whitmore, 1995; Sackett & Hakel, 1979). These are all desirable outcomes that are in favor of a small number of competency dimensions instead of an endless list of separate competencies. The optimal number of (competency or behavioral) dimensions varies between three and seven in overall assessment ratings, and

between two and four in assessment center exercises (e.g., Arthur, Anthony Day, McNelly, & Edens, 2003; Gaugler & Thornton, 1989).

Given the fact that individuals have a limited capacity to process information at least in part because of the number of dimensions they can retain (Lachman, Lachman, & Butterfield, 1979), and that individuals reduce the number of dimensions during the rating procedure, competencies used in the present study were designed to tap three dimensions; Thinking, Feeling, and Power. This triadic approach is adopted from the work of Kolk, Born, and van der Flier (2004), which studied the construct validity of assessment center exercises, and concluded that each exercise tapped three dimensions. Kolk *et al.* regarded the dimensions as category labels for clusters of competencies and named them the Thinking, Feeling, and Power dimensions. According to Kolk *et al.* the origins of these three dimensions can, for example, be found in the work of Plato who, in *The Republic*, distinguished between the faculties of knowing, feeling, and volition. Furthermore, similar dimensions are reported in research on leadership and personality (Yukl, 2005; Zand, 1997).

In the present study, the competency dimension Thinking relates to cognitive aspects and contains competencies such as analytical ability, inventiveness, and judgment. In the competency dimension Feeling social relations are the central aspect. The dimension Feeling is based on competencies such as empathy, cooperation, and customer orientation. The competency dimension Power contains competencies concerning action related issues, such as persuasion, risk awareness and acceptance, and decisiveness. An overview of competency dimensions, competencies, and their behavioral anchors is given in Table 1. For the current study, we used data gathered during a 1-day selection procedure comprising many different assessment methods. The data was gathered in collaboration with a Dutch psychological consultancy firm that was familiar with the Thinking, Feeling, and Power dimensions. Based on the different assessment methods psychologists make competency ratings by translating and categorizing overt behavior into competencies and competency dimensions such as Thinking, Feeling, and Power. We focus on the influence of cognitive ability measures, personality measures, and assessment center exercises on ratings made by psychologists with regard to the competencies and competency dimensions Thinking, Feeling, and Power.

#### 4. Competency dimensions, cognitive ability, and personality

To be able to judge an applicant's competencies, psychologists have to disentangle competencies and com-

petency dimensions into different determinants of behavior. As McClelland (1973) argues, competencies are directly resembling or related to job performance. Therefore, ultimately, competencies should lead to positive work-related outcomes, such as increased job performance and job satisfaction. The same argument is made by Silzer in his exchange of letters with Hollenbeck and McCall (Hollenbeck *et al.*, 2006). Silzer argues that competencies and competency models have been helpful in determining and understanding leadership effectiveness. In conclusion, we propose that, in assessing the competencies of an applicant, psychologists have to focus on those underlying constructs that lead to positive outcomes such as high job performance, low turnover, job satisfaction and so forth.

Previous research has indicated that, across a variety of occupations, general mental ability ([GMA], i.e., intelligence or cognitive ability) is the most valid predictor of job performance (e.g., Hunter & Hunter, 1994; Schmidt & Hunter, 1998), and that GMA plays an important role in learning and skill acquisition (Kanfer & Ackerman, 1989), and effective coping (LePine, Colquitt, & Erez, 2000). In line with this, we expect the competency dimensions Thinking, Feeling, and Power to be strongly related to measures of GMA, or cognitive ability. In other words, we expect psychologists to rely on measures of cognitive ability to assess applicants on the competency dimension Thinking, Feeling, and Power.

Besides cognitive ability there are other constructs that appear to have incremental validity in the prediction of work-related behaviors. The Big Five personality traits have proven to be related to work-related behaviors such as job performance (e.g., Barrick & Mount, 1991; Thoresen, Bradley, Bliese, & Thoresen, 2004). Therefore, we expect the Big Five personality traits to explain variance in the competency dimensions over and above measures of verbal and abstract reasoning. In other words, in assessing competencies related to the Thinking, Feeling, and Power dimensions, we expect psychologists not only to rely on scores of applicants on measures of verbal and abstract reasoning, but also on scores of applicants on measures of personality. Therefore, we hypothesize:

*Hypothesis 1:* Both measures of verbal and abstract reasoning and measures of the Big Five personality traits contribute significantly to ratings made by psychologists on competencies of the competency dimensions Thinking, Feeling, and Power.

For personality the first hypothesis can be further specified. In a meta-analysis, Barrick and Mount (1991) studied the Big Five as predictors of three job performance criteria (job proficiency, training proficiency, and personnel data) for different occupational groups. Their

results pointed out that the Big Five personality trait conscientiousness was a valid predictor for all job performance criteria for all occupational groups. Similar findings have been reported by Byrne, Stoner, Thompson, and Hochwarter (2005), Salgado (1997), and Tett, Jackson, and Rothstein (1991). Conscientious employees favor planning, and are responsible and organized (McCrae & John, 1992). These individual characteristics all contribute to job performance and they are likely to be of importance in predicting competencies such as judgment and analytical ability. A study conducted by Baron *et al.* (2003) indeed showed a relation between the competency organizing/executing and conscientiousness ( $r = .18$ ). Therefore, we expect conscientiousness to play a role in assessing the competency dimension Thinking.

Besides a relationship with conscientiousness a positive relationship between the competency dimension Thinking and the openness to experience trait is expected. This expectation is based on two lines of reasoning. First, the content of the fifth trait seems directly related to mental ability. The trait has even been named intellect or intellectence (e.g., Peabody & Goldberg, 1989). Employees scoring high on openness to experience are creative and divergent thinkers that are open to change and new experiences (Costa & McCrae, 1985). Openness to experience can be seen in vivid fantasy, intellectual curiosity, and in a deliberation of social values (McCrae, 1996). A number of studies indeed have proven openness to experience to be consistently related to general intelligence (e.g., Zeidner & Matthews, 2000). Thus, in the present study, in assessing the competency dimension Thinking a substantial contribution of the openness to experience trait over and above verbal and abstract reasoning is likely.

Second, openness to experience appears to be a valid predictor for job performance. In their meta-analysis on the relationships between the Big Five personality dimensions and job performance, Barrick and Mount (1991) found openness to experience to be a valid predictor of training proficiency ( $\rho = .25$ ), one of the three job performance criteria used in their study. In sum, due to the apparent relationship with mental ability and job performance, we expect conscientiousness and openness to experience to be primarily related to the competency dimension Thinking. In other words, in assessing competencies of the competency dimension Thinking, we expect psychologists to rely on ratings of conscientiousness and openness to experience over and above ratings of verbal and abstract reasoning. In sum, we hypothesize:

*Hypothesis 2:* The Big Five personality traits conscientiousness and openness to experience contribute significantly to ratings made by the psychologist on competencies of the competency dimension Thinking.

