THE EFFECTS OF FAILURE AND FANTASY ON CREATIVITY

by

Faramarz Simhai

A Dissertation Presented to the Faculty of
Graduate Studies of University of Manitoba
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for the Degree of Doctor of Philosophy

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Acknowledgments and Dedication

The apex of the great concatenation of things which comprised my past several years of graduate training is, at last, no longer eluding. In these concluding moments, I muse of the vow that I first made to myself in the fall of 1973 as I dodged the frustration of 17.776-777 and more importantly, endured the boredom of 17.732-733. With other similar anguishes over the years, I would reaffirm, over and over again, that when the last bout was fought and if I survived long enough to make the exit, I would take the stance, as pompous and flatulent as it sounded, and close the final chapter of my graduate career on a note of self-congratulation. The most potent version of the vow was formulated after the experience of the candidacy examinations over a year and a half ago. It read: "This dissertation is dedicated to myself for outlasting the many well-coordinated attempts--more accurately, assaults--of academia aimed at educating me; for prevailing through the many gulps forced down my throat in the name of my own learning and salvation, not to mention that of mankind and progress of science; and for not being lured by the many prescriptions coquettishly dressed as descriptions, and philosophies disguished as methodologies."

After the candidacy examinations there was the vehement

pursuit of the research which culminated in this volume and hence work late into many nights and pre-occupations which started on Saturday mornings and trailed well into Sunday evenings. In those exacting moments of solitude, when the Duff-Roblin Building--which houses the Psychology Department--gained an air of dignity from the tranquility and forlornness of the early morning or late night, Felix, the caretaker of the first floor, became a most dependable companion. The many discussions which we pursued (their frequency and duration proportionate to the hardship of the times, but their theme frequently a variant of that great subject libido) became the only escape of those solitary hours and provided valuable though short periods of comic relief. We made long and complicated conjectures and treatises on the rise and fall of what came to be appropriated as the "Zigee Zigee" power; and for such mitigating times, on more than one fleeting moment, the consideration became that this dissertation should be dedicated to Felix. . .

* * *

The bitterness has not dissipated, and yet, completing these last steps of a not-at-all erotic, nor orgiastic rite of passage, more fervid thoughts demand expression. Equally in need of recognition are those sparse but potent human encounters of the past years which have left me with a lasting sense of deference. It is more apt that their

expression and acknowledgment should pervade the following lines.

* * *

First, there was Ross Hartsough! At his door I would frequently appear; sometimes, in panic after discovering a new rule in that highly complicated but never fully committed to paper labyrinth of rules and regulations which are to guide the behavior--not to mention the feelings and thoughts--of graduate students; sometimes, elated in having thought up a new idea which had to be shared then and there before the excitement of the aha experience diminished; frequently demanding, redundant, grandiose, emotional, and always, but always, in rush. The title "Persian Pest" which grew out of those numerous unexpected knocks on his door, followed by "Ross, do you have a few minutes?" was fully deserved. Reluctant or not he would usually nod his affirmation and in those edifying moments that followed, he would be most impeccable: as an advisor; as a critic; as an objective and analytical scholar; and if the need arose, also as a friend. And the need arose frequently! With the deep empathy of a friend, he was the first to recognize the plight of a poet trying to function as a logician, a synthesizer as an analyzer, and worst of all, a rebel as a conformist. He understood the independence of my spirit and granted me autonomy. With his understanding I grew, and with his regard and accepting attitude, I experienced a rare

sense of freedom which became a powerful motive for action and progress through the graduate years. . . After some 22 years of formal education, he is the only teacher of whom I can earnestly say: "His teaching never interfered with my learning."

Then, there was Dick Gatley! The good, jolly, laughing ho ho, guru of therapeutic innovation, with a sword sharp wit and heart-warming sense of caring who would throw his coffee cup in the air, amidst an absurd meeting, and walk out. In his playful way he was quite profound, and merged in his tough therapeutic style was a deep sense of respect and concern. Those of us who had the good fortune of being supervised by him for psychotherapy--and lasted through it--will remember him as that rare breed of therapist who could see through you in five minutes without making you feel exposed; frustrate you out of your neurosis without causing you the grief reaction of parting; laugh at you but come across as showing respect; and show up late for an appointment but lead you towards order. He was an advocate of the experiential and non-verbal mode of therapy and it is apt that my final words of tribute to him be uttered non-verbally:

But of course, my drawing ability is no match for my writing aptitude (reflecting more the meagerness of the first rather than the richness of the second). In fact, the above may even appear to illustrate the superiority of the verbal to non-verbal communication. However, consistent with the means and ways of the advocates of experiential therapy, I would suggest replacing the smiling face and open arms of the present writer for that of the above figure. The proper gestalt shall emerge in no time.

There was also Roy Gabriel! The grand Prince of Numbers who is guaranteed to pierce through the dense outer layer of nearly anyone's non-mathematical brain and teach them more than a thing or two about the magic of numbers and statistics. He remains with you in his gentle, unique, incessant and patient way until you start to appreciate the poetry of numbers. More significantly for a budding clinician, however, he simultaneously teaches you the mode of treatment for a brand of traumatic neurosis known as statisticitis. This recently discovered psychological disorder is frequently found among graduate students in psychology--especially the Ph.D. candidates--and is likely a consequence of what has been termed the age of accountability. Neither the nature nor even the name of this disorder has yet been recorded in the classificatory system of the DSM II (nor DSM III) and it is likely that further research will prove it more related to psychosis

than neurosis. It is also possible that the conceptualization of this disorder as neurosis may raise the voice of criticism from the opposing camps and could even provide the impetus for the writing of the Myth of Statisticitis and the thesis that such disorders should be viewed as problems in counting rather than mental illness (Thomas Szasz and his followers are alive, well, and still prolific). However, despite these possibilities, it is the secure conviction of the present writer that the name associated with the pioneering attempts at treatment of this disorder (with notable success in case of the present writer) will be Roy Gabriel.

My association with David Martin started a few months before his sabbatical leave and was unfortunately short in duration. His non-intrusive, empathic way was powerful and left a definite mark on me; I recall our association with ode to those intense moments when we met face to face and were devoid of all the everyday mummery. I wish him well! But more than that, since he has a sense of inventiveness and originality, I wish that he may enjoy that rare balance of belligerence, aloofness and humor indispensable to the survival and expression of one's originality, and prerequisite to that rare art of not alienating the covetous colleagues whose creativity or attitude toward novelty does not match their overriding zeal for recognition and academic promotion.

Morgan Wright taught me, perhaps without really intending to, a great lesson on a subject, very infrequently discussed in academia without being detruncated, life itself. That idealism needs not impede pragmatic progress and that coexistence with reality can stem from mastery rather than submission is an important lesson for a Persian who frequently finds himself fluctuating between the grandiosity generated by the idealism of how things should be and the despair growing from the realism of how things are. From Morgan's unique blend of pragmatism and hedonism grew a more tolerant attitude in me toward that conglomeration of images and beliefs we uphold as reality but which is more appropriately a reflection of the inevitable price we have paid for our individual certitude.

With Seymour Opochinsky there was the pursuit of the northern lights and the quixotic attempts at the psycho-therapy of schizophrenia. (The combination is particularly Seymourian.) Though he alternately smiled and yawned at my neophytic attempts at a life style of headiness and intoxication and the inadvertent manifestations of these attempts in my psychotherapy work, he grew tolerant at the end. In fact, I can't help but feel that he may even have found an appreciation for the many ways of this neophyte; at any rate, he certainly yawned far less frequently. Incidentally, success may be reported for both of our joint undertakings.

It was always enjoyable to drop by Fred Marcuse's office for a chat and have a humorous and enlightening conversation with this avatar of wit. It was even more enjoyable having him as a committee member and although we at times argued differing points of view, I always felt, upon leaving him, that I had grown a bit wiser.

Terry Hogan and John Adair, the high priests of Duff Roblin, proved helpful when the need arose, and I am only too sorry that I did not get to know them better outside of their administrative roles.

It would have also been a delight to have known J. J. van der Krabben better, the grand Dutchman, who is reputed to be a first rate chef as well. He was supportive when support was most needed.

Dr. Joe Khatena of Marshall University, my external examiner, I do not even know well enough not to call Doctor. However, from the little I know of him through our correspondences, he appears a kind and genuine gentleman in the true sense of the word and I would definitely look forward to meeting with him in person someday and learning more about him.

* * *

Yet, as I finish the above lines, I wonder! How could the global and collective edifice of my pallid-bitter institutional and academic experiences of the past few years contain so many pleasant and human individual faces? And if

I ponder the dictum that "gestalt is indeed less than the sum of its parts," will Fred Marcuse smile that warm, archetypal, friendly, old as time, and erudite as wisdom smile of his, and say, as he did after the candidacy examinations, that "you have not studied your Kofka, Kohler and Wertheimer, not to mention Asch, and J. W. F. Brown?"

* * *

Even as debts are acknowledged and the story told of my academic encounters, the account still remains incomplete. There remains another group who have made a great, perhaps the greatest, contribution to my development and toward them I shall remain reverent for years to come. They accepted me--a foreigner having no claim to their land, nor food, nor love--and treated me as one of themselves. None of my ancestors has made a penny contribution to their public-money supported institutions and yet they offered me fellowships and supported me in many ways more than one. They forebore my complaints and still offered me (an embittered, anti-academic, half-psychologist, half-artist, all madman--or eccentric if madness needs justification) a chance to learn what I could in their University and complain about what I could not. I think of them as the tax payers of this Province.

There are moments too that this vague, faceless, collective anonymity "they" changes into a singular personalized individual. . . It becomes the stranger

stopping to ask the right time in the crowd of that life-blood of Winnipeg, Portage Avenue, in the midst of the rush hour . . . the driver who abruptly turns into your lane, almost forcing you off the road, his careless-but-not-malign way telling you of how the city has grown and that the streets were not as crowded at one time in the past . . . the cashier at the supermarket who regardless of the size of your purchase always asks: "will that be all?" and does her bit in enhancing consumerism and contributing to a developing economy . . . the Woolco car mechanic who calls after a tune up, requesting that you bring your car back because he may have forgotten to tighten up a bolt, his earnestness making you feel good even as you have to take two additional hours off work to bring the car back . . . the policeman who politely waves you to the side of the street (yes policemen can be polite) and courteously fines you a fat twenty-three dollars for making a turn which would be legal in any other city, refusing to budge to your plea of ignorance performed in a more than usual heavy foreign accent, and in his refusal reminding you that the city may already have absorbed more than enough foreign accents . . . or even, the unfriendly immigration officer with a thick British accent who acts as if sent by the Queen herself to save Canada, and likely raises the flag every morning and salutes to the picture of Her Majesty on every Canadian dollar bill, and feels the glory of having saved

the Empire everytime he refuses to grant a visa to a non-British foreigner.

It also becomes Robert Goulet eating Chinese food across the table from you, and talking of the Kakabeka Falls where life is as it must have been for millennia . . . Lorne Sexton, sharing with you his deep intuitive understanding of statistics, who takes a momentary break and intercepts the discussion with a Polish joke, as his charming wife of Slavic descent walks into the room . . . the third year psychiatric resident who complains, in the hallway, of the high taxes in Manitoba and talks of how much better it is south of the border; or the undergraduate medical student who distributes Marxist literature in the cafeteria, preaches socialism during lunch hour, and when pressed, will tell you how much worse things are south of the border . . . the old man in the park, on his daily outing, who sits next to you on the bench and tells you of the times when things were different and simpler, the furrows on his forehead telling you that time is always time, the same eternal time, and that it only passes . . . the young couple, on the next campsite, sitting by the fire, listening to the crackling of the wood, appreciating the last rays of the dying sun, in the solitude of the majestic woods . . . and on rare and memorable occasions, to your delight and agony, it becomes a tall, blond, all-Canadian nurse who allures you by her golden, prairie, long-hair beauty;

invites you by her innocent, discontent, quivering lips which occasionally open into a hesitant smile; seduces you by her thirsty for life and variety eyes; but who keeps you at a distance, in the end, as you become all desire, by her between the two oceans cautiousness.

Yesterday, in the shelter where I was waiting for the bus, it became an elderly woman who briskly walked in from the odious January cold outside and the mid-Sunday afternoon tranquility. For a few minutes she looked suspiciously and appraisingly at me--a bearded, frosty, bouncing Persian trying to combat the northern cold by motion, holding a briefcase in one hand, and conducting with the other the loud orchestral music that poured into the air from the adjoining building. She apparently decided that the stranger is safe and began to complain that the teen-agers had broken the previous two heaters placed in the shelter by the bus company and that the company was no longer willing to supply heaters. Later, she became even more talkative and reported, in pride, that she spoke twelve languages and talked of coming to Canada from a land which was once Poland, but became Russia during the War, then became Poland again after the War, only in name, however . . . and then, the bus came.

It is to them, the people of this Province, that my greatest tribute goes. And in humbleness, it is to them that the work bound in this volume is dedicated, as unworthy

and minute a token as it might be of my gratitude.

Faramarz Simhai

January 1977

Abstract

This study investigated the effects of failure and fantasy on creativity, taking into consideration the pre-test creativity level of the subjects. Creativity was defined as the fluency, flexibility and originality scores of subjects on a subtest of Torrance Tests of Creative Thinking. The study was viewed as a 3 X 2 X 2 factorial design and the results were analyzed by the multivariate analysis of variance method. Other analyses were also carried out to answer some ancillary questions. The results indicated the following:

1. When experiencing failure, independent of how creative a person is, his creative thinking suffers. It becomes more rigid and less flexible.

2. High creativity individuals become more creative when they engage in fantasy. The low creativity individuals, however, become even less creative as a result of fantasy. The two seem to use fantasy in different ways.

3. The degree to which an individual views himself as variable or consistent is related to creativity. There is some indication that highly variable people may be more creative.

4. There was some support for the view that more creative persons may be able to imagine things more vividly.

5. No support was found for the view that sex is related

to the vividness of fantasy.

6. After experiencing failure, the creative output of subjects who engage in fantasy does not significantly differ from that of the subjects who do not engage in fantasy.

7. Some support was obtained for the psychometric validity of Torrance Tests of Creative Thinking and methodological implications of the findings were analyzed and discussed. Since the three dependent variables which Torrance's tests yield seem to measure different but overlapping operations, use of multivariate methods was recommended for analysis of this type of data.

