

# TOWARD A GENERAL THEORY OF HUMAN CREATIVITY

by *Mária Sági and Iván Vitányi*

*Abstract.* The presence of a basic and general form of creativity in people is investigated through experiments with music. The results indicate that “generative” creativity—the ability to spontaneously generate a music by varying a basic set of musical elements—is a basic human endowment, unlike “constructive” creativity—the type of creativity exhibited by composers and other artists—which is the result of training and the special development of faculties. Generative creativity’s coming to the fore in contemporary people would contribute to the development of the personality and help bring about more fulfilled, better balanced people and societies.

*Keywords:* creativity; folk art; high art; modern society; music.

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The subject of creativity has been frequently the object of highly specialized psychological, sociological, and philosophical investigation; recently many noteworthy findings have surfaced. Yet, the idea that creativity is a universal human faculty which appears in each and every person to some degree is seldom seriously entertained. The authors’ empirical investigations show that there is a type or form of creativity which is general, and for all practical purposes universal, in normal, healthy human beings. This constitutes a distinct level of creative activity from that usually investigated by psychologists and described in the professional literature. The present paper provides a brief outline of the theory of creativity emerging from the authors’ empirical investigations, summarizing the main findings and drawing the relevant conclusions.

The empirical researches concern music, more precisely the nature of creativity in music. They were conducted in Hungary with people in diverse walks of life (see Appendix). Yet, despite the limitation of the experiments to music and to Hungary, the conclusions encourage broader generalizations. There does not appear to be anything unique

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about music as a sphere of human activity that would warrant the assumption that a type of creativity which appears there would be entirely lacking elsewhere, nor is there anything so unique about people in Hungary that abilities discovered in them would turn out to be missing in others. The general conclusions derived from the findings are clearly speculative and hypothetical, but they are not without warrant and justification. Furthermore, they are highly suggestive of certain ills which beset modern people and societies everywhere, and thus they merit further testing and reflection.

The principal import of a general creative faculty in humans resides in the fact that the safeguarding and development of such a faculty would go a long way toward creating healthier, more satisfied, and developed human beings and better balanced societies. General human creative abilities seem to be warped and suppressed by life in modern societies; therewith a natural human endowment is thwarted. The creative abilities are there in potential but fail to evolve. This is a basic fault of modern social life and one that would not be impossible to rectify.

Rather than entering into detailed considerations of the ways and means of evolving the general creative ability of contemporary people—topics which must await another occasion—this paper will focus on the evidence concerning the existence of such ability. In the authors' experiments with musical faculties in Hungary a basic level of creativity has clearly emerged in all the test subjects. This level of creativity is termed the *generative* one. It is contrasted with *constructive* creativity. The latter corresponds by and large to artistic creativity as it has been treated in the literature. Generative creativity is the novel element of the theory; it is the creative element which appears in one form or another, whether latent or actualized, in every normal person.

As a preliminary definition, generative creativity may be said to consist of the ability to generate an indefinite number of different structures using different combinations of given elements. The concept is similar to that of Noam Chomsky in linguistics: in his view persons using language can generate an indefinite number of sentences using a delimited set of lexical elements and a finite number of grammatical rules. Just as every normal language user is able to create sentences which have never been used precisely in the same way in the same context (taking into account inferred meanings, intonation, emphasis, and related ancillary factors), so every normal human being can create various objects (sounds, meanings, etc.) by using a limited set of elements according to given rules, but in novel ways.

These objects of creativity can be of various kinds; they are not limited to the medium of the socially acknowledged arts or even crafts.

It is convenient to classify them according to the kind of product or object that results, even if the term *object* is stretched to embrace mental and social artifacts in addition to material ones. Thus the objects of creativity can be subsumed in three general categories: the first is the sphere of material objectifications, such as shaping, carving, assembling, painting, and fashioning material objects in specific forms and sequences. The second is the sphere of social and communicational objectifications; here examples include education, the shaping of minds rather than of objects, and the creation of new social, economic, and political conditions and realities through policy definition or policy implementation. The third category is the sphere of intellectual objectifications, which results in “objects of the intellect” such as concepts, theories, and ideas.

