[Original Article]

Structure of Creativity Measurements and Their Correlations with Sensation Seeking and Need for Uniqueness ¹⁾

KOICHI OKAMOTO

Toyo Eiwa Womens' University

EISAKU TAKAKI

Toyo Eiwa Womens' University

ABSTRACT

College students' response to Picture Creativity Test, Unique Uses Test, and Unreal Imagination Test was evaluated according to four criteria; fluency, flexibility, originality, elaboration. A factor analysis indicated, contrary to a conventional assumption, factors composed of the scores within the test types rather than those composed of the scores that shared criteria over the test types. This factor structure justified creation of standardized summation scores for each test type; Picture Creativity Score, Unique Uses Score, and Unreal Imagination Score. Their correlational pattern with the Need for Uniqueness and Sensation Seeking was examined for a better understanding of the nature of those creativity scores. Implications of these analyses to the future research of creativity are discussed.

Key words: creativity, uniqueness, need for uniqueness, sensation seeking.

There have been various approaches to measurement of creativity, of which Guilford's and Torrance's methods have become known as the most representative. Guilford (1956, 1959, 1960, 1986) has conceptualized creativity in terms of the mental abilities involved in creative achievement. He saw creative thinking as divergent production, and emphasized on measuring variety of information output from the same source. He proposed four dimensions as measuring criteria of creative thinking and named them dimensions of fluency, flexibility, originality, and elaboration. He attempted to measure creativity by giving evaluation on these four dimensions to subjects' responses to what he called "Unique Uses Test" and "Conse-

quence Test." In the Unique Uses test, subjects were instructed to think of unique usages of various daily objects such as shoes, newspaper, etc. In the Consequences Test, subjects were required to think of what would happen if an unthinkable event would take place. An example of this type of test would be, "What would happen, if people could read everyone else's mind?" Guilford attempted to evaluate subjects' free responses to these tests on those four dimensions (fluency, flexibility, originality, and elaboration). Torrance added a picture creation test to these test types. In Torrance's version (Torrance, 1974), subjects were given an incomplete picture and instructed to add their own lines to make it a complete picture.

1) This research was supported by a Grant-in-Aid for Scientific Research (#A0171082). Cooperative assistance of Tokyo Shinri Psychological Testing Service Inc. (President: Seinosuke Suzuki) is gratefully acknowledged.

The stimuli and responses were prepared in several "standardized versions" to give statistical criteria to judgments on the four dimensions. Later, test types were further extended by Torrance to include Sounds and Images version (Torrance, 1984). Individual scores based on these measurements were reported to correlate with each other over 12 years, and they were shown to predict subjects' high school and post-high school creative achievements, creative style of living, and quality of future career images.

There has been one serious shortcoming in Guilford and Torrance's studies, however. Specifically, it is a lack of correlational examination of the scores over the four dimensions and the various test stimulus types. It seems to be related to their indifference to a structural model of measuring devices and evaluation criteria. They have neither discussed that creativity is a single concept of individual difference, nor tried to specify the number of sub-concepts to justify so many criteria and so many test types.

They seem to be too optimistic to assume that the four criteria would measure the same entity over the various stimulus types, since an integrative definition of creativity and its structural model are both lacking.

The present study aims at (a) clarifying the correlational structure of evaluation criteria over some representative test types, and (b) relating them to other individual differences that are more familiar to psychologists, namely, the sensation seeking and the need for uniqueness.

It is intuitively noticeable that at least two levels of individual creativity would be distinguishable: a crude process and a more elaborate or dispositional process. As we intend this research to be an exploratory one, correlations of creativity subscores to psychological differences of sensation and motivational levels would be helpful in ascertaining the natures of creativity subscores.