Chapter I

Introduction

The failures and frustrations interspersed in the process of creation, and their effects on creativity, have seldom lured psychologists into experimental investigation, though references to them abound in anecdotal, introspective accounts of creativity. Faulkner's contention that "the human heart in conflict with itself. . . alone can make good writing" (1969, p. 444) or Eugene O'Neill's that "The people who succeed and do not push on to a greater failure are the spiritual middle-classers" (cited in Gelb & Gelb, 1962, p. 5) are only two examples.

In the few cases where phenomena such as failure are investigated empirically, subjects are not given a chance to mobilize their resources to deal with their failure prior to returning to the creativity tasks. The mediational and imaginal processes utilized to deal with failure, variously discussed as fantasy (Singer, 1971b), daydream (Hammer, 1967; Singer, 1971a), imagery (Holt, 1964; Khatena, 1975a, 1975d; Singer, 1971a, 1971b) and coverants (Homme, 1965) are seldom tapped. Yet, a good deal of research (e.g. Helson, 1971) indicates that more creative persons have a richer fantasy life.

Additional questions need to be asked about the effects

of both failure and fantasy on creativity. Furthermore it needs to be inquired what the effects are on creativity of a chance to engage in fantasy after failure. And in view of a higher resourcefulness frequently attributed to the highly creative individuals (e.g. Barron, 1965, 1969), the effects of failure and fantasy need to be further analyzed in terms of a person's prior creativity level. Are there any differences in the way high versus low creativity persons respond to their failure and/or opportunity to engage in fantasy?

Statement of the Problem

The following questions define the problems with which this study is concerned.

1. When subjects work on test-tasks which presumably draw out their creativity, how is their creative behavior affected by failure?

2. When subjects work on creativity tasks, how is their creativity affected by an opportunity to engage in fantasy?

3. What is the difference between engaging in fantasy after failure and doing so while working on a creativity task? In terms of creativity, what are the outcome differences?

4. A large body of literature points to the resourcefulness and unique cognitive style of highly creative individuals (e.g. Barron, 1965, 1969; Dellas & Gaier, 1970; Getzels & Jackson, 1962). In view of such

literature it may be inquired how a subject's standing (high or low) on a prior measure of creativity relates to his later creativity scores when exposed to the conditions of this experiment.

5. What are the effects on creativity of repeated exposures to these conditions?

The five core questions above constitute the primary problems investigated here. However, a number of ancillary questions are also asked of the data regarding certain other variables related to creativity. These questions are presented in a later section.

A Diagrammatic Outline of the Present Study

Subjects were assigned randomly to one of the four groups below and instructed to work on the following sequence of tasks.

G1	G2	G3	G4
CT1	CT1	CT1	CT1
M1	FT1	Fantasy	FT1
M2	M1	M1	Fantasy
M3	FT2	Fantasy	M1
	M2	M2	FT2
	FT3	Fantasy	Fantasy
	M3	M3	M2
			FT3
			Fantasy
			M3

G = Group

CT1 = Creativity task 1 which taps the prior creativity standing of the subjects (Unusual Uses Test).

M1 - M3 = Measures 1, 2 and 3 are three randomly distributed creativity tasks from Torrance Tests of Creative Thinking, TTCT. Scores on these tasks constitute the dependent variables of this study.

FT = Failure task (very difficult puzzles).

Creativity tasks were from Torrance Tests of Creative Thinking which are scored for fluency, flexibility and originality according to the directions of the TTCT manual (Torrance, 1974a, 1974b). There are <u>five factors</u> (independent variables) in this study: (1) failure (present or absent), (2) fantasy (present or absent), and (3-5) the fluency, flexibility and originality scores on CT1. CT1, which yields three pre-test measures of creativity, is the Unusual Uses sub-test of TTCT and is used here to stratify subjects as high, medium or low on pre-test creativity. The <u>three dependent variables</u> are the pooled fluency, flexibility and originality scores obtained from M1, M2 and M3.

<u>Fluency</u> is the number of relevant responses supplied to each test task. <u>Flexibility</u> refers to the number of categories used in responding to each task and presumably reflects a person's "functional fixedness" or ability to change sets. <u>Originality</u> refers to the statistical uniqueness of a subject's responses.

The study was viewed as a 3 X 2 X 2 factorial design as follows:

		Pre-test creativity (CT1)	M1	M2	M3	*Pooled Measures
Failure1	Fantasy1	High				1. Fluency 2. Flexibility 3. Originality
		Medium				
		Low				
	Fantasy2	H				
		M				
		L				
Failure2	Fantasy1	H				
		M				
		L				
	Fantasy2	H				
		M				
		L				

1 = Present
2 = Absent

* Pooled measures are the three dependent variables of this study. They are formed by adding up a subject's fluency scores on M1, M2 and M3, his flexibility scores on these individual measures, and finally his three originality scores.

Three multivariate analyses of variance were carried out depending on whether the subjects were stratified on fluency, flexibility or originality of CT1. Also univariate analyses of variance were carried out to analyze the effects of repeated measures, using the above three stratification procedures.

History of Previous Research, and Definitions

The research antecedents of the major concepts employed in this study are summarized below and the operational procedures which define and measure each of these concepts are presented.

Creativity

Criteria. Many criteria have been employed in the past to conceptualize, define and measure creativity. The goal and design of the present study imposed certain demands on the test tasks used for tapping creativity and these criteria directed the choice of the definition adopted here. It was argued that test tasks are to be chosen so that:

A. A previous body of empirical research has established their relevance to creativity.

B. These tasks were also to be chosen so that they can be scored to yield a reliable measure of creativity.

C. All subjects had to be able to supply some responses to these tasks. Otherwise the measures of creativity themselves would be measures of failure.

D. The scores had to be sensitive enough to pick up changes in the subject's performance caused by the introduction of the experimental variables.

E. Tasks had to be homogeneous enough to allow a pooling of the various dependent measures into one set of scores.

F. Tasks also had to be heterogeneous enough so that the findings cf the present study have some generality beyond the specific tasks used here.

Conceptualization of creativity in this study. Psychology's present concern with creativity is attributed by many (e.g. Khatena, 1975a; MacKinnon, 1967) to the impetus of Guilford's (1950) retiring presidential address to the APA. Since then, the volume of research in the area has become massive and several published bibliographies of the field attest to this fact (Davis, 1971; Kaltsounis, 1971, 1972; Razik, 1965; Romanyshym & Gratton, 1966; Stein & Heinze, 1960; Stievater, 1971a, 1971b, 1971c, 1973a, 1973b; Taylor, 1964). The field has gone through what may be viewed as three stages. First there were attempts at making creativity a legitimate area of psychology, then attempts at definition and psychometric evaluation, and finally studies where creativity was employed as a dependent measure (Guilford, 1967). Within the last category, attempts were made to study the personality and cognitive correlates of creativity and methods of enhancing, teaching, and increasing creativity. Yet, despite the fact that a tacit

understanding of creativity is shared by most people and even though the dictionary definition of the concept presents little difficulty, creativity "has proved one of the most troublesome concepts in the literature of measurement with no universally accepted definition and method for its evaluation" (Khatena, 1973a, p. 7).

Of these measures and definitions, one which has best stood the test of time is the work which originated with Guilford's emphasis on divergent thinking and culminated in Torrance's seventeen years of sustained and ongoing research (Khatena, 1975a). Whereas Guilford stressed factorially pure instruments (1959), Torrance (1962, 1967, 1974b) emphasizes diversity in test tasks believing that creativity is a complex process which draws on more than one type of thinking. Torrance's approach has fared somewhat better than either that of Guilford (Mackler & Spotts, 1965) or Mednick's associational model (1962, 1967) which views creativity in terms of the availability of remote associates to various stimuli (Davis & Belcher, 1971).

However, voices of criticism have not been absent. Torrance's tests as well as the whole notion of the relationship between "divergent production" and creativity (Butcher, 1972) have come under various criticisms. MacKinnon (1967) finds the relationship questionable. Nicholls (1972) argues against the models of creativity which attribute some degree of this trait to most people and

maintains that even in cases where the tests do relate to some external criteria of creativity, these criteria are far from being eminent. Moerdyk (1971) believes that divergency is more related to the area of interest than to creativity. The long-term predictive validity of the divergent thinking tests has come under scorn by Kogan and Pankove (1974). Wallach (1968) argues that what Torrance's tests measure are manifestations of intelligence rather than creativity and as such characterizes Torrance's tests as measures of thinking rather than creative thinking. Kazelskis (1972) criticizes the scoring method of Torrance's tests and Treffinger and Poggio (1972) point out that since different researchers sample different subtests of Torrance's tests, comparing results across studies is quite difficult.

Yamamoto (1965) has compared the research on creativity with the blind man's report on the elephant. But the view subscribed to here--and perhaps it is imperative to subscribe to such a view in order to do research on creativity--is best verbalized by Treffinger and his colleagues. They maintain that even though "the study of creativity has been described as a classic case of the blind leading the blind," it needs to be in the forefront of the researcher's ". . . mind that in the land of the blind, a one-eyed man can be king!" (Treffinger, Renzulli, & Feldhusen, 1971).

On this account of acceptability at least, the

accumulating body of evidence points to the Torrance Tests of Creative Thinking (TTCT) (Torrance, 1974a, 1974b) as the "king" of the psychometric approaches to creativity. Bearing in mind the two levels of creativity, major and minor, discussed by Ghiselin (1963), it is probably the second type of creativity, that Torrance's tests tap. But in view of the way traditional education has geared itself towards the student scoring high on convergent tests such as IQ rather than divergent tests such as TTCT, further study of even this low level of creativity is imperative. Most likely, Ghiselin's highly creative persons accomplish their "life's mission" not only because they possess a higher level of creativity but as well due to a belligerence and crustiness which allows them to withstand the many assaults of the environment. What though, it may be inquired, of the less creative individuals, perhaps less pugnacious, who may not fare as well in withstanding such pressures?

The "one-eyed king" of psychometric approaches to creativity does indeed differentiate these individuals from others. Regardless of whether the high scorers on TTCT are labeled creative, diverger, low-level creative, or just plain different, the fact remains that TTCT has done well in distinguishing these individuals from the rest of the population. The distinction becomes even more important in light of the studies showing that high scorers on TTCT are different from others in some fundamental ways. Put these

individuals, for example, in a group and you will soon find the group mobilizing its resources to annul the effects these high scorers may exert (Torrance, 1963). Place them in a traditional classroom and you will find them performing poorer than their high IQ counterparts, rebellious and disruptive, their behavior suggesting "an incoherent protest against their plight" (Torrance, 1972, p.279). Yet, give these same individuals an opportunity to learn through discovery and independence and they will start to bloom (Kaltsounis & Stephens, 1971; Torrance, 1965, 1972). Torrance summarizes the result of a host of studies on this subject: ". . . it seems rather clear that" high scorers on TTCT

> differ in some quite fundamental ways from those who score low on such measures. They prefer to learn in creative ways, by experimentation, manipulation, inquiry, etc. rather than deliberate ways, by discovery rather than by authoritative identification (1974b, p.5). A major reason for the author's interest in developing measures of creative thinking abilities is that he believes that such instruments can yield one useful basis for making instruction different for different students (1974b, p.10).

Though Torrance also cautions against generalizing too indiscriminately from the present findings, his tests are known to correlate significantly with a variety of traits frequently attributed to the creative persons. Towell (1973) showed that high scorers on TTCT tend to be more curious than the middle or low scorers. Other studies show that high scorers on TTCT are field-independent (Gensemer, 1968) and have attained a higher degree of ego development (Workman & Stillion, 1974) where ego development is defined as the degree of integration one can impose on conflicting stimuli. Martindale and Armstrong (1974) employing the Alternate Uses Test report a basic difference in basal alpha index and alpha blocking in response to stimulus onset between the high and low scorers. Torrance (1974b) supplies a sizable number of similar studies in support of the validity of his scales.

Barabasz (1969) reports interscorer reliabilities ranging from .91 to .99, and Halpin and Halpin (1974) have shown that self-trained scorers can reliably score TTCT. Further evidence is supplied by Torrance (1974b) regarding the other types of reliability of his scale. For instance test retest reliabilities of as high as .90 or over have been reported for TTCT, though the figure drops for normative studies (as opposed to the experimental studies) in which no attempts are made to equate the testing situations in terms of the age level or the motivational,

situational, and training variables. Torrance has also traced the route of the development of his tests and has supplied the rationales of his test-tasks (1962, 1964, 1967, 1968, 1974b). TTCT have been translated into at least twelve languages (Torrance, 1967) and over 744 studies, dissertations, theses and articles have utilized them in studying creativity and/or related matters (Torrance, Hudgins, & Frost, 1974; Torrance, Phillips, & Hudgins, 1973).

Though it is possible to cite further evidence for the psychometric validity and reliability of TTCT, it is important to emphasize that these criteria by themselves did not dictate the choice of TTCT for the present study. Indeed what has been discussed up to now pertains to criteria A and B listed previously, and these are only two of the six criteria which needed to be satisfied in the present study.

In terms of criterion C, it may be stressed that tasks used in TTCT are open-ended, divergent and verbal. They are constructed in such a way that all subjects will be able to supply some satisfactory responses to them (i.e. satisfactory according to the task demands).

The scores of TTCT have been shown to be sensitive to a variety of experimental operations (Torrance, 1974b) and this forms one of their major strengths in terms of the present study (the criterion listed under D).

The criteria of homogeneity and heterogeneity (cited under E & F) are also abided by in chosing the TTCT. The way Torrance has defined creativity and the manner he has sampled the various test tasks which comprise his tests attests to this point. He characterizes creativity as the

> process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies: testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results (1974b, p.8).
> . . . a consistent and deliberate effort has been made to base the test stimuli, the test tasks, instructions, and scoring procedures on the best theory and research now available (1974b, p.22).

Torrance's eclectic approach has guided the choice of his test material, and as such the diversity of his test tasks satisfies the condition imposed previously under F. His test tasks are also homogeneous in that they are purported to tap the various aspects of the same criterion, namely creativity. Indeed it is a common practice to add the

scores from the various subscales of TTCT to form pooled scores on fluency, flexibility and originality; these final three scores are then taken as the indeces of a person's creativity. This satisfies the criterion cited under E.

