

BAR-ILAN UNIVERSITY

**The Cognitive Functions that Contribute to
Verbal and Artistic Creativity among
Children**

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Summary

Background: creativity is perceived as something new and original, which must have value in a certain context and be effective and beneficial for task solving. Guilford defines creativity according to two types of thinking: convergent thinking and divergent thinking (Guilford, 1967a, 1968). Creativity can be expressed verbally and non-verbally. Metaphorical language is one of the most meaningful fields of linguistic innovation. Creating a new metaphor is an example of verbal creativity (Mashal&Kasirer, 2016). Creative thinking is based on administrative functions that relate to fluid intelligence.

The education systems around the world understand the importance of developing creativity in the schools, and even attempt to promote it through programs and reforms. However, programs that develop creativity encounter many obstacles. One of the reasons for these difficulties is a lack of existing evaluation tools for creative processes in general, and for artistic creation in particular. This leads teachers to focus on providing knowledge and contents through repetition and memorization, a path that enables a clearer measurement of scholastic accomplishments but uses less divergent and creative thinking. Our research developed a questionnaire aimed at evaluating the creativity of elementary students in various artistic fields (painting and sculpting, music, dancing, creative writing, theater and cinema and cooking), while focusing on three levels: involvement, ability and performance. The questionnaire is based on the CAQ – Creative Achievement Questionnaire (Carson, Peterson & Higgins, 2005), which is intended for adults, and was modified and adjusted for the participating children. The creative fields were carefully selected according to the fields studied at the elementary schools and the common afterschool activities and classes.

Research goals: the current research had four main objectives: 1) to evaluate the level of artistic and verbal creativity of children in elementary schools; 2) to assess the possible relationship between artistic creativity and verbal creativity; 3) to examine, for the first time, the cognitive abilities that contribute to artistic and verbal creativity among children in elementary schools; 4) to find differences in artistic and verbal creativity between females and males. These differences and connections were tested on a regularly developed population of children.

Method: the current research included 100 participants, who were asked to answer questionnaires. 30 participants did not complete the questionnaires fully (or did not show interest in any of the sub-fields), so only the questionnaires taken from 70 participants were used. All 70 participants were born in Israel, are regularly developed and are studying in regular classes in elementary schools. Of the 70 participants, 33

(47.8%) were male and 36 (52.2%) were female. The age range was 11-13 years (5th and 6th grades). The current research examined four areas: verbal creativity, artistic creativity, administrative functions and linguistic capabilities, all through six questionnaires. Artistic creativity was examined through a self-report questionnaire that focuses on fields of interest and artistic ability and performance – CAQ (Carson et al., 2005). Verbal creativity was examined through a questionnaire for generating imagery and metaphors – Metaphor Generation Test (Kasirer&Mashal, 2014). Administrative functions included: response inhibition – Stroop Test (Stroop, 1935), cognitive flexibility – D-KEFS – Trail Making Tests (Reitan& Davison, 1974), working memory – Digit Span Test and linguistic capabilities – Naming Test (Kave, 2005).

Results: the first objective was to evaluate the level of artistic and verbal creativity of children in elementary schools. We found that the percentage of artistic creativity of the students was measured at 18.62%, while the verbal creativity was at 61.86%. The second objective was to assess the possible relationship between artistic creativity and verbal creativity. A positive correlation was found, so the higher the artistic creativity, the higher was the verbal creativity, as tested by generating new metaphors. It was also discovered that the correlation between verbal creativity and an interest in creative writing was significantly stronger than the correlation between verbal creativity and an interest in dancing and cooking. The third objective was to examine the cognitive abilities that contribute to artistic and verbal creativity among children in elementary schools. The results showed that administrative functions and various linguistic capabilities contribute to artistic and verbal creativity. Response inhibition is significantly related to the field of dancing and verbal creativity. Cognitive flexibility is significantly related to the field of art and creative writing and to verbal creativity. A significant, positive correlation was found between working memory that tests reverse digit span and general artistic creativity and verbal creativity, and between working memory that tests forward digit span and the field of dancing. Another strong, positive correlation was found between cognitive flexibility and the field of art and creative writing, meaning that the higher the cognitive flexibility, the greater the artistic creativity. Naming ability was another contributor for creativity: a positive correlation was found between linguistic capabilities and artistic creativity in its various fields (apart from dancing and cooking). Meaning, the better the linguistic capabilities, so was the artistic creativity, and vice versa. A correlation was also found between naming ability and verbal creativity. The fourth objective was to find differences in artistic and verbal creativity between females and males. It was found that distinct, gender-based differences exist in several specific fields: art (painting and sculpting), music and dancing. The creativity level was higher in females than in males in those three fields.

Conclusions: the low percentage of students with artistic and verbal creativity found in this research demands a general review in the context of the policy of the Ministry of Education. Various cognitive abilities and characteristics are related to creativity in different fields and sub-fields. Administrative functions are essential for creativity and contribute to performance in complex cognitive tasks. In addition, the research results strengthen creativity as a general field, since participants with achievements in a sub-field of art (for instance, music), also have achievements in verbal creativity. However, a deeper look into the results shows that the artistic creativity fields rely upon various administrative functions. For example, a correlation was found between response inhibition and verbal creativity, but not creativity in the fields of theater and cinema. Another example – a correlation was found between cognitive flexibility and verbal creativity, but not creativity in the field of dancing. These results show that the six fields of general artistic creativity rely upon various administrative functions. However, artistic