Conscientiousness and openness to experience are not the only Big Five personality traits that are expected to be of importance in rating competencies and competency dimensions. We expect the competency dimension Feeling to be positively related to the Big Five trait agreeableness. Facets of this Big Five trait, such as caring and empathy, resemble competencies underlying the competency dimension Feeling (see Table 1). Baron *et al.* (2003) found a strong correlation between the competency supporting/cooperating and agreeableness ( $r = .21$ ). Bartram (2005) reported a correlation of .90 between predictors of the competency supporting/cooperating and the Big Five factor agreeableness, which was measured based on the Occupational Personality Questionnaire. The above led us to expect that the Big Five personality trait agreeableness plays a significant role in assessing the competency dimension Feeling over and above the role of verbal and abstract reasoning. In other words, in assessing competencies of the competency dimension Feeling, we expect psychologists to focus on ratings of agreeableness. In sum, we hypothesize:

*Hypothesis 3:* The Big Five personality trait agreeableness contributes significantly to ratings made by the psychologist on competencies of the competency dimension Feeling.

Extraversion is a Big Five personality trait that includes facets like dominance, energy, and cheerfulness. According to research done by McCrae and Costa (1987), individuals high on extraversion are dominant in their behavior and expressive when interacting with others. The described facets, as well as the characteristics proposed by McCrae and Costa, equal the competencies underlying the competency dimension Power, such as persuasion and decisiveness. According to studies carried out by Baron *et al.* (2003) and Bartram (2005), persuading and influencing others, both characteristics of the competency dimension Power, require extraversion ( $r = .18$  in both studies). Based on the above, we expect extraversion to contribute significantly to ratings on the competency dimension Power.

*Hypothesis 4:* The Big Five personality trait Extraversion contributes significantly to ratings made by the psychologist on competencies of the competency dimension Power.

## 5. Competency dimensions and assessment center exercises

Assessment center exercises seem to be a valid predictor of a wide range of criteria, including for example

Table 1. The categorization of competencies with behavioral anchors into the competency dimensions Thinking, Feeling, and Power

Thinking	Feeling	Power
<i>Analytical ability</i> The ability to distinguish between primary and secondary issues, to divide a problem into its component parts and to establish logical links between the parts	<i>Empathy</i> The ability to view matters from others' perspectives, to show concern for the welfare of others, and to demonstrate sensitivity	<i>Initiative</i> The ability to take matters in his/her own hands, to identify opportunities, and to take appropriate actions
<i>Planning</i> The ability to create a time schedule and/or to establish priorities within one's own work or that of others	<i>Customer orientation</i> The ability to think and act in the best interest of the client or customer	<i>Direction</i> The ability to specify to subordinates what needs to be done, and to manage and monitor processes
<i>Judgment</i> The ability to make an adequate judgment based on the analysis of a given situation and the information available	<i>Sociability</i> The ability to initiate and maintain new contacts	<i>Result orientation</i> The ability to set and to accomplish concrete goals
<i>Inventiveness</i> The ability to generate different, sometimes unconventional, ideas and solutions	<i>Cooperation</i> The ability to accomplish goals through constructive collaboration with others, both within and outside the organization	<i>Persuasion</i> The ability to exert influence over people and situations based on personal conviction and authority by gaining acceptance and overcoming resistance
<i>Acuity of understanding</i> The ability to process new information and to adjust to unfamiliar situations or circumstances quickly	<i>Coaching</i> The ability to support and advise others with respect to work related activities and personal development	<i>Risk awareness and acceptance</i> The ability to take a chance or personal risk
<i>Vision</i> The ability to approach matters with a broader perspective, to demonstrate conceptual and policy related long term thinking	<i>Relationship management</i> The ability to establish and maintain relationships with clients and other (business) contacts	<i>Decisiveness</i> The ability to make tough decisions whenever required, to act firm in order to contribute to clarity
<i>Organizational awareness</i> The ability to observe and understand organizational processes and organizational culture, to know how the organization works		<i>Stress resistance</i> The ability to work under pressure, to deal effectively with job related stress and the causes
		<i>Responsibility</i> The ability to accept accountability for own and others' actions

Note: This categorization is based on the work of Kolk et al. (2004).

job performance (Schmidt & Hunter, 1998). In a study done by Gaugler, Rosenthal, Thornton, and Bentson (1987) a mean corrected validity coefficient of .37 for predicting job performance and of .53 for predicting job potential was found. Although the assessment center exercise is an important predictor of job performance, it seems to have little incremental validity over, for instance, cognitive ability in predicting work related criteria (Schmidt & Hunter, 1998). However, for several reasons we do expect performance on assessment center exercises to influence the psychologists' ratings with regard to the competency dimensions. First, a well-developed assessment center exercise strongly linked to future work-related behavior provides psychologists with insights on future performance and potential (Gaugler et al., 1987). Second, an assessment center exercise is rated by independent assessors, and thus provides psychologists with a kind of second

opinion. Therefore, we expect psychologists to rely on an applicant's performance on assessment center exercises. In sum, we hypothesize:

*Hypothesis 5:* Besides measures of verbal and abstract reasoning and measures of personality, the applicant's performance on assessment center exercises rated by independent assessors contributes significantly to ratings made by psychologists on competencies of the competency dimensions Thinking, Feeling, and Power.

## 6. Method

### 6.1. Participants and procedure

Data were collected in collaboration with a Dutch psychological consultancy firm specialized in 1-day

selection procedures between 2000 and 2005. During this selection procedure applicants were confronted with a test battery containing measures of verbal and abstract reasoning, and personality. Furthermore, applicants participated in assessment center exercises and they had an interview with a psychologist. The content of the assessment center exercises varied per position applied for. More information on the assessment center exercises is given in the measures section. During the interview the psychologists discuss the applicants' curriculum vitae as well as their motivation to apply for the job and their interests.