Definition. Preceeding has been a discussion elaborating the rationales for the use of TTCT in the present study. In summary, it was emphasized that among the psychometric approaches to creativity, none fared as well as TTCT in terms of the design and goal of the present study. In this study then creativity is defined as a person's fluency, flexibility and originality scores on a subscale of Thinking Creatively with Words, form A, of the Torrance Tests of Creative Thinking (Torrance, 1974a). These subscales will be described more fully in the method section in the next chapter.

Failure and Creativity

As indicated previously, studies probing the relationship between creativity and failure are quite sparse. Even among these studies failure is frequently stretched bordering on such concepts as frustration and stress. Difficult anagrams are utilized to designate conditions variously defined as failure, stress or frustration.

Hinton (1968) found that frustration reduces creative problem solving performance. Krop, Alegre and Williams (1969) similarly found that divergent thinking is inhibited

by stress. Contrary results are reported by Leith (1972) who found that moderate stress enhances creativity, and Eisenman and Brownstein (1970) who tentatively suggest that frustration may energize subjects and thus lead to higher creativity scores. More recent investigators in the area attribute the above discrepency to the levels of task difficulty. Belcher (1975) has shown that moderate amount of stress may enhance creativity test scores whereas larger degrees of stress depress creativity scores. Rollins and Calder (1975) also argue in favor of a curvilinear relationship.

There have also been attempts to explain the above discrepencies in terms of other relevant--at times mediating-- variables. Rollins and Calder (1975) have shown that in the presence of feelings of personal inadequacy, stress decreases problem-solving flexibility whereas the case becomes reversed with the feelings of personal adequacy. Metz (1962) found that stress facilitated the performance of the low scholastic aptitude subjects while it inhibited that of the subjects ranking high on this variable. Hare (1972) has shown that the flexibility of low authoritarian subjects was not affected by failure. But among the high authoritarian subjects, high creativity subjects grow more flexible after failure whereas the relationship became reversed for the high authoritarian low-creativity subjects. Randolph (1971) discovered that

failure affects creativity differently depending on whether a person is field dependent or independent. Failure decreases the effectiveness in problem solving ability of the former but not the latter group. And related to the purpose of the present study, Kerr and McGehee (1964) have indicated that high creativity subjects are superior in problem solving under stress.

In the present study subjects were asked to solve three very difficult problems. Failure was operationally defined as the inability to solve these problems. In view of the potential variety of mediating variables affecting one's reaction to and perception of failure, subjects were also directly asked whether they had actually experienced failure during this experiment. Failure was additionally defined by self-report that the feeling of failure was indeed present in response to the difficult problems.

Fantasy

Holt's article (1964) entitled "Imagery: The return of the ostracized" summarized the attitude of psychology towards this area up to the early 1960's. It also hinted at the emergence of the topic back into the mainstream of psychology, an observation which proved accurate. Various studies have appeared since Holt's article. The research has been discussed under labels ranging from fantasy (Singer, 1971b), imagery (Holt, 1964; Khatena, 1975a, 1975d) and daydream (Hammer, 1967; Singer, 1966, 1971a) to coverant

positive reinforcement (Cautela, 1970b). Since these various areas, in one way or another, form the research antecedents of the variable labeled fantasy here, they are presented below, under two general rubrics corresponding to the two diverse paradigms in which work has been pursued.

Fantasy and imagery. Therapists for some time have realized the potential of fantasy, imagery and daydream in modifying and changing behavior (Hammer, 1967; Singer, 1971a, 1971b; Wilkins, 1974). Studies probing the relationship between these variables and creativity, on the other hand, have basically been correlational. The effects of fantasy and imagery on modifying creativity have not been investigated.

There are indications that highly creative individuals exhibit a higher level of primary process thinking (Domino, 1970; Schaefer, 1971b) and seem to have a richer fantasy life (Helson, 1971). Lewin (1969) related creativeness to visual imagery and Walkup (1967) has claimed that a high degree of perfection in the ability to visualize may be the most salient variable in distinguishing the high from the low creativity individuals. In one study (Schaefer, 1971a) the thematic protocols of highly creative girls were rated as exhibiting more vivid imaginative elements than the protocols of matched controls. In another study (Leonard & Lindauer, 1973) the imagery scores of the subjects were found to predict their aesthetic participation scores, and

Adair and Shimkunas (1973) found that subjects with high sex related fantasies but low-overt behavior score higher on creativity measures.

A more recent upsurge of interest in the relationship between imagery and creativity is that of Khatena who has supplied summary accounts of previous research as well as make original contributions of his own (1973b, 1974, 1975a, 1975b, 1975c, 1975d; Khatena & Parnes, 1974). In terms of the interests here, the indications are that higher creativity subjects may produce better imagery (Khatena, 1975c, 1975d), hence subjects' pre-test creativity may relate to fantasy in an interactive way (i.e. the effect of fantasy may depend on the prior creativity level of a person).

Covert conditioning. For over a decade now, a proliferating line of research has been in progress under the rubric of covert conditioning. The basic assumption of this paradigm is that stimuli presented via imagination can have an effect on behavior similar to effects produced when stimuli are presented physically and externally. The "covert positive reinforcement" which is frequently employed in this paradigm to modify behavior is quite similar to the operations which define fantasy in the present study.

The historical roots of this paradigm may be viewed as going back to several studies conducted in the early to mid 1960's. Lazarus and Abramovitz (1962) instructed phobic

children to imagine pleasant experiences in the same context as the phobia related stimuli. These covert contingencies which the authors called "emotive imagery" were observed to decrease the frequency and/or intensity of the actual phobic behavior. Barber and Hahn (1964) showed that imagining pain, both under hypnosis and in the "waking" state, resulted in physiological responses similar to the actual administration of painful stimuli. Homme (1965) talked of extending the laws which apply to operants to covert behaviors and used the term "coverant" as a label for private events or the "operants of the mind".

The culmination of this conceptualization of conditioning and reinforcement has been in the work of Joseph Cautela who is most responsible for developing the paradigm within which covert conditioning has been studied. The basic assumption underlying this paradigm "is that a stimulus presented in imagination via instructions can affect covert and overt behavior in a manner similar to a stimulus presented externally" (Cautela, Flannery, & Hanley, 1974, p. 494). The rationale, methodology, and empirical foundations of the paradigm are supplied by Cautela and his co-workers (Ascher & Cautela, 1972; Cautela, 1967, 1970a, 1970b, 1971, 1972a, 1973; Cautela, Flannery, & Hanley, 1974; Cautela & Kastenbaum, 1967; Cautela, Kastenbaum, & Wincz, 1972; Cautela & Wisocki, 1971b; Tondo & Cautela, 1974; Wish, Cautela, & Steffen, 1970). Successful applications of the

paradigm have been reported in the treatment of compulsive behavior (Cautela, 1966), smoking (Cautela, 1970c), overeating (Cautela, 1972b), self-injurious behavior (Cautela & Baron, 1973), modification of attitudes toward the mentally retarded (Cautela, Walsh, & Wish, 1971), and treatment of sexual deviations (Cautela & Wisocki, 1971a).

Successful applications have also been reported by other investigators in the treatment of alcoholics (Ashem & Donner, 1968), sexual deviations (Barlow, Leitenberg, & Agras, 1969), rodent phobia (Blanchard & Draper, 1973), nail biting behavior (Daniels, 1974), amphetamine addiction (Gotestam & Melin, 1974), reduction of avoidance behavior (Kazdin, 1974a, 1974c), and increasing assertive behavior (Kazdin, 1974b).

Indications from the covert conditioning research are that imaginal events which are pleasant and vivid, when made contingent on a behavior will have an effect similar to actual positive reinforcement and can thus increase the frequency and/or strength of those behaviors. When these imaginal stimuli are unpleasant, they frequently have the reverse effect.

In view of the above research, and in order to introduce a degree of control, fantasy in the present study was defined as only the <u>vivid</u> and <u>pleasant</u> imaginal stimuli which the subjects reported they produced under instruction.

Can Creativity be Manipulated?

Whether failure and/or fantasy are hypothesized to have a detrimental or enhancing effect on creativity, the implicit assumption is that creativity (or creative behavior), like other samples of behavior, can indeed be manipulated by the introduction of salient variables. This assumption has ample research antecedents. The supportive evidence comes from two areas. First investigations which use global strategies and instructional methods aimed at training and encouraging subjects for creativity, and second, those which probe the effects of specific variables such as reinforcement.

Global instructional material. Several creativity programs have been launched since the early 1960's. Parnes and his associates at the Creative Education Foundation, University of Buffalo (1962, 1967) have reported positive results in training subjects to become more creative at problem solving. Torrance (1962, 1963) suggests that a more supportive and rewarding milieu can greatly enhance creativity, and Davis (1969) has formulated three categories of behaviors related to creativity on which subjects can be trained. Another encouraging procedure has been the Purdue Creativity Program which attempts to provide training in different components of creative behavior (Feldhusen, Treffinger, & Bahlke, 1970; Shivley, Feldhusen, & Treffinger, 1972). A representative list of such methods

for enhancing creativity are supplied in summary by Treffinger and Gowan (1971), and in a more extensive form by Stein (1974). Most of them have reported success in training for creativity.

Creativity and reinforcement. In view of the large number of studies devoted to reinforcement, those probing the relationship between this variable and test scores in general, or creativity scores in particular, form only a very meager minority. Bass and Ninios (1974) demonstrated that IQ scores obtained under verbal reinforcement were higher than under no reinforcement; similar findings were reported when M & M's were used as reinforcement (Edlund, 1972) in a more conscientious design.

In the area of creativity, Maltzman and his co-workers were one of the first to employ reinforcement to train subjects for originality (Maltzman, 1960; Maltzman, Bogartz, & Breger, 1958; Maltzman, Simon, Raskin, & Licht, 1960). Ray (1967), making mention of some of the contradictory findings of Maltzman, nonetheless summarizes the results of his work as indicating that original thinking can be both produced and manipulated. Whittmore and Heimann (1966) similarly found that Maltzman's operant conditioning training using verbal reinforcement "good" was effective in enhancing the originality responses of the subjects. However, despite the success of these studies in increasing their dependent measures, it must be noted that as Guilford

(1959) and Maltzman himself (1960) have indicated, originality is not synonymous with creativity. In a later study reported by Mitchell (1971) creativity rather than originality becomes the focus of interest. Using a reversal operant design, he showed that reinforcement enhances creativity and that with the withdrawl of reinforcement certain aspects of creativity return to their initial level, while other components stabilize at the higher level.

The assumption that creativity can indeed be manipulated, or specifically enhanced, is thus shown to have some research antecedents. The present study then is not unique in assuming that creativity--or at least, a subject's creativity test scores--can be affected by the introduction of experimental variables. Although, a few studies have investigated the effects of failure on creativity, studies attempting to relate fantasy to creativity have been correlational. No previous study, to the present writer's knowledge, has attempted to manipulate creativity by the use of fantasy. In the present study, it was assumed that on the basis of the aforementioned research, fantasy may be viewed as (1) pertinent in the study of creative behavior, and (2) powerful enough to have an effect on creativity and actually change creative behavior in measureable ways.

Questions Asked and Predictions

Though, the present study was viewed as primarily exploratory, certain tentative predictions were formulated

regarding the questions asked of the data. The questions and predictions are presented below under two categories depending on whether they pertain to the core of the study or are ancillary in this respect.

Core questions. The following are the major questions around which this study was designed.

1. What are the effects of failure on creativity and are these effects a function of the pre-test creativity level of the individual? It was predicted that creativity scores will be lower under failure than under no failure and that this effect would be greater for the initially low than for the initially high creativity subjects.

2. How does an opportunity to engage in fantasy affect creativity and are the effects dependent on a person's prior creativity standing? It was predicted that a main effect due to fantasy will be obtained, and that subjects initially high on creativity will benefit more from exposure to fantasy than those who are initially low on this measure.

3. Another question of major interest pertained to the effects on creativity of exposure to fantasy after failure (G4). Does engaging in fantasy after failure enhance creativity or does it have a detrimental effect? How do the effects of these operations differ from those of the operations in G2 and G3 and are there differences between the high and low creativity individuals? In view of lack of previous research in this area, no predictions could be made

regarding the outcome.

4. What are the effects of repeated exposures to failure and fantasy on creativity?

Ancillary questions. The design of this study allowed the collection of data on the creativity level of a relatively large sample of people. The Unusual Uses Test which is presented as CT1, to all subjects (in all conditions) yields a measure of creativity which is independent of the experimental manipulations of this study. As such, an independent measure of creativity is obtained for a sizable number of subjects. In terms of this pre-test measure of creativity, further questions were asked which are unrelated to the main goal of this study but which are of direct interest in relation to creativity. These ancillary questions are enumerated below.

5. A high degree of variability and unpredictability is frequently attributed to the highly creative individual, at least on an anecdotal level. However, only one study has related a measure remotely similar to the above variable to creativity (Bowers & Keeling, 1971). In the present study the subjects were asked to supply self-ratings on whether they perceived themselves as consistent or variable, and whether or not they viewed these attributes as relevant in describing themselves as persons (Bem & Allen, 1974). The question of interest was whether the persons who perceive themselves as variable are more or less creative than those

who perceive themselves as consistent. Furthermore, what are the effects of viewing the above dimension as relevant versus irrelevant in describing oneself? In view of the lack of previous research, no predictions were made.

6. Some previous research has indicated the possibility of sex differences in fantasy pattern (e.g. Cramer & Bryson, 1973). It was thus inquired whether or not there is any relationship between sex and vividness of fantasy.

7. Do the more creative persons have more vivid fantasies? The sparse previous research leads one to expect affirmative results.

Chapter II

Method

Subjects

Subjects were 404 undergraduate students at the University of Manitoba, enrolled in introductory psychology courses, who participated in this study for 2 experimental credits. They signed up for one of eight experimental groups which were then randomly determined to represent G1, G2, G3 or G4. In view of some previous research indicating sex differences in creativity (e. g. Raina, 1969; Torrance, 1963), an attempt was made to keep the same ratio of males to females for all of the groups. Males and females were tested together in groups of about 35 to 65.

