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Assessing Creativity by Meaning

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Abstract: The paper presents a new approach to the assessment of creativity in terms of the meaning system. A brief presentation of the major constructs of meaning in line with the theory of meaning by Kreitler and Kreitler is followed by the theoretical and empirical considerations that have led to the hypothesis that it would be possible to assess creativity in terms of the meaning system. Three studies are presented briefly describing the meaning variables that were found to differentiate significantly between the more and less creative participants, in different samples of children, and with different measures of creativity used for validating the new meaning-based measure. A set of meaning variables characterizing the more creative children was identified. It was found that the more creative individuals tended to focus both on external and internal reality, on the general and the specific, on the personal-subjective and the interpersonally-shared, and on the present inputs and more distant ones.

Keywords: Meaning, Creativity, Assessment, Cognition

INTRODUCTION

This paper focuses on creativity, defined in conformity with the prevalent approaches as the tendency or ability to bring into existence products that are innovative or original and also valuable or useful (Rhodes, 1962). Creativity is a notoriously difficult theme for assessment, not in the least because of the rich variety of its manifestations and multiplicity of theories providing accounts for its dynamics and characteristics. Yet no less evident is the growing awareness of the need to assess creativity in a valid and reliable manner which would be neither overly simple nor so elaborate that it becomes unwieldy in application.

Measuring Creativity

The major commonly used tools for assessing creativity belong to one of the following categories: (a) Assessments of specific cognitive processes that are considered as characteristic of creativity, such as divergent thinking (Wallach & Kogan, 1965), metaphorical thinking (Gibbs, 1999), production of remote associations (Mednick, 1962) or the four basic processes characterizing fluency, flexibility, originality and elaboration (Torrance, 1974); (b) Self-reported creative activities and achievements, e.g.,

The Statement of Past Creative Activities (Bull & Davis, 1982), such as having written poetry, put on a play or started a club, or The Things Done on your Own (Torrance, 1962) that requires the respondent to state how many times he or she has engaged in a task outside of school in one of the following four areas of creativity language arts, science, social studies or art; (c) Self reports of different personality tendencies identified in previous studies as characterizing creative individuals, e.g., The ACL (Domino, 1994), The Khatena-Torrance Creative Perception Inventory (KTCPI) (Khatena & Torrance, 1976) which includes

"Something About Myself" (SAM) that measures artistic inclination, intelligence, individuality, sensitivity, initiative, and self-strength and "What Kind of Person Are You?" (WKOPAY) which measures imagination, appeal to authority, self-confidence, inquisitiveness, and awareness of others; or The How Do You Think (Davis, 1982) that assesses traits such as independence, humor, risk taking behavior and playfulness; (d) Attitudes toward creativity and interest inventories, such as The Creativity Attitude Survey (Schaeffer & Bridges, 1970) that assesses interest in art and writing and attraction to abstract and magical, or The Runco Ideational Scale (RIBS) that assesses ideas regarding creativity, such as the higher importance of the quality of ideas than their quantity (Runco & Basadur, 1993); (e) Judgments of creativity of persons (e.g., Malakate, Andriopoulos, & Gotsi, 2007) or the creativity of products, by experts and trained evaluators (Casakin & Kreitler, 2008) or by naïve persons in line with the consensual assessment technique developed by Amabile (Dollinger & Shafran, 2005; Hickey, 2001).

Why Yet Another Measure of Creativity?

The decision to venture to suggest the introduction of another measure of creativity into the crowded domain of creativity assessments is based, on the one hand, on dissatisfaction with the existing measures and, on the other hand, on the conviction that the new measure has certain advantages that the other measures may not have.

Without delving in the present context into a detailed criticism of each approach or test, it may suffice to state that the major shortcomings of the existing measures are that they rely heavily on self assessments, that are open to biases or self-deceptive tendencies, or on assessments by others, whereby different unspecified criteria creep in; that within cognition they focus on a limited number of the relevant processes; and that they refer mostly to one domain – either cognition or personality or behavior – so that they are not comprehensive enough.

On the other hand, the legitimacy of introducing a new approach for assessment of creativity rests on the conviction that the new approach is better suited than many of the existing measures to implement the major assumptions inspiring the search of assessment tools in creativity in recent years. These assumptions are that creativity denotes a set of cognitive abilities or processes, that it is distinct from intelligence, that it may be manifested to different degrees and in different domains, that it may appear already in young ages, and that it is best conceptualized in terms of the famous four *p*'s person, process, product and place (or press) (Rhodes, 1962). We have used these assumptions in order to check the overall suitability of our approach. As will be shown the system of assessment to be described in the present paper does justice to these assumptions: it assesses cognitive variables, it differentiates between creativity and intelligence, it provides a profile reflecting multiple dimensions, it may be applied on different levels and in regard to participants of different ages, and it is affiliated theoretically and empirically with personality.