Sensation Seeking, measured by a questionnaire scale, has been shown to correlate with Change Seeker Index (Garlington & Shimona, 1964), Novelty Experiencing Scale (Waters, 1974 ;

Waters et al, 1976), extroversion (Farley & Farley, 1967, 1970 ; Bone & Montgomery, 1970 ; Zuckerman & Link, 1968), impulsivity scale in Jackson (1967)'s Personality Research Form (Zuckerman, 1974 ; Daitzman & Tumilty, 1974 ; Eysenck & Eysenck, 1977). A tendency to seek for new stimuli and new environment may constitute one of the most basic or crude quality of being creative, and subscores marking a high correlation with this scale may reflect this "crude" part of creativity.

The motivational difference in need for uniqueness has been known to correlate with various psychological differences reflecting an elaborate process of seeking uniqueness.

Snyder & Fromkin (1977) demonstrated that the Need for Uniqueness Score was correlated with the size of formal signature, and membership to statistically unique activities such as woman's liberation, gay group, and MENSA. They also found that those who scored high on this scale tended to report a decrease of self-esteem in response to a feedback of extreme self-other similarity, whereas low-scorers were likely to show positive reaction to it. Okamoto (1985) reported that subjects who scored high tended to be more unique in daily preference, such as preferred professional baseball team, favorite type of novels, taste for jewels, preferred leisure activities, *etc.* These studies support that the need for uniqueness is a motivational concept of individual difference, possibly related to a motivational process of being creative.

There is more ground to consider the inclusion of need for uniqueness in the present research design. If it is safe to assume that uniqueness of response to word association test and rejection of popular response to Rorschach plates are analogues of creativity, there are studies that demonstrated significant correlations between them and the need for uniqueness (Snyder & Fromkin, 1977 ; Okamoto, 1985). In addition, Fromkin (1968) reported higher achievement on the originality dimension to Guilford's unique uses test as a result of enhanced need for uniqueness through a feedback procedure. These evidences would justify

the employment of need for uniqueness as an appropriate motivational correlate of creativity.

In summary, the primary object of this research is to explore into the correlational structure of the subscores over the four dimensions, (fluency, flexibility, originality, and elaboration) across some prominent test types. It is desired to have an empirical guide to specific sets of criterion dimensions or test types. Secondly, we wish to pay a close look at these sets of dimensions or test types in relation to sensational and motivational differences, represented, respectively, by the sensation seeking and the need for uniqueness. Such an inspection would allow us to distinguish sensational and motivational processes of being creative. If the criterion dimensions, rather than the stimulus types, would tend to constrain the correlational structure, we would intuitively predict that quality (such as elaboration) of creativity would typically be correlated with motivational difference, and quantity (such as fluency) would typically be correlated with sensation difference. As a sound ground is lacking in past theory as well as in foregoing evidences, however, no firm prediction can be considered well-founded.

METHOD

Subjects

Freshmen and sophomore students of both sexes at Toyo Eiwa Women's University, Tama Art University, Sugino Women's College, and Tokyo University participated the experiment as a part of their classroom activity. Four-hundred and eighteen students sat for the Creativity Test. A week later, 402 students of the same classroom answered a questionnaire that included the Need for Uniqueness Scale and the Sensation Seeking Scale. As a result, 390 students filled both the test and the questionnaire. The test and the questionnaire did not have a title that indicated anything about the true object of this investigation.

Creativity Test

The Creativity Test consisted of three parts; Picture Creation Test, Unique Uses Test, and Unreal Imagination Test (previously referred to as

the Consequence Test).

In the Picture Creation Test, two incomplete pictures were given in 12 reproductions respectively, and the subjects were allowed five minutes to add lines to make them into a complete picture. An example given in the instruction is shown in Fig. 1. Instructions were given to make clear that (a) subjects would not have to complete more than 12 pictures, (b) no verbal explanations were to be added to their response, (c) they were not supposed to advance to the next page unless they were instructed to, (d) funny responses that nobody would think of were encouraged, and (e) that the scoring would have nothing to do with whether the drawing was skillful or not.