Certain of the above subjects did not meet the requirements to be included in the core calculations of this study (due to reasons which will be elaborated later). The final sample for the core questions consisted of 288 subjects. A ratio very close to five females for every three males was maintained for all of the four conditions. The final number of subjects assigned to the four groups was unequal ($n1 = 82$; $n2 = 78$; $n3 = 74$; $n4 = 54$).

Instrument

As indicated previously, the instrument of the present study was a subscale of Torrance Tests of Creative Thinking (Torrance, 1974a), consisting of four subsets. Unusual Uses

Test was presented first to all subjects in the four conditions. The allotted time for working on this task was 10 minutes. The other three tasks were Product Improvement, Unusual Questions, and Just Suppose. (Appendix G contains the workbook for the G4 condition of this study which is the most inclusive condition. It includes the above tasks in the actual form presented to the subjects.) The order of the presentation of the three tasks was randomized so that on each occasion different subjects worked on different tasks. The allotted time for each occasion was 6 minutes, and each occasion represented a random sample of all the three tasks. After the time for each task was finished the experimenter asked the subjects to "please go to the next task". All tasks were scored according to the directions of the test manual (Torrance, 1974a, 1974b). The other items included in the test booklets depended on the condition to which the subjects were assigned.

In summary then, the instrument tapping creativity consisted of the following tasks:

1. Unusual Uses (CT1) Independent variable
2. Product Improvement (M1, M2 or M3) Dependent variable
3. Unusual Questions (M1, M2 or M3) Dependent variable
4. Just Suppose (M1, M2 or M3) Dependent variable

Procedure

This experiment was characterized as a "study of the way different people think in different situations". All

subjects were asked to commit two hours for this experiment so that the shorter experimental periods do not attract more (or different type of) subjects, and also so that the anticipation of time involvement was the same for everyone at the onset of the experiment.

At the onset of each experimental session, the subjects were informed about the time and place when they could obtain more information about this study. They were requested not to speak to anyone and not to ask any questions while the experiment was in progress. They were informed that the experimenter would be keeping time and telling them when to stop working on one task and go to the next one. Finally, they were requested to remain in their seat until the experimenter announced that the experiment was finished.

Upon the termination of each task, the subjects were asked to "please stop working on this task and go to the next one". After working on the last creativity task (M3) all subjects filled out a questionnaire answering a number of general questions and also some specific ones depending on the group to which they were assigned.

Group 1. This group primarily served as a control for the other conditions. Subjects assigned to this group first worked on the Unusual Uses item for 10 minutes and then the other three creativity tasks. As indicated before, the order of presentation of these three tasks was randomized

and each occasion lasted 6 minutes. At the end of the experiment, subjects responded to a number of questions (appendix G, questions 6-13).

Group 2. Subjects assigned to this group worked on a very difficult problem after each creativity task. They worked on each of these failure tasks for four minutes and then proceeded to work on the next task, a creativity task which presumably was to register the effects of the previously experienced failure. The position of the failure tasks was fixed while that of the three creativity tasks varied randomly as before. At the end of the experiment, the subjects responded to a number of questions (appendix G, questions 5-13).

Group 3. The operations in this condition were similar to G2 except that instead of the failure tasks, subjects were given three four minute breaks during which they were requested to indulge in a pleasant fantasy which they could imagine vividly. Extra questions were also asked of them at the end of the session regarding their fantasy (appendix G, questions 1-4 and 6-13).

Group 4. Subjects in this group were exposed to the failure tasks as in G2, but before going to the next creativity task they were given a four minute break during which they were asked to indulge in fantasy as in G3. At the end of the experiment, subjects responded to several questions (appendix G, questions 1-13). The booklet

comprising appendix G is the exact workbook used for group 4. Since the material used in the other conditions are all contained in the workbook for G4, the workbooks for the other conditions are not appended in order to avoid redundacy.

The pages used for the workbooks were not very thick. It was possible to see the next creativity task through them when the booklet was turned to pages with the failure tasks or fantasy directions. In order to avoid the possibility that the subjects who are on the failure or fantasy pages may actually work on the next creativity item without turning the page, extra pages were inserted before each creativity task. This was done for all the workbooks (G1, G2, G3 and G4). All that appeared on these extra pages was the direction: "Please go to the next page". They prevented the seeing of the next creativity task until the page was turned to that task.

Measures

For the core of this study there are five independent and three dependent measures.

Independent variables. The first three factors of this study are interrelated and are thus discussed under one heading. The other two are discussed independently.

I, II & III. Creativity. As indicated previously the subjects in this study were stratified on the basis of pre-test creativity into 3 categories of high, medium and

low. The Unusual Uses Test was the measure of pre-test creativity. The trichotemization of the subjects was conducted after the creativity scores of all the 404 subjects were computed. On the basis of the frequency distribution, the range of the scores was so divided that approximately a third of subjects would fall in each category of low, medium or high.

However, the Unusual Uses Test yields <u>three</u> measures of creativity: Fluency, flexibility, and originality. There are no ways of distilling these three scores into one and thus, the stratification of the subjects was undertaken three times. Correspondingly the analysis of the data was carried out three times: First when pre-test creativity was equated with fluency, next with flexibility and finally with originality. The criteria for the trichotemization are summarized below for all of the three factors:

I.	Fluency	1.	Low: 5-16
		2.	Medium: 17-24
		3.	High: 25-42
II.	Flexibility	1.	Low: 1-9
		2.	Medium: 10-12
		3.	High: 13-20
III.	Originality	1.	Low: 0-8
		2.	Medium: 9-14

3. High: 15-20

IV. Failure. This factor was defined by exposure to three very difficult problems. These problems were adopted because some pilot work on their difficulty level indicated that almost no one could solve them in the allotted time of 4 minutes. Additionally all subjects exposed to these problems were asked at the end of the experiment whether or not they felt they had failed during the experiment. If they responded that they felt no failure they were not included in the core calculations of this study. Thus, failure was defined as (1) exposure to three very difficult problems, (2) inability to solve these problems, and (3) the presence of feeling of failure.

The following problems comprised the three failure tasks and they were presented in the fixed order below:

1. Match Problem (Fixx, 1972, pp. 11-12)
2. Square Problem (Dudeney, N. D., p. 98)
3. Dot Problem (Adams, 1974, p. 17).

These problems are attached in appendix G (the correct solution to them is shown in appendix H). They were chosen with the following criteria in mind:

A. They are very difficult problems. Athough there are correct solutions to these problems, it would be next to impossible to reach these solutions in the time allowed during the experiment.

B. These problems were chosen so that the subject's

inability to solve them will be very obvious to him. This immediate feedback prevents the subject from supplying a false response and then assuming that he has been correct and hence perceiving himself as successful.

C. The failure tasks were chosen so that they are not only demanding but also involving. Problems which would discourage the subjects immediately and thus would not involve them were avoided. It was argued that this criterion, together with the time restraints put on these tasks, will decrease the likelihood of the subjects indulging in daydream when they are supposed to work on the difficult problems.

D. The failure tasks were chosen so that they are cognitive. After all, it would also have been possible to choose very difficult sensory-motor tasks. However, in such a situation it would not have been possible to decide whether the salient variable is failure or the change in the task related set of the subject, alternating between the two types of cognitive and sensory-motor tasks.

E. In the directions for all of the three tasks it was indicated that there is a correct solution to the problem so that the subjects do not assume these problems are impossible to solve.

V. Fantasy. This factor in the present study is defined as the <u>pleasant</u> and <u>vivid</u> stimuli that the subjects reported they generated under instruction. A four minute

period was designated as the "break period"; the length of this period was not disclosed to the subjects. At the onset of this period the subjects read the following instructions: "Let your mind wander. Imagine something (anything) which is both very pleasant and enjoyable to you and which you can imagine clearly and vividly. There will be no demand on you to disclose the specifics of your fantasy so what you imagine may be as personal and private as you desire. If it helps make your fantasy more vivid and pleasant, you may close your eyes. The experimenter will let you know when to stop, so just let yourself go". The same instructions were repeated for the other break periods. The pages on which the fantasy instructions appeared were blue. This choice of color allowed the experimenter to know at a glance whether the subject had turned to the page with the fantasy directions or he was working on other tasks.

In order to impose a degree of control and introduce a measure of homogeniety in defining fantasy, only the subjects who reported pleasant and vivid fantasies were included in the core calculations of this study. This measure of control was deemed necessary in view of the aforementioned research in the covert conditioning paradigm. The general view is that unpleasant fantasies may affect behavior in ways opposite to those of pleasant fantasies, and that in order for imaginal stimuli to have an impact on observable behavior, the person has to be able to imagine

them vividly.

Bases for the exclusion of subjects from the core calculations. This seems an apt place to indicate how out of the original sample of 404 subjects who participated in this study, only 288 were used to ascertain the answers to the core questions. The list below enumerates criteria used for excluding a subject from the core calculations:

A. Subjects were excluded from G3 and G4 if they reported no vivid fantasies, or no fantasies at all (a score of 5 or 6 on question 1, appendix G).

B. Subjects were also excluded from G3 and G4 if their fantasies were not pleasant at all, or were actually unpleasant (a score of 5 or 6 on question 2, appendix G).

C. It was possible for the subjects to use the fantasy periods to think of the tasks on the test booklet. Thinking of the failure tasks might have caused lingering feelings of failure, contaminating the fantasy measure. Also, thinking of the test tasks might have served as practice effect, resulting in a possible increase in the creativity scores and making the outcome difficult to interpret. Thus, in order to avoid the above compounding factors, only those subjects were included in G3 and G4 whose fantasies did not involve the material on the test booklet (a score of 1 on question 4, appendix G).

D. As indicated previously, subjects were also excluded from G2 and G4 if they indeed found the right solution to

the difficult tasks, or reported that they experienced no sense of failure whether or not they had actually solved the problems.

E. If the subjects did not answer the relevant questions on the test booklet, they were also excluded.

Dependent variables. The three dependent measures of this study are the pooled fluency, flexibility and originality scores of the three sub-tests of TTCT described in the instrument section, namely, Product Improvement, Unusual Questions, and Just Suppose. What is intended by pooled measure is simply the addition of the fluency scores of the three tasks to obtain a pooled fluency, and the addition cf the three originality scores to obtain a pooled originality. Since no guidelines are yet developed for the flexibility score of the Unusual Questions, pooled flexibility is based on the scores derived from only two tasks. The directions for scoring the tasks are supplied by Torrance (1974a, 1974b). The three dependent variables were defined operationally and specifically in the section presenting a diagrammatic outline of this study. Previous research indicates that these three dependent variables may be differentially sensitive to the operations of the independent variables (e. g. Nash, 1975).

Statistical Analyses

Preliminary analysis. Due to the method of assigning subjects to the various groups of this study, and then

excluding a sizable number of these subjects from the core calculations, a preliminary analysis was carried out. This analysis aimed to rule out the theoretical possibility that the above operations contaminated the sampling procedure of this study in terms of pre-test creativity. It was specifically desired to show that the pre-test creativity of the subjects in the four groups was not different, and that the subjects excluded from the core calculations did not systematically differ from the ones included in terms of pre-test creativity.

The analysis involved a 4 X 2 multivariate analysis of variance where factor one was group membership with 4 levels, and factor two involved whether or not the subjects were included in the core calculations of the study. The criterion variables were the fluency, flexibility and originality scores of the Unusual Uses Test, treated multivariately (Harris, 1974) and the analysis was carried out by the use of the Finn multivariate computer program (Finn, 1968). The acceptable probability of type I error was set at the 0.0500 level.

Core questions. The core of this study was viewed as constituting a 3 X 2 X 2 factorial design. Since several correlated dependent variables were involved the chosen method of analysis was multivariate analysis of variance (Harris, 1974). The data were thus analyzed by the use of the Finn multivariate computer program (Finn, 1968).

Failure and fantasy were dichotemized variables each having 2 levels depending on whether they were absent or present. Pre-test creativity had three levels of high, medium, and low, and since there were three criteria of pre-test creativity (the fluency, flexibility, and originality of the Unusual Uses Test) three MANOVA's were carried out. The acceptable p of type I error was set at the 0.0500 level for the experiment. But since three multivariate analyses were carried out, and in order to guard against an inflated probability of type I error, the acceptable level of p for each of the three multivariate F's was set at the 0.0160 level.

Univariate F's corresponding to each dependent variable was considered further only if the multivariate F was considered significant. When both the multivariate and univariate F's were considered significant (both molar indices), the Bonferroni procedure was used to probe the more detailed (and molecular) nature of the effects. The various tests of the main effects and the first and second order interactions corresponded to core questions 1 to 3.

Repeated measures. Since the three creativity tasks were randomly distributed as M1, M2 and M3 and the design was counter balanced, it was possible to study the effects of repeated exposures to the operations of this study.

The design was viewed as a 3 X 3 X 2 X 2 factorial consisting of three repeated measures, three levels of

creativity, two levels of failure and two levels of fantasy. The analysis of variance was carried out three times depending on the pre-test criterion for creativity and each analysis was carried out for fluency and originality as the dependent variables. Flexibility was not included as a dependent variable because all subjects had missing data either in M1, M2 or M3. The overall acceptable level for the probability of type I error was set at 0.0500 and since 6 analyses were carried out, the level of error for each individual analysis was set at 0.0083. These analyses were carried out by the use of the BMD computer program (Dixon, 1975).

Ancillary questions. Question 5 was viewed as a 4 X 2 factorial arrangement consisting of 4 levels of self-report on the consistency-variability factor and 2 levels of relevance (relevant or irrelevant). The criterion variables were the fluency, flexibility and originality scores of the Unusual Uses Test. And as before since the dependent variables are correlated, the data was analyzed by the multivariate analysis of variance method (Finn, 1968). The acceptable probability of type I error was set at the 0.0500 level, and a significant multivariate F was considered a prerequisite for considering the univariate F's. The sample employed for answering this question consisted of all of the subjects who participated in this study. The few cases who had not answered the relevant questions were excluded and

the final sample included 396 subjects.

