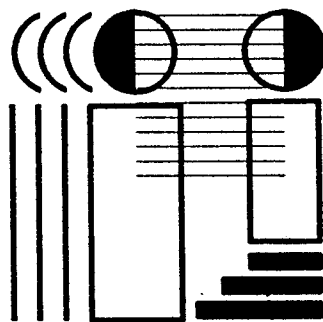


**Kurt A. Heller**  
**Ernst A. Hany (Eds.)**

# Competence and Responsibility

The Third European Conference of  
The European Council for High Ability



**Volume 2**



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The Third European Conference of  
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**Volume 2**

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Edited by

Kurt A. Heller und Ernst A. Hany



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# Intelligence - creativity relationship

- Are creative motivation and need for achievement influencing it?

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## The Problem

This presentation is concerned with intelligence-creativity relationship. A great deal of efforts has been aimed at investigating relationship between intelligence and creativity measures and a really impressive amount and variety of data have been collected. Of interest in the present investigation is what extensive literature on intelligence-creativity relationship is documenting about factors that influence it.

Testing conditions seem to be the largely studied ones among those factors. Wallach and Kogan (1965) showed that untimed, game-like conditions resulted in greater independence of creativity scores from individual differences in intellectual level. Dellas and Gaier (1970), Nicholls (1972) and Hattie (1977, 1980) reviewed a lot of studies supporting Wallach and Kogan's assumption that pressures of time and evaluation may influence the intelligence-creativity relationship. However, they reported also controversial findings. In a later publication Wallach (1971; cf. Hattie, 1977) concluded that there are consistent individual differences across game-like and test-like administration procedures and that game-like setting does not necessarily decrease the degree to which differences in scores on creativity tests are predictable from information about intelligence level. It might well be that personality-based variables are responsible for individual differences which situational variations failed to explain.

Intelligence-creativity relationship has been found to depend also on intelligence level. McNemar formulated this tendency as follows: "at high IQ levels there will be a very wide range of creativity whereas as we go down to average IQ, and on down to lower levels, the scatter for creativity will be less and less" (cf. Dellas & Gaier, 1970, p. 59). Findings, supporting this "fan shaped" hypothesis are reported also by Torrance (1962, 1974, 1987). Torrance (1987) suggested that characteristics like motivation and test-taking attitudes and skills might cause this differentiation in patterns of relationship.

The nature of creativity measures seems also to be a factor contributing to the variations in intelligence-creativity relationship. Differences between creativity tests can hardly be neglected and should not be ignored when their relations with intelligence tests are examined. Torrance (1987) summarized data from a great variety of studies with Torrance Tests of Creative Thinking (TTCT) and came to the conclusion that correlations involving verbal measures are higher than those involving figural measures. Data reported by Wallach and Kogan (1965), Dellas and Gaier (1970), Guilford and Hoepfner (1971), Nicholls (1972) and Torrance (1987) suggest that indicators derived from tests making use of the creative problem solving process (e. g. Guilford's or from Guilford derived tasks, TTCT) are more often positively related to intelligence scores than those derived from instruments based on the associative concept of creativity (e. g. Wallach and Kogan's battery). Mednick's Remote Association Test which has been severely criticized as being a measure of convergent rather than of divergent thinking usually produces positive correlations with intelligence level (Dellas & Gaier, 1970; Cropley, 1982).

To summarize, the research data on intelligence-creativity relationship that has been accumulated showed that this relationship depends on characteristics of the measures themselves and of the testing conditions. Many of the researchers in this field have also come to the idea that personality variables might account for unexplained variations in intelligence-creativity relationship, but for the moment this idea has not been examined (at least no research works on this topic are known to the author).

The present paper brings attention to the role of personality factors in intelligence-creativity relationship. Such an assumption is supported by a substantial body of evidence in creativity research. Two main areas of investigation will be reviewed here: personality studies of eminent creators and conceptual models of creative behaviour.