Meaning: The Theory and The System

Since the assessment tool for creativity is grounded in the theory of meaning, it is necessary first to provide a brief description of this approach (Kreitler, 2022a, 2022b).

Meaning is a procedure for using cognitive contents for defining, expressing and communicating meanings for a variety of purposes, e.g., identifying inputs, problem solving, comprehension, or communication. Meaning consists of meaning units, which include two components: 'the referent' which is the input, the stimulus, or the subject to which meaning is assigned, and 'the meaning value' which is the cognitive contents designed to express or communicate the meaning of the referent. The following are five examples of meaning units: "table – serves for eating", "bread – is on the table", "milk – is produced by cows", "bottle – is made of glass". In these meaning units, 'table', 'bread', 'milk' and 'bottle' are the referents and 'serves for eating', 'is on the table' 'is produced by cows' and 'is made of glass' are the meaning values. Each meaning unit may be characterized in terms of meaning variables of the five following classes: meaning dimensions – which characterize the contents of the meaning values (e.g., locational qualities, material, sensory qualities, emotions), types of relation – which characterize the immediacy of the relation between the referent and the meaning value (e.g., attributive, exemplifying-illustrative, metaphoric-symbolic), forms of relation – which characterize the logical-formal properties of the relation between the referent and the meaning value (e.g., positive, conjunctive, partial), shifts of referent – which characterize the relations of the present referent to the initial input and previous referents (e.g., identical, partial, opposite), and forms of expression – which characterize the media of expression of the referent and/or the meaning value (e.g., verbal, graphic, motional). For example, when the input is Car and a child's response is "The car has a motor", the meaning unit is "Car – has a motor" and this meaning unit is coded in the following manner: Meaning dimension: Range of inclusion, Type of relation: attributive, Form of relation: Declarative positive, Shift of referent: Identical to input, and Form of expression: Verbal. The meaning system consists of the whole set of the meaning variables.

Table 1: Major Variables of the Meaning System: The Meaning Variables

Meaning Dimensions		**Forms of Relation**	
Dim. 1	Contextual Allocation	FR 1	Propositional (1a: Positive; 1b: Negative)
Dim. 2	Range of Inclusion (2a: Sub-classes; 2b: Parts)	FR 2	Partial (2a: Positive; 2b: Negative)
Dim. 3	Function, Purpose & Role	FR 3	Universal (3a: Positive; 3b: Negative)
Dim. 4	Actions & Potentialities for Actions (4a: by referent; 4b: to referent)	FR 4	Conjunctive (4a: Positive; 4b: Negative)
Dim. 5	Manner of Occurrence & Operation	FR 5	Disjunctive (5a: Positive; 5b: Negative)
Dim. 6	Antecedents & Causes	FR 6	Normative (6a: Positive; 6b: Negative)
Dim. 7	Consequences & Results	FR 7	Questioning (7a: Positive; 7b: Negative)
Dim. 8	Domain of Application (8a: as subject; 8b: as object)	FR 8	Desired, wished (8a: Positive; 8b: Negative)
Dim. 9	Material	SHIFTS IN REFERENT[b]	
Dim. 10	Structure	SR 1	Identical