At the end of the day, psychologists were provided with ratings of performance on assessment center exercises and test results of applicants with whom they had an interview. Based on this information, psychologists had to rate the applicants on relevant competencies related to the position the applicant applied for. Each applicant thus was rated by one psychologist. Ratings were given on a four-point scale representing different competency levels; 1 = *basic*, 2 = *standard*, 3 = *advanced*, and 4 = *expert*. Competencies were designed to tap three competency dimensions Thinking, Feeling, and Power. All psychologists that were involved in the final rating had an educational background in work and organizational psychology and several years of practical experience in assessing and selecting individuals. Psychologists responsible for the final rating were not involved in rating the applicants in any other way during the 1-day selection procedure. The only contact between the psychologist and the applicant took place during the selection interview. As stated, in the present study, we focus on the influence of verbal and abstract reasoning, personality, and assessment center exercises on competency ratings made by psychologists.

Complete data on competencies, cognitive ability, personality, and two assessment center exercises was available for 932 applicants. Data of these applicants were used in the present study. The majority of the applicants were male (64%). Age ranged between 20 and 61 with a mean of 38 years ( $SD = 8.01$ ). Level of education varied between lower vocational training (2.6%) to master's degree (10.0%), bachelor's degree being the largest category (28.1%). A total of 440 values for educational level were missing (47.2%). Applicants applied for a wide variety of jobs, for example, account manager, supervisor front office, trainee, and traffic agent. The jobs represented a wide range of industries, including healthcare (24.1%), professional services (22%), transport and communication (15.1%), and authorities (11.5%). A large percentage of the positions applicants applied for were on managerial level (33.8%) or on level of head of staff (15.8%).

## 6.2. Measures

### 6.2.1. Cognitive ability

Cognitive ability is measured by the Differential Aptitude Tests (DAT'83; Bennett, Seashore, & Wesman, 1959; authorized Dutch translation by Evers & Lucassen, 1992). The DAT'83 is a series of nine aptitude tests. The subtests for verbal reasoning (VR) and abstract reasoning (AR) were used in this study. The subtest VR is a test for the verbal part of general intelligence. Items are based on reasoning by analogy and focus on analytical and constructive thinking. Applicants are confronted with analogy items in which they have to fill in two blanks by choosing out of four options for every blank they have to fill. The test consists of 50 items which must be completed within 30 min and the end score resembles the number of correct answers ( $Sc. = C$ ). The subtest AR is a test for the non-verbal part of general intelligence and items are based on geometric series. Applicants have to detect the underlying principle of change and have to complete the series by choosing the right option out of five different possibilities. The test consists of 50 items which must be completed within 25 min and the end score resembles the number of correct answers minus one-fourth of the false answers ( $Sc. = C - 1/4F$ ).

The DAT'83 (Evers & Lucassen, 1992) is a well-developed and well-documented test which has been regularly updated. In 1992, the test was positively evaluated by the Committee of Tests Affairs of the Dutch Association of Psychologists (COTAN). The test manual reports that the split-half reliability coefficients for the DAT'83 subtest VR range between .58 and .80 for females, and between .63 and .81 for males. Split-half reliability coefficients for the DAT'83 subtest AR range between .78 and .85 for females, and between .75 and .87 for males. Based on the DAT-test manual (Evers & Lucassen, 1992) and on the evaluation of the Committee of test Affairs of the Dutch Association of Psychologists (COTAN), it can be said that the lowest reliability coefficients are found for individuals with lower educational levels. In our sample, level of education is rather high. We therefore expect that the measures of verbal and abstract reasoning are adequate. This expectation is supported by a more recent study done by Te Nijenhuis, Evers, and Mur (2000) in which Cronbach's  $\alpha$  coefficients of .75 for verbal reasoning and of .85 for abstract reasoning were reported. The test manual furthermore reports good validity studies.

### 6.2.2. Big Five personality traits

For the current study, we used probably the most extensively validated self-report measure of the five-factor model of personality, namely the revised

NEO personality inventory (NEO-PI-R; Costa & McCrae, 1992; authorized Dutch translation by Hoekstra, Ormel, & de Fruyt, 1996). This 240-item, non-timed inventory, measures 30 primary personality traits (facets) and its underlying Big Five personality factors (scales), i.e. neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Each of the five factors is measured by 48 items which are divided equally over the facets, and which are answered on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). In this study, internal consistency (coefficient  $\alpha$ ) of the five scales was .83 for neuroticism, .78 for extraversion, .70 for openness to experience, .69 for agreeableness, and .80 for conscientiousness. These  $\alpha$  coefficients are in line with the coefficients as reported in previous research (Costa & McCrae, 1992; Hoekstra et al., 1996).

#### 6.2.3. Assessment center exercises

In the current study, we used interview simulation exercises as representatives for the assessment center. An interview simulation is a fairly typical situational exercise (used in 47% of all assessment centers), in which the applicant talks one-on-one with someone playing the role of a subordinate, colleague, or customer (Thornton, 1992). The one-on-one situation varies for different types of jobs, for example if the target position is in sales, the applicant (sales person) then tries to sell products or services to the interviewee/role player (client).

Applicants had 15 min to prepare for the exercise and another 15 min to perform the exercise. The rater–ratee ratio was 2:1. To minimize biases, the raters were not provided with information concerning the applicant or the job the applicant applied for before the exercise. After completion of the exercises the applicant was rated by two independent, trained and experienced assessors with at least a bachelor's degree. Most of them had an educational background in psychology. Each assessor rated the performance of the applicant on the Thinking, Feeling, and Power dimensions on a five-point scale ranging from (1) *weak* to (5) *strong* where ratings on intermediate scores (e.g., 1.8 and 2.3) were allowed. During the rating procedure consultation between the assessors with respect to the rating was not allowed. As a consequence independent ratings were guaranteed.

#### 6.2.4. Control variables

Age and gender were used as control variables<sup>1</sup>, because these variables were expected to affect the psychologists' ratings of competencies due to possible biases (e.g., Marlowe, Schneider, & Nelson, 1996; Schmitt & Hill, 1977; Singer & Sewell, 1989).

### 6.3. Analyses

Our final data set, containing 932 applicants, was based on two related data sets. The first data set contained competency data for 3470 applicants. In other words, this data set contained the psychologists' ratings of the competencies that were salient for the jobs the applicants applied for. For each applicant a mean of nine out of 21 competencies was rated, resulting in missing data for the other competencies. Missing data are a potential problem (Graham & Hofer, 2000). According to Horton and Lipsitz (2001) three types of concerns arise with missing data: (1) loss of efficiency, (2) complication in data handling and analysis, and (3) bias due to differences between observed and unobserved data (Barnard & Meng, 1999). A growing body of research has shown that there are potential problems with the traditional pairwise, listwise, and regression imputation approaches to missing value analysis (e.g., Von Hippel, 2004; Graham & Hofer, 2000). Therefore, we used expectation maximization method operationalized using missing value analysis in SPSS 12.0.2 to impute missing competency scores, and to compute Thinking, Feeling, and Power scales.