Personality studies of acknowledged creators and of persons with outstanding achievements (Albert, 1983; Barron, 1968, 1969; Cattell & Butcher, 1982; Helson, 1988; MacKinnon, 1978; Roe, 1982) investigated productive human behaviour in general as well as the positive interaction of intellectual and non-intellectual variables in real-life creative achievements in particular. The obtained results were quite similar across areas of creative endeavors and across research methodologies. They showed that the creative performance emerges at an intelligence level above the average - the average IQ of groups of eminent creators was already a superior one (Barron, 1968, 1969; MacKinnon, 1978). But their individual scores ranged widely and no correlation existed between rated level of creative achievements and level of intelligence: the correlations between rated creativity of professional activity and measured intelligence among artists, architects, mathematicians, writers, scientists were not significantly different from zero (Barron, 1968, 1969; MacKinnon, 1978).

At the same time several personality characteristics had been found to be positively related to creative achievements: driving absorption in the work (Roe, 1982); concentration and readiness to face endless difficulties (Cattell & Butcher, 1982); intellectual competence and enjoyment of intellectual activity, inquiringness of the mind, independence in thought and action; aesthetic sensitivity and openness to experience; an achievement oriented personality, setting standards of excellence and striving to attain them, with positive self-image, high self-confidence and self-acceptance (MacKinnon, 1978).

In studies of engineers from research and design bureaus, Chougounova (1984) found that interests, motivation and strong identification with the highly valued profession and with the work organization contributed to creative productivity in different engineering professional activities.

The accumulated evidence reveals that high intelligence level is a necessary ingredient for the highest achievements, but a complex pattern of personality factors is equally essential. This interaction between intelligence and personality variables has been discovered also in historiometric and biographical studies of eminent creators (Cox, 1926; Simonton, 1984).

Cox (1926) found that they had been characterized not only by high intelligence but also by forcefulness or strength of character, persistence of motive and efforts and confidence in their abilities. Her conclusion is especially interesting for the present study: "... that high but not the highest intelligence, combined with the greater degree of persistence, will achieve greater eminence than the highest degree of intelligence with somewhat less persistence" (p. 187).

Simonton's (1984) review offers additional support to the idea that cognitive contributions are supplemented by motivational ones in high-level performance and focuses attention especially to the need for achievement.

The idea of the interaction between intelligence and personality variables is incorporated also in different models which are developed to explain and examine creative behaviour. According to Sternberg and Lubart (1991), creativity results from a positive confluence of individual

resources like intelligence, knowledge, intellectual style, personality characteristics, motivation and environmental context. Torrance's model (1979) also takes into consideration creative motivation in relation to abilities and skills. Urban (1990) attempts to design a componential model of creativity, which consists of the following components: three cognitive - general knowledge base, specific knowledge base and skills, divergent thinking - and three personality - task commitment, creative motives, and tolerance of ambiguity. Amabile (1988) also proposes a componential model describing creativity as a result of motivation, domain-relevant skills and creativity-relevant skills, where intrinsic motivation is the most important component.

Therefore, psychological studies of real-life creative achievements and the conceptualization of their individual determinants in multicomponential models of creative behavior both justify the adopted approach, which is designed for studying intelligence-creativity relationship through the means of its personality moderators. Two empirical studies will be reviewed in search of evidence supporting our hypothesis.

## Method

The purpose of the first study is to investigate the influence exerted by creative motivation on the relationship between intelligence and productivity on creativity tests. Raven's Progressive Matrices (a measure of intelligence), Torrance Tests of Creative Thinking - Verbal and Figural Forms B (a measure of creativity) and Creative Motivation Scale by E. P. Torrance were administered to 204 9th graders from two public high schools in Sofia.