In the Unique Uses Test, the subjects were instructed to think of ten unusual uses of bar soap and a basketball within 5 minutes each. An

●テストーA

次ページからの問題は、与えられた線をつかって、いろいろな絵をかくてもらう問題です。
問題はA-1とA-2がありますが、それぞれ5分間です。

【注意】

- 各問ともこたえは12以上考える必要はありません。時間があつたら絵をより具体的にしてください。
- 各問とも、絵だけで答えるようにしてください。
- 指示があるまで次の問題に進まないでください。
- なるべくだれもが考えつかないような、おもしろい絵をかくてください。
- このテストは絵の上手、下手とはあまり関係ありません。

[れい]

解答例

[れんしゅう]

Fig. 1. A practice example of Picture Creativity Test.

instructions similar to that given in the Picture Creation Test were given, and the subjects were encouraged to generate unusual uses regardless of whether they were practical.

In the Unreal Imagination Test, the subjects were required to think of ten consequences of what would happen, (a) if there would be no mountains whatsoever on earth, and (b) if a day were to be 20 hours, instead of 24. They were allowed 5 minutes for each test.

Need for Uniqueness Scale

The Japanese version of Snyder & Fromkin (1977)'s Need for Uniqueness Test was used. It consists of 32 Likert-type scales. An example of the scales is "When I am in a group of strangers, I am not reluctant to express my opinion publicly." The exact wording and form of the scale is available in Okamoto (1985).

Sensation Seeking Scale

Zuckerman's Sensation Seeking Scale Form V (Zuckerman, 1979) was translated into Japanese. Each item was a forced-choice question where subjects were to choose one of two statements that would describe themselves better. Two of the original 40 scale items were deleted from translation for cultural reasons. These items were, "I have tried marijuana or would like to *vs.* I would never smoke marijuana," and "I would not like to try any drug which might produce strange and dangerous effects on me *vs.* I would like to try some of the new drugs that produce hallucinations." These items were excluded from the present study because of extreme uncommonness of drug use among the present population of the subjects. Examples of the items used are; "I like 'wild' uninhibited parties *vs.* I prefer quiet parties with good conversation," and "There are some movies I enjoy seeing a second or even a third time *vs.* I can't stand watching a movie that I've seen before."

RESULTS

Scoring procedure of the creativity test

Professional judges evaluated the subjects' responses according to the following four criteria :

(a) number of responses to each stimulus, (b) number of response categories observed (c) number of original responses, and (d) number of elaborate responses.

The number of responses was simply counted and called Fluency-scores. It is considered to reflect the respondent's desire to make creative responses.

Typical response categories had been prepared for each stimulus from the past data and constituted the judgment criteria for Flexibility-scores. If a respondent added lines to make four stimulus-pictures into four different flowers, for example, his Fluency-score in the Picture Creation Test would be 4, whereas his Flexibility-score is 1, because his production belonged to only one category. If his pictures would have been, say, a picture of a flower, a picture of a car, and two pictures of birds, his Flexibility-score would be 3, because his production fell into 3 categories of response content.

Responses that less than 10% of the past subjects had produced were counted for each stimulus and were made into Originality-score.

Creativity imagery is often accompanied with unreality, unfeasibility, or stupidity. An Elaboration-score is a number of responses in which anything is mentioned about such unreality or unfeasibility. It is believed to reflect the degree of elaboration of each subject.

These four criteria are justified by Guilford (1956) and Torrance (1974). The four scores were computed for the two respective tasks in Unique Uses Test and Unreal Imagination Test. Only the three scores but the Elaboration scores for the Picture Creation Test were rendered, because of the lack of clear operational criteria for elaboration evaluation in the Picture Creation Test. The scores from the respective pairs of tasks within each test type were summed, because they were found to be highly correlated beyond the .001 level, except the Originality-scores, where the correlation level was only beyond .05 for the Unique Uses Test and Unreal Imagination Test, and the correlation did not turn out significant for the Picture

Creativity Measurements

Creation Test. As a consequence, 11 scores were produced from the whole Creativity Test. Raw means and standard deviations are rendered in Table 1 for men and women. No gender difference reached statistical significance.