Ratings based on missing value analysis were combined with the second data set containing ratings of cognitive ability, personality, and assessment center exercises. Combining the data sets resulted in a data set containing 932 applicants. We conducted a confirmatory factor analysis (CFA) using structural equation modeling (SEM) with LISREL 8.30 (Jöreskog & Sörbom, 1993) to determine whether the *a priori* competency dimensions we proposed could be empirically verified.

Results showed a good fit for a three-factor model, in which the separate competencies loaded on the Thinking, Feeling, and Power dimensions following the *a priori* categorization,  $\chi^2$  three-factor model (186,  $N = 932$ ) = 3091.12,  $p < .001$ , NNFI = .88, CFI = .90, and SMSR = .11. The three-factor model fits the data significantly better than a one-factor model, in which all competencies loaded on a single factor,  $\chi^2$  one-factor model (189,  $N = 932$ ) = 5972.83,  $p < .001$ , NNFI = .77, CFI = .80, and SMSR = .13,  $\chi^2$  diff (3) = 2881.71,  $p < .001$  (cf. Hu & Bentler, 1999). Thus, supported by the results of the confirmatory factor analysis, we decided to maintain the *a priori* categorization.

Based on the *a priori* categorization the Thinking, Feeling, and Power scales were formed by computing mean scores based on the scores on the separate competencies. Alpha coefficients for the scales were .90 for Thinking, .85 for Feeling, and .87 for Power. Based on these scales, we conducted further analyses. To test the hypotheses, we used correlation analysis and hierarchical regression analysis.

### 7. Results

We first examined the relationships between measures of verbal and abstract reasoning and the Thinking, Feeling, and Power scales. Means, standard deviations, and correlations of these measures are reported in Table 2. As we expected, verbal and abstract reasoning are related to all three competency dimensions. However, the relationships between the competency dimension Thinking and the verbal and abstract reasoning measures are much stronger than the relationships between the Feeling and Power dimensions and these measures. All Big Five personality factors are significantly related to the competency dimensions as well, with the notable exception of agreeableness and conscientiousness. No significant relation is found between agreeableness and the competency dimension Thinking and between conscientiousness and the competency dimension Feeling.

To examine the amount of variance in the Thinking, Feeling, and Power dimensions explained by measures of verbal and abstract reasoning and personality, we conducted hierarchical regression analysis (Table 3). In the first step Thinking, Feeling, and Power were regressed on age and gender. Age and gender both had a significant main effect on the Thinking dimension in that older and female applicants were provided with lower scores on the Thinking dimension than younger and male applicants. The second step in the regression analysis showed that verbal and abstract reasoning accounted for 35% of the variance in the competency dimension Thinking, for only 2% of the variance in the competency dimension Feeling, and for 4% of the variance in the competency dimension Power above and beyond age and gender. Though significant, propor-

tions of variance explained by verbal and abstract reasoning in competency dimensions Feeling and Power are relatively small compared with the proportion explained by the competency dimension Thinking. Thus, it seems that psychologists, in assessing competencies related to the competency dimension Thinking, rely more heavily on the applicant's scores on measures of verbal and abstract reasoning than in assessing competencies related to the competency dimensions Feeling and Power.

Besides verbal and abstract reasoning, we expected personality to be relevant to psychologists in assessing competencies related to the three competency dimensions. We focused on personality as measured by the authorized Dutch translation of the Big Five inventory NEO-PI-R (Hoekstra et al., 1996). As is formulated in Hypothesis 1, we expected the Big Five factors to explain a significant amount of additional variance in the competency dimensions Thinking, Feeling, and Power over and above the variance explained by verbal and abstract reasoning. Table 3 presents the results of the hierarchical regression analysis of verbal and abstract reasoning, the Big Five factors and the Thinking, Feeling, and Power dimensions. Results showed that the Big Five factors, added to the regression equation in the third step, explained a significant amount of additional variance in the competency dimensions Thinking, Feeling, and Power over and above measures of verbal and abstract reasoning. Thus, Hypothesis 1 was supported by the data.

Though significant, the increase in variance explained by the Big Five factors in the Thinking and Feeling dimensions is relatively small,  $\Delta R^2 = .01$ ,  $F(5, 922) = 3.94$ ,  $p = .00$  and  $\Delta R^2 = .05$ ,  $F(5, 922) = 10.64$ ,  $p = .00$  respectively. In contrast, the increase in variance

Table 2. Means, standard deviations, and correlation of the Thinking, Feeling, and Power dimensions, intelligence test, NEO-PI-R, and interview simulation exercise dimensions

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Thinking	2.76	.45															
2. Feeling	2.76	.43	.46**														
3. Power	2.74	.39	.55**	.45**													
4. Verbal reasoning	33.34	7.74	.55**	.13**	.16**												
5. Abstract reasoning	37.54	7.48	.52**	.10**	.18**	.57**											
6. Neuroticism	2.24	.35	-.15**	-.10**	-.32**	-.07*	-.10**										
7. Extraversion	3.63	.34	.12**	.19**	.32**	.04	.10**	-.38**									
8. Openness	3.47	.33	.16**	.14**	.12**	.19**	.16**	-.09**	.38**								
9. Agreeableness	3.58	.29	-.01	.10**	-.07*	-.04	-.10**	-.20**	-.02	.07*							
10. Conscientiousness	3.81	.30	.11**	.05	.25**	.01	.05	-.56**	.41**	.07*	.20**						
11. M ISE_1: Thinking	2.74	.72	.25**	.35**	.18**	.18**	.15**	-.04	.09**	.12**	-.02	-.04					
12. M ISE_1: Feeling	2.74	.82	.21**	.39**	.08*	.12**	.13**	-.01	.10**	.10**	.00	-.05	.62**				
13. M ISE_1: Power	3.00	.72	.16**	.19**	.32**	.05	.03	-.05	.10**	.07*	-.02	.00	.55**	.24**			
14. M ISE_2: Thinking	2.80	.72	.26**	.31**	.21**	.22**	.18**	-.04	.07*	.16**	.02	.02	.27**	.23**	.17**		
15. M ISE_2: Feeling	2.77	.78	.22**	.37**	.11**	.15**	.12**	.02	.07*	.14**	-.01	-.02	.24**	.32**	.12**	.60**	
16. M ISE_2: Power	2.99	.69	.12**	.17**	.28**	.07*	.05	-.07*	.07*	.07*	-.03	.07*	.18**	.11**	.24**	.49**	.22**

Note: N = 932. Results with respect to the Thinking, Feeling, and Power dimensions are based on missing value analysis; 1–3 are based on aggregated competency scores; 4–5 are based on intelligence test DAT; 6–10 are based on NEO-PI-R; 11–16 are based on mean ratings of independent assessors on interview simulation exercises. M ISE refers to the mean score on interview simulation exercise 1 or 2, and is based on the scores of the two independent assessors. \* $p < .05$ , two-tailed. \*\* $p < .01$ , two-tailed.