The sample for question 6 was composed of all the subjects in G3 who reported having fantasies (i. e. attained a score of 1-5 on question 1, appendix G). The size of this sample (n = 85) was larger than the sample of G3 used in core calculations (n = 74) but smaller than the total sample which comprised G3 (n = 96). A correlation coefficient was established between vividness of fantasy (on a 1-5 scale) and sex (on a 1-2 scale). The probability that this correlation is significantly different from zero was obtained and as in the other parts of this study, the acceptable probability of type I error was set at the 0.0500 level.

Question 7 was analyzed using the same sample as above. Three univariate analyses were carried out using first the fluency, second the flexibility and third the originality of Unusual Uses as the criterion of creativity. In each ANOVA, pre-test creativity was the factor stratifying the subjects into the low, medium and high levels and the dependent variable (or more aptly the criterion variable) was the vividness of fantasy on a 1-5 scale. Since three analyses were carried out the acceptable level of type I error was set at 0.0500/3 or 0.0160 for each analysis.

Chapter III

Results

As indicated previously, in order to rule out the possibility that exclusion of subjects from the core calculations of this study systematically excluded certain subjects in terms of pre-test creativity, a preliminary analysis was carried out. The multivariate F test (see appendix A) showed neither a significant main effect due to the group assignment factor ($F = 0.84$, $df = 9,944$, p less than 0.57) nor one due to the used-not-used factor ($F = 0.72$, $df = 3,388$, p less than 0.53). The interaction was not significant either ($F = 0.99$, $df = 6,776$, p less than 0.42). Thus, it was concluded that overall the experiment, and in terms of the prior level of creativity, (1) subjects were randomly assigned to the experimental groups 1, 2, 3 and 4, and (2) subjects excluded from the core calculations did not systematically differ from the ones included.

Core Questions

For the core questions of this study, as mentioned before, the probability of type I error is set at 0.0500 and since three multivariate analyses are undertaken, only those multivariate F's are considered statistically significant which have a p of 0.016 or less. Table 1 and figure 1 summarize the findings where pre-test creativity is equated with the fluency score of the Unusual Uses Test.

TABLE 1

MULTIVARIATE AND UNIVARIATE ANALYSIS OF VARIANCE
CORE QUESTIONS--CREATIVITY BREAKDOWN ON FLUENCY

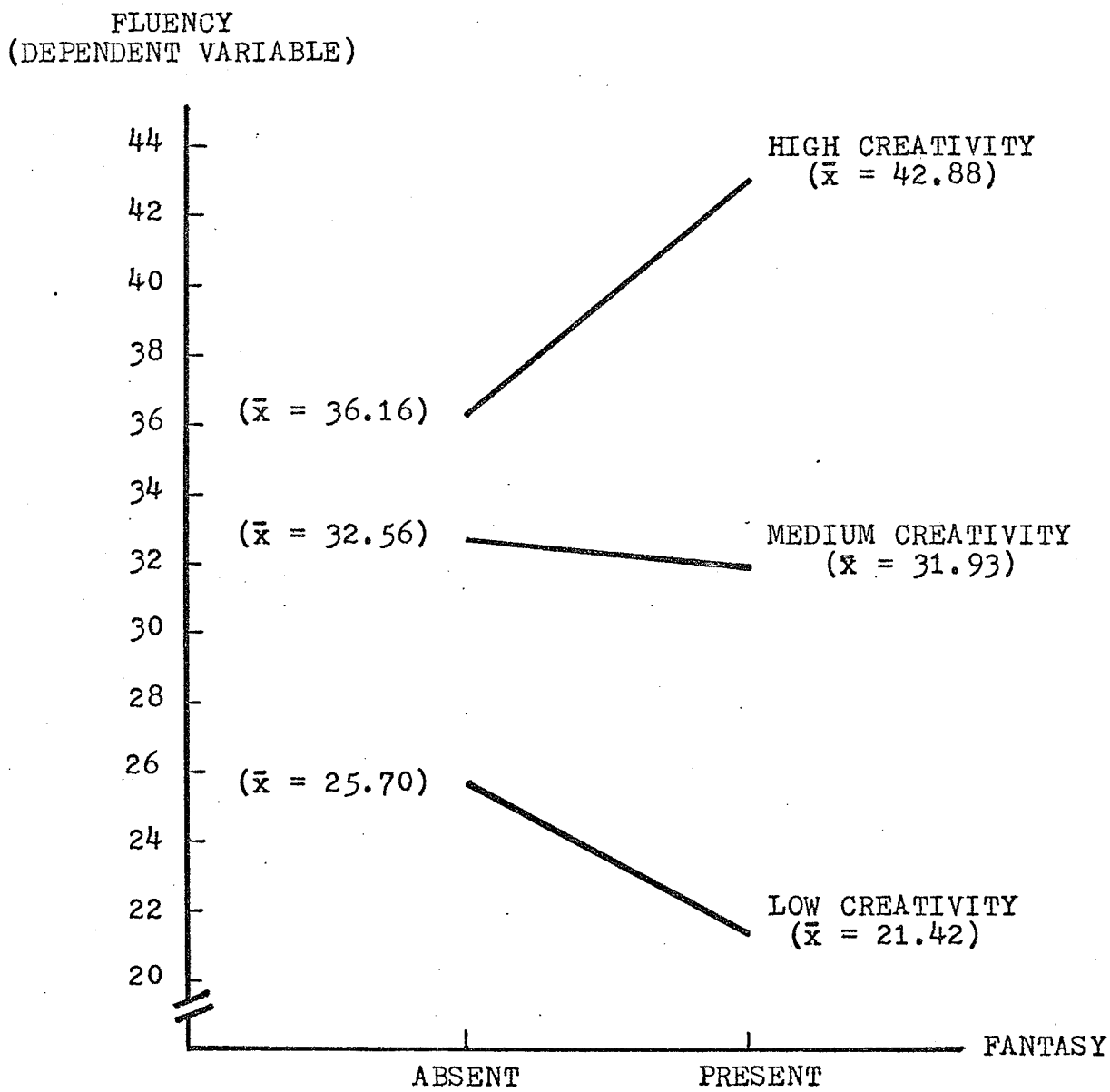
Source	df	MS	F	p less than
Creativity				
Multivariate	(6,548)	--	22.96	0.0001
Univariate				
Fluency	2	5556.84	57.21	0.0001
Flexibility	2	472.70	54.80	0.0001
Originality	2	1968.71	33.28	0.0001
Failure				
Multivariate	(3,274)	--	4.37	0.0050
Univariate				
Fluency	1	55.62	0.57	0.4499
Flexibility	1	91.45	10.60	0.0013
Originality	1	53.41	0.90	0.3430
Fantasy				
Multivariate	(3,274)	--	1.31	0.2704
Univariate				
Fluency	1	21.66	0.22	0.6371
Flexibility	1	1.72	0.20	0.6548
Originality	1	145.18	2.45	0.1183
Creativity X Failure				
Multivariate	(6,548)	--	0.79	0.5733
Univariate				
Fluency	2	118.38	1.21	0.2971
Flexibility	2	12.55	1.45	0.2352
Originality	2	91.15	1.54	0.2160

(Cont. . .)

Source	df	MS	F	p less than
Creativity X Fantasy				
Multivariate	(6,548)	--	2.71	0.0132
Univariate				
Fluency	2	743.41	7.65	0.0006
Flexibility	2	11.72	1.35	0.2585
Originality	2	83.75	1.41	0.2444
Failure X Fantasy				
Multivariate	(3,274)	--	0.47	0.7001
Univariate				
Fluency	1	67.48	0.69	0.4054
Flexibility	1	0.04	0.00	0.9428
Originality	1	25.00	0.42	0.5163
Creativity X Failure X Fantasy				
Multivariate	(6,548)	--	1.06	0.3819
Univariate				
Fluency	2	64.79	0.66	0.5141
Flexibility	2	5.07	0.58	0.5562
Originality	2	90.33	1.52	0.2190
Error Terms				
Fluency	276	97.11		
Flexibility	276	8.62		
Originality	276	59.15		

FIGURE 1

INTERACTION BETWEEN CREATIVITY (PRE-TEST FLUENCY) AND FANTASY



As the table indicates, the multivariate test of the main effect due to pre-test creativity is significant ($F = 22.96$, $df = 6,548$, p less than 0.0001). All the univariate tests are also significant. Subjects scoring high on the fluency of Unusual Uses also score high on all of the three dependent variables and this trend correspondingly holds for the medium and low scorers. The high creativity subjects score significantly higher than the medium scorers, and the latter, in turn, score significantly higher than the low scorers. Table 2 provides a list of all these comparisons.

There is also a significant effect due to the next independent variable of this study, namely failure ($F = 4.37$, $df = 3,274$, p less than 0.0050). Here, however, only flexibility as a dependent variable is sensitive to the operations which define failure (p less than 0.0013). The indication is that exposure to failure has a detrimental effect on the flexibility of the subjects.

Although fantasy as a whole does not seem to have an effect on creativity, when the pre-test creativity of the subjects is taken into account, a significant interaction emerges (i. e. the effect of fantasy depends on the prior creativity level of the subjects). The multivariate test of this interaction is significant ($F = 2.71$, $df = 6,548$, p less than 0.0132) with fluency as the only univariately sensitive dependent variable ($F = 7.65$, $df = 2,276$, p less than 0.0006). The subjects who are initially high in

creativity benefit from the opportunity to engage in fantasy (t = 3.32, df = 276, p = 0.001) whereas the subjects who are initially low in creativity suffer a loss in their fluency score (t = 2.09, df = 276, p = 0.039). For full detail see table 3. Figure 1 presents the graph of this interaction.

The present study does not lead to any conclusions regarding the effects of exposure to fantasy after failure. The test of interaction between failure and fantasy is far from significant (F = 0.47, df = 3,274, p less than 0.7001). Similar findings hold when pre-test creativity is taken to be flexibility and originality.

TABLE 2

COMPARISON OF VARIOUS PRE-TEST CREATIVITY LEVELS ON THE THREE DEPENDENT VARIABLES

Pre-test creativity	Levels compared	Means compared	Dependent variable	t(d)	p(e)
Fl(a)	H & M	39.03 & 32.28	Fluency	4.78	0.000
Fl	H & M	11.83 & 10.59	Flexibility	2.94	0.003
Fl	H & M	18.96 & 13.95	Originality	4.55	0.000
Fl	M & L	32.28 & 23.72	Fluency	6.02	0.000
Fl	M & L	10.59 & 7.48	Flexibility	7.35	0.000
Fl	M & L	13.95 & 9.84	Originality	3.69	0.000
Fx(b)	H & M	37.79 & 32.51	Fluency	3.30	0.001
Fx	H & M	11.61 & 10.66	Flexibility	2.05	0.041(f)
Fx	H & M	18.61 & 14.31	Originality	3.63	0.000
Fx	M & L	32.51 & 26.43	Fluency	4.04	0.000
Fx	M & L	10.66 & 8.17	Flexibility	5.70	0.000
Fx	M & L	14.31 & 10.92	Originality	3.04	0.002
Og(c)	H & M	37.62 & 31.49	Fluency	4.01	0.000
Og	H & M	11.75 & 9.96	Flexibility	4.03	0.000
Og	H & M	18.12 & 14.14	Originality	2.86	0.004
Og	M & L	31.49 & 25.96	Fluency	3.59	0.000
Og	M & L	9.96 & 8.21	Flexibility	3.88	0.000
Og	M & L	14.14 & 10.47	Originality	3.19	0.001

(a) Fluency score of the Unusual Uses
(b) Flexibility score of the Unusual Uses
(c) Originality score of the Unusual Uses
(d) Unequal sample t-test for the difference between two sample means calculated from
$t = M1 - M2/\sqrt{M.\ S.\ within\ (1/n1 + 1/n2)}$
distributed as t with n - 12 degrees of freedom.
(e) All the p values are based on $df = 276$
(f) Does not remain significant when subjected to the more conservative Bonferroni procedure (dividing the p of type I error by the number of comparisons, which is 2 in this case).

Table 3 lists the *t* values for the test of interaction between various pre-test creativity criteria and fantasy. The general tendency is for fantasy to decrease the fluency score of the low creativity subjects but to increase that of the high creativity individuals, and this tendency remains statistically significant for various pre-test creativity criteria. Some exceptions occur when the various comparisons are subjected to the more conservative Bonferroni procedure for the control of type I error. When flexibility of Unusual Uses Test is the criterion of pre-test creativity the lows score significantly lower when exposed to fantasy and the highs significantly higher. However, with fluency and originality as the pre-test criteria of creativity, only one in each of the two sets of comparisons remains significant when employing the more conservative Bonferroni criterion. Table 3 summarizes the result of various comparisons.

TABLE 3

t VALUES FOR THE SIGNIFICANCE OF INTERACTION BETWEEN PRE-TEST CREATIVITY AND FANTASY

Pre-test creativity equated with	Pre-test creativity level	t value (a)	df	p
Fluency	Low	2.09	276	0.037 (b)
Fluency	High	3.32	276	0.001
Flexibility	Low	2.87	276	0.004
Flexibility	High	2.51	276	0.012
Originality	Low	2.96	276	0.003
Originality	High	2.13	276	0.034 (b)

(a) Unequal sample t test for the difference between two sample means calculated from
$t = M1 - M2/\sqrt{M.\ S.\ within\ (1/n1 + 1/n2)}$
distributed as t with N - 12 degrees of freedom.

(b) Does not remain significant at a $p = 0.05$ (or less) when subjected to the more conservative Bonferroni procedure (dividing the p of type I error by the number of comparisons, which is 2 in this case).

When pre-test creativity is equated with flexibility (see appendices B and C) and originality (see appendices D and E) the MANOVA tables reveal nearly the same results. Consequently, rather than further reiterate these results here, they are attached as appendices with the exceptions being noted here.

When pre-test creativity is equated with flexibility, the interaction between fantasy and pre-test creativity reaches marginal significance with the other two dependent variables of flexibility ($F = 2.68$, $df = 2,276$, p less than 0.0697) and originality ($F = 3.02$, $df = 2,276$, p less than 0.502) as well (appendix B). However, in view of the decision rule stated previously, here also, fluency is viewed as the only dependent variable which reflects the interaction between pre-test creativity and fantasy ($F = 7.36$, $df = 2,276$, p less than 0.0008).