Dim. 11	State & Possible change in it	SR 2	Opposite
Dim. 12	Weight & Mass	SR 3	Partial
Dim. 13	Size & Dimensionality	SR 4	Modified by addition
Dim. 14	Quantity & Mass	SR 5	Previous meaning value
Dim. 15	Locational Qualities	SR 6	Association
Dim. 16	Temporal Qualities	SR 7	Unrelated
Dim. 17	Possessions (17a) & Belongingness (17b)	SR 8	Verbal label
Dim. 18	Development	SR 9	Grammatical variation
Dim. 19	Sensory Qualities[c] (19a: of referent; 19b: by referent)	SR 10	Previous meaning values combined
Dim. 20	Feelings & Emotions (20a: evoked by referent; 20b: felt by referent)	SR 11	Superordinate
Dim. 21	Judgments & Evaluations (21a: about referent; 21b: by referent)	SR 12	Synonym (12a: in original language; 12b: translated in another language; 12c: label in another medium; 12d a different formulation for the same referent on the same level)
Dim. 22	Cognitive Qualities (22a: evoked by referent; 22b: of referent)	SR 13	Replacement by implicit meaning value
Types of Relation[a]		**Forms of Expression**	
TR 1	Attributive (1a: Qualities to substance; 1b: Actions to agent)	FE 1	Verbal (1a: Actual enactment; 1b: Verbally described; 1c: Using available materials)
TR 2	Comparative (2a: Similarity; 2b: Difference; 2c: Complementariness; 2d: Relationality	FE 2	Graphic (2a: Actual enactment; 2b: Verbally described; 2c: Using available materials)
TR 3	Exemplifying-Illustrative (3a: Exemplifying instance; 3b: Exemplifying situation; 3c: Exemplifying scene)	FE 3	Motoric (3a: Actual enactment; 3b: Verbally described; 3c: Using available materials)
TR 4	Metaphoric-Symbolic (4a: Interpretation; 4b: Metaphor; 4c: Symbol)	FE4	Sounds & Tones (4a: Actual enactment; 4b: Verbally described; 4c: Using available materials)
		FE5	Denotative (5a: Actual enactment; 5b: Verbally described; 5c: Using available materials)

[a] Modes of meaning: Lexical mode: TR1+TR2; Personal mode: TR3+TR4, [b] Close SR: 1+3+9+12 Medium SR: 2+4+5+6+10+11 Distant SR: 7+8+13, [c]This meaning dimension includes a listing of subcategories of the different senses/sensations: [for special purposes they may also be grouped into "external sensations" and "internal sensations"] e.g., color, form, taste, sound, smell, pain, humidity and various internal sensations.

Each of the five sets of meaning variables is complete in itself and independent of the other sets. Thus, characterizing a meaning unit involves using one variable from each set. Hence, when we have a group of meaning units characterized in terms of meaning variables and we count the frequencies of meaning variables used in characterizing these meaning units, we get in fact five independent groups of frequencies, namely, one for

meaning dimensions, one for types of relation, one for forms of relation, one for shifts of referent, and one for forms of expression. Each of these five groups of frequencies amounts to the same total but consists of different meaning variables.

The description o the components of meaning indicates that it is a system, that it is complex, and that its elements are defined in terms of other elements of the system (namely, it is self-embedded and regressive). These three characteristics reflect the static or structural aspects of the system. They are complemented by three further properties that describe the dynamic aspects of meaning: it is a developing system in the ontogenetic sense; it is a selective system dependent in its structure and functioning on properties of the individual and the input; and it is a dynamic system, whose special characteristics become manifest when it is activated for meaning assignment.

Each individual disposes over a certain selected part of the meaning system which represents the specific tendencies of that individual to apply the meaning system in information processing. Thus, each individual tends to use specific meaning variables with higher frequency and other meaning variables with medium or low frequency. The frequencies with which the individual tends to use each meaning variable are assessed by means of The Meaning Test and constitute the individual's meaning profile (see 2.2.2).

The major and most essential function of meaning is input identification (Kreitler & Kreitler, 1984). This function is implemented by providing the contents and processes enabling meaning assignment to inputs. Input identification ranges all the way from limited identification in terms of a stimulus for a particular action to highly complex meaning elaborations necessary for acts involving cognitive, emotional, physiological and behavioral components (Kreitler & Kreitler, 1985).

A further function of the meaning system is to provide the cognitive contents and processes necessary for carrying out different cognitive acts. Studies showed that each meaning variable represents a specific set of contents and processes. For example, the meaning dimension Locational Qualities represents the set of contents denoting location (e.g., special, geographic) and the processes involved in dealing cognitively with locations (e.g., identifying, specifying, recalling, transforming locations). Further studies showed that each type of cognitive act corresponds to a specific pattern of meaning variables that provide a description of the contents and processes involved in its enactment. For example, meaning variables involved in planning include structure, temporal qualities, and causes and antecedents (Kreitler & Kreitler, 1986a, 1987b,c). If the individual's meaning profile includes a sufficient proportion of the meaning variables included in the pattern corresponding to the particular cognitive act, that individual will be able to perform well the particular cognitive act (Kreitler & Kreitler, 1989, 1990a, 1994).

