

## Chapter 2

# Perspectives on Creativity in General and while Music is being Listened to and Composed

## 2.1 Perspectives on Creativity in General

### 2.1.1 Cognition and Creativity

Research in cognition can be described as the attempt to capture the functionality of 'homo sapiens'<sup>1</sup> intelligence, particularly in defining mental models, which are founded on basic mental processes underlying human thinking and behavior, such as attention (Shaffer, 1975; Allport, 1980), memory (Atkinson/Shiffrin, 1968; Baddeley, 2003), language (e.g. Chomsky, 1965; Fauconnier/Turner, 2003, learning (e.g. Piaget see 1.4.1 on page 58) , or problem solving (Newell/Simon, 1972; Mayer, 1992). Research in creativity also tries to discover the functionality of certain intelligent processes, such as the emergence of new and unexpected ideas in humans (see in this regard Boden, 1994).

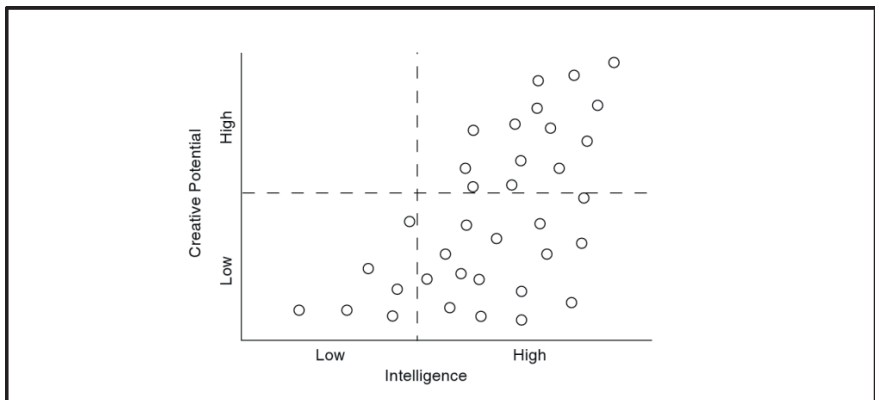
This field has shown an intuitive connection between cognition and creativity, from which scientists start to look at creativity in human cognition by using methods and knowledge from existing cognitive theories, and study it empirically (see Smith/Ward/Finke, 1995). RUNCO (2007), p.2 thus proposes that “[...] bridges [exist] between cognitive processes (e.g. attention, perception, memory, information processing) and creative problem solving, as well as connections with intelligence, problem solving, language, and other indications of individual differences. The basic processes are generally *nomothetic*, meaning that they represent universals. These are things shared by all humans. Individual differences represent the dimensions along people differ. There are both cognitive universals and cognitive individual differences in creativity.”

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<sup>1</sup> The precise meaning of this denomination is: 'a particularly wise man'.

This section presents an overview of various prominent theories which are related to creative cognition, in order to get more insight on individual differences of creative behaviors and their relations to cognitive processes.

A persistently controversial debate in creative cognition focused on the question if creativity potential is related to humans intelligence (measured in IQ-tests). Early indications for such a relationship came from SPEARMAN's conception (1927) of 'g', which means general ability (the foundation for IQ). In SPEARMAN's conception, the coping of creative tasks – *inkblot test*, *free completion test*, *unfinished pictures*, *unfinished stories* (see in this regard Spearman, 1927, p.187) – requires a high degree of 'g'. Such a relationship has recently partially been confirmed. However, as certain researchers, such as GARDNER (1993b), define creativity as essential to act intelligently on a high level, other studies have found poor relations between intelligence and creative potential (e.g. Getzels/Jackson, 1958; Torrance, 1975; Furnham/Chamorro-Premuzic, 2006; Furnham/Bachtiar, 2008). Indeed, a highly intellect person is not necessarily creative.