Table 3. Results of hierarchical regression analysis of verbal and abstract reasoning, NEO, and interview simulation exercises each rated by 2 independent assessors on the Thinking, Feeling, and Power dimensions rated by psychologists based on total assessment and corrected for age and gender

Variable	Thinking					Feeling					Power				
	St. 1	St. 2	St. 3	St. 4	St. 5	St. 1	St. 2	St. 3	St. 4	St. 5	St. 1	St. 2	St. 3	St. 4	St. 5
Age	-.10**	.04	.05	.05	.04	.00	.03	.06	.06	.06	.02	.08*	.17**	.15**	.14**
Gender	-.09**	-.01	.01	-.01	-.02	.04	.06	.05	.01	-.01	-.07*	-.04	.05	.04	.04
Verbal reasoning		.38**	.38**	.36**	.35**		.11**	.10**	.06	.03		.07*	.08*	.08*	.06
Abstract reasoning		.31**	.30**	.29**	.28**		.05	.05	.02	.01		.16**	.12**	.12**	.12**
Neuroticism			-.05	-.04	-.04			-.03	-.01	-.02			-.20**	-.19**	-.19**
Extraversion			.04	.02	.02			.21**	.17**	.17**			.25**	.22**	.22**
Openness			.02	.02	.01			.03	.02	.01			-.01	-.02	-.03
Agreeableness			.01	.01	.01			.10**	.10**	.10**			-.14**	-.13**	-.13**
Conscientiousness			.05	.07*	.06			-.08	-.03	-.03			.07	.09*	.07
M ISE_1: Thinking				.04	.03				.13**	.12**				-.02	-.03
M ISE_1: Feeling				.08*	.06				.28**	.21**				-.01	-.02
M ISE_1: Power				.08*	.07*				.03	.02				.29**	.25**
M ISE_2: Thinking					.05					.06					.07
M ISE_2: Feeling					.07*					.22**					-.01
M ISE_2: Power					.01					.03					.15**
R <sup>2</sup>	.02**	.36**	.38**	.40**	.41**	.00	.02**	.07**	.21**	.28**	.01	.05**	.21**	.28**	.32**
ΔR <sup>2</sup>		.35**	.01**	.03**	.01**		.02**	.05**	.14**	.06**		.04**	.16**	.07**	.03**

Note: Standardized regression coefficients are shown. *n* between 919 and 932. For gender 1 = male, 2 = female. M ISE refers to the mean score on interview simulation exercise 1 or 2, and is based on the scores of the two independent assessors. \**p* < .05. \*\**p* < .01, all tests are two-tailed.

explained after adding the Big Five to the regression equation was larger for the Power dimension,  $\Delta R^2 = .16$ ,  $F(5, 922) = 37.98$ ,  $p = .00$ . It seems that, in the eyes of the psychologists, personality is an important predictor for the competencies in the Power dimension.

To examine the relationships between the competency dimensions and the Big Five factors more closely, we studied the correlations and  $\beta$  weights. We hypothesized that the Big Five personality traits conscientiousness and openness to experience would contribute significantly to ratings made by psychologists on the competency dimension Thinking (Hypothesis 2). As Table 2 shows, the correlations with conscientiousness ( $r = .11$ ,  $p = .00$ ) and openness to experience ( $r = .16$ ,  $p = .00$ ) were both significant. The  $\beta$  weights of the relationships between the competency dimension Thinking and conscientiousness and openness to experience were not significant,  $\beta = .05$ ,  $p = .18$  and  $\beta = .02$ ,  $p = .42$ , respectively. Based on the results presented here, the expected relationships are not significant and, thus, Hypothesis 2 must be rejected. These results are in line with the results of Hypothesis 1, which already showed that personality plays a relatively small role in the assessment of the competency dimension Thinking.

In Hypothesis 3 we expected the Big Five factor agreeableness to contribute significantly to ratings on the competency dimension Feeling. Table 2 shows that the Feeling dimension and agreeableness are indeed related,  $r = .10$ ,  $p = .00$ . In addition, the  $\beta$  weight of the relation between the competency dimension Feeling and agreeableness is significant,  $\beta = .10$ ,  $p = .01$ . Thus,

Hypothesis 3 was supported by our data. A closer look at correlations between the competency dimension Feeling and Big Five facets showed that the agreeableness facets 'trust' and 'altruism' are important (Table 4). In other words, in assessing competencies of the competency dimension Feeling, psychologists focus on aspects such as trust and altruism.

In addition to the expected finding, we also found positive correlations between the competency dimension Feeling and the Big Five factors extraversion and openness to experience, and a negative correlation between Feeling and neuroticism. However, regression analysis showed that only the extraversion factor, in addition to the agreeableness factor, contributed significantly in explaining variance in the Feeling dimension,  $\beta = .21$ ,  $p = .00$ . Relatively high correlations were found between Feeling and the extraversion facets 'warmth,' 'assertiveness,' and 'positive emotions.'

With respect to Hypothesis 4, expecting the Big Five personality trait extraversion to contribute to ratings on the competency dimension Power, we found that extraversion was indeed strongly related to this competency dimension (Table 2). The  $\beta$  weight of this relationship was also highly significant,  $\beta = .25$ ,  $p = .00$ . As the results of Hypothesis 1 already pointed out, personality plays an important role in assessing the competency dimension Power. As a result, besides a strong relationship with extraversion, a negative relationship with neuroticism and agreeableness was found. More specifically, the competency dimension Power appeared to be strongly negatively correlated to the neuroticism facets 'anxiety,' 'self-consciousness,' 'depression,' 'impulsiveness,' and 'vulnerability' (Table 4).