A third function of the meaning system is manifested in the domain of personality. A body of research showed that each of over 200 personality traits corresponds to a specific pattern of meaning variables. Again, as in the case of cognitive acts, the pattern of meaning variables may be considered as providing a description of the contents and processes involved in the enactment of the specific trait. For example, the meaning variables in the pattern corresponding to extraversion include high salience of the meaning dimensions of action, sensory qualities, temporal qualities and belongingness of objects, as well as low salience of the meaning dimensions of internal sensations and cognitive qualities (Kreitler & Kreitler, 1990a, 1997). If the individual's meaning profile contains a sufficient proportion

of the meaning variables included in the pattern corresponding to the particular personality trait, it is highly likely that the individual scores high on that personality trait.

The same holds in regard to further tendencies in the domain of personality, such as personality dispositions, defense mechanisms, the self, and emotions (Kreitler, 2003; Kreitler & Kreitler, 1987c, 1993).

In sum, the described functions of the meaning system indicate that the meaning system provides the understructure - that is, the raw materials in terms of contents and processes – for input identification, cognitive functioning, personality tendencies and emotions. All four functions depend on meaning assignment and reflect the central role of meaning for and within cognition. This has given rise to the psychosemantic conceptualization of cognition as a meaning-processing and meaning-processed system.

Meaning Variables and Creativity: Initial Indications

The three studies presented in this paper are grounded in the psychosemantic conception of meaning. Several considerations have led to the hypothesis that the meaning system may constitute the adequate tool for assessing creativity potential. One was previous findings about the involvement of meaning variables in various cognitive functions, such as planning, curiosity, exploration, problem solving, mathematics and comprehension (Arnon & Kreitler, 1984; Kreitler & Kreitler, 1985b, 1986a, 1986b, 1987a,1987b; Kreitler & Nussbaum, 1998). This led to the expectation that insofar as creativity includes cognitive components, it would be characterized by specific meaning variables. Second, previous studies showed that promoting specific meaning variables in an experimental setting, mainly those involved in personal meaning (viz. exemplifying-illustrative and metaphoric-symbolic types of relation), resulted in enhanced manifestations of creativity, such as increases in fluency, flexibility, elaboration and originality in the Wallach and Kogan test, increases in the number of original responses in the Rorschach test and increases in original associations (Kreitler, 1999; Kreitler & Kreitler, 1990b; Kreitler, Kreitler & Wanounou, 1987-1988; Lahav, 1982). Notably, an intervention focused on promoting thinking skills of creativity in teacher trainees resulted in changes in meaning variables similar to those identified earlier as producing increases in creativity manifestations viz. the exemplifying-illustrative and metaphoric-symbolic types of relation (Margaliot, 2005). Third, in view of the evidence that creativity is promoted by particular personality tendencies (Runco, 2007, chap.9) and is even assessed in terms of personality tendencies (see 1.1), it seemed adequate to use for the assessment of creativity a tool such as the meaning test that provides assessment of personality traits and tendencies too (Kreitler & Kreitler, 1990a, 1997). Finally, further supporting considerations were the fact that the meaning test can be administered to individuals in different ages, that it does not require only verbal responses that it does not have the character of a stress-evoking test.

STUDY

Objectives

The purpose was to identify the meaning profile of children characterized as high in creativity. It was expected that comparing the meaning profiles of children differing in creativity will yield a set of meaning variables characteristic of the more creative.

Method

Participants

The participants were 158 children of both genders (72 girls and 86 boys) in the second and third grades of two regular schools, in the age range of 7;2 to 9;4 years (Mean=8;3, SD= 0;7), who have undergone routine testing for the purpose of establishing whether they can join a special class of the gifted in their schools.

Instruments

The routine testing by the education authorities included the following two tests: the standard Wechsler IQ test and two parts of the Torrance Tests of Creativity Thinking (the verbal part and the figural part). In addition they were administered the standard Meaning Test (Kreitler & Kreitler, 1990a) in which they were requested to communicate to someone of their choice (who understands language etc. but not the meaning of the specific stimuli) the interpersonally-shared and personal-subjective meanings of 11 standard stimuli, using any means of communication they consider adequate (write, draw, describe drawings or objects, etc.).

Procedure

The IQ and Torrance tests were administered and scored by professional testing personnel independently of the Meaning Test. The IQ test was scored according to standard procedures. The raw scores of the Torrance tests were first transformed into standardized z-scores which enabled combining the scores for fluency, flexibility, originality and elaboration for the 3 verbal and the 3 figural items; and then were transformed into binary scores (1=above the group's median, 0= below) that were summed to form a scale from 0 to 4. The Meaning test was administered in class sessions, to part of the children prior to the other tests, and to the others afterwards. Time interval between the administration of the Meaning test and the other tests was 4-6 weeks. At the time of the testing, none of the participants or the test administrators knew the hypothesis of the study. The Meaning Test was coded by experimenters who did not know the hypothesis. The coding consisted in identifying in the responses meaning units, each of which was characterized in terms of one variable of each of the five classes of variables (e.g., meaning dimensions, types of relation), which were then summed and thus yielded the meaning profiles of each individual participant.