**Fig. 2.1** “Scatterplot showing that creative potential is more likely to be high with high intelligence.” (Runco, 2007, p. 7)

However, as seen in Figure 2.1, “[...] no one with extremely low IQ does highly creative work (low variation, high correlation), but above a moderate level of IQ some individuals are creative but others are not (high variation, low correlation). This allows for the possibility that at the highest level of IQ, creativity is very difficult or even impossible (low variability, high correlation).” (Runco, 2007, p.8)

WALLACH and KOGAN (1965) contributed an additional perspective to this debate. Based on their study concerning children's divergent thinking<sup>2</sup> abilities, they propose that the intelligence quotient and convergent thinking – which are necessarily related – are independent from divergent (original) thinking. In a later study concerning college students, WALLACH and WING (1969) extended this view, and found that extracurricular activities and accomplishments allow a 'predictive validity' on the output of divergent thinking tests, and therefore, divergent thinking capabilities "[...] were moderately correlated with (i.e., predictive of) the extracurricular activities and achievements of the students, whereas the measures of more traditional intelligence were not. This conclusion has been replicated many times (Kogan & Pankove 1974; Milgram 1978; Runco 1986). It does apply to some domains of accomplishment more than others, but that is as it should be, given domain differences in creativity (Albert 1980; Gardner 1983; Plucker 1998; Runco 1987). This difference is extremely important. It implies that creative thinking, as estimated from tests of divergent thinking, is more important in the natural environment than are tests of the IQ or academic tests." (Runco, 2007, pp.4-5)

Another relation between creativity and cognition is possible, if one evaluates the 'original output' created through analogical thinking, such as RUTHERFORD's atom model, KÉLKULÉ's benzene model, or the more 'ordinary' analogies, produced while/after listening to music (see 2.4 on page 140). The common process acting behind these models can be simplified as information (e.g. concepts) which has been constructed in a certain other context, and which is transferred (used) in a current context showing similarities (Weisberg, 1995; Welling, 2007). In this way, it is a kind of common sense that "[...] on a general level, analogy is at the very basis of any human cognitive activities, from the more automatic, (those that operate implicitly without the person even being aware of it), all the way to very elaborate and explicit forms that are active in scientific research, logical thinking, etc." (Deliège, 2006, p.64)

To define and compare such processes, WELLING (2007) specifies four mental operations from existing theories of creativity: *application*, *analogy*, *combination*, and *abstraction*, which are more or less related with a high degree of creative output. He concludes that "[...] so-called high creativity is more readily associated with combination and abstraction operations, while everyday creativity is derived primarily from application and analogy operations. Some contradictory findings might be explained by the fact that high creativity is often not the result of a single operation but results from a longer period in which several operations are put to use during the discovery process." (Welling, 2007, p.22)

Another important fact about creative thinking is concerned with people's abilities to solve problems. There are many different kinds of problems (see Wakefield,

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<sup>2</sup> The distinction between convergent thinking and divergent thinking was first proposed by J. P. Guilford (1950).

1992), such as coping with a situation, reaching a goal, or solving a test, as is often practiced in schools. This suggests solving strategies depend on how 'well-defined or ill-defined' is the problem itself (see Mumford et al., 1993; Schraw/Dunkle/Bendixen, 1995). In terms of 'ill-defined' problems, an individual's ability in problem definition is in itself an important component of creative problem solving (Csikszentmihalyi/Getzels, 1971; Getzels, 1975; Getzels/Smilansky, 1983; Wertheimer, 1945). For example, WERTHEIMER (1945), p.123 proposes that "[...] thinking is not just solving an actual problem but discovering, envisaging, going into deep questions. Often in great discoveries the most important thing is that a certain question is found. Envisaging, putting the productive question is often a more important, often a greater achievement than the solution of a set question."

In addition, it seems problem formulation and problem solving concern different domains of creativity:

"A large body of research now indicates that individual differences exist, with some persons exceptionally capable at identifying or defining problems, but perhaps not as good at solving problems. Other people may be very good at solving problems, but the problems need to be given to them in a very unambiguous fashion." (Runco, 2007, p.16)

A more structured insight on the creative process, such as problem finding, is possible on the basis of the four-stage perspective of WALLAS (1926), who defines an ensemble of stages, called *preparation*, *incubation*, *illumination*, and *verification*, through which the creative process evolves.