It is evident that specifically “artistic” creativity can be exercised in all of these spheres although it has been traditionally exercised mainly in the first. The interest of the present theory lies in suggesting that *generative* creativity, on the other hand, is being exercised in all three spheres by normal, healthy people. The difference between an artistically talented person (not to mention a genius) and an ordinary one is not that the former is creative while the latter is not but that the talented individual has built upon and transcended his or her basic generative creativity and attained what we term the level of constructive creativity, while the average person remains at the generative level. People are creative on the whole, even if some are creative on a higher plane than others.

The distinction between generative and constructive creativity can be best observed in fields where also the latter is present, such as the arts. The authors’ investigations of the musical creativity of average, “ordinary” people show quite clearly that musical generativity is present in all people and can be brought to the surface under controlled conditions using standard testing procedures (for details see the Appendix below). It is sufficient to note here that there are definite, clearly identifiable boundaries separating the two types of creativity. The general variety is, as may be expected, more limited in a number of ways, but it is not any the less creative.

Two basic limitations can be distinguished. The first is *the limit imposed by the “magic number seven” (plus or minus two)* described by Wundt and G. A. Miller in their now classical works. This limitation is due to the fact that generative creativity is spontaneous, unplanned, and unrecorded; it relies on perception and memory without special-purpose symbolic mnemonic and constructive devices. It is not accidental that generative folk art in all its variations “respects” this limit. Folk music consists of five (at the most seven) different tones and its average

length is four lines with twelve notes per line, or forty-eight notes in all. The same applies to other artistic media as well. Propp's functional system of folk tales as well as popular arts and crafts, painting and decorating all fall within this limit. All such objectifications use four, five or at the most six principal colors, and have about this many main incidents and characters in a plot. (Naturally, if the elements or motifs are organized into closed sets, the magic number seven applies to the sets themselves: the individual elements can then number approximately seven times seven, or forty-nine in all.) These factors indicate a sharp differentiation between popular and "high" art. These are the limits of the creativity which apply to all normal persons in their spontaneous creative activities. By contrast, contemporary "art" music evolved a twelve-tone system and its formal elements became complex; for example, the sonata form includes melodies as elements within an element (the exposition). Also literature, the novel, the epic poem, and other art forms exceed by far the functional complexity of folk tales. Yet, in daily life the average person can keep in mind only about seven different objects, syllables, or drum beats at a time. Folk art being spontaneous and unrecorded moves within this limit, whereas "high" art uses complex construction devices to transcend it. The factor of complexity does not, of course, determine uniquely the artistic value of the work although a larger degree of complexity also gives a higher degree of freedom for artistic expression.

*The second basic limitation consists of the principle of binary opposition.* The sphere of validity of this principle is wide; numerous psychological experiments testify to its applicability. The principle also figures among the linguistic rules discussed by Chomsky. On the first level of linguistic generativity sentences can be divided into two parts, the subjective and the predicative. In music there is a binary system at the basis of all further developments. Several musicologists (including Lesseler, Yasser, Blaukopf, and Lendvai) suggest that the so-called functional system, which brings about the variation of the tonic-dominant-subdominant cadences and is typical of modern European music, was preceded by a bi-functional or binary system, which comes to the fore in the logic of melodic construction and occasionally in certain harmonic constructions.<sup>1</sup>

The higher-level system appears in full-fledged form only in contemporary art music. This is all the more significant as it corresponds to the basic structure of formal thinking as analyzed by Jean Piaget. There is a clear parallel between formal thinking on the one hand and contemporary European polyphonic music on the other. In both cases we are leaving behind the limits of generative creativity as it appears in everyday life and in folklore.

It is important to emphasize that in generative creativity a limited number of variations are produced using a limited number of elements according to a limited set of rules. The “objectifications” produced in this way are necessarily constrained by these limits, although the creative process is free to emphasize one or another of the elements. Constructive creativity transcends the above limits reaching a much higher degree of complexity in the use of the elements, rules, and variations of its medium. This conclusion applies to music as well as to literature, the fine arts, and the corresponding folkloric and popular media.