The main effect of creativity pre-test remains significant for all the three pre-test criteria of creativity. The high pre-tests score significantly higher than the medium pre-tests and the latter, in turn, significantly higher than the low pre-tests. This relationship holds for all the three pre-test criteria of creativity and on all the three dependent variables. The only exception is indicated in table 2 which lists the t values for all the comparisons.

The Repeated Measures Dimension

The repeated measures dimension of this study revealed no significant measures' main effect. The only interaction that comes close to significance (see appendix F) is that between R X C X Fn when pre-test creativity is equated with originality ($F = 2.837$, $df = 4,552$, $p = 0.024$). However, in view of the number of analyses carried out, and since the probability of type I error is set at 0.0083, the above is not considered significant.

Variability-Consistency and Relevance-Irrelevance

Table 4 lists the means for various levels of the variability-consistency and relevance-irrelevance factors used in this analysis (ancillary question #5). An informal comparison with the other three levels indicates that the individuals characterizing themselves as very variable have the highest scores on all three indices of creativity (with one exception). Also those who have considered the consistency-variability dimension as relevant in describing themselves have a higher creativity score--on all three measures--than those who have considered it irrelevant.

However, this is descriptive statistics and when the data are analyzed for inferential purposes the results are not this clear cut. The multivariate analysis of the data (table 5) does not reveal as lucid a result here as for the core questions. When the dependent variables are taken as a package, the multivariate analysis reveals a significant

effect due to the variability-consistency factor ($F = 1.91$, $df = 9,939$, p less than 0.0467) though, the univariate tests do not reach significance. The exact nature of the relationship between creativity and the variable labeled variability-consistency does not become clear from this study, what does become clear is the pertinence of this heretofore neglected variable to the study of creativity, but more on this in a later section.

The situation is in reverse for the relevance-irrelevance factor. Whereas two of the univariate tests are significant (fluency: $F= 4.64$, $df = 1,388$, p less than 0.0317; flexibiliy: $F = 4.88$, $df = 1,388$, p less than 0.0277), the multivariate F is not ($F = 1.82$, $df = 3,386$, p less than 0.1415). Since in the present study establishing a significant multivariate F is a prerequisite for testing the dependent variables univariately, no claim of significance is made here. The interaction between the two variables is not significant either ($F = 0.86$, $df = 9,939$, p less than 0.5595).

TABLE 4

MEANS FOR THE VARIOUS LEVELS OF
VARIABILITY-CONSISTENCY AND RELEVANCE-IRRELEVANCE

Level	n	Fluency	Flexibility	Originality
Consistency-Variability				
1. Very consistent	25	19.64	10.08	12.60
2. Moderately consistent	192	20.98	10.95	13.03
3. Moderately variable	130	20.27	10.06	11.77
4. Very variable	49	21.90	10.73	15.04
Relevance-Irrelevance				
1. Relevant	303	21.28	10.79	13.25
2. Irrelevant	93	19.12	9.87	11.51

TABLE 5

MULTIVARIATE AND UNIVARIATE ANALYSIS OF VARIANCE
ANCILLARY QUESTION (#5)

Source	df	MS	F	p less than
Consistency-Variability				
Multivariate	(9,939)	--	1.91	0.0467
Univariate				
Fluency	3	45.08	0.66	0.5727
Flexibility	3	22.78	2.04	0.1064
Originality	3	131.61	2.40	0.0673
Relevance-Irrelevance				
Multivariate	(3,386)	--	1.82	0.1415
Univariate				
Fluency	1	314.13	4.64	0.0317
Flexibility	1	54.31	4.88	0.0277
Originality	1	178.58	3.25	0.0718
Interaction				
Multivariate	(9,939)	--	0.86	0.5595
Univariate				
Fluency	3	26.63	0.39	0.7574
Flexibility	3	10.59	0.95	0.4153
Originality	3	8.39	0.15	0.9277
Error Terms				
Fluency	388	67.56		
Flexibility	388	11.11		
Originality	388	54.79		

Sex and Vividness of Fantasy

The males ($n = 34$, $M = 2.44$) scored somewhat higher than the females ($n = 51$, $M = 2.07$) on the vividness of fantasy (on a scale of 1 to 5). However, the Pearson correlation coefficient between sex and vividness of fantasy was only $r = 0.175$ ($n = 85$, $p = 0.054$). In view of the small magnitude of the correlation and the marginal probability of type I error, this correlation will not be considered of much conceptual significance.

Creativity and Vividness of Fantasy

Of the three analyses of variance (tables 6, 7 and 8) undertaken to answer question 7 of this study concerning the relationship between creativity and vividness of fantasy only one shows a significant F (table 7). But since for the control of experimentwise error rate the acceptable level of type I error is set at $p = 0.016$ for each individual analysis, this finding is considered only of marginal significance.

TABLE 6

ANOVA TABLE FOR THE RELATIONSHIP BETWEEN VIVIDNESS OF FANTASY AND FLUENCY

Source	df	Sum of Squares	Mean Squares	F	p
Between Groups	2	4.8267	2.4133	2.415	0.094
Within Groups	82	81.9265	0.9991		
Total	84	86.7532			

TABLE 7

ANOVA TABLE FOR THE RELATIONSHIP BETWEEN VIVIDNESS OF FANTASY AND FLEXIBILITY

Source	df	Sum of Squares	Mean Squares	F	p
Between Groups	2	6.5237	3.2618	3.334	0.040
Within Groups	82	80.2295	0.9784		
Total	84	86.7532			

TABLE 8

ANOVA TABLE FOR THE RELATIONSHIP BETWEEN VIVIDNESS OF FANTASY AND ORIGINALITY

Source	df	Sum of Squares	Mean Squares	F	p
Between Groups	2	4.5986	2.2993	2.295	0.105
Within Groups	82	82.1545	1.0019		
Total	84	86.7532			

Chapter IV

Summary and Discussion

This study has primarily been an empirical and exploratory investigation. It attempted to answer four core and three ancillary questions about creativity. The findings related to each question are presented below and discussed.

1. The first question investigated in this study pertained to the effects of failure on creativity. It was predicted that failure has a detrimental effect on creativity and that this effect is greater for the low creativity individuals than for the high creativity ones. The results indicated that persons who were exposed to failure indeed became less flexible in their creative thinking. However, this effect was independent of the pre-test creativity level. That is: When experiencing failure, independent of how creative a person is, his thinking becomes less flexible.

The failure tasks in the present study were very difficult puzzles which likely generated a high degree of frustration. In line with the aforementioned research (e. g. Belcher, 1975; Rollins & Calder 1975) which indicated a curvilinear relationship between creativity and the severity of failure and/or stress, the present study showed that failure has detrimental effect on the flexibility

component of creativity. However, there were no indications that failure has any effect on fluency or originality. It is possible then that the effect of failure on creativity depends on how these two variables are defined and measured. Among the available studies in the area, the method variance in gauging creativity and defining failure and/or the generated stress and frustration is great. It is likely that part of the discrepancy of findings is due to this method variance.

Belcher (1975), for example, defined creativity in terms of TTCT scores, as does the present study, but generated stress via test taking atmosphere and instructions. He found originality to be the only sensitive dependent variable. The number of studies in the area are yet too few to draw any conclusions regarding the most potent factor or the most sensitive dependent variable. Furthermore, both the present study and that of Belcher (1975) were basically concerned with the short term effects of situational failure on creativity. The long term effects, perhaps closer to the heart of the statements by Faulkner (1969) and O'Neill (Gelb & Gelb, 1962) quoted at the beginning of this study, remain to be investigated and may be quite different.

Also, what seems discrepancy on one level, may prove a consistency on a higher conceptual level. Though a different dependent variable proves sensitive to the

operations which define failure in each study, both the present study and that of Belcher (1975) indicate something similar: In situations where risk of anxiety, frustration and failure is present people seem to prefer to hold on to the familiar grounds and not venture too far away from the better known "routes". If valid, the formulation may have some implications for the conservatism generated by frustrating historical times.

As indicated before, although the present study found the effects of failure in the hypothesized direction, it failed to indicate the anticipated differences due to the pre-test creativity level. Both the high and low creativity subjects suffered from exposure to failure and there were no statistically significant differences between them. In this sense, the present study did not support the findings of Kerr and McGehee (1964) that under stress the more creative subjects proved better problem solvers. In retrospect, the discrepancy may be due to a variety of differences between the two studies. Kerr and McGehee (1964) were dealing with creative temperment and not necessarily creative thinking, their subjects were management and sales candidates applying for jobs, and perhaps more importantly, stress was measured by several scales which were then correlated with the creativity scores of the subjects. No attempt was made to induce stress and then measure the effect of this induction on creativity. The relationship between creative

temperament and creative thinking ability is far from clear and it is also possible that Kerr and McGehee (1964) were tapping moderate levels of stress which, as indicated previously, relate to creativity in a manner different from high stress.

But if failure and the reactions associated with it have a detrimental effect on creativity independent of the initial creativity level of a person, how is one to view the aforementioned statements of Faulkner and O'Neill on the relation between the two? A word seems appropriate here on the distinction, cited earlier, that Ghiselin (1963) makes between the major and minor types of creativity. Those who satisfy the present study's criteria of highly creative, most likely, fall in the upper range of what Ghiselin (1963) discusses as the minor type of creativity. The major type of creativity, attributed to the "light holders of mankind" may indeed be different from the criteria of the present study and is most likely far more complex. As speculated before, the highly creative members of mankind probably become successful not only because of a unique cognitive style and ability, but also due to a capacity to withstand pressure and outlast disappointment, which is far superior to that of the average man. One may even speculate that these individuals invite difficulty and frustration because these experiences offer them a chance to calibrate their strength. Whereas the average man may shun challenging

situations that offer the possibility of failure, frustration, or stress, the highly creative individual (possessing what Ghiselin describes as the major type of creativity) may actually seek these situations because they present a chance to affirm his existential validity.

Interesting possibilities may be suggested for the future direction of research in this area. A comparison of the high scorers on tests of creativity with the individuals who become renowned for their creativity in real life is long overdue. The way failure and frustration affect creativity of the two groups may be different; a study of the possible differences may cast some light on why some individuals who have many of the ingredients associated with creativity never create anything of long lasting value.

2. The effects of fantasy on creativity formed the second question probed in this study. It was predicted that a chance to engage in fantasy will increase one's creative output and that the initially high creativity persons will derive a greater benefit from fantasy than the initially low creativity individuals. The results failed to support the anticipation that fantasy would increase creativity, rather they indicated that the effects of fantasy depend on the initial level of creativity. Fantasy has an enhancing effect on the fluency score of the highly creative persons, but it has a detrimental effect on the fluency of the low creativity persons. That is: <u>The high creativity</u>

individuals become more creative when they engage in fantasy whereas the low creativity individuals become even less creative as a result of fantasy. The two seem to use fantasy in different ways.

The above findings suggest a need for studies using behaviors other than creative behavior as a dependent variable. It would be pertinent to investigate the effects of fantasy on other types of abilities and behaviors. It is possible that the difference between high and low creativity persons holds when exposed to fantasy for a variety of other behaviors. And if the above findings can be generalized to the effects of fantasy on other behaviors, there are some clear consequences.

Schools of psychotherapy employing fantasy for modifying behavior may do well to take into account the creativity level of the clients. The question of which type of patient benefits most from what kind of therapy has always been dear to the heart of clinicians. It may well be possible that high scorers on TTCT respond differently to imaginal stimuli than do the low scorers. The findings of the present study points to the fruitfulness of carrying this line of research further. A person's creativity level may prove of parametric value for studies of fantasy, imagery, daydream and covert positive reinforcement, whether in terms of therapy or otherwise.

There are also implications for educational practices.

Domino (1968, 1971) has used the California Psychological Inventory to distinguish between the conformers and independents in terms of achievement orientation. He found that conformers learn most and enjoy their experiences most when they are taught by methods which emphasize conformity rather than allow individuality. The independents, on the other hand, learn most and enjoy their learning better when they are allowed freedom and less direction is imposed upon them by the teachers. In short, each group performs better and reports greater satisfaction when taught by methods consonant with their achievement orientation. Barron (1965) reports that creative persons usually score higher on the achievement via independence scale of the CPI.

The finding of the present study is in line with the above research and lends support to a recent emphasis in education arguing for the individualization of instructional materials. Torrance (1974b) has argued that high scorers on TTCT prefer to learn in the more imaginative ways which allow the freedom of discovery and may be different from others in some fundamental way. The present findings indicate that higher scorers on TTCT use fantasy in a different way than lower scorers. This is consistent with the small but clearly applied and important body of research cited above on the relationship between learning and methods of instruction. The results of the present study supply a welcomed bit of evidence in support of TTCT's capacity to

identify individuals who may benefit from the more free methods of instruction and those who may perhaps suffer when taught by such methods.

3. The present study does not lead to any conclusions regarding the effects on creativity of exposure to fantasy after failure. Apparently, in terms of the operations of the present study, it makes no difference whether or not a person engages in fantasy after failure: i. e. there are no effects on his creative output. However, in view of a total lack of previous research in this area, it is hard to speculate as to whether this lack of effect is due to the procedural difficulties with the present study or an actual absence of effects.

4. No indications were found to support the existence of a main or interaction effect due to the repeated measure factor. What this implies is that no significant change took place as a result of individual exposures to the operations which defined failure and fantasy. The effects that these two variables had were only significant when pooled across the repeated operations.

Another implication of lack of effect in this area is that the subjects' performance in Group 1 did not significantly differ from the beginning of the experiment (M1) to the end (M3). Since in the present design the tasks for each occasion were randomized, there are some suggestions regarding the internal consistency of TTCT. The

results show no evidence of practice effect or susceptibility to fatigue while taking the TTCT, at least on the subtests employed here. If the scores decreased significantly over trials the instrument may have been viewed as too sensitive to fatigue or a variety of other such variables categorized by Campbell and Stanley (1963) as maturational variables. On the other hand if the scores kept increasing across trials, practice effect may be suspect. The above evidence, though tangential to the main goal of the present study, offers support for the psychometric validity of TTCT.