As Wallas (1926), a wide range of researchers (Ypma, 1970; Mansfield/Busse, 1981; Hayes, 1985) believe that *preparation* is an important condition for creative processes. This involves problem identification and problem definition, where preparatory work explores the problem's dimensions. But, to be able to explore relevant knowledge, the creative person "[...] often carried out over long periods of time, to acquire knowledge and skills relevant to the creative act. Hayes (1985) has provided strong evidence that even the most talented composers and painters, e.g. Mozart and Van Gogh, required years of preparation before they began to produce the work for which they are famous." (Hayes/Mellon, 1990, no page numbers) The stage of *incubation* points at unconscious thinking or processing of information about the problem. These unconscious processes of creative cognition are studied in various perspectives, such as the associative thinking (e.g. Mednick/Mednick/Mednick, 1964; Guilford, 1979), concerning intuition (Bowers et al., 1990; Hasenfus/Martindale/Birnbaum, 1983), or blind variation (Campbell, 1960), and try to explain the progression towards the solution to a problem, even if it is not consciously thought out. *Illumination* can be described as a sudden insight, and leads to a 'eureka' experience (see Gruber, 1988).

"Very importantly, most often insights are singular. We may have a problem, and one solution pops into our heads, like bulb being turned on. In that light (another pun!), insightful

thinking is unlike divergent thinking, where various ideas are generated. Insight leads to one solution.” (Runco, 2007, p.20)

But on the other side, WEISBERG (1986), p.50 suggests “[...] there seems very little reason to believe that solutions to novel problems come about in leaps of insight. At every step of the way, the process involves a small movement away from what is known.” In a similar direction, SCHILLING (2005), p.134 proposes that the “[...] process of insight incorporate[s] unexpected connections within or across representations as one of the underlying mechanisms: (a) completing a schema, (b) reorganizing visual information, (c) overcoming a mental block, (d) finding a problem analog, and (e) random recombination.”

Incidentally, to see insight as a kind of restructuring also points to perceptual processes, which probably also play an important role in creative processes. Regarding ‘reorganizing visual information’ or reorganized auditory grouping and segregation processes (see 1.3.1 on page 47), “[...] Shepard clearly viewed that mechanisms of perceptual organization that involve spatial relationships in particular as a powerful source of general knowledge about relationships that can be analogically applied to invention and problem solving.” (Flowers/Garbin, 1989, p.152)

“The creative productions of a brain presumably stem from whatever intuitive wisdom, whatever deep organizing principles have been built into that brain as a result of the immense evolutionary journey that has issued in the formation of that brain. If the arguments sketched out in this chapter have any merit, the most basic and powerful innate intuitions and principles underlying verbal and nonverbal thought, alike, may well be those governing the relations, projections, symmetries, and transformations of objects in space.” (Shepard, 1981, p.339)

The final stage *verification* “[...] allows the creative individual to test and tinker. With creativity requiring both originality *and* effectiveness, verification is probably vitally important. It may be that problems are made the most effective during some sort of verification. The more recent applications of this stage model have included recursion, the idea being that the individual may revisit early stages and cycle through the process as much as needed. It is not a strictly linear affair.” (Runco, 2007, p.19)

Besides theories explaining creative thinking in a kind of step-by-step movement, some recent theories (Amabile, 1990; Mumford et al., 1991; Runco/Chand, 1995; Sternberg/Lubert, 1996; Finke, 1997; Mumford et al., 1997b) define creativity as a process of component mechanisms interact together, without the requirement of a linear progression. RUNCO and CHAND (1995) for example, “[...] presented a two-tiered componential model of the creative process. This differs from the model of Wallas primarily in including a second tier which recognizes the influence of knowledge and information, both procedural and factual, and the

influence of motivation, both intrinsic and extrinsic.” (Kozbelt/Beghetto/Runco, 2010, p.31)

### ***2.1.2 Developmental and Social Influences on Creativity***

As we have seen in the previous section (see 2.1.1 on page 88), creative output depends on various cognitive factors, which interact in a multifaceted process. Moreover, it seems plausible that creative output is also influenced by individuals’ development in a given culture.

