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Journal of Psychoeducational Assessment 2009 27: 57 originally published online 8 August 2008
DOI: 10.1177/0734282908322584

Journal of Psychoeducational Assessment
Volume 27 Number 1
February 2009 57-67

10.1177/0734282908322584
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Divergent Thinking and Interview Ratings

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This study examined divergent thinking (DT) test scores of applicants taking part in a selection procedure for an undergraduate psychology degree (N = 370). Interviewers made six specific (creative intelligence, motivation, work habits, emotional stability, sociability, and social responsibility) and one overall recommendation rating on each candidate. Results show that trained interviewers could identify which applicants would receive greater scores for originality for DT test scores. The implications for the use of DT tests in selection are considered.

Keywords: *divergent thinking; fluency; originality; creativity; interview; selection and assessment*

Creativity remains a neglected area of research within psychology (Sternberg & Lubart, 1999) because of both definitional and measurement problems (Batey & Furnham, 2006). The relative paucity of research is disproportionate to the importance of creativity for humankind, given that creativity has clear benefits for individuals and society as a whole (Runco, 2004).

Creativity as a psychological concept has resisted unequivocal definition or clear operationalization (Parkhurst, 1999). It has been suggested that "over the course of the last decade, however, we seem to have reached a general agreement that creativity involves the production of novel, useful products" (Mumford, 2003, p. 147). Mumford (2003) suggested that as the field of creativity research matures "less emphasis will be placed on the study of the eminent . . . [the field will] require studies of creative work in normative samples" (p. 149). This study examined the extent to which trained interviewers using a rating scale for six behavioral competencies in a structured interview were able to predict the scores, of applicants for a university degree, on tests of verbal divergent thinking (DT).

DT tests "require individuals to produce several responses to a specific prompt, in sharp contrast to most standardized tests of achievement or ability that require one correct answer" (Plucker & Renzulli, 1999, p. 38). DT tests are, however, time-consuming and expensive to process (Runco & Mraz, 1992). There are also issues of test reliability both in terms of administration effects (e.g., perceived threat, effect on mood states, etc.) and in the scoring of these tests (Amabile, 1996). Some critics have lamented their lack of ecological validity as measures of creativity per se (Amabile, 1982; Lubart, 2003) often on the basis

that eminently creative achievers do not score higher on DT tests than do the less creative (e.g., Gough, 1961; MacKinnon, 1961). Therefore, it is important to stress that DT is not creativity itself, but an indicator of creative potential. Indeed, longitudinal research has shown that DT is related to real-world achievement for noneminent achievers (Plucker, 1999). A recent review (Kim, 2006) examined the validity of the Figural version of the Torrance Tests of Creative Thinking (Torrance, 1974).

Hocevar (1979) suggested DT tests are most commonly scored for the *quantity* of responses (fluency). They may be scored for statistical infrequency of response (originality) which provides some indication as to the *quality* of the responses. Wallach and Kogan (1965) scored their sample for "*uniqueness*"; answers provided by only one participant, whereas others have suggested scoring scales whereby no points are allotted for common responses, with increasingly higher scores allotted for statistically infrequent responses (Torrance, 1974). A comprehensive meta-analysis by Carroll (1993) suggested that originality and fluency are independent factors of the creativity construct. Therefore, this study will examine fluency scores and two scores for originality: Torrance (1974) Originality and Uniqueness (Wallach & Kogan, 1965) for several verbal DT tests in relation to structured interview ratings from a university undergraduate selection procedure.

Interviews are amongst the most common methods of selection employed by organizations (Smith & Smith, 2005). Campion, Campion, and Hudson (1994) demonstrated that the interview could be used to predict such constructs as teamwork, commitment, self-management, and other primarily social attributes. Blackman (2002) has shown that interviews can be used to assess personality traits. Such findings beg the question as to whether interviewers can predict creative potential as manifested in DT scores.

The interviews in this study were concerned with generating ratings on six behavioral competencies; *creative intelligence*, *motivation*, *work habits*, *emotional stability*, *sociability,* and *social responsibility*. Creative intelligence ratings were concerned with the extent to which each candidate expressed ideas clearly and demonstrated the capacity for original thinking tempered by reference to relevant factual knowledge. Motivation ratings were concerned with an assessment of general drive, ambition, and keenness to study psychology. Work habits ratings were concerned with the extent to which candidates expressed the ability to be hard-working even when their interest was not aroused. Emotional stability ratings were concerned with an assessment of ability to withstand emotional and social pressures and continue to function academically. Sociability ratings assessed the candidates in terms of performance in a social context including the ability to form positive relations with others and facilitate social relations. Social responsibility ratings were an assessment of candidate awareness of the needs of others.