5. The findings of this study regarding the core questions have been clearly either significant or not significant. With the ancillary questions, however, the picture that emerges is not this lucid. This study, by its very nature, has taken the most conservative route in adopting a decision rule and carrying on statistical interpretations. But there are logical as well as statistical grounds for considering a finding significant. When the probe of a new area yields marginal results, one must guard as vehemently against type II as against type I error. Before the emergence of more potent methods and technology, the exclusion of marginal findings from consideration may be premature and cause a delay in the ultimate discovery of the relevant variables. For the remainder of this discussion, results will be discussed not

only on the basis of statistical significance but also logical merit.

The present study lends support to the relevance of a variable named here "variability-consistency" to the area of creativity. However, knowledge of the exact nature of the relationship between the two variables does not emerge from the present study. Originality seems to be the dependent variable which registers the relationship between the two most clearly (see table 5). The subjects who describe themselves as highly variable have the highest score on originality (see table 4).

The eccentricity, and at times bizarreness, attributed anecdotally to creative individuals likely corresponds to a large degree of behavioral variability, unfamiliar to most people. Of the three dependent variables in this study, originality, appears the best index of how much a person's behavior deviates from the norms, or how much his responses vary from the range of responses associated with "normal" behavior. As such, there is a face validity to the above finding. But what the present study indicates more clearly is that the variable conceptualized here as variability-consistency is relevant to creativity and that further research in this area will likely prove worthwhile. What is needed is a more comprehensive assessment of creativity and not only self-reports on the variability-consistency and relevance-irrelevance scales,

but also some behavioral assessments by external observers, both situationally specific and also over time. The scaling of the two factors may also stand further refinement.

6. The present study failed to find any meaningful or significant relationship between sex and vividness of fantasy. If fantasy is indeed related to sex, the relationship may be with the other components of fantasy such as the content, duration or frequency.

7. Though in the strict sense of the decision rule adopted in this study no significant relationship can be reported between creativity and vividness of imagination, a point needs further emphasis. The aforementioned study by Khatena (1975d) reporting a relationship between creativity and vividness of imagery employed a very different method for measuring both creativity and vividness of imagery. The fact that the present study despite the use of different instruments and procedures, nonetheless, showed a relationship of marginal significance between the two variables needs some elaboration. When creativity is equated with the flexibility of the Unusual Uses the test of the relationship between creativity and vividness of fantasy approaches statistical significance.

When a relationship between two variables shows up in different studies despite a considerable method variance, there are logical grounds for deeming the relationship of some importance. It is argued that the relationship found

here between creativity (or more specifically flexibility) and vividness of fantasy cannot simply be attributed to chance. The conclusion gains further support from the findings in relation to question 2. When flexibility (as opposed to fluency or originality) is equated with pre-test creativity, the effects of fantasy is most clear cut as well as most potent (see table 3 and appendix B). This is the only case where the test of interaction between pre-test creativity and fantasy is significant for both the low and the high creatives (see table 3). Also, this effect is shown not only on fluency which clearly registers it on a statistically significant level, but also the other dependent variables, namely flexibility and originality, where the results reach marginal statistical significance (see appendix C). If vividness is a parameter determining the effect of fantasy (a conclusion supported by the research cited from the covert conditioning paradigm) then, it is quite consistent that flexibility should indicate this effect most clearly and potently.

The issue is obviously far from resolved! What can be said at this point is that in the present study some support was found for the relationship first reported by Khatena (1975c, 1975d) but that a need is also indicated for further investigation of this relationship.

* * *

The above have been a presentation and discussion of the various questions posed in this study. A few additional comments need to be made prior to concluding this section. The first relates to the finding of a significant main effect due to pre-test creativity. People who score high on the Unusual Uses Test continue to score high on the other creativity tasks and corresponding trends hold for the medium and low scorers. The high creativity groups score significantly higher than the medium scorers on the three dependent variables, and the latter in turn, score significantly higher than the low scorers. What this indicates is that Unusual Uses Test is a reasonable single "shot" measure of creativity and that in situations where a more complete battery of tasks cannot be administered, this task may be a good single measure.

The fact that the three dependent variables show different degrees of sensitivity to the various operations of this study has an important implication. Despite a degree of overlap, the three dependent variables measure different operations. The fluency, flexibility, and originality scores of TTCT should not be treated as completely separate variables, nor can they be considered interchangeable. The best method of analyzing such overlapping but separate variables is the <u>multivariate method</u>. This approach allows distilling the three variables

into one package where the overlap is "trimmed off" while the independent portion of each dependent variable is retained. This issue has important methodological implications because a great majority of the extant studies of creativity using TTCT have treated the three scores univariately, ignoring the type of relationship between them.

The final comment pertains to the sensitivity of TTCT as a psychometric instrument. The present study supports the view that TTCT is sensitive to the effects of various operations on creativity, and that it is not greatly affected by noise variables. If the latter were the case, the error variance would be so great that gauging the effects of the independent variables would be next to impossible. The three different scores attained from TTCT seem to register somewhat different but overlapping operations and show different degrees of sensitivity to the operations of the independent variables. The use of the multivariate method is again recommended as the best method of studying the variables which this instrument yields.

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APPENDICES

APPENDIX A

PRELIMINARY ANALYSIS
MANOVA TABLE ON GROUP MEMBERSHIP
AND USED OR NOT-USED FACTORS

Source	df	MS	F	p less than
Group Membership Factor				
Multivariate	(9,944)	--	0.84	0.5715
Univariate				
Fluency	3	20.00	0.30	0.8231
Flexibility	3	7.56	0.67	0.5676
Originality	3	35.99	0.65	0.5775
Used or Not-Used Factor				
Multivariate	(3,388)	--	0.72	0.5348
Univariate				
Fluency	1	28.30	0.42	0.5131
Flexibility	1	17.99	1.60	0.2057
Originality	1	7.56	0.13	0.7101
Interaction				
Multivariate	(6,776)	--	0.99	0.4257
Univariate				
Fluency	2	63.51	0.96	0.3829
Flexibility	2	18.79	1.67	0.1881
Originality	2	12.73	0.23	0.7920
Error Terms				
Fluency	390	65.96		
Flexibility	390	11.20		
Originality	390	54.58		

APPENDIX B

MULTIVARIATE AND UNIVARIATE ANALYSIS OF VARIANCE
CORE QUESTIONS--CREATIVITY BREAKDOWN ON FLEXIBILITY

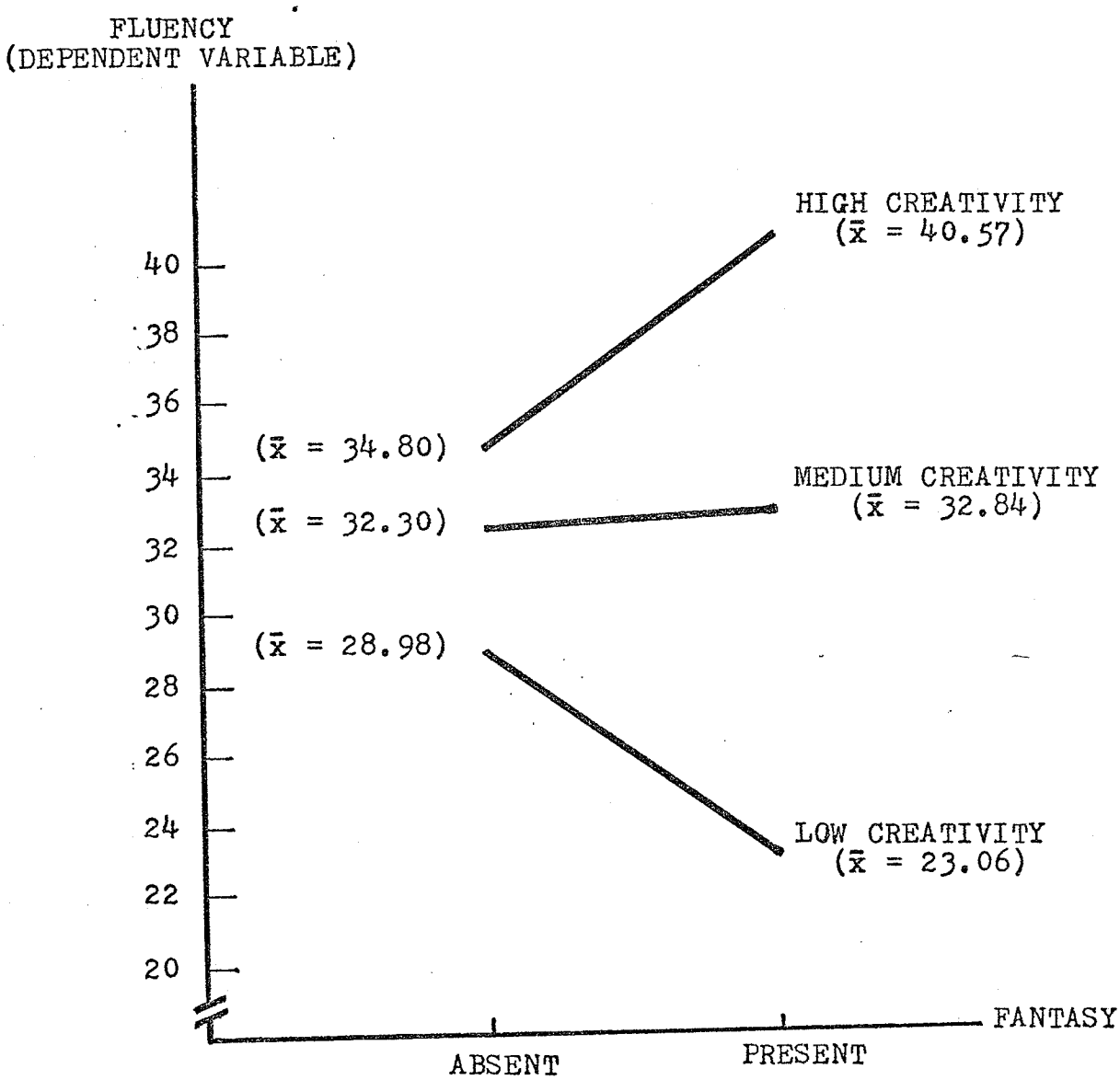
Source	df	MS	F	p less than
Creativity				
Multivariate	(6,548)	--	13.18	0.0001
Univariate				
Fluency	2	3118.49	27.18	0.0001
Flexibility	2	312.50	32.27	0.0001
Originality	2	1413.70	22.47	0.0001
Failure				
Multivariate	(3,274)	--	4.23	0.0060
Univariate				
Fluency	1	17.15	0.14	0.6994
Flexibility	1	81.14	8.37	0.0041
Originality	1	17.63	0.28	0.5970
Fantasy				
Multivariate	(3,274)	--	1.09	0.3499
Univariate				
Fluency	1	9.80	0.08	0.7703
Flexibility	1	10.92	1.12	0.2890
Originality	1	44.99	0.71	0.3987
Creativity X Failure				
Multivariate	(6,548)	--	0.71	0.6398
Univariate				
Fluency	2	59.75	0.52	0.5947
Flexibility	2	11.97	1.23	0.2920
Originality	2	69.48	1.10	0.3328

(CONT. . .)

Source	df	MS	F	p less than
Creativity X Fantasy				
Multivariate	(6,548)	--	3.22	0.0041
Univariate				
Fluency	2	844.83	7.36	0.0008
Flexibility	2	26.04	2.68	0.0697
Originality	2	190.33	3.02	0.0502
Failure X Fantasy				
Multivariate	(3,274)	--	0.06	0.6094
Univariate				
Fluency	1	111.67	0.97	0.3248
Flexibility	1	0.58	0.06	0.8064
Originality	1	70.70	1.12	0.2899
Creativity X Failure X Fantasy				
Multivariate	(6,548)	--	0.93	0.4667
Univariate				
Fluency	2	33.22	0.28	0.7489
Flexibility	2	5.85	0.60	0.5470
Originality	2	87.17	1.38	0.2519
Error Terms				
Fluency	276	114.72		
Flexibility	276	9.68		
Originality	276	62.91		