The reliability of coding across two different coders was satisfactory (correlation coefficients for two coders for the different meaning variables ranged from $\underline{r}$=.76 to $\underline{r}$=.92). The criterion values for giftedness were a minimum score of 115 on the IQ test and a minimum score of 3 on the creativity scale. The "creativity" group included the children who passed both criteria (n=36). Since the IQ scores and creativity scores correlated significantly ($\underline{r}$=.58, $\underline{p}$<.01), the numbers of children who passed only one of the criteria was low ($\underline{n}$=19). They were excluded from the "control" group ($\underline{n}$=99). The meaning profiles of the children in the "creativity" group and the "control" group were compared by t-tests.

Results

Control analyses showed that there were no significant differences in the major variables of the study between the genders, the classes or the two orders of presentation of the tests. Hence all the data was analyzed together. Table 2 presents the results of comparing the meaning profiles of the "creativity" and "control" groups.

Table 2: Significant Differences in Meaning Variables between the "creative" and "control" groups

Meaning Variable[a]	Creative Group	Control Group	t-test[b]
Dim. 1. Contextual Allocation	3.25	2.01	2.78
Dim. 2a. Range of Inclusion: Subclasses	4.51	1.19	5.18
Dim. 5. Manner of Occurrence and Operation	7.19	1.11	14.23
Dim. 7. Consequences & Results	4.18	1.19	3.12
Dim. 10. Structure	1.10	.36	4.52
Dim. 11. State	2.59	.22	3.71
Dim. 14. Quantity and Mass	2.10	.54	3.95
Dim. 16. Temporal Qualities	5.17	2.62	4.18
Dim. 18. Development	2.31	.02	6.10
Dim. 19b. Sensory Qualities perceived by Referent	5.78	2.83	3.56
Dim. 20b. Feelings & Emotions experienced by Referent	6.11	3.35	7.13
Dim. 21a. Judgments & Evaluations of Referent	5.53	2.29	3.79
Dim. 22b. Cognitive Qualities of Referent	6.76	3.52	4.12
TR 3a+b+c. Exemplifying-Illustrative: Instance, Sit., Scene[c]	16.54	5.22	5.29
TR4a+b+c. Metaphoric-Symb.: Interpretation, Metaphor, Symbol[d]	10.26	2.51	5.81
FR1b. Propositional: negative	5.22	.10	5.16
FR2a. Partial: positive	2.73	.87	4.34
FR4a+b. Conjunctive	3.29	1.10	3.81
FR5a+b. Disjunctive	1.84	.20	4.19
FR6a+b. Normative	.10	1.89	3.33
FR7a+b. Questioning	1.28	.00	3.89
SR Close (1+3+9+12)	5.34	12.73	6.14
SR Distant (7+8+13)	16.95	3.42	5.67
SR10: Previous Meaning Values Combined	9.57	3.41	5.55
FE nonverbal (2+3+4+5)	2.56	1.10	3.24
Different FR	5.22	2.26	4.55
Different SR	5.10	3.13	3.95
Different FE	3.21	2.10	2.76

[a] The meaning variables are presented in Table 1, [b] In view of the large number of comparisons only results on the level of at least p<.01 are presented, [c] Especially significant were the differences in

regard to Exemplifying Instance and Situation, [d] Especially significant were the differences in regard to Interpretation and Metaphor.

Table 2 shows that the meaning profile of the creativity group differs in many variables from that of the control group. There are differences in all five types of meaning variables. In meaning dimensions the differences refer to a broad range of variables that include those involved in abstract (Dim. 1), quantitative (Dim. 14), evaluative (Dim. 21), dynamic (Dim. 5) and implicative (Dim. 7) thinking as well as in emotional responses (Dim. 20), and the more concrete aspects of objects, such as structure (Dim. 10) and sensory qualities (Dim. 19). In regard to types of relation the most salient findings are those that involve the exemplifying-illustrative and metaphoric-symbolic types of relation. These findings replicate those of previous studies (e.g., Kreitler & Kreitler, 1990b; Margaliot, 2005). In regard to forms of relation, the notable findings are those that concern the negative and partial relations. In regard to shifts of referent, the findings show a clear tendency for shifts distant from the presented inputs. In forms of expression there is a tendency for the creative to use to a greater extent the nonverbal forms. In all cases except two the findings show a greater frequency in the use of the specific meaning variables in the creative than in the control group. The two exceptions are the normative form of relation and the shifts of referent to close referents: in these variables the creative group scores lower than the control group.

