

Problems of Development & Learning

Personality Development

7.1 Creativity, Intelligence, & Personality

Divergent thinking; creativity in women; hemispheric specialization opposing right brain to left as the source of intuition, metaphor, and imagery; the contribution of altered states of consciousness to creative thinking; an organismic interpretation of the relationship of creativity to personality and intelligence; new methods of analysis of biographical material and a new emphasis on psychohistory; the relationship of thought disorder to originality; the inheritance of intellectual and personal traits important to creativity; the enhancement of creativity by training; these have been the main themes emerging in research on creativity since the last major reviews of the field (Stein 1968; Dellas & Gaier 1970; Freeman, Butcher & Christie 1971; Gilchrist 1972).

Much indeed has happened in the field of creativity research since 1950, when J. P. Guilford in his parting address as president of the American Psychological Association pointed out that up to that time only 186 out of 121,000 centuries in Psychological Abstracts dealt with creative imagination. By 1956, when the first national research conference on creativity was organized by C. W. Taylor at the University of Utah (under the sponsorship of the National Science Foundation), this number had doubled. By 1962, when *Scientific Creativity* (compiled by C. W. Taylor and F. Barron) went to press with a summary of the first three biennial Utah-NSF conferences, approximately 400 references post-1940, mostly of an empirical research character, were found for citation. In 1965, the comprehensive bibliography of the Creative Education Foundation (Razik 1965), which includes articles and books outside the professional field of psychology, contained 4176 references, nearly 3000 of them dated later than 1950. This almost exponential increase has leveled off to a stream of approximately 250 new dissertations, articles, or books every year since 1970.

New journals attest to the vigor of this still growing field of study. The Journal of Creative Behavior, under the editorship of Angelo Biondi, has proved to be much more than a house organ of the Foundation for Creative Education, with whose sponsorship it was founded. Its listing of creativity-related dissertations and theses is an invaluable scholarly resource.

The Gifted Child Quarterly, both in its publication of research on the relationship of the various forms of giftedness to creativity in general and in its attentive book reviews, has kept a professional readership up to date on new developments in a socially important movement in education. Other new journals of general importance to the field are: Intelligence, Journal of Mental Imagery, The Psychocultural Review, and The Journal of Altered States of Consciousness. Several important publications emerged from conferences and symposia involving creativity during this period (Steiner 1965; Roslansky 1970; Taylor 1972; Stanley, Keating & Fox 1974; Keating 1976; Stanley, George & Solano 1977) along with a collection of pieces by investigators invited to take stock of the field 25 years after Guilford's 1950 APA address (Taylor & Getzels 1975).

Scholarship was also facilitated by the publication of two major reference works by Rothenberg & Greenberg – Creative Men and Women (1974) and The Index of Scientific Writings on Creativity: General, 1566-1974 (1976). Torrance's impressively lengthy cumulative bibliography on the Torrance Tests of Creativity and Thinking (1979) and an unpublished cumulative bibliography of research at the University of California's Institute of Personality Assessment and Research (IPAR) containing more than 600 references (and available from the Institute) are valuable guides to significant lines of research during the past 15 years.

In addition to the comprehensive reviews cited above and the many more specialized reviews noted later in this chapter, particularly useful surveys and analyses of the field include those by Chambers (1969), Bloomberg (1973), Taylor (1975), and Rothenberg & Hausman (1976).

7.2 The Varieties of "Creativity"

The term creativity stands in need of precise distinctions among the referents it has acquired. Commonly used definitions of creativity vary in several ways. First of all, some definitions require socially valuable products if the act or person is to be called creative, while others see creativity itself as being intrinsically valuable, so that nothing of demonstrable social value need be produced; dreams thus may be creative, or unexpressed thoughts or simply the imaginative expressiveness or

curiosity of a child. Definitions may vary also in terms of the level of accomplishment recognized as creative: difficulty of the problem seen or solved, e.g., or elegance or beauty of the product or the nature of the impact. A third kind of distinction is between creativity as achievement, creativity as ability, and creativity as disposition or attitude.