The second study focuses upon the role of need for achievement in the relation between intelligence and creativity measures. Raven's Progressive Matrices (a measure of intelligence), Torrance Tests of Creative Thinking - Verbal Form A (a measure of creativity) and a questionnaire for measuring need for achievement by Paspalanov and Stetinsky (Paspalanov, 1984) were administered to 126 16-18 years old students from a public high school in Sofia.

## Instruments

Raven's Progressive Matrices (1960) which were used in the both studies, are constructed on the basis of Spearman's theoretical assumptions and provide assessment of a person's capacity for intellectual activity.

Torrance Tests of Creative Thinking are among the most popular creativity tests (Davis, 1989). According to their author (Torrance, 1987), they have been translated into more than 32 languages and have been used in more than 1500 studies worldwide. The Verbal form consists of seven and the Figural form of three open-ended tasks which require kinds of thinking, analogous to the thinking involved in recognized creative achievements and lead to a variety of creative production.

The Verbal Form (Torrance, 1974) is scored for fluency (the number of generated solutions to the problem), flexibility (defined as a change in the subject's approach to the task, shifts in attitudes or focus on the problem), originality (the degree to which unusual, unique ideas are generated, that are away from the obvious and commonplace).

The scoring of the Figural form is based on its streamlined revision (Ball & Torrance, 1984). The following norm-referenced indicators are used: fluency, originality, elaboration (the number of details, used to elaborate the pictures), abstractness of titles (the degree to which the titles given by the children to their pictures are going beyond what can be seen), resistance to premature closure (a measure of the ability to "keep open" and to resist to natural psychological urge to close the incompleteness by the simplest, easiest solution).

Creative motivation and need for achievement have been chosen for their proved relevance to creative productivity. As it had been shown, creative motivation and need for achievement

are correlated positively with rated creativity of real-life achievements and they are systematically presented in revised conceptual models of creativity. Aside the proper research interest of the author in these motivational variables, they are playing an important role in the process of personal and social realization of the individual.

Creative Motivation Scale (Torrance, in press) was developed on the basis of analysis of reported research and theoretical works in the field of creative personality, of biographies and autobiographies of eminent creators. The scale measures "...an inquiring, searching, reaching out, persistent and courageous attitude" as a central notion in the conceptualization of the motivational determinants of creative achievement.

The questionnaire for measuring nAch, constructed and standardized by Paspalanov and Stetinsky (Paspalanov, 1984), is measuring predisposition to behavior related to high standards of activity and success in terms of a general behavioral strategy in performing different activities.

### Study I

Two hypotheses were set up for the first study:

1. Creative motivation will influence the relationship between intelligence and creativity in the direction that higher creative motivation will result in higher correlation between intelligence and creativity scores.

2. Creative motivation will be a more powerful predictor of individual differences in creativity for highly intelligent subjects than for low intelligent ones. As intelligence in its upper range was found to be less predictive of creative productivity, it is hypothesized that this is related with greater predictivity for personality determinants of creative behavior.

To test the first hypothesis, the subjects were divided into three groups according to their level of creative motivation (low, average, high) and coefficients of correlation between intelligence and creativity scores were computed for each group. The results we obtained didn't confirm the stated hypothesis.

To test the second hypothesis, subjects were divided in three groups again, this time according to their level of intelligence, and coefficients of determination of the creativity measures by creative motivation scores were computed. This time again no support was found for our hypothesis.

Two-way analyses of variance were performed and they didn't reveal as well any significant interaction between intelligence and creative motivation in determining both verbal and nonverbal creativity scores. Data analyses showed a tendency for highly motivated individuals to produce a greater number of ideas and a greater number of details to elaborate them; to use a variety of creative problem-solving approaches; to give more rich titles to their pictures and to produce more original responses to both verbal and figural creative tasks. This tendency however doesn't reach statistical significance. The slight positive correlation we obtained between creative motivation scores and creativity measures are similar to those reported by Torrance (in press) himself and they conform to his theoretical assumption that creative motivation and creative abilities are related, but different however prerequisites of individual's creative behavior and achievements.