Discussion and Conclusions

The findings indicate that there is evidence for a particular meaning profile characterizing the creative group. The profile is particularly rich and variegated. It is to be noted that the creative group in this study was defined not only in terms of creativity but also in terms of high IQ. Hence, it is likely that the obtained findings reflect also this component of cognitive exceptionality.

STUDY 2

Objectives

The purpose was to identify the meaning profile of students in the fifth and sixth grades whose paintings and drawings were evaluated as highly creative by experts. It was expected that comparing the meaning profiles of the students differing in the creativity evaluations they got for their paintings and drawings will yield a set of meaning variables characteristic of the more creative students.

Method

Participants

The participants were 71 students of both genders (46 girls and 25 boys) studying in the fifth and sixth grades of two regular schools. Their mean age was 10:9 (SD= 1;8). They constituted 58.2% of the total student population in the four classes that were addressed for the purpose of the study. The students' creativity was rated by three experts.

Instruments

The rating of the creativity of the children's art products was done in terms of the following 7-step scale: exceptional creativity, high creativity, above average creativity, medium creativity, below average creativity, low creativity, no evidence for creativity (scored as 7 to 1, respectively). All the students participating in the study were administered the Meaning Test (see 2.2.2).

Procedure

The art products of the children – paintings or drawings – were prepared for a local exhibition of children's art organized by the two elementary schools. The exhibition was designed for fifth and sixth graders. The art products that were considered for the exhibition had to be handed in up to a certain predetermined date. Out of the 122 in the participating classes, 71 handed in their art products. These art products were presented for rating to three different experts who were experienced art teachers. None of the experts knew the children or the identity of those who produced the paintings or drawings or the hypothesis of the study. Each of the experts was requested to rate independently the degree of creativity in each of the 71 art products. The three ratings given each art product were averaged to produce one score for each art product. The Meaning Test was administered to the children in a class session, to each class separately, about a month prior to the announcement about the art exhibition of the schools. The administration of the Meaning Test was presented as an independent study and was not related in any way to the art exhibition. The Meaning Test was coded according to the standard procedure (see 3.2.3). The participants were divided into two groups in line with whether their art product was rated above or below the median of creativity evaluations (Median=2.9).

Results

Control analyses showed that there were no significant differences in the major variables of the study between the genders, the classes or the two participating schools. Hence all the data was analyzed together. Table 3 presents the results of comparing the meaning profiles of the groups whose products were rated above or below the median.

Table 3: Significant Differences in Meaning Variables between the Groups Whose Art Products were Rated as Higher or Lower in Creativity

Meaning Variable[a]	Rated as Showing Higher Creativity	Rated as Showing Lower Creativity	t-test[b]
Dim. 5. Manner of Occurrence and Operation	5.72	.25	9.52
Dim. 7. Consequences & Results	4.10	0.35	4.75
Dim 9. Material	7.22	2.15	6.42
Dim. 10. Structure	1.97	.21	4.85
Dim. 11. State	3.46	1.12	3.99
Dim. 12. Size & Dimensions	3.45	.87	3.50
Dim. 15. Locational Qualities	6.51	2.11	5.33

Dim. 18. Development	1.85	.00	7.24
Dim. 19b. Sensory Qualities perceived by Referent[c]	9.65	2.42	6.38
Dim. 20b. Feelings & Emotions experienced by Referent	8.66	2.82	7.73
Dim. 22b. Cognitive Qualities of Referent	5.12	1.12	6.72
TR 3a+b+c. Exemplifying-Illustrative: Instance, Sit., Scene	18.54	6.38	4.69
TR4a+b+c. Metaphoric-Symb.: Interpretation, Metaphor, Symbol	14.26	3.34	8.95
FR4a+b. Conjunctive	2.12	.71	4.00
FR7a+b. Questioning	1.10	.00	2.96
SR Distant (7+8+13)	14.14	2.87	7.12
SR10: Previous Meaning Values Combined	6.71	2.33	3.61
FE nonverbal (2+3+4+5)	4.72	2.68	2.97
Different SR	6.25	2.18	3.71

[a]The meaning variables are resented in Table 1, [b] In view of the large number of comparisons only results on the level of at least p<.01 are presented, [c] Especially significant were the responses in regard to color, form and brightness

The findings in Table 3 show that the meaning profiles of the group whose products were rated as more creative differed from the others in higher frequency of meaning variables of the different types, including those involved in the meaning dimensions of dynamic (Dim. 5), implicative (Dim. 7) and developmental (Dim. 18) thinking, sensory qualities, emotions and cognitive qualities, as well as the exemplifying-illustrative and metaphoric-symbolic types of relation, the shifts to distant referents, and the use of nonverbal forms of expressions.