Table 4. Means and standard deviations of NEO-PI-R facets and their correlations with the Thinking, Feeling, and Power dimensions

Big Five facets	M	SD	Thinking	Feeling	Power
<b>N</b>					
Anxiety	2.25	.54	-.17**	-.11**	-.29**
Angry hostility	2.08	.44	-.12**	-.11**	-.17**
Depression	2.20	.50	-.13**	-.06	-.30**
Self-consciousness	2.18	.48	-.08*	-.11**	-.29**
Impulsiveness	2.89	.52	-.03	.06	-.06
Vulnerability	1.86	.36	-.16**	-.13**	-.35**
Warmth	3.93	.42	.09**	.21**	.15**
<b>E</b>					
Gregariousness	3.64	.51	.02	.11**	.13**
Assertiveness	3.58	.51	.18**	.20**	.47**
Activity	3.45	.42	.08*	.07*	.25**
Excitement seeking	3.20	.55	.03	.05	.14**
Positive emotions	3.97	.50	.11**	.19**	.19**
<b>O</b>					
Fantasy	3.11	.57	.10**	.08*	.00
Aesthetics	3.30	.63	.03	.07*	.06
Feelings	3.71	.43	.07*	.17**	.07*
Actions	3.33	.50	.06	.07*	.12**
Ideas	3.56	.52	.18**	.06	.11**
Values	3.81	.40	.22**	.13**	.13**
<b>A</b>					
Trust	3.88	.42	.19**	.18**	.14**
Straightforwardness	3.49	.56	-.02	.01	-.09**
Altruism	3.89	.40	-.02	.10**	.03
Compliance	3.23	.41	.03	.08*	-.06
Modesty	3.42	.51	-.12**	-.03	-.14**
Tendermindedness	3.57	.42	-.06	.07*	-.11**
<b>C</b>					
Competence	3.95	.34	.19**	.12**	.29**
Order	3.48	.42	.01	-.07*	.09**
Dutifulness	4.07	.41	.11**	.03	.14**
Achievement striving	3.82	.48	.11**	.10**	.31**
Self-discipline	4.03	.39	.13**	.09**	.27**
Deliberation	3.48	.50	-.03	-.06	.02

Note:  $n = 932$ . Results with respect to the Thinking, Feeling, and Power dimensions are based on missing value analysis. N = Neuroticism, E = Extraversion, O = Openness to experience, A = Agreeableness, C = Conscientiousness. \* $p < .05$ . \*\* $p < .01$ , all tests are two-tailed.

Furthermore, the  $\beta$  weight of the relationship between Power and agreeableness appeared significant,  $\beta = -.14$ ,  $p < .00$ . This relationship was negative, thus a high score on the Power dimension is related to a lower score on agreeableness. Especially the agreeableness facets 'trust' and 'modesty' played a role. Trust and modesty were negatively correlated with the competency dimension Power (Table 4).

Another remarkable and unexpected finding was the correlation between the competency dimension Power and conscientiousness (Table 2). As Hypothesis 2 stated, we expected conscientiousness to be related to the competency dimension Thinking. Contrary to our expectations, the only strong correlation we found for conscientiousness was with the competency dimension Power. To get some further insight in this unexpected finding, we examined correlations between the competency dimension Power and the Big Five facets. As Table 4 shows, the conscientiousness facets 'competence,' 'achievement striving,' and 'self-discipline' are strongly

related to the competency dimension Power. However, the  $\beta$  weight of the relationship between the competency dimension Power and the conscientiousness factor was only marginally significant,  $\beta = .07$ ,  $p = .53$ , so the conscientiousness factor did not explain unique variance in the competency dimension Power. This means that in assessing the competency dimension Power psychologists mainly focus on scores on the Big Five factors neuroticism, extraversion, and agreeableness.

In the fifth and final hypothesis, we stated that the applicant's performance on the interview simulation exercises as rated by independent assessors would explain additional variance over and above cognitive ability measures and personality measures. To test this hypothesis we used mean scores of assessor ratings on each dimension for each exercise separately in the regression analysis. To provide insight in rater reliability we calculated two kinds of intra-class correlation coefficients: ICC(1) and ICC(2) (see, e.g., James, 1982; Shrout & Fleiss, 1979).

The ICC(1) coefficient represents the reliability associated with a single rating of the Thinking, Feeling, and Power dimensions on an assessment center exercise. We calculated ICC(1) coefficients for all three dimensions and for both assessment center exercises. ICC(1) coefficients, as is shown in Table 5, range between .57 and .71, indicating that a single rating of an assessor is likely to provide a reliable rating. The ICC(2) coefficient is referred to as the reliability of the mean score of both assessor ratings on the competency dimensions. ICC(2) coefficients are also shown in Table 5. In our study, ICC(2) coefficients range between .72 and .83 indicating reliable ratings of the Thinking, Feeling, and Power dimensions. Keeping in mind the fact that ratings of performance on assessment center exercises are given without any form of contact between both raters (see 'Method') these results provide support for combining assessor ratings. Thus, based on these results we calculated mean ratings of the Thinking, Feeling, and Power dimensions. These mean ratings were used in the regression analysis to establish the influence of performance on assessment center exercises on the psychologists' judgments of the Thinking, Feeling, and Power competency dimensions.

Table 3 shows that adding ratings of performance on the first interview simulation exercise to the regression equation caused an increase in variance explained in all three dimensions. However, the increase of variance explained in the competency dimensions Thinking and Power was relatively small,  $\Delta R^2 = .03$ ,  $F(3, 919) = 13.20$ ,  $p = .00$  and  $\Delta R^2 = .07$ ,  $F(3, 919) = 31.63$ ,  $p = .00$ , respectively. In contrast, the percentage of variance explained in the Feeling dimension increased from 7% to 21%,  $\Delta R^2 = .14$ ,  $F(3, 919) = 54.09$ ,  $p = .00$ . Adding the second interview simulation exercise to the regression analysis caused an increase in the variance explained in the competency dimensions Thinking, Feeling, and Power,  $\Delta R^2 = .01$ ,  $F(3, 916) = 5.02$ ,  $p = .00$ ;  $\Delta R^2 = .06$ ,  $F(3, 916) = 26.89$ ,  $p = .00$ ; and  $\Delta R^2 = .03$ ,  $F(3, 916) = 14.46$ ,  $p = .00$ , respectively. These results provide considerable support for Hypothesis 5. Psychologists do rely on performance on interview simulation exercises when assessing compe-

Table 5. Intra-class correlation coefficients (ICC(1) and ICC(2)) across assessors for both interview simulation exercises

	ICC(1)	ICC(2)
ISE_1: Thinking	.68	.81
ISE_1: Feeling	.71	.83
ISE_1: Power	.61	.76
ISE_2: Thinking	.69	.82
ISE_2: Feeling	.70	.82
ISE_2: Power	.57	.72

Note: All coefficients are significant at the  $p < .01$  level.

tency dimensions, especially in assessing the competency dimension Feeling.