Works that result from constructive (i.e., artistic) creativity are planned (composed, created); they cannot simply be improvised. They must be recorded by means of symbols, permitting the artist to insert groups of elements already highly structured and to modify and vary the elements already included. Such works achieve a level of finality; their elements can no longer be freely exchanged or varied. Of course, some degree of variation is possible in regard to certain elements in almost every work of art; only the ratio of the variable to the fixed elements has changed radically. In folk art entire sequences can be constructed from variations leading to the creation of essentially new works, while such variability is not permissible in the case of high art. This distinction between high art and folk art is clearly evident in the contrast between the care with which the artist’s intentions are reconstructed by musicologists and other art experts in order to penetrate the real, and fixed, “meaning” of the work (even if doing so involves, in the views of some estheticians, committing the “intentional fallacy”) and the spontaneity with which folk music and other spontaneous expressions of popular art are treated by their practitioners, the normal people for whom such objects are vehicles of personal creativity. Furthermore, acts of generative creativity bring forth novelty and originality quasi accidentally without consciously setting out to create something new and original. Acts of constructive creativity, on the other hand, are frequently beset with problems due to the desire to create something original and even “revolutionary”—whether or not this comes about spontaneously.

Differences between these two levels of creativity can be traced to historical and social conditions; an analysis confined to the characteristics of the resulting art objects is insufficient in itself. Under certain conditions, such as those which obtain in modern society with its highly evolved division of labor and pronounced degree of specialization, constructive creativity emerges as a career niche prepared by long years of training and followed by a lifetime of highly specialized praxis. (That the constructively creative person is often unable to make a living

from the exercise of his or her vocation is another matter; typically this fact does not stop such persons from committing themselves to the exercise of their creativity to the fullest possible extent.) In less structured societies, such as those of earlier times, and also in "alternative living" communities, such as youth groups and communes, there are fewer career niches for the exercise of constructive creativity but more opportunities for engaging in generative creativity. This can explain the large volume of spontaneous musical, poetical, pictorial, and related output of these groups and societies.

It is clear that the differences between generative and constructive creativity are not merely psychological but are also historical and social, rooted in the concrete societal conditions in which individuals live their lives. Generative creativity as a faculty appears to be the unalienable possession of all people as human beings; constructive creativity, on the other hand, is the result of the historical development of culture. In modern societies its exercise is concentrated in certain individuals, although its basic elements could be evolved by everyone.

There is a real correspondence between the development of individual personality and the development of society. In every person, generative creativity surfaces in childhood as a natural developmental phase. In the same way, in so-called primitive societies (and in the alternative lifestyle communities of modern society) generative creativity seems to be a generic endowment, shared by most (and possibly all) members. In highly evolved, technoindustrial societies, on the other hand, generativity appears to be suppressed or restrained; daily existence is characterized by a division of labor that allows each individual only a small share in meaningful activity, and the overall commercialization of life discourages spontaneous acts of creativity.

In these societies there are special career niches for talented individuals to enable them (often at considerable personal sacrifice) to exercise the specific form of creativity which we call constructive.

The dilemma of average modern people is evident: they either participate in the social and cultural structure of society, in which case they risk losing the development of the generative faculty, or decide to develop this faculty at the cost of isolation or separation from the dominant societal pattern, living in relative isolation or joining an alternative lifestyle community. The dilemma is not conscious for the majority of people who are not even aware that they possessed a generative faculty in their childhood and have let it atrophy in the "rat race" of daily existence. But just what is gained or lost in this context?

Here, perhaps the concepts of personal autonomy and socialization can clarify the situation. From the viewpoint of the development of personality, generative creativity constitutes a primary level of au-

tonomy in the socialization process, whereas constructive creativity constitutes a secondary, higher level. Constructive creativity can evolve in adolescence (under favorable social and cultural conditions); it is a manifestation of the overall development of personality toward higher autonomy and the secondary level of socialization. Constructive creativity is not merely a final result or outcome of the individual's growth process; it is also one of the pillars upon which full individual autonomy and a high level of socialization can be built and supported.

The level of creativity achieved by an individual is a determining factor of his or her personality. A person that is generatively creative is different from one that is constructively creative. These two forms of personality are not opposites, but they represent different stages of personality development. Normally, constructive creativity constitutes a further development of the faculties which appear in childhood in the form of generative creativity. If professional artists—or professionally creative persons—suppress or distort their spontaneous, generative creative faculties, they lose the element of spontaneity and the natural creative drive which characterize truly creative persons. This can render sterile, mechanical, or technical the creative activity even of highly trained artists, poets, and musicians.