First of all, a large number of researchers propose that creativity research and developmental psychology share many concepts and theoretical frameworks. Obviously, a persistent prominent conception in developmental psychology is that individuals’ development proceeds in a sort of stages or phases (see 1.4.1 on page 58 – 1.4.2 on page 64). As explained above (see 2.1.1 on page 88), creative processes are also partly explained in a kind of passage through stages. However:

“In developmental theory, the stages proceed over childhood, with each stage lasting several years; in creativity theory, the stages culminate in the production of a single creative work or creative thought. Thus, the latter stages were markedly shorter, lasting only a few months or even, in some cases, a few days.” (Sawyer, 2003, p.16)

Nevertheless, SAWYER (2003) points out about PIAGET’s stage theory of development (see in this regard 1.4.1 on page 58) “[...] that Piaget’s constructivist theory of development was fundamentally a theory of creativity. [...] I discovered that Piaget (1971a) himself had noted these parallels: “The real problem is how to explain novelties. I think that novelties, i.e., creations, constantly intervene in development” (p.192).” (Sawyer, 2003, pp.12-13), hence “[...] the crux of my problem [...] is to try and explain how novelties are possible and how they are formed.” (Piaget, 1971a, p.194) FELDMAN (1974) argued, there are parallels between PIAGET’s stage-to-stage transitions and creative insight (see 2.1.1 on page 88). Because both are issues of novelty, and furthermore, the creative insight – “aha” experience – emerges from the unconscious incubation. As PIAGET already noted (see above), also the transition to a new stage<sup>3</sup> is hardly to explain.

“Some developmentalists have proposed that there is something like an incubation period between developmental stages, because it takes time for individuals “to appropriate the complex knowledge that they co-construct during social interaction” (Azmitia, 1998, p. 240). Complex ideas must ferment or percolate in our unconscious until they fully develop and begin to influence cognitive performance.” (Sawyer, 2003, p.43)

<sup>3</sup> “If there are novelties. Then, of course, there are stages. If there are no novelties, then the concept of stages is artificial.” (Piaget, 1971a, p.194)

A most obvious relationship between concepts of creativity research and development psychology is that “[...] development is an active process in which the child *transforms* sense impressions and information from the external world. Transformationist theories view development as a creative process. Almost all twentieth-century theories of development, including behaviorism, psychoanalysis, and socioculturalism, accept some form of transformationist view (Lawrence & Valsiner, 1993), yet this perspective attained its most sophisticated expression in the constructivism of Jean Piaget.” (Sawyer, 2003, p.32)

Another perspective, which relates individuals’ development with creative output, based on KOHLBERG’s (1987) theory of development and changes in conventional behavior. Because a distinction between conventional and unconventional behavior is useful to define creative output (e.g. Rosenblatt/Winner, 1988), and furthermore individuals’ development in a given culture (see in this regard 1.4.2 on page 64).

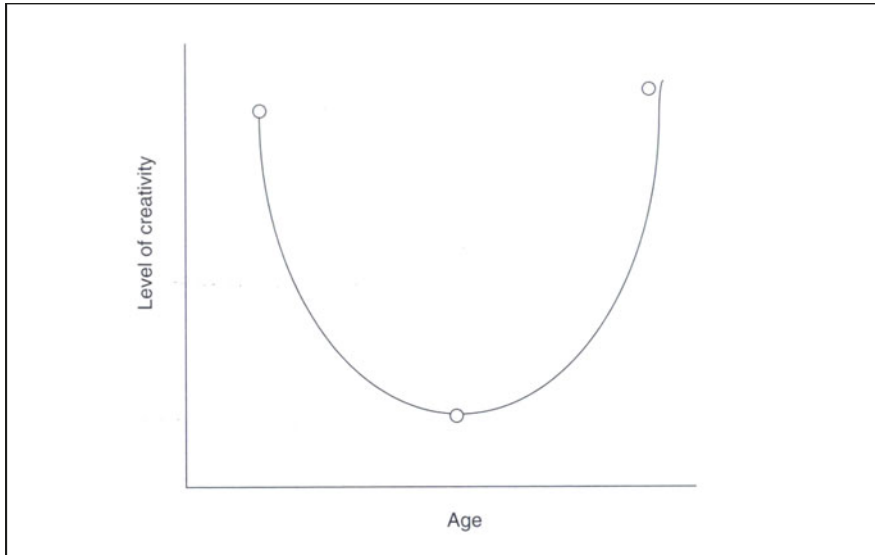
“Conventions define culture. They also direct thinking toward normative behavior, which means that they constrain thinking and can easily inhibit creativity. Conventions are, after all, indicative of something about which there is a consensus; creativity, on the other hand, requires originality, self-expression (not group expression), and unconventional thought and action.” (Runco, 2007, p.41)