A closer look at the  $\beta$  weights, as shown in Table 3, revealed that after adding the ratings of the first interview simulation exercise to the regression analysis the assessment dimension 'thinking' played a role in assessing the competency dimension Feeling, whereas the assessment dimension 'feeling' played a role in assessing the competency dimensions Thinking and Feeling. The assessment dimension 'power' was used in assessing the competency dimensions Thinking and Power. Adding the ratings of the second interview simulation exercise to the regression equation resulted in a significant role for the assessment dimension 'feeling' in assessing the competency dimensions Thinking and Feeling, and in a significant role for the assessment dimension 'power' in assessing the competency dimension Power.

In sum, based on these data, it seems that in assessing the competency dimension Thinking psychologists almost solely focus on verbal and abstract reasoning. In assessing the competency dimension Feeling the main focus is on performance on interview simulation exercises, although personality also plays a substantial role. In assessing the competency dimension Power the main focus is on personality. However, in assessing this competency dimension psychologists also rely on performance on interview simulation exercises and on verbal and abstract reasoning.

## 8. Discussion

The main purpose of this study was to examine the competency concept and to create more insight in the nature of competencies. Therefore, we investigated the relationships between competency dimensions Thinking, Feeling, and Power and verbal and abstract reasoning, personality, and performance on interview simulation exercises. We used data gathered during a 1-day selection procedure and focused on ratings of competency dimensions made by psychologists based on test results as well as performance on assessment center exercises.

In line with our expectations, psychologists focus on verbal and abstract reasoning when assessing the competency dimensions Thinking, Feeling, and Power. Not surprisingly, verbal and abstract reasoning appear to be the main predictor when assessing the competency dimension Thinking. The competency dimension Thinking contains competencies such as analytical ability, judgment and acuity of understanding. These competencies all require verbal and abstract reasoning. Thus, it seems that to assess an applicant's ability to, for example analyze, plan, and judge, a certain level of verbal and abstract reasoning is necessary. According to the psychologists, less verbal and abstract reasoning

skills are required to be perceived competent in the Feeling and Power area. Thus, being customer oriented, sociable, cooperative, direct, persuasive, decisive, and responsible requires less verbal and abstract reasoning skills than, for example, analyzing and planning. These results are in line with findings of Bartram (2005), who reported a stronger correlation between cognitive ability and the competency analyzing/interpreting ( $\rho = .40$ ) than between cognitive ability and the other competencies of his generic competency framework.

Unexpectedly, age and gender had a significant influence on assessing applicants in the competency dimension Thinking. It appeared that older and female applicants were provided with lower scores on the Thinking dimension than younger and male applicants. However, this influence disappears when taking cognitive ability into account. Thus, based on the results, we can conclude that psychologists, without information on test results, are (consciously or unconsciously) biased in assessing the competency dimension Thinking. It would be interesting to study whether other raters display the same bias toward older and female applicants.

Furthermore, our data indicated that personality aspects make a vast contribution to assessing the competency dimensions Feeling and Power. In assessing the competency dimension Feeling, extraversion and agreeableness played an important role. As expected, according to the psychologists showing empathy, being customer oriented, sociable and cooperative (all competencies underlying the competency dimension Feeling) requires a personality characterized by trust, and altruism. Though not expected, the data showed that warmth, assertiveness, and positive emotions (which are all facets of the Big Five factor extraversion) are even more important. Apparently, psychologists assess applicants as competent in the feeling area whenever they display some form of extraversion. The content of the extraversion facets justifies the reliance on these facets when assessing the competency dimension Feeling. It is, indeed arguable that scoring high on these facets contributes to being competent with regard to social relations.

The role of personality in assessing the competency dimension Power differs from the role personality plays in assessing the competency dimension Feeling. Neuroticism, extraversion, and agreeableness were all taken into account by the psychologists when judging, for example, the applicant's initiative, result orientation, persuasiveness, and decisiveness. According to the psychologists, being competent in the competency dimension Power requires a stable applicant who is somewhat dominant, energetic, and not inclined to trust each and everyone.

Research on the relation between personality and positive work outcomes, such as high job performance (e.g., Barrick & Mount, 1991; Salgado, 1997), has

indicated the Big Five personality trait conscientiousness as an important predictor. According to McCrae and John (1992) conscientious employees favor planning, and are responsible and organized. We expected these characteristics to resemble competencies such as planning and analytical ability, underlying the competency dimension Thinking. In line with this, and based on conceptual similarity, we hypothesized that conscientiousness would be related to the competency dimension Thinking. Contrary to our expectations, conscientiousness did not play a role in predicting any of the competency dimensions at all, or, in other words, psychologists do not focus on conscientiousness when assessing the competency dimensions.

There are several possible explanations for the absence of the expected relationship. First, psychologists are not aware of the fact that conscientiousness is an important predictor for job performance and, therefore, they do not focus on conscientiousness when assessing competency dimensions. This explanation is doubtful given the educational background in psychology of each psychologist. Second, it is possible that psychologists consider competencies to differ from job performance and, therefore, do not presuppose a direct relationship between the competency dimensions and the Big Five personality trait conscientiousness. The possible difference between competencies and job performance is discussed in more detail later on in this section. Third, although conscientiousness is proven to be a strong predictor of overall job performance (e.g., Barrick & Mount, 1991), narrow trait measures maximize the predictive validity of specific performance criteria (e.g., Dudley, Orvis, Lebiecki, & Cortina, 2006). Following the preceding explanation, it might be that being competent is an aspect of job performance that is better predicted by a narrow trait of conscientiousness, such as achievement or dependability (e.g., Hough, 1992), than by global conscientiousness. Future research should focus on the value of more narrow personality traits in predicting ratings of competency dimensions.

Large meta-analyses (Gaugler *et al.*, 1987; Schmidt & Hunter, 1998) have shown that assessment exercises can be regarded as valid predictors for job performance. In this study, interview simulation exercises had a strong link to future work-related behaviors, and were rated by independent assessors. Therefore, we expected the ratings on interview simulation exercises to contribute to the ratings made by the psychologists on the competency dimensions. Indeed, results show that, besides cognitive ability and personality, performance on interview simulation exercises is taken into account by psychologists when rating competency dimensions. Thus, performance on interview simulation exercises seems to be an important component in rating competencies. In line with previous studies

(e.g., Schmidt & Hunter, 1998), the incremental validity over, for instance, verbal and abstract reasoning is small, especially in the case of the assessment of the competency dimension Thinking. However, ratings of the competency dimension Feeling are primarily based on interview simulation exercise ratings and, thus, in assessing this competency dimension psychologists rely heavily on performance on interview simulation exercises.