Factor analysis of creativity scores

A factor analysis was performed on these 11 creativity scores. Extraction of three factors were judged appropriate by the Scree-method (Cattell, 1978) and these factors were rendered to a varimax rotation. The factor coefficients are

presented in Table 2. Contrary to our intuitive prediction, and to our surprise, the test type had stronger commonalty than the scoring criteria. Scores from the same test types tended to constitute factors rather than the scores that shared the criteria. The three test types seemed to reflect mutually independent aspects of creativity.

Computing three creativity scores

On the basis of this factor pattern, Picture Creation Score, Unique Uses Score, and Unreal Imagination Score were computed by adding up

Table 1
Raw Means and Standard Deviation of Creativity Subscores

Test type and Scoring criterion		Men (77)		Women (307)	
		<i>M</i>	<i>S. D.</i>	<i>M</i>	<i>S. D.</i>
Picture Creation	Fluency	12.4	(4.0)	11.7	(4.2)
	Flexibility	8.2	(2.4)	8.2	(2.2)
	Originality	3.8	(2.2)	3.8	(2.3)
Unique Uses	Fluency	9.4	(3.3)	8.7	(3.5)
	Flexibility	5.9	(1.8)	6.1	(2.0)
	Originality	3.2	(1.9)	3.2	(1.7)
	Elaboration	8.4	(2.9)	7.7	(3.2)
Unreal Imagination	Fluency	11.2	(3.3)	11.6	(3.4)
	Flexibility	7.2	(1.8)	7.4	(1.9)
	Originality	3.4	(1.8)	3.7	(2.1)
	Elaboration	10.2	(3.3)	10.9	(3.3)

Table 2
Factor Analysis of Creativity Test

Test type and Scoring criterion	FACTOR 1	FACTOR 2	FACTOR 3
Picture Creation Fluency	0.25860	0.22794	0.80248
Picture Creation Flexibility	0.19877	0.19972	0.89240
Picture Creation Originality	0.06410	0.04924	0.87463
Unique Uses Fluency	0.81038	0.32989	0.30874
Unique Uses Flexibility	0.87197	0.26127	0.17270
Unique Uses Originality	0.79558	0.11201	0.01137
Unique Uses Elaboration	0.82718	0.26554	0.26731
Unreal Imagination Fluency	0.32819	0.81808	0.22460
Unreal Imagination Flexibility	0.27576	0.84301	0.13821
Unreal Imagination Originality	0.05959	0.74610	0.05570
Unreal Imagination Elaboration	0.27844	0.78899	0.18117

standardized scores within each mode. For example, Fluency-, Flexibility-, Originality-, and Elaboration-scores in the Unique Uses Test were normalized and summed into an Unique Uses Score. Unreal Imagination Test Score was computed similarly. Picture Creativity Score was a summation of only three subscores instead of four, since no Elaboration-score was produced in the Picture Creativity Test. Alpha coefficients of internal consistency (Cronbach, 1970) were .873 for the Picture Creativity Score, .905 for the Unique Uses Score, and .870 for the Unreal Imagination Score. Gender differences of these scores did not reach significant levels at all.

Need for Uniqueness Scale

The Need for Uniqueness Scale had been reported to show high inter-item consistency, with Cronbach's alpha coefficient being 0.795 (Okamoto, 1985). The alpha coefficient from the present data also proved to be acceptably high ($\alpha = .811$), justifying use of the summation score.