The use of ratings of creativity has a rich history and continues to prove a popular and reliable method (Baer, Kaufman, & Gentile, 2004; Kaufman, Lee, Baer, & Lee, 2007; Silvia, 2008). In rating the creativity of a product or person, it has been suggested that alongside ratings of creativity, judges should focus on other proximal constructs like intelligence or quality of work to allow raters to delineate their assessment of creativity from those proximal constructs (Amabile, 1982). In this study, the use of six behavioral competency ratings should ensure that ratings of creative intelligence are conceptually distanced from proximal constructs. There have been few studies of the relationship of

DT to rated creativity. It is likely that the scarcity of studies lies in the fact that researchers who utilize ratings of creativity tend to be dismissive of DT tests (Amabile, 1996), whereas researchers who prefer DT are liable to lament the lack of objectivity in ratings of creativity (Guilford, 1967). Stubbs and Amabile (1979) found that the rated creativity of schoolchildren's collages and storytelling correlated with DT ($r = .48$ and .40, respectively). Runco (1984) illustrated that teacher judgments of creativity are significantly positively correlated with DT test scores. Therefore, *it is hypothesized that creative intelligence will be positively and significantly related to the DT scores* (Hypothesis 1 [H1]).

The literature on individual creativity indicates motivation to be an important construct (Collins & Amabile, 1999; Eisenberger & Shanock, 2003). A popular contention is that motivation conforms to two types; intrinsic and extrinsic (Amabile, Hill, Hennessey, & Tighe, 1994; Judge, Higgins, Thoresen, & Barrick, 1999; Judge & Larsen, 2001). Intrinsic motivation relates to engagement in an activity for its own sake. Amabile (1996) suggested that intrinsic motivation is "absolutely required for high levels of creativity" (p. 37). The concept of intrinsic motivation seems closely aligned to the motivation dimension used in this study. *Therefore, it is hypothesized that motivation will be positively and significantly related to DT test scores* (Hypothesis 2 [H2]). Extrinsic motivation relates to the external reinforcement of behavior. Eisenberger and Shanock (2003) have demonstrated that extrinsic motivation is also important for creative achievement in students. Extrinsic motivation, or working for external reasons such as reward or the attainment of a degree in the case of this study, is similar to the work habits dimension. *Therefore, it is hypothesized that work habits will be positively and significantly related to DT test scores* (Hypothesis 3 [H3]).

The meta-analytical work of Feist (1998) indicates that elevated Neuroticism scores correspond with greater artistic creativity, a finding corroborated in individual studies of artistic creativity (Dollinger & Clancy, 1993; Gelade, 1997; Gotz & Gotz, 1973). Other researchers have found relationships between emotional instability and creativity (Furnham, Batey, Anand, & Manfield, 2008; Kaufman, 2001; Lloyd-Evans, Batey, & Furnham, 2006; Ludwig, 1995; Richards, Kinney, Lunde, Benet, & Marzel, 1988; Schuldberg, 2000-2001). Neuroticism is conceptually similar to the emotional stability dimension. *Therefore, it is hypothesized that there will be negative and significant relationships between emotional stability and DT test scores* (Hypothesis 4 [H4]).

The study of personality traits in relation to DT test scores has generally found positive relationship between Extraversion and DT (Batey & Furnham, 2006). The sociability dimension is similar to Extraversion, *so it is hypothesized that* sociability *will be positively and significantly related to DT test scores* (Hypothesis 5 [H5]).

Personality research has regularly found negative relationships between Agreeableness and creativity (Batey & Furnham, 2006) either in relation to DT (King, Walker, & Broyles, 1996) or in meta-analyses of creativity (Feist, 1998). The Compliance, Altruism, and Tender-mindedness facets of Agreeableness in the Costa and McCrae (1992) conceptualization of the five factor model appear to be inversely related to the social responsibility dimension. *Therefore, it is hypothesized that there will be negative and significant relationships between DT test scores and social responsibility* (Hypothesis 6 [H6]).

Method

Participants

A total of 370 (214 female) applicants for a psychology degree at a U.K. university comprised the sample for this research. The mean age of the participants was 19.93 (*Mdn* = 19, *SD* = 3.63). The ages of the sample ranged from 17 to 43. All participants possessed excellent English language skills.