By way of illustration, let us take the two main categories of definition of a criterion of creativity actually used in large bodies of research:

- 1) creativity as socially recognized achievement in which there are novel products to which one can point as evidence, such as inventions, theories, buildings, published writings, paintings and sculptures and films; laws; institutions; medical and surgical treatments, and so on; and
- 2) creativity as an ability manifested by performance in critical trials, such as tests, contests, etc, in which one individual can be compared with another on a precisely defined scale. The first category may lead to a definition of a field of activity and its products as intrinsically creative: all inventors, e.g., or all artists or all poets. This has led to a certain amount of research in which practitioners of a creative activity are compared with people in general, leading to a portrait of *“the creative person”* in terms of intellectual and personality differences between the criterion group and the generality. But these intrinsically creative products may differ among themselves in qualities such as originality, elegance, impact, and far-reachingness,

Studies of individual differences as to creativity among members of such groups (architects, artists, mathematicians, and writers in the IPAR studies, for example) give a different picture of the components of creativity than do *“field vs the generality”* studies. A good example is measured intelligence. Creative architects do not score higher than comparison groups in architecture on standardized intelligence tests, but all architects studied scored an average of about two standard deviations higher than the general population (MacKinnon & Hall 1971).

What does one then conclude about the relationship of creativity to intelligence? Many such examples could be given, not just in relationship to intelligence but to personality, interests, values, life history. The point is that results will appear confusing and contradictory unless the implications of the adopted definition of creativity and the assumptions of the methods are kept clearly in mind. Creativity as an ability manifested by performance on tests is dogged by even more formidable difficulties. What kind of test is it? What abilities is it tapping? What

effect do different methods of scoring it (and different, usually Let us take divergent thinking (DT) tests as a prime example.

There is a certain uncriticalness of analysis embedded in DT tests and their scoring methods. High scores on the Consequences test, e.g., are considered evidence of divergent thinking, although in fact the criterion of high quality is remoteness, perhaps combined with cleverness and aptness. Remoteness implies a process of going a distance from the obvious, but does it rule out the process of thought by which one converges, sometimes by occasional divergence, on an idea or result? Divergent thinking in fact goes hand in glove with convergent thinking in every thought process that results in a new idea. The aha! comes when the process reaches a conclusion. But process is precisely what is invisible in the usual DT test used in creativity research. A problem is set, and a written answer is obtained. What happens in between is anybody's guess, except the respondent's, who hasn't been asked.

Short, closely timed tests in which a problem is set and a brief response is required are ideal for use in a battery of tests destined for factor analysis. Has this requirement, which deliberately excludes scrutiny and analysis of process, been more of a bane than a blessing to research on creativity? Has the distinction between convergent and divergent, though real enough in the life of thought, been a mischievous one? We have for this review surveyed hundreds of reports on DT tests and are left wondering.

The actual sampling of persons, using either criterion of creativity, may also confound the search for commonalities of "the creative person." Creative women may be quite different from creative men, e.g., and different too in each field of endeavor. Age and level of training must also enter the picture. While this review cites many studies which individually respect the distinctions noted here (ability vs achievement, sex of person, etc), we believe the field needs a comprehensive catalog of empirical studies and a set of conceptual categories and dimensions with which a meta-analysis of results in the entire domain of creativity could be conducted.

Though such an analysis was beyond the scope of this review, we urge its undertaking and refer colleagues to exemplary meta-analytic efforts in other domains (e.g. Block 1976, Smith & Glass 1977, Cooper 1979). Before turning to our review of 15 years' work, a few comments regarding our space-and self-imposed restrictions are in order. In general we have emphasized empirical rather than theoretical work and studies employing achievement-rather than ability-based

criteria. For some important topics we have only been able to recommend other reviews to the interested reader.