Sensation Seeking Scale

Factor analysis of the Sensation Seeking Scale with dichotomous scales indicated a general factor rather than plural factors. Kuder-Richardson Form 20 ($\rho = .768$) also supported summing up the responses to each scale item. Zuckerman (1979) suggested concurrent use of four subscales (Thrill and adventure seeking; Experience seeking; Distraction seeking; and Boredom sensitivity). Kuder-Richardson coefficients (Form 20) for these 4 subscales were calculated from the present sam-

ple. None of them exceeded the K-R coefficient of the total score (Thrill and Adventure seeking, 0.705; Experience Seeking, 0.592; Distraction Seeking, 0.537; Boredom Sensitivity, 0.502). Use of the total summation score was thus justified.

Creativity Scores as correlates of Need for Uniqueness and Sensation Seeking

Product-moment correlation coefficients between the three creativity scores, the Need for Uniqueness Score, and the Sensation Seeking Score are shown in Table 3. As is apparent from Table 3, the correlation coefficients were all above the conventional level of significance. Although we had a conceptual distinction between the sensation seeking and the need for uniqueness, the former representing a possible correlate with a more crude process of creativity and the latter relating to a more motivational process, the correlation between these two variables was, to no wonder, impressively high ($r = .51$, $p < .0001$). In order to rule out the effect of this mutual correlation in examining the creativity scores, multiple regression analysis was performed, using the three creativity scores as functions on the two psychological scales, the need for uniqueness scale and the sensation seeking scale. Table 4 shows the result of this analysis.

It is clear that sensation seeking contributed significantly to all the three scales of creativity, while need for uniqueness contributed only to the Unique Uses Score, when the mutual correlation between the need for uniqueness and the sensation

Table 3
Product-moment Correlation Coefficients

	Sensation Seeking Scale	Picture Creation Score ^{#1}	Unique Uses Score ^{#1}	Unreal Imagination Score ^{#1}
Need for Uniqueness	0.535***	0.131**	0.241***	0.145**
Sensation Seeking Scale	—	0.211***	0.244***	0.186***
Picture Creation Score ^{#1}		—	0.438***	0.394***
Unique Uses Score ^{#1}			—	0.557***

* : $p < .05$, ** : $p < .01$, *** : $p < .001$

#1 : Sum of standardized subscores

Table 4
Partial Correlation Coefficients

DEPENDENT VARIABLES	INDEPENDENT VARIABLES	
	Need for Uniqueness	Sensation Seeking
Picture Creation	0.022	0.539***
Unique Uses	0.144**	0.143**
Unreal Imagination	0.081	0.109*

* : $p < .05$, ** : $p < .01$, *** : $p < .001$

seeking was controlled.

DISCUSSION

The four scoring dimensions of creativity, namely, fluency, flexibility, originality, and elaboration, did not show so high statistical independence, as the earlier researcher might have assumed. They tended to contribute to a common factor with little differentiation among themselves. The type of test, or the field of response proved to show more discrimination than the scoring dimension. If more types of stimuli (e.g. sounds or images) had been added to the test, they might have constituted still more dimensions of creativity. There may be far more dimensions of creativity measurement than the researchers presently think there are. The need for a more concrete definition of creativity is imperative. The test types and evaluation dimensions used in this study simply represent what has been measured most conventionally in this field of research, and may not cover the range of desirable construct.

Need for uniqueness and sensation seeking were both highly correlated to the three types of creativity. However, sensation seeking seemed to be more important as a psychological correlate of creativity, when the effects of their mutual correlation was partialled out. It corresponds to our initial intuition that this variable is related to a more "crude" process of creativity than the need for uniqueness. It may be safe to conclude, tentatively, that the sensation seeking is a more basic predictor of individual difference of creativity than

the need for uniqueness, while correlation with the need for uniqueness may come to be regarded as a discriminating criterion for a more motivational process of creativity.

Creativity seems to be a complex process, involving various levels of psychological differences, of which the two correlates employed in this study constitute exploratory examples. When innumerable types of test stimuli would be used in the future, in a process of exploring possible measurement and integrating the conceptual construct of creativity, their correlations with perceptual, sensational, motivational, and psychological differences, including the present two variables, would prove useful to probe the nature of creativity test scores.