Measures

Tests of DT. The Alternate Uses and Consequences tests of DT were administered from the Guilford Battery (Guilford, 1967). Alternate Uses were sought for a brick and a blanket. The Consequences test items were the consequences for sudden blindness and deafness. The DT tests were administered in 12 minutes (3 minutes for each DT test item). The DT data were scored for fluency (quantity of responses) and originality (statistical infrequency of response) in accordance with Torrance (1974), whereby 4, 3, 2, 1, and 0 points were given for responses provided by less than 1%, 1% to 2%, 3% to 5%, 6% to 12%, and more than 12% of the respondents in the sample, respectively. The DT responses were also scored for uniqueness in accordance with Wallach and Kogan (1965), whereby one point was allotted for each response unique to the sample. There is evidence that DT tests possess predictive (Plucker, 1999) and construct (Hargreaves & Bolton, 1972; Torrance, 1974) validity.

Structured interviews. Participants engaged in two structured interviews conducted independently by Department of Psychology faculty. All interviewers received training on the use of the interview scales. The interview scales assessed six "behavioral competencies" or selection criteria that were considered essential for successful study of psychology at degree level and resulted in an *overall recommendation*. The six behavioral competencies were creative intelligence, motivation, work habits, emotional stability, sociability, and social responsibility. Both the behavioral competencies and the overall recommendation were rated on a 7-point scale. Further details of the behavioral competencies and the scoring system used in this study may be obtained from the corresponding author. Interviews took no less than 20 minutes and no more than 30 minutes and were conducted in faculty offices. Conway, Jako, and Goodman (1995) suggested interview reliability and validity can be improved through the standardization of questions, standardization of response evaluation criteria, and interviewer training. Research of modern interview procedures indicates the selection interview to be approximately as predictive of future performance as cognitive ability tests (Robertson & Smith, 2001).

Procedure

DT tests were administered in a quiet, invigilated lecture theatre. Interviews were conducted one-to-one in departmental staff offices.

Table 1
Descriptive Statistics and Intercorrelations for All Measures

	M	*SD*	1	2	3	4	5	6	7	8	9
Fluency (alt. uses)	16.51	4.49	.36***	.74***	.36***	.15*	.08	.08	–.05	–.02	–.03
1. Fluency (consq.)	14.66	3.85	—	.24***	.67***	.08	.02	.02	–.01	.04	.07
2. Orig. (alt. uses)	11.15	6.53		—	.35***	.21***	.11*	.11*	–.11*	–.07	–.03
3. Orig. (consq.)	14.23	6.77			—	.16**	.14*	.09	–.05	.01	.04
4. Creative int.	4.76	1.01				—	.56***	.60***	.24***	.17**	.27***
5. Motivation	4.81	1.00					—	.77***	.45***	.36***	.51***
6. Work habits	4.91	0.97						—	.39***	.22***	.46***
7. Emot. stability	4.74	1.04							—	.62***	.52***
8. Sociability	4.78	1.03								—	.53***
9. Social resp.	4.93	1.05									—

Note: $N = 370$. Alt. uses = alternate uses; consq. = consequences; orig. = originality; creative int. = creative intelligence; emot. stability = emotional stability; social resp. = social responsibility.
*$p < .05$. **$p < .01$. ***$p < .001$.

Results

The reliability of the interview data was assessed. The interjudge correlations for each of the behavioral competencies were calculated. The correlations ranged from $r = .51$ to .57 for each competency and .70 for the overall recommendation (all p values < .001). The interview ratings of the two interviewers were aggregated for analysis. The alpha reliability of the ratings by the first and second interviewers were .79 and .83, respectively. The alpha reliability of the aggregated interview ratings was .83.

The correlations between the fluency and originality scores for the Alternate Uses and Consequences tests were $r = .35$ and .34, respectively (p values < .001). However the correlation between the two uniqueness scores was nonsignificant. Therefore, subsequent analyses examined the scores for Alternate Uses and Consequences separately. Uniqueness scores were not considered for further analysis.

To examine the effects of gender on the DT scores, regressions were performed for the fluency and originality scores for both Alternate Uses and Consequences with gender as a predictor variable. No gender differences were found, so subsequent analyses did not include gender.

A Pearson product–moment correlation was performed on the behavioral interview ratings and DT test scores. The results of this analysis are presented, along with the means and standard deviations for the variables under investigation in Table 1.

Creative intelligence was found to significantly and positively correlate with fluency for Alternate Uses, originality for Alternate Uses and originality for Consequences, with r values on the order of .15 ($p < .05$), .21 ($p < .001$), and .16 ($p < .01$), respectively, partially confirming H1. Motivation was found to positively correlate with originality for Alternate Uses and Consequences with r values on the order of .11 and .14 ($p < .05$), respectively, partially confirming H2. Work habits was found to be significantly and positively related to originality for Alternate Uses ($r = .11$, $p < .05$), partially confirming H3.