Overall, the proportion of variance in the competency dimensions explained by cognitive ability, personality, and performance on assessment center exercises was less than 50% indicating that other aspects play a role in assessing the applicants Thinking, Feeling, and Power competencies. In a summary of practical and theoretical implications of 85 years of research in personnel selection that is based on meta-analytic findings, Schmidt and Hunter (1998) show that general mental ability plus a work sample test together account for a mean validity of .63 for the prediction of job performance. They also reported a mean validity of .60 for general mental ability and conscientiousness for the prediction of job performance. Given the expected link between competencies and job performance, these numbers are noticeably higher than the numbers found in our study. Several remarks must be made here.

First, our study is based on the assumption that factors underlying job performance equal, or at least highly resemble, the factors underlying competency dimensions. Although, factors underlying both constructs are the same, this, however, does not mean that job performance and competency dimensions are one and the same. On the contrary, competencies and competency dimensions are related to job performance (McClelland, 1973). In line with Spencer *et al.* (1992), Schippmann *et al.* (2000) and Lievens *et al.* (2004) argue that competencies can be regarded as overt behavior. This behavior, following McClelland (1973), is directly resembling or related to job performance. Or, as Kurz and Bartram (2002, p. 230) state: 'A competency, then, is a construct that represents a constellation of the characteristics of the person that result in effective performance in his or her job.' Thus, competencies are a prerequisite for job performance and it might be that, aspects underlying the competency dimensions differ from the aspects underlying job performance.

Second, and following our first remark, in the current study we focused solely on the role of cognitive ability, personality, and performance on assessment center exercises. However, aspects such as motives and values do also determine what people do (e.g., McClelland, 1985; Winter, John, Stewart, Klohn, & Duncan, 1998). The idea that other aspects may be underlying the competency dimensions and/or competencies is supported by Spencer *et al.* (1992, p. 6), who define competencies as any individual characteristic that can

be measured or counted reliably and that can be shown to differentiate significantly between superior and average performers, or between effective and ineffective performers. Thus, according to Spencer *et al.* competencies can be motives, traits, self-concept, attitudes or values, content knowledge, or cognitive or behavioral skills. Future research should focus on the role of these aspects in assessing competencies.

Third, in the present study we examined the role of only a few components of the 1-day selection procedure, thereby probably leaving out an important one: the employment interview. The employment interview is widely used to make hiring decisions (e.g., Shackleton & Newell, 1997; Moscoso, 2000). Numerous meta-analyses have shown that employment interviews, especially structured ones, predict job performance and related criteria such as training proficiency (e.g., Schmidt & Hunter, 1998). This would advocate for the inclusion of interview data in future studies to study the role of the interview when assessing competency dimensions.

Although, the current study has given us insight in the competency concept by examining competencies through the eye of psychologists there are several limitations that we would like to mention. First, each applicant was assessed on only those competencies that were relevant for the job the applicant applied for resulting in missing data. Competency scores that were left blank were imputed using MVA. Although the expectation maximalization technique is widely used, it would be better to study the relationships between competency dimensions and other aspects based on actual instead of imputed competency scores. We therefore argue for future research based on complete data on the 21 competencies (see Table 1) to test the robustness of our findings.

Second, in the current study, we focused on competency dimensions. Although the triadic approach to competency dimensions used in this study is widely used in different areas, such as selection, assessment, and leadership (e.g., Kolk *et al.*, 2004; Yukl, 2005), there has been an ongoing debate on specificity and generality of dimensions (e.g., Tett *et al.*, 2000). As Tett *et al.* point out, the debate is about measuring a few things well or more things less well. The focus on general competency dimensions in the current study provided us with preliminary insight in the nature of competencies and indicated where to look for in future, more specific, studies. Thus, in addition to the current study we do argue for research with a focus on separate competencies.

A third remark should be made about the fact that overall assessment ratings were given by psychologists. It would be interesting to compare these ratings with ratings given by others, for example practitioners without an educational background in psychology or

managers. Previous research has already shown that using psychologists as assessors increases the predictive validity (Gaugler *et al.*, 1987) and the dimension variance (Lievens & Conway, 2001) of assessment centers. Future research should focus on the effects of different types of raters on the assessment of competencies or competency dimensions. Furthermore, it would be most interesting to look at competencies through the eyes of managers and to examine the relationship between competencies and actual job performance. We therefore argue for longitudinal research, following those applicants that are actually hired based on the 1-day selection procedure. Ratings on competencies and competency dimensions given by managers based on applicants' actual performance on the job together with an objective measure of actual job performance would provide further insight in the competency concept and its value beyond traditional predictors of job performance.

Fourth, final competency ratings were given by a single rater, namely the psychologist. Although we believe that psychologists are perfectly capable of giving an overall rating based on information gathered during the 1-day selection procedure, the possibility of rater effects needs to be addressed. Implicit theories and halo effects may have played a role in assessing applicants. Before giving the final rating, the psychologist may have already formed an impression of the applicant influenced by rater–ratee interaction or implicit theories. Implicit theories are defined by Dweck (1986) as lay beliefs about the malleability of personal attributes that affect behavior, such as cognitive ability and personality. Halo error accounts for the part of the impression formed that is not shared with other raters and that thus is unique to the rater. Both implicit theories and halo effects appear to influence decision making and performance appraisal (e.g., Heslin, Latham, & Vande Walle, 2005; Viswesvaran, Schmidt, & Ones, 2005). Thus, implicit theories as well as halo effects influence the extent to which raters (psychologists) consider all relevant information when rating applicants. Therefore, future studies should investigate the influence of implicit theories and halo effects on the assessment of competencies or competency dimensions.

Finally, data for this study was collected during a 1-day selection procedure in collaboration with a single consultancy firm. Psychologists working for this firm all participated in internal courses and received training on the job. This may have led to consultancy-specific procedures, routines, or biases that may have influenced the data. Therefore, we argue for replication of this study using data gathered in collaboration with different consultancy firms.

To conclude, competencies and competency dimensions seem interesting to study in more detail using different methodologies and different data sources and thereby making an attempt to fill the existing gap

between practice and science. The present study provided us with preliminary insights in the competency concept and uncovered part of the nature of competencies and competency dimensions. Our study showed that assessing the competency dimension Thinking leads psychologists to focus on cognitive ability, whereas in assessing the dimensions Feeling and Power personality and performance on interview simulation exercise played a more central role.

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## Note

1. In an additional analysis we controlled for level of education. Owing to missing variables *N* ranged between 479 and 492 in hierarchical regression analysis. Although level of education explained variance, especially in the Thinking competency domain, overall patterns of beta weights were equal to patterns of beta weights when level of education was not controlled for. Furthermore, the total amount of variance explained by all variables incorporated in the regression analysis was equal to the total amount of variance when level of education was not controlled for.

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