KOHLBERG’s conception organized the development leading from the child to the adult in three phases of moral reasoning: pre-conventional, conventional, post-conventional. Research in creativity has bought this perspective, and as schematically seen in Figure 2.2, there are indicators for “[...] a U-shaped development that begins with a period of high creativity in early childhood (marked by play and freedom from conformity), is followed by a slump in the middle years, and then reemerges in a more sophisticated form of creativity in one’s adulthood (Albert, 1996; Keegan, 1996; Runco & Charles, 1997). Although there is no consensus as to the exact age that a slump occurs, it seems to be prominent either at the start of school or between the ages of 9 and 12 and there are disagreements as to whether creativity is different in degree or in kind once it reemerges in adulthood (cf. Albert, 1996; Keegan, 1996).” (Hickey, 2002, p.400)

Concerning social factors, which may fulfill children’s creative potential during the childhood, RUNCO (2007) suggests a useful perspective, in which *adaptation*, *adversity*, and *family depended variables/factors* are decisive ‘external’ influences on creativity during childhood.

*Adaptation* plays an important role in DARWIN’s theory (1964), and in PIAGET’s stage-theory of cognitive development. The latter conceptualizes adaptation as a process, which takes place in terms of assimilation and accommodation (see 1.4.1 on page 58).

“The first of these can help us to understand the cognitive transformations that sometimes lead to creative ideas (Guilford 1968; Runco 1996d). The latter can explain the sudden



**Fig. 2.2** “U-shaped developmental trajectory” (Runco, 2007, p.43)

insight that characterize many creative “aha” moments (Gruber 1981b). Neither assimilation nor accommodation is considered, however, unless the individual feels the need for adaptation. In Piaget’s own terms, adaptation occurs only when the individual experiences a kind of disequilibrium. This may occur when the person does not understand some experience or information (understanding is not in equilibrium with the information), or in the case of adversity.” (Runco, 2007, p.44)

*Adversity* is often considered as a strong motivation for creative efforts to change certain circumstances. Therefore, various investigations (Goetzal/Goetzal, 1962; Goetzal et al., 2004; MacKinnon, 1983 (1960); Albert, 1978) have studied adversity and its impact on creative output. For example, in the very prominent study of GOETZEL and GOETZEL 1962; 2004 autobiographical data of 400 eminent persons were analyzed, with the conclusion that most of them had “[...] in their childhood experienced trauma, deprivations, frustrations, and conflicts of the kind commonly thought to predispose one to mental illness or delinquency.” (Goetzal/Goetzal, 1962, p. xii) Moreover, “[...] only fifty-eight can be said to have experienced what is the stereotyped picture of the supportive, warm, relatively untroubled home [...]. The comfortable and contented do not ordinary become creative.” (Goetzal/Goetzal, 1962, p.132) ALBERT (1978) extended this perspective after studying gifted children, who lost their parents early, because he concludes that parental loss can be seen as a particular form of adversity. Finally, MACKINNON 1983 (1960) observed that some of his highly creative subjects “[...] endured the



most brutal treatment at the hands of sadistic fathers.” (MacKinnon, 1983 (1960), p.375)

RUNCO (2007) sees a strong relation between strong creative motivation, caused by adversity, and PIAGET’s concept of dis-equilibration, PIAGET “[...] tied adaption to *intrinsic motivation*. Given his biological training and perspective, it is likely that he felt there was a genetic basis for the motivation to adapt. Regardless of the nature and nurture, the assumption is that humans do not like to feel dis-equilibrium and are motivated to avoid it by adapting. Often these adaptations are creative (Cohen 1989; Runco 1994d). Piaget’s tying adaptation to intrinsic motivation is significant because it helps us to understand why so many others have found intrinsic motivation to be necessary for creative work [...].”(Runco, 2007, p.49)<sup>4</sup>

*Family* is one of the most influential factors for individuals’ development during childhood, because the characters of family members, and the structure and processes within family life have a tremendous impact on the development of children’s creative potential.