REFERENCES

- Bone, R. N., & Montgomery, D. D. 1970 Extraversion, neuroticism, and sensation seeking. *Psychological Reports*, **26**, 974.
- Cattell, R. B. 1978 *The scientific use of factor analysis in behavioral and life sciences*. N. Y.: Plenum Press
- Cronbach, L. J. 1970 *Essentials of psychological testing*. N. Y.: Harper & Row.
- Daitzman, R. J., & Tumilty, T. N. 1974 Support for an activation-regulation deficit in schizophrenia: Implications for treatment. *Newsletter for Research in Mental Health and Behavioral Science*, **16**, 31-35.
- Eysenck, S. B. G., & Eysenck, H. J. 1977 The place of impulsiveness in a dimensional system of personality description. *British Journal of Social and Clinical Psychology*, **16**, 57-68.
- Farley, F. H., & Farley, S. V. 1967 Extroversion and stimulus seeking motivation. *Journal of Consulting Psychology*, **31**, 215-216.
- Farley, F. H., & Farley, S. V. 1970 Impulsiveness, sociability and the preference for varied experience. *Perceptual and Motor Skills*, **31**, 47-50.
- Fromkin, H. L. 1968 Affective and valualational consequences of self-perceived uniqueness

- deprivation. *Doctoral Dissertaion*, Ohio State University.
- Garlington, W. K., & Shimona, H. E. 1964 The change seeker index : A measure of the need for variable sensory input. *Psychological Reports*, **14**, 919-924.
- Guilford, J. P. 1956 Structure of intellect. *Psychological Bulletin*, **53**, 267-293.
- Guilford, J. P. 1959 *Personality*. N. Y. : McGraw-Hill.
- Guilford, J. P. 1960 Basic conceptual problems of the psychology of thinking. *Proceedings of the New York Academy of Science*, **91**, 6-12.
- Guilford, J. P. 1986 *Creative talents : Their nature, uses and development*. Buffalo, N. Y. : Bearly Limited
- Jackson, D. N. 1967 *Personality research form manual*. Goshen, N. Y. : Research Psychologists Press.
- Okamoto K. 1985 A study on measuring the individual difference in need for uniqueness (in Japanese). *Japanese Journal of Psychology*, **56**, 160-166.
- Snyder, C. R., & Fromkin, H. L. 1977 Abnormality as a positive characteristic : The development and validation of a scale measuring need for uniqueness. *Journal of Abnormal Psychology*, **86**, 518-527.
- Torrance, E. P. 1974 *The Torrance test of creative thinking : Technical-norms manual*. Bensenville, I. L. : Scholastic Testing Service.
- Torrance, E. P. 1984 Sounds and images productions of elementary school pupils as predictors of the creative achievements of young adults. *Creative Child and Adult Quarterly*, **7**, 8-14.
- Waters, C. W. 1974 Multi-dimensional measures of novelty experiencing, sensation seeking and ability : Correlational analysis for male and female college samples. *Psychological Reports*, **34**, 43-46.
- Waters, C. W., Ambler, R., & Waters, L. K. 1976 Novelty and sensation seeking in two academic training setting. *Education and Psychological Measurement*, **36**, 453-457.
- Zuckerman, M. 1974 The sensation seeking motive. In B. A. Maher (Ed.), *Progress in Experimental Personality Research (Vol. 7)*. New York : Academic Press.
- Zuckerman, M. 1979 *Sensation Seeking : Beyond the optimal level of arousal*. N. Y. : Lawrence Erlbaum Associates.
- Zuckerman, M., & Link, K. 1968 Construct validity for the Sensation-Seeking Scale. *Journal of Consulting and Clinical Psychology*, **32**, 420-426.

(Received Jul. 20, 1991 ; Accepted Jan. 9, 1992)