Modern human beings generally have suppressed their basic and universal generative creativity in exchange for the supposed benefits of modern existence. Such a trade-off, however, is not necessary. A higher level of creativity, and therewith a higher development of the personality, is not only compatible with modern society but also would be humanly and socially beneficial. Even in modern industrial society normal adults are likely to remain endowed with the potential for the essential element in human creativity, such as *generative* creativity, which does not call for specialization and training. The actual exercise of such creativity in contemporary society would overcome many of the ills associated with the perceived meaninglessness of life and the poverty of everyday routine existence. Acts of genuine generative creativity create *wholes* and not just *parts* and provide satisfactions typically associated with such activity. As the authors' experiments demonstrate, the average person is fully capable of creating artistic products, at least in music, and by the same token in other media; there is no reason why the musical faculty should be in any sense more privileged by nature than other creative faculties. Even if such products move within strictly defined limits, they have all the elements which make for genuine artistic creations: wholeness, variety, expression, and so forth. A person capable of such acts of creativity is a healthier, more fulfilled human being; moreover, he or she is capable of evolving to higher levels of creativity, attaining the level of genuine art.

It is not necessary that every individual should develop creative faculties on a level with Beethoven or Rembrandt; the role of the truly discriminating listener or perceiver can also provide high levels of satisfaction. It should be a basic task of education in contemporary society to nurture the generative, universally human creativity that is present in every normal child but is suppressed in the human "robots" created by modern industrial society. To nurture this faculty it is necessary first of all to be aware of it, and to know its nature and its limits. It is to this task that this study, and the experiments with musical generative creativity upon which it is based, have hoped to contribute.<sup>2</sup>

#### APPENDIX

The following condensed outline gives a brief overview of the technical elements of the experiments on musical generative abilities for the interested reader.

The experiments were designed to grasp the nature of musical creativity in the average person. In addition to the usual methods applied in research in the sociology and psychology of music (which are normally limited to the processes of musical perception and memory), the subjects of the experiments were assigned tasks which would reveal their musical creative abilities. In order to examine their capacity to compose melodies, stimuli were provided by giving the subjects three poems, or parts of three poems, by well-known Hungarian poets.

The first text consisted of the first two sections of a four-line poem, with eight syllables in each line, by Sándor Petőfi. The text had a pattern resembling a Hungarian folk song. The second text was the first eight lines of a poem by Endre Ady, with a 9-8-9-8-9-8 structure, and the third consisted of eight lines of a poem by Attila József with a 6+2-line structure with 10-10-10-9-11-10/10 syllables. As a result the texts were arranged as twice 32, 68 and 50+20 elements (i.e., syllables) structured in accordance with the requirements of their style. The subjects were given the texts one after the other but easier musical tasks were interspersed. They were asked to "sing" the texts. This was so unexpected that, after the initial surprise, almost all subjects complied with the request as if it were entirely natural.

The same reaction was obtained in the experiment designed to reveal the subjects' abilities to improvise music. Seven different cadences were played for them on the piano, beginning with I-IV-V-I to more complicated versions in the manner of Béla Bartók. Each cadence was played several times, one after the other, in order to familiarize the subjects. The subjects were told to consider the piano as an accompaniment to whatever melodies they wished to construct and to sing their melodies to the piano accompaniment.

As a last task of improvisation, meant to test the sense of harmony of the subjects, they were asked to complete a part of a Mozart melody in a major key from *The Magic Flute*, together with a part from Bartók's *The Wooden Prince* and an acoustically melodic section from Bartók's *Bluebeard's Castle*, making use of an improvised melody of similar duration.

The experiments began with a group of twenty college students and continued in turn with various groups of diverse ages and professions. Following standard psychological testing procedures, each group consisted of twenty



subjects and was internally homogeneous. Of the test groups seven were laypersons as regards music, and the remaining three consisted of people trained in music. The latter were used as the control group. Some 220 recordings were made in all, containing 3,080 melodies of the dimensions of Hungarian folk songs.

The Petőfi poem was set to music by 198 subjects, the Ady poem by 132, and the poem by József by 117. Thus, almost all test subjects produced some variety of improvisations to Petőfi's poem of four lines with eight syllables each, while the score was somewhat lower for the other texts.