Table 2
Hierarchical Regression: Interview Ratings as Predictors of Originality for Alternate Uses

	St. β		*t*
Creative intelligence	.21		3.19**
Motivation	.09		1.03
Work habits	.01		0.10
Emotional stability	–.17		–2.50**
Sociability	–.01		–0.12
Social responsibility	–.04		–0.52
$F(6, 363)$		4.73**	
Adj. R^2		.06	

Note: $N = 370$.
*$p < .05$. **$p < .01$.

Emotional stability was found to be significantly and negatively related to originality for Alternate Uses, partially confirming H4.

To investigate the relationship between DT fluency and originality for both the Alternate Uses and Consequences tests with regards to the interview rating dimensions, four separate regressions were performed, where the six interview ratings were regressed against the four different DT scores. In the regression where fluency for Alternate Uses was the dependent variable, the overall model was found to be nonsignificant. However, creative intelligence significantly predicted variance ($\beta = .14$, $t = 2.16$, $p < .05$), partially confirming H1. There were no significant relationships between the predictors and dependent variable for the regression examining fluency for Consequences. In the regression where originality for Alternate Uses was the dependent variable, the variables in the model were able to account for approximately 6% of the variance. The results of that analysis are presented in Table 2. Creative intelligence was found to be a significant and positive predictor ($\beta = .21$, $t = 3.19$, $p < .01$) partially confirming H1. Emotional stability was found to be a significantly and negatively related ($\beta = –.17$, $t = –2.50$, $p < .01$) partially confirming H4.

In the regression where originality for Consequences was the dependent variable, the variables in the model were able to account for approximately 3% of the variance. The results of that analysis are presented in Table 3. Creative intelligence was found to be a significant and positive predictor ($\beta = .14$, $t = 2.1$, $p < .05$) partially confirming H1. Emotional stability was found to be a significantly and negatively related ($\beta = –.16$, $t = –2.22$, $p < .05$) partially confirming H4.

To investigate whether DT scores had a direct effect on the overall recommendation rating, four separate regressions were performed where in each case the dependent variable was the overall recommendation rating and the predictor variables were the four different DT scores. None of the regressions yielded significant results.

Table 3
Hierarchical Regression: Interview Ratings as Predictors of Originality for Consequences

	St. β		*t*
Creative intelligence	.14		2.10*
Motivation	.17		1.92
Work habits	–.10		–0.80
Emotional stability	–.16		–2.22*
Sociability	.03		0.45
Social responsibility	.01		0.21
$F(6, 363)$		2.96**	
Adj. R^2		.03	

Note: $N = 370$.
*$p < .05$. **$p < .01$.

Discussion

The primary aim of this study was to investigate whether observations derived from interviews could accurately predict DT scores. The hypotheses were partially supported. There was support for the first hypothesis, in that creative intelligence ratings were consistently found to be related to the fluency and originality scores. In particular, this relationship was strongest with regards to originality. This finding may be explained, because of the fact that interviewers were exhorted to assess candidates for capacity for original thinking tempered by reference to relevant factual knowledge, as opposed to simple ideational fluency. Therefore, it could be argued that interviewers are able to identify the creative potential of applicants for a university degree program. However, given the extremely modest variance explained by the regression models, in no way can it be suggested that ratings of creative intelligence can be used to supplant DT tests. The ratings used in this study were intended to predict suitability for university study, rather than explicitly for the prediction of DT test scores. Future research might examine the extent to which interviewers are able to specifically predict DT scores.

There was some evidence from the correlational analysis in support of the second hypothesis, that motivation ratings would be positively predictive of DT. However, the failure to find significant relationships between motivation and DT scores in the regressions may be explained with reference to the primary purpose of the motivation ratings, which was to assess general drive, ambition, and keenness to study psychology. Though this is similar in nature to intrinsic motivation it is not the same. Keenness to study psychology is not the same as possessing a strong, curious drive for challenge and exploration, which are suggested to be strong hallmarks of intrinsic motivation. In addition, the ratings of motivation may not have been particularly reliable, suffering from range restriction given that applicants for a degree program to study psychology would be inclined to profess a keen interest in studying psychology. A similar argument may be proposed to explain why only one significant correlation between work habits and DT scores was observed. Candidates

applying for university degree are likely to claim that they would be hard-working even when their interest was not engaged. In the case of both motivation and work habits the interviewers are reliant on self-reported behaviors, rather than being able to observe the behaviors directly.