Discussion and Conclusions

Notably, the creative children in this study differ from the others in some meaning dimensions additional to those of study 1 (see 2.4), mainly those that refer to more concrete aspects of objects, such as location, size, material and the sensory qualities of color, form and brightness. These variables are likely to be involved in the production of visual art objects.

On the other hand, some of the variables that differentiated between the groups in study 1 (see 2.4) did not show up in the present study, mainly the meaning dimensions involved in abstract (Dim. 1), quantitative (Dim. 14) and evaluative (Dim. 21) thinking, the disjunctive form of relation (FR 5) and the shifts to close referents.

The latter variables, in which there were no significant differences in this study, may be those that are likely to be involved in the higher intelligence component of the gifted who participated in study 1.

STUDY 3

Objectives

The purpose of the study was to identify the meaning profile of Arab Bedouin children who score high on a test of self-reported creative activities. It was expected that comparing the meaning profiles of children differing in creativity will yield a set of meaning variables characteristic of the more creative children. The special focus of this study was the different cultural background of the children.

Method

Participants

The participants were 238 Bedouin children of both genders (135 girls and 103 boys) in the seventh to the tenth grades of two regular schools, with a mean age of 13:7 years (SD=1;10; age range of 12;2 to 14;10 years).

Instruments

The children were administered the Meaning Test (see 2.2.2) and the questionnaire of "The Things Done on your Own" (Torrance, 1962). The latter was modified from the original to include items more characteristic of the Bedouin culture.

Procedure

The Meaning Test and the "The Things Done on your Own" test were administered in a class setting in two separate sessions, about two weeks apart. About half of the children responded first to the Meaning Test and the others responded first to "The Things Done on your Own" test. All responses were in the Hebrew language. The Meaning Test was coded according to the standard procedure (see 2.2.3).

Each child got a score for creativity in line with the self-reported "Things done on your Own" and a meaning profile based on the responses to the Meaning Test. The groups were formed in terms of the mean score on the Torrance test (M=3.62, SD=2.25): children with a score above the mean were identified as "more creative" and those below the mean as "less creative".

Results

Control analyses showed that there were no significant differences in the major variables of the study between the genders, the classes, and the two kinds of order in which the tests were administered. Hence all the data was analyzed together.

Table 4 presents the results of comparing the meaning profiles of the groups defined as "more creative" and "less creative".

Table 4: Significant Differences in Meaning Variables between the "more creative" and "less creative" groups

Meaning Variable[a]	"More Creative"	"Less Creative"	t-test[b]
Dim. 1. Contextual Allocation	2.67	6.41	4.66
Dim. 2a+b. Range of Inclusion: Subclasses & Parts	7.60	2.75	6.11
Dim. 5. Manner of Occurrence and Operation	6.13	.46	12.58
Dim. 9. Material	10.38	6.92	3.10
Dim. 10. Structure	5.11	1.79	3.96
Dim. 11. State	6.67	3.27	3.01
Dim. 15. Locational Qualities	11.13	6.19	4.28
Dim. 16. Temporal Qualities	9.57	6.26	3.92
Dim. 18. Development	2.99	.01	7.59
Dim. 19a+b. Sensory Qualities of Referent and perceived by Referent	17.78	12.83	6.00
Dim. 20a+b. Feelings & Emotions experienced and evoked by Referent	14.57	9.25	8.61
Dim. 21a. Judgments & Evaluations of Referent	7.22	4.81	4.15
Dim. 22a+b. Cognitive Qualities of and by Referent	10.24	6.11	3.74
TR 3a+b+c. Exemplifying-Illustrative: Instance, Sit., Scene	16.54	5.22	5.29
TR4a+b+c. Metaphoric-Symb.: Interpretation, Metaphor, Symbol	19.59	12.51	4.95
FR4a+b. Conjunctive	2.75	.55	2.97
SR Distant (7+8+13)	14.22	4.94	7.15
SR10: Previous Meaning Values Combined	6.12	2.82	4.63
FE nonverbal (2+3+4+5)	15.11	6.17	7.44
Different SR	6.28	2.69	2.86
Different FE	4.29	3.11	2.82