### Study II

In the second study two analogical hypotheses were examined:

1. Need for achievement will influence the relationship between intelligence and creativity in the direction that higher need for achievement will result in higher correlation between intelligence and creativity scores.

2. Need for achievement will be a more powerful predictor of individual differences in creativity for highly intelligent subjects than for low intelligent ones.

Correlational analyses similar to those described in the first study were performed and the results that were obtained rejected once again our hypotheses, except for originality scores in the frame of the second hypothesis. The correlation between originality scores and need for achievement scores is highest for the high intelligence group and is lowest for the low intelligence group. However, the percentage of explained variance in the high intelligence group is quite low - 8%, and the difference between correlational coefficients just missed significance. That is why we can't consider this fact as something more than just a tendency.

The two-way analyses of variance didn't reveal significant interactions between intelligence and need for achievement in this study, too. But what it shows and what is absolutely away from our expectations is the negative impact of need for achievement on verbal fluency ( $F=4.168$ ;  $p=.02$ ), verbal flexibility ( $F=3.847$ ;  $p=.02$ ) and verbal originality ( $F=2.689$ ;  $p=.07$ ): students with low need for achievement are more productive, more flexible and more original in solving creative tasks.

This finding is even more surprising when compared to previous studies (Stoycheva, 1990), of high school Bulgarian students with outstanding creative and academic achievements who were found to score higher on need for achievement than their agemates that have not been realized such achievements.

In what way can we integrate these findings in the accumulated knowledge about creative personality and creative performance? The following explanation is suggested: Strong orientation towards achievement has negative effect on creative productivity in the stages of idea-finding and solution-finding. Creative attitudes like experimenting with the objects, exploring the unknown, playing with the ideas seem to be more favorable to the creative process at these stages than the desire to stick up to the evaluative standards set by the society. That is why high need for achievement blocks the creative output of the individuals while the freedom of evaluative demands (low nAch) stimulates the idea generation. The slight positive correlation we found between creative motivation and creative productivity is consonant to this explanation. On the next stages of practical implementation and communication of the new ideas however, achievement motivation becomes a factor of crucial importance in finding acceptance and social support for the creative ideas. As Barron (1968, 1969) and MacKinnon (1978) notice, when summarizing the results of IPAR studies of eminent contemporary creators, highly creative individuals are characterized by integrating and reconciling of opposite personality traits within themselves and that's what makes them unusually effective and productive in diverse situations.

## Conclusion

As Wallach (1988, p. 13) pointed out, "fulfillment of potential is, after all, one of the goals of trying to reach a better understanding of talent (aside from our interest in the knowledge itself)". The complexity of the productive mechanisms of human behavior, as well as the increasing public awareness of their importance for our future call for exploring every research possibility with the aim of getting more information about their functioning. And enlarging our knowledge in creative behavior predispositions is bringing us closer to its flourishing in human beings. That is why I dare to present you a study which hypotheses were rejected.

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**W**ith its 52 carefully revised and edited chapters, this book provides a representative overview of the topics discussed at the Third European Conference of the European Council for High Ability, held in Munich (Germany) in 1992. These topics include cognitive approaches to intelligence and creativity, the life-long development of gifted individuals, the discussion on sex differences in ability and academic achievement, the problems of handicapped gifted, and the more classical issues of identifying and educating the gifted, among others.

However, the deliberate concept of the book goes far beyond the design conference proceedings usually have. The main issues of the most recent research on giftedness, talent, and creativity, and current European approaches to the systematic development of individual competences and creative productivity, are dealt with by key chapters, which in turn are commented on by other authors. The chairpersons of the main symposia provide overviews and summaries of their sessions and point to the critical issues under discussion. The whole book is structured in ten parts, each of which is introduced by editors' comments.

Volume I of this Conference Report contains the Abstracts of all 200 papers submitted to the conference and was published by the same publisher in 1992.



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