There was relatively strong support for the third hypothesis, that there would be a negative relationship between emotional stability and DT scores. Originality scores were significantly and negatively predicted by emotional stability. This finding may at first be counterintuitive. It might be hypothesized that increased anxiety and worry, which could be hypothesized to be common for those rated as emotionally unstable, would have a deleterious effect on DT performance, especially under invigilated conditions as part of an assessment for a university program. However, there is a rich vein of literature that supports the notion that creative individuals are more prone to emotional difficulties. The literature regarding hypomania, a subclinical manifestation of bipolar disorder, reports positive relationships to creativity (Furnham et al., 2008; Lloyd-Evans et al., 2006; Schuldberg, 2000-2001) as is the case for the literature on schizotypy (Batey & Furnham, 2008a, 2008b; Nettle, 2006). Similar findings are presented in the literature on Neuroticism (Batey & Furnham, 2006; Feist, 1998). It has been argued that the thinking style of the creative person is similar to that of the thinking characteristics of the schizo-affective disorders (Green & Williams, 1999; Weinstein & Graves, 2002). In addition, there are a cluster of other traits that tend to coexist with the creative thinking style (American Psychiatric Association, 2000). Alongside a creative cognition style, many individuals will also possess emotional disturbance traits. This in turn explains why creativity as manifested in DT scores is negatively related to ratings of emotional stability.

There is a rich history in the literature relating Extraversion to DT (Batey & Furnham, 2006). Therefore, failing to find significant relationships between sociability and DT was surprising. However, this may be explained. First, with regards to the tendency of applicants to present themselves in a socially desirable manner, which would likely be in terms of reporting the ability to form positive relations with others and facilitate social relations. This would reduce the reliability of the sociability rating. Second, a rating of sociability is not the same as Extraversion per se, therefore the lack of a significant relationship may be explained by the fact that the two constructs are not necessarily the same.

It was proposed that the social responsibility dimension was similar to the personality factor Agreeableness, therefore a negative relationship to DT scores was hypothesized, but not confirmed. Again, this finding can be explained with regards to socially desirable responding by the applicants, in that university degree applicants are unlikely to present themselves as unaware of the needs of others. This would reduce the accuracy of the ratings.

Overall, the findings of this study are that there are consistent relationships between some of the interview ratings, namely creative intelligence and emotional stability and the DT scores. It is interesting that it may be argued that these two dimensions are the easiest for an interviewer to behaviorally assess. Given that, for applicants to express themselves clearly and demonstrate original thinking, they must produce observable behavior, which in turn can be rated. Similarly, the behavioral cues of emotional stability would likely be obvious signs of anxiety, nervousness, and tension, which too could be rated. However, in a one-to-one interview scenario, it would be much harder for an interviewer to observe the

relevant behaviors for the other ratings of motivation, work habits, sociability, and social responsibility. However, though there are demonstrable relationships between the ratings and DT scores, very little variance in DT test scores could be explained by the interview ratings. This suggests that although the selection interview has been found to be predictive of diverse range of behaviors, creativity does not appear to be one of them.

The final aim of this study was to examine the relationship between overall recommendations provided by the interviewers and DT scores. There were no significant relationships, indicating that creative potential (as assessed by DT tests) has a negligible impact on recommendations made by university entrance assessors. In part, this finding is expected; university performance will require a host of ability and nonability factors (e.g., Chamorro-Premuzic & Furnham, 2003). The finding is also a little disappointing, given that DT scores are predictive of real-world creative achievement (Plucker, 1999). The results of this study beg the question as to whether highly creative students are overlooked in selection procedures. Such a contention is not unlikely given that creative students are more likely to be perceived as emotionally unstable. To counteract this effect assessors could be trained to appreciate that ideational originality is likely to be accompanied with emotional instability.

There were some limitations inherent in the study reported here. The age range of participants was restricted, making generalizability of the results outside of the educational setting limited. The DT tests employed were entirely verbal. Future studies might investigate the relationship between interview ratings and figural creativity. However, figural DT has not been found to predict real-world achievement (Plucker, 1999). The ratings generated from the interviews were to select entrants for university degree study, not to specifically predict DT scores. Future studies might examine this issue.

Overall, this study suggests that trained interviewers are able to identify how original or unusual the ideation of selection candidates may be. However, there is no evidence to suggest that interviewers are more or less prone to recommend creative thinkers for university study.

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