7.3 Creativity and Intelligence

Intelligence itself is a term with many meanings and referents. While an analysis of this construct is beyond the scope of this chapter (see Resnick 1976 and numerous articles in the new journal *Intelligence* for some current perspectives), we would like to note that creativity investigators have used the term “*intelligence*” variously to refer to:

- a) that which IQ tests measure;
- b) the entire multifactorial domain of human cognitive abilities (including such creativity-related components as DT abilities, problem-finding abilities, special talents such as musical and artistic abilities, and the ability to access primary process modes of thought by regressing in the service of the ego); and
- c) that which qualified observers (peers, teachers, etc) describe as “*intelligence*” on the basis of repeated observations of behavior in many situations. Our brief review of research of the past 15 years regarding creativity and intelligence will deal briefly with each of these perspectives.

7.4 Models of Intellect, Old and New

Though Guilford’s Structure-of-Intellect (SI) model has continued to dominate discussions of the relationship between intelligence and creativity, the SI model has been increasingly criticized on technical and conceptual grounds. (See Butcher 1973, Horn 1977, and Vernon 1979 for summaries and evaluations of such criticism). Critics object to the alleged subjectivity of the underlying rotational procedures, to Guilford’s insistence upon orthogonal rather than oblique factors, to some possible narrowness in the 120 (1) SI abilities, to the alleged psychological superficiality of the SI’s “product” category, and to the tendency of the model to suggest that the operations (cognition, memory, evaluation, convergent production, and divergent production) are mutually exclusive and isolatable.

Despite these criticisms, the SI model has spurred the development of interesting new tests [e.g. Lang & Ryba’s (1976) SI-inspired tests of auditory abilities which nicely discriminated musicians, artists, and controls] and provided a conceptual framework for many investigators. During this same period, Cattell continued to develop his alternative model of fluid and crystallized intelligence. In its radically

elaborated 1971 form, this appeared to involve about 500 sub-abilities (Cattell 1971, Butcher 1973).

A study by Rossman & Horn (1972) found modest positives between indices of creative achievement or reputation and a broad “*fluency*” factor, but insignificant and very smaller with “*fluid*” and “*crystallized*” intelligence factors. While Cattell’s model of intellect will surely receive much deserved attention, and while the thirteenth chapter (“*Genius and the processes of creative thought*”) of Cattell’s 1971 book is must reading for serious students of creativity, the links between Cattell’s model of intellect and achievement-based creativity are primarily speculative at this point.

The emergence of what one might term “*differential cognitive psychology*” in recent years also holds enormous potential for future research involving the cognitive underpinnings of creativity. This approach, which involves the simultaneous attempt to understand test performances and intellectual abilities in terms of underlying cognitive processes and the reciprocal effort to view cognitive processes in terms of potentially measurable sub skills and component abilities, may lead to a much needed blending of the process and ability approaches to the study of creativity.

Recent efforts by Carroll (1976), for example, to identify and characterize DT abilities in terms of underlying information processing components have obvious implications for creativity research. (See also the review by Stankov 1980, the effort by Mendelsohn 1976 to understand Remote Association Test (RAT) performance in terms of attention abilities, and the attempt by Sternberg 1977 to analyze analogical thinking skills into component abilities). In our view, differential cognitive psychology has the potential to deepen our understanding of creative processes and abilities quite substantially. For further introductions to this perspective, the reader is referred to Resnick (1976), to a series of articles appearing in the second volume of *Intelligence* (1978), to Carroll & Maxwell (1979), to Pellegrino & Glaser (1979), to Sternberg (1979), and to Royce (1980).