An examination of the structure of the melodic improvisations provides some insight into the correlations between music and poetry, and it also sheds light on cultural orientations, allowing a comparison of the world pictures projected by the poems and those entertained by the subjects themselves. It is significant that most of the subjects composed strophic melodies to the Petőfi poem: forty-three of them persisted with the pattern (repeating the melody in the second strophe either identically with the first or with but a slight modification) while forty-seven subjects tried this pattern but did not succeed. Another thirty subjects viewed the two poems as four long lines and sang one musical line to each two lines of the poem. The rest made only attempts to achieve a strophic pattern but experienced difficulties in melodic construction. Only the cadences revealed the nature of these attempts. Endeavors to achieve strophic patterns were indicated also by the fact that 30 percent of the subjects made use of four different musical lines (i.e., two times four lines) and 52 percent used 3-4-5 different musical lines (i.e., attempted to produce repetitive strophes despite the obvious difficulties). The share of subjects that used 6-7-8 or 1-line repetitive melodies remained below 20 percent in all.

The subjects found Ady's lines difficult to approach; not more than 132 of them could "sing" them while the rest appeared not to understand the meaning of the text and could not compose melodies to it. The excerpt consisted of eight lines of 9-8-9-8-9-8 syllables; this was recognized only by forty-four subjects who managed to produce eight-line forms. Sixty-three subjects regarded it as a 2×4-line pattern and twenty viewed it as a 4×2 structure. It is important to recall that the number of elements in the eight-line strophe goes beyond the limit of seven times seven, that is, it transcends the pattern that can ordinarily be grasped at one time.

Of the improvisations to the Attila József poem, 70 (of the 117) failed to display any kind of structure. Thirty-two subjects sang 2×4 strophes, and fifteen sang 4×2 strophes—whereas the pattern of the excerpt consists of 6+2 lines with 10-9-11 syllables.

It appears from the experiments that the morphological ideal of the test subjects is the four-line eight-syllable song form; this is the form they could best understand and master. Those capable of repeating the first section did so while others, with lesser musical abilities, made an attempt at it. When the subjects encountered more complicated forms they still approached them with this morphological ideal, yielding imperfect or inadequate results.

Petőfi's lines give a clue to the ideal form in the minds of the subjects. This is (in terms of the most frequently employed patterns) ABCD: ||, AAAB: ||, ABAC: ||, ABBA: ||, AABC: ||, and ABAB: ||. These patterns recur in attempts with a strophic orientation although these cannot be constructed along such symmetrical lines. In these cases, too, the most frequent patterns were ABCD and other similar ones such as AAAB, AABC, and ABBC.

## NOTES

1. The binary system constitutes a real and basic factor that goes beyond the specific features of modern European music. It is at the root of the trifunctional cadence logic that appears in modern art music on several levels. On the elementary level only the three elements appear in diverse variations always represented by the same chords. This level is also reached by music resulting from generative creativity (e.g., in polyphonic folk music, gypsy music, jazz, hit songs, etc.). In European art music the three functional system is much more complex; it consists (in addition to the basic functions) of principal and secondary degrees, polar oppositions, and contrasts among several sequences of chords. This higher-level system employs multiple contrasts and oppositions instead of simple ones. The higher level of contrasts is illustrated by the quadratic group (group of four elements) described by Klein. This is a mathematical structure in which each quantity ( $x$ ) appears together with its negation ( $-x$ ), with its inverse ( $1/x$ ), and with the negative of its inverse ( $-1/x$ ). In music the modern tonic-functional system constitutes an incomplete example of this quadratic structure. Here each tone (e.g., the tonic) has two kinds of "negation," the dominant and the subdominant. In contemporary music the two kinds of negations also appear in a unified form, as shown in Schönberg's "theory of regions" and Lendvai's analysis of Bartók's work (Lendvai calls this the "polar opposition" of the tonic, e.g., if C is the tonic, the polar opposition is F-sharp).

2. The above experiments are contained in the full-length study by one of the authors, Mária Sági, "A zenei generatív készségek kísérleti vizsgálata" (*The Experimental Investigation of Musical Generative Abilities*) originally published by the Institute for Culture, Budapest, 1979; revised edition to be published by the publishing house of the Hungarian Academy of Sciences (currently in preparation).