“Whatever levels of [creative] potential are present in a child, the direction in which they are developed (towards convergence or divergence), will be [...] guided by the kinds of interactions the children have with their parents.” (Cropley, 1967, p.62)

There is a controversial debate about the relationship between family size, birth order and creativity potential/output (see Kaufman/Sternberg, 2005). Most studies (Csikszentmihalyi, 1965; Jarial, 1979; Dave, 1980; Runco/Bahleda, 1987; Feldman/Goldsmith, 1991); (see in this regard Goetzel/Goetzel, 1962) found indications that birth order validity predicts the creative potential of individuals. For example, in a study of 200 students, JARIAL (1979) noted that the firstborn children have more verbal creativity than children who were born later. RUNCO and BAHLEDA (1987) have measured higher skills in divergent thinking in eldest, followed by the youngest, and lastly middle children. CSIKSZENTMIHALYI (1965), p.87 suggests “[...] that the most original artists were more likely to be first-borns.” And FELDMAN (1991) proposes that prodigies are more commonly first-borns. However, there are also investigations (Cicirelli, 1967; Datta, 1968; Albaum, 1977; Wilks/Thompson, 1979), which found no significant differences in creativity between firstborns and later-borns. SAWYER (2012) refers to studies which found no relations.

“Sulloway (1996) argued that firstborns are less likely to be innovative revolutionary scientists, because firstborns identify more with their parents and with authority, and are more invested in the status quo. There’s some evidence that whereas firstborns are more likely to become famous scientific creators, laterborns are more likely to become artistic creators (Clark & Rice, 1982). Simonton (1994, 1999a) likewise argued that creative geniuses were generally not firstborns; he thought that firstborns and only children tend

<sup>4</sup> For detailed information about motivation and creativity see 2.1.3 on page 96.

to make good leaders in time of crisis, but that middle-borns are better in safe, peaceful times, because they are better listeners and compromisers.” (Sawyer, 2012, p.68)

RUNCO and BAHLEDA (1987) have found indications for a relation between family size and creativity, because divergent thinking takes more place in families with numerous children. BEAR ET AL. (2005) studied sibling sex- and age differences in relation to family size, and observe that “[...] growing up with a large group of opposite-sex siblings or with a large group of siblings relatively close in age seems to positively affect the creativity of firstborns.” (Bear et al., 2005, p.75) Moreover they suggest that “[...] rather than focusing on the question of whether different birth order positions are associated with relatively high or low levels of creativity, future research should shift its attention to the sibling constellation variables that likely moderate the effects of birth order position on creativity.” (Bear et al., 2005, p.75)

Besides sibling influences, various other factors, such as family trees and history (see Kerr/Chopp, 1999), family climate and interaction (Kerr/Chopp, 1999), parents’ own creativity (Runco/Albert, 1986; Noble/Runco/Ozkaragoz, 1993), parents’ attitude toward education (Runco/Albert, 1985), socio-economic situation (Chaurasia, 1993; Kaur/Kharb, 1993), and peer status (Lau/Li, 1996) can also play a significant role in individuals’ creative development.

For example, CHAURASIA (1993) and KAUR (1993) observed correlation between creativity and a high socio-economic situation. However, “[...] creative individuals typically come from more difficult and stressful family environments.” (Kerr/Chopp, 1999, p.712). And RUNCO (2007) concludes from his earlier study<sup>5</sup> concerning relationships between children’s creativity and parental independence:

“Parental appreciation for the autonomy of their children is related to the actual independence of the children and to the creative and divergent thinking skills of the children. Parents who allow independence tend to have children who think creatively. The highly original children have parents who allow independence at an early age.” (Runco, 2007, p.52)

Similarly, but partly contrasted to RUNCO’s (2007) perspective (see 2.1.2 on page 91), SIMONTON (1999) proposes six developmental and social variables, that influence creative individuals during their life span. One notes that “[...] creative individuals tend not to be first-born, that they are intellectually precocious, that they suffer childhood trauma, that their families tend to be economically and socially marginal or both, that they receive special training early in life, and that they benefit from role models and mentors.” (Nakamura/Csikszentmihalyi, 2003, p.187)

Returning to KOHLBERG’s (1987) concept of post-conventional thinking (see 2.1.2 on page 91), and thus concerning developmental influences on creativity in adult-

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<sup>5</sup> (Runco/Albert, 1985)

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