7.5 Creativity and Traditional Measures of Intelligence

Findings in the last 15 years have tended to confirm the picture which earlier research had suggested. Studies of creative adult artists, scientists, mathematicians, and writers find them scoring very high on tests of general intelligence. In other studies, often involving nonprofessional samples, measures of tested intelligence and indices of creative achievement or reputation are often insignificantly or only very weakly positive (e.g. Helson & Crutchfield 1970b; Rotter, Langland & Berger

1971; Davis & Belcher 1971; Rossman & Horn 1972; R. M. Milgram, Yitzhak & N. A. Milgram 1977; Frederiksen & Ward 1978; and Hocevar 1980) and sometimes modestly positive (e.g. McDermid 1965; Helson 1971; Vernon 1972b; Torrance 1972b; Schmidt 1973; Kogan & Pankove 1974; Gough 1976a; and Hocevar 1980).

Though a curvilinear relationship between intelligence and creativity has often been suggested (with intelligence presumably becoming less and less influential as one moves into higher and higher levels of intelligence), the only formal test (with negative results) of this hypothesis we are aware of which was conducted by Simonton (1976) in a reanalysis of Cox's historical geniuses – a sample quite probably too rarified to be a particularly good test of the curvilinear hypothesis.

7.6 Creativity and Rated or Perceived Intelligence

It should be noted that creative people are often perceived and rated as more intelligent than less creative people even in samples where no corresponding correlations between tested intelligence and creativity obtain. Despite an r of $-.08$ between Terman's Concept Mastery Test and professionally rated creativity among the top 40 IPAR architects (MacKinnon 1962a), e.g., staff ratings of the single adjective "intelligent" correlated $+.39$ with the index of creativity (MacKinnon 1966). While such an r may reflect some spurious halo effects, it may also tell us something about the true overlap in meaning of these terms in the natural language.

Popular criteria for "*intelligence*" are much broader than those tested by standard "*intelligence*" tests. It is also possible that such r s partially reflect the presence of a set of personality characteristics and processes which influence the degree to which raw talent or aptitude of almost any form is translated into effective and socially impressive behavior. It is conceivable, for example, that factors making for success (such as forcefulness of character, self-confidence, etc) facilitate effective behavior of many forms (including behavior having an "intelligent" and a "creative" look about it) and thereby produce a degree of correlation between "effective creativity" and "effective intelligence" which is higher than the correlation between "*raw creative ability*" and "*raw intelligence*." After all, creativity is a social outcome, and so is intelligent action. We believe that this distinction between "raw (or best-measured) intelligence" and "effective intelligence" and between "raw creative ability" and "effective creativity" is certainly one worth making.

7.7 Creativity and Divergent Thinking Abilities

Binet began the development of open-ended, multiple-solution measures (e.g. "Sentence Invention" and "Ink Blots") of the type we now call divergent thinking

(DT) tests (Binet & Henri 1896). Upon such tests, much of modern research on creativity depends and is focused. Though DT tests were essentially excluded from Binet's subsequent batteries (see Guilford 1967, for an interesting discussion of this point), the open-ended, multiple-solution format assumed by Binet to facilitate the measurement of imaginative abilities was quickly adopted by early creativity investigators. Indeed, the proliferation of studies involving such tests was so great that by 1915 Whipple was able to devote an entire in the second edition of his *Manual of Mental and Physical Tests* (1915) to "***Tests of Imagination and Invention***" in which he cites the work of at least 19 investigators actively exploring this domain.

The development and use of DT tests continued quite steadily up to 1950, at which time Guilford's (1950) presidential address to the American Psychological Association introduced many psychologists to his own research group's new efforts in a research tradition already half a century old. The impact of Guilford's address upon the field of creativity was, of course, catalytic and long term.

Wallach and Kogan's influential book, *Modes of Thinking in Young Children*, which contained a battery of highly intercorrelated DT tests influenced by Guilford's earlier work, was published in 1965. these tests [and Ward's (1968) modification of them for use with much younger children], together with the Torrance Tests of Creative Thinking (TTCT) (Torrance 1966) and a few of the early measures produced by Guilford's group (Alternate Uses, Consequences, Plot Titles), have dominated the DT test scene for the 15 years.