[a] The meaning variables are resented in Table 1, [b] In view of the large number of comparisons only results on the level of at least $p<.01$ are presented

The findings in Table 4 show that the children who were identified as more creative differed from those identified as less creative in various meaning variables, some of which were found to differentiate between the groups in study 1 and study 2 (see 2.4 and 3.4), such as the meaning dimensions reflecting dynamic (Dim.5), structural (Dim. 10), and developmental (Dim. 18) thinking, as well as the meaning dimensions of state (Dim. 11), emotions (Dim. 20), sensory qualities (Dim. 19), and cognitive qualities (Dim. 22), the exemplifying-illustrative and metaphoric-symbolic types of relation, the shifts to distant referents, and the salience of the nonverbal forms of expression.

Discussion and Conclusions

Notably, the means of some of the variables seem to be higher than in studies 1 and 2, for example, in the case of the exemplifying-illustrative and the metaphoric-symbolic types of relation and the dimension of structure. Another notable difference is that in the meaning profiles of the present sample of creative children some of the meaning dimensions are used in a more holistic and less differentiated manner (e.g, Dim. 2a+b and not just Dim. 2b, Dim. 19a+b and not just Dim. 19b and Dim 20a+b and not just Dim. 20b). Notable is also the absence of some of the variables that differentiated between the groups in the samples of study 1 and study 2, such as the normative and questioning forms of relation. In the case of the dimension contextual allocation (Dim. 1), the difference between the groups was opposite to that observed in study 1 (see 2.4).

GENERAL DISCUSSION

Summary of Findings

The major results of the three presented studies consist in sets of meaning variables that differentiate significantly between the more creative and less creative children in the studied samples. A comparison of the sets reveals several meaning variables that differentiate between the groups in all three samples. These include mainly the following meaning variables: the meaning dimensions of manner of occurrence and operation (Dim. 5), structure (Dim. 10), state (Dim. 11), development (Dim. 18), sensory qualities (Dim. 19), emotions (Dim. 20), cognitive qualities (Dim. 22), the types of relation exemplifying-illustrative (TR 3) and metaphoric-symbolic (TR 4), the conjunctive form of relation (FR 4), the shifts to more inclusive referents (SR 10) and to distant referents, and the nonverbal forms of expression. This set of meaning variables may be considered as characterizing the more creative children as compared with the less creative ones in view of the fact that it recurred in three samples of children differing in age and cultural background and whose creativity has been assessed by different instruments.

Major Cognitive Tendencies Characterizing Creativity

The set of variables differentiating significantly between the more and less creative respondents in the three samples indicates the following tendencies characterizing the more creative children: they tend to think in more dynamic terms, focusing on how things operate (e.g., Dim. 5); they tend to consider the objective aspects of objects, such as their structure, state, development and sensory qualities; they focus on the experiential aspects of emotions and cognitions; they conceptualize reality in terms of the two major components of personal-subjective meaning, namely the exemplifying-illustrative and metaphoric-symbolic types of relation, without however neglecting the major components of the interpersonally-shared meaning, namely the attributive and the comparative types of relation in which they do not differ from the less creative children; they tend to integrate cognitively (as indicated in the tendencies to apply the conjunctive form of relation and to combine meaning values into new referents); they tend to shift from the presented inputs to distant referents without however overlooking the more close referents (with the exception of the highly gifted in study 1); they tend to use a variety of shifts of referents,

thus enriching the presented inputs; and they tend to use nonverbal forms of expression in addition to the verbal form.

The described set of cognitive tendencies is characterized mainly by the tendencies to focus both on external and internal reality, on the general and the specific, on the personal-subjective and the interpersonally-shared, on the present inputs and the distant ones. Some of the findings confirm previously often reported results about the cognition of creativity, such as metaphors and restructuring (Runco, 2007, chap. 1). Other findings (e.g., the use of different shifts of referent) provide new explanations for frequently noted tendencies of creative individuals, such as divergent thinking (Runco, 2007, chap. 1).

The described set of meaning variables constitutes a core set which needs to be further tested and validated in further samples and against additional criteria of creativity. However, in addition to the core set there may be further meaning variables that may characterize individuals creative in particular domains, such as the meaning variables of visual aspects of objects found to characterize the creative children in study 2 (see 3.3) whose creativity was assessed in terms of drawings and paintings. It is likely that creativity in the sciences or in sports, to mention just two examples, may be characterized by further specific meaning variables that would be identified in future studies of the meaning-based method of assessment.

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