APPENDIX C

INTERACTION BETWEEN CREATIVITY
(PRE-TEST FLEXIBILITY) AND FANTASY



APPENDIX D

MULTIVARIATE AND UNIVARIATE ANALYSIS OF VARIANCE
CORE QUESTIONS--CREATIVITY BREAKDOWN ON ORIGINALITY

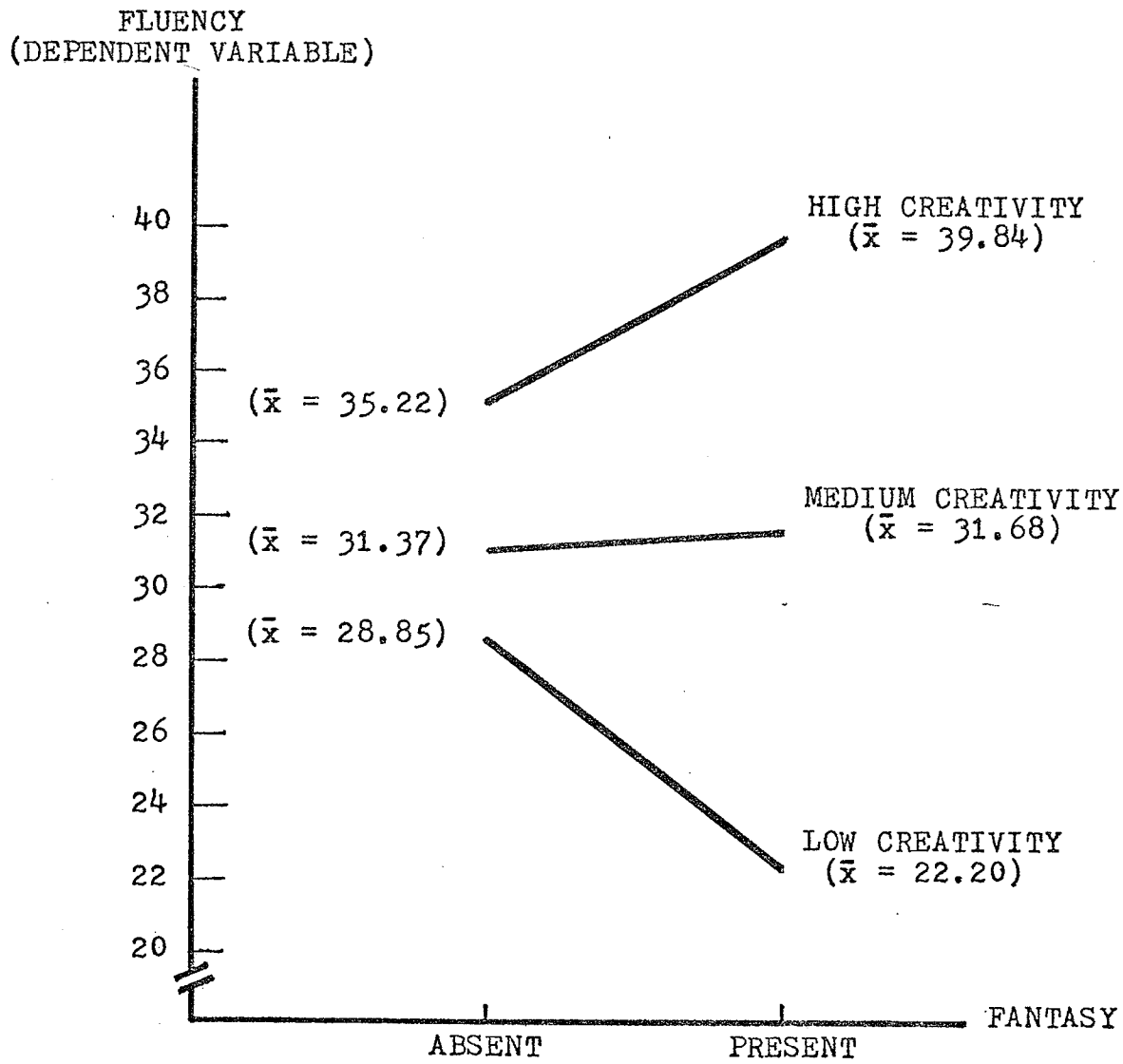
Source	df	MS	F	p less than
Creativity				
Multivariate	(6,548)	--	11.92	0.0001
Univariate				
Fluency	2	3204.04	28.07	0.0001
Flexibility	2	293.25	30.21	0.0001
Originality	2	1379.23	21.67	0.0001
Failure				
Multivariate	(3,274)	--	5.46	0.0012
Univariate				
Fluency	1	96.45	0.84	0.3589
Flexibility	1	122.05	12.57	0.0005
Originality	1	58.45	0.91	0.3388
Fantasy				
Multivariate	(3,274)	--	1.34	0.2596
Univariate				
Fluency	1	20.16	0.17	0.6747
Flexibility	1	16.30	1.67	0.1960
Originality	1	41.05	0.64	0.4227
Creativity X Failure				
Multivariate	(6,548)	--	1.45	0.1915
Univariate				
Fluency	2	76.34	0.66	0.5131
Flexibility	2	25.29	2.60	0.0757
Originality	2	120.90	1.90	0.1515

(Cont. . .)

Source	df	MS	F	p less than
Creativity X Fantasy				
Multivariate	(6,548)	--	3.12	0.0051
Univariate				
Fluency	2	744.33	6.52	0.0018
Flexibility	2	6.77	0.69	0.4984
Originality	2	131.48	2.06	0.1286
Failure X Fantasy				
Multivariate	(3,274)	--	0.63	0.5909
Univariate				
Fluency	1	78.47	0.68	0.4079
Flexibility	1	0.12	0.01	0.9086
Originality	1	46.14	0.72	0.3954
Creativity X Failure X Fantasy				
Multivariate	(6,548)	--	0.59	0.7370
Univariate				
Fluency	2	85.37	0.74	0.4743
Flexibility	2	5.02	0.51	0.5964
Originality	2	24.87	0.39	0.6769
Error Terms				
Fluency	276	114.13		
Flexibility	276	9.70		
Originality	276	63.62		

APPENDIX E

INTERACTION BETWEEN CREATIVITY
(PRE-TEST ORIGINALITY) AND FANTASY



APPENDIX F

UNIVARIATE REPEATED MEASURES TABLES

I. PRE-TEST CREATIVITY EQUATED WITH FLUENCY

Dependent Variable	Source	df	MS	F	p
Fluency	R	2	0.175	0.012	0.987
Fluency	R X C	4	4.778	0.352	0.842
Fluency	R X Fl	2	32.443	2.392	0.092
Fluency	R X Fn	2	16.160	1.191	0.304
Fluency	R X C X Fl	4	3.770	0.278	0.892
Fluency	R X C X Fn	4	10.473	0.772	0.543
Fluency	R X Fl X Fn	2	15.554	1.147	0.318
Fluency	R X C X Fl X Fn	4	4.131	0.304	0.875
Fluency	Error	552	13.558		
Originality	R	2	14.894	0.680	0.507
Originality	R X C	4	27.264	1.245	0.291
Originality	R X Fl	2	6.376	0.291	0.474
Originality	R X Fn	2	38.267	1.748	0.175
Originality	R X C X Fl	4	27.739	1.267	0.282
Originality	R X C X Fn	4	29.508	1.348	0.251
Originality	R X Fl X Fn	2	33.330	1.522	0.219
Originality	R X C X Fl X Fn	4	28.940	1.322	0.260
Originality	Error	552	21.890		

II. PRE-TEST CREATIVITY EQUATED WITH FLEXIBILITY

Dependent Variable	Source	df	MS	F	p
Fluency	R	2	0.292	0.021	0.978
Fluency	R X C	4	11.781	0.877	0.477
Fluency	R X Fl	2	26.603	1.981	0.139
Fluency	R X Fn	2	17.058	1.270	0.282
Fluency	R X C X Fl	4	7.310	0.544	0.703
Fluency	R X C X Fn	4	9.286	0.691	0.598
Fluency	R X Fl X Fn	2	20.068	1.494	0.225
Fluency	R X C X Fl X Fn	4	10.022	0.746	0.561
Fluency	Error	552	13.428		
Originality	R	2	15.970	0.728	0.483
Originality	R X C	4	24.683	1.125	0.344
Originality	R X Fl	2	10.718	0.488	0.614
Originality	R X Fn	2	67.351	3.071	0.047
Originality	R X C X Fl	4	34.756	1.584	0.177
Originality	R X C X Fn	4	19.241	0.877	0.477
Originality	R X Fl X Fn	2	39.353	1.794	0.167
Originality	R X C X Fl X Fn	4	29.819	1.359	0.247
Originality	Error	552	21.931		

III. PRE-TEST CREATIVITY EQUATED WITH ORIGINALITY

Dependent Variable	Source	df	MS	F	p
Fluency	R	2	1.314	0.099	0.906
Fluency	R X C	4	5.822	0.438	0.780
Fluency	R X Fl	2	27.980	2.109	0.122
Fluency	R X Fn	2	14.208	1.071	0.343
Fluency	R X C X Fl	4	5.219	0.393	0.813
Fluency	R X C X Fn	4	37.640	2.837	0.024
Fluency	R X Fl X Fn	2	17.093	1.288	0.276
Fluency	R X C X Fl X Fn	4	16.923	1.275	0.278
Fluency	Error	552	13.263		
Originality	R	2	21.689	0.992	0.371
Originality	R X C	4	8.574	0.392	0.814
Originality	R X Fl	2	11.794	0.539	0.583
Originality	R X Fn	2	50.738	2.322	0.099
Originality	R X C X Fl	4	35.670	1.633	0.164
Originality	R X C X Fn	4	27.118	1.241	0.292
Originality	R X Fl X Fn	2	30.876	1.413	0.244
Originality	R X C X Fl X Fn	4	40.557	1.856	0.117
Originality	Error	552	21.842		

R = repeated measure
C = pre-test creativity
Fl = failure
Fn = fantasy

APPENDIX G

WORKBOOK FOR STUDY FSII

Please answer all items on this questionnaire, as instructed by the experimenter. Answer all the items. Once you are finished with an item please do not go back to it at a later period.

Do not go to the next page until requested to do so by the experimenter.

UNUSUAL USES (Cardboard Boxes)

Most people throw their empty cardboard boxes away, but they have thousands of interesting and unusual uses. In the spaces below and on the next page, list as many of these interesting and unusual uses as you can think of. Do not limit yourself to any one size of box. You may use as many boxes as you like. Do not limit yourself to the uses you have seen or heard about; think about as many possible new uses as you can.

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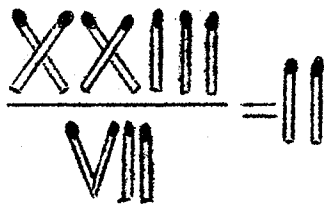
40. _____

<u>Do not</u> go to the next page until requested to do so by the experimenter.

MATCH PROBLEM

The following equation can be corrected by rearranging only one match. Make this rearrangement and draw your solution below. (None of the matches are to be discarded and only one can be rearranged. There is only one correct solution to this problem.)



Do not go to the next page until requested to do so by the experimenter.

BREAK PERIOD

Now, you have a short break. Please remain in your seat. Do not work on the test items and do not speak to anyone else. Let your mind wander. Imagine something (anything) which is both very pleasant and enjoyable to you and which you can imagine clearly and vividly. There will be no demand on you to disclose the specifics of your fantasy so what you imagine may be as personal and private as you desire. If it helps make your fantasy more vivid and pleasant, you may close your eyes. The experimenter will let you know when to stop, so just let yourself go.

Do not go to the next page until requested to do so by the experimenter.

PLEASE GO TO THE NEXT PAGE

UNUSUAL QUESTIONS

In this activity, you are to think of as many questions as you can about cardboard boxes. These questions should lead to a variety of different answers and might arouse interest and curiosity in others concerning boxes. Try to think of questions about aspects of cardboard boxes which people do not usually think about.

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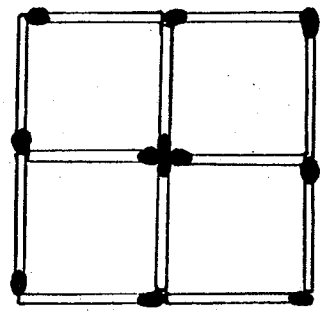
40. _____

<u>Do not</u> go to the next page until requested to do so by the experimenter.

SQUARE PROBLEM

As you can see below the twelve matches are so arranged that they form four squares. Rearrange these matches, all lying flat on the table, so that they form five squares. Every square must be entirely empty, no duplicated match or loose ends are allowed, and you cannot break any of the matches. (Work out your solution and draw the rearrangement you devise on the bottom of this page. There is only one correct solution to this problem.)



Do not go to the next page until requested to do so by the experimenter.

BREAK PERIOD

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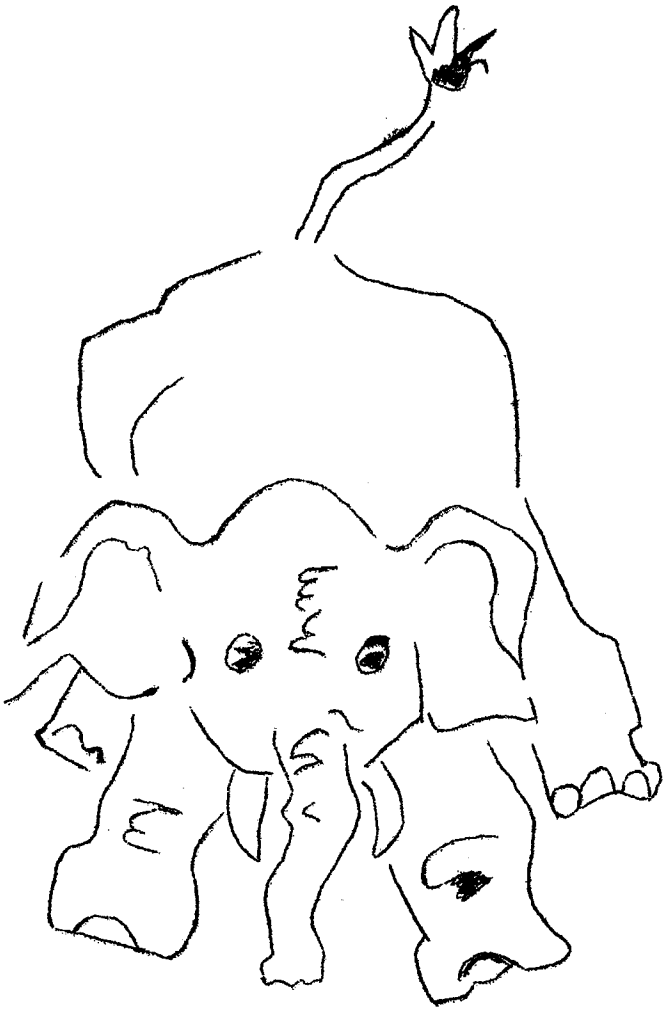
Do not go to the next page until requested to do so by the experimenter.

PLEASE GO TO THE NEXT PAGE

PRODUCT IMPROVEMENT

In the middle of this page is a sketch of a stuffed toy elephant of the kind you can buy in most dime stores for about one to two dollars. It is about six inches tall and weighs about a half pound. In the spaces on the next page, list the cleverest, most interesting and unusual ways you can think of for changing this toy elephant so that children will have more fun playing with it. Do not worry about how much the change would cost. Think only about what would make it more fun to play with as a toy.



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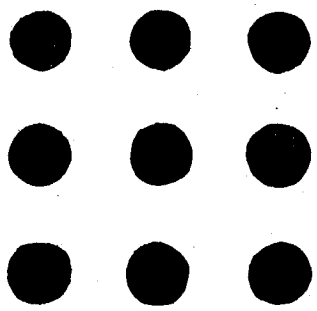
<u>Do not</u> go to the next page until requested to do so by the experimenter.

DOT PROBLEM

Without lifting your pen from the paper and without retracing your path, draw three straight lines which connect all the nine dots. (You may use the lower portion of this page as scrap paper. There is only one correct solution to this problem.)



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BREAK PERIOD

Now, you have a short break. Please remain in your seat. Do not work on the test items and do not speak to anyone else. Let your mind wander. Imagine something (anything) which is both very pleasant and enjoyable to you and which you can imagine clearly and vividly. There will be no demand on you to disclose the specifics of your fantasy so what you imagine may be as personal and private as you desire. If it helps make your fantasy more vivid and pleasant, you may close your eyes. The experimenter will let you know when to stop, so just let yourself go.

Do not go to the next page until requested to do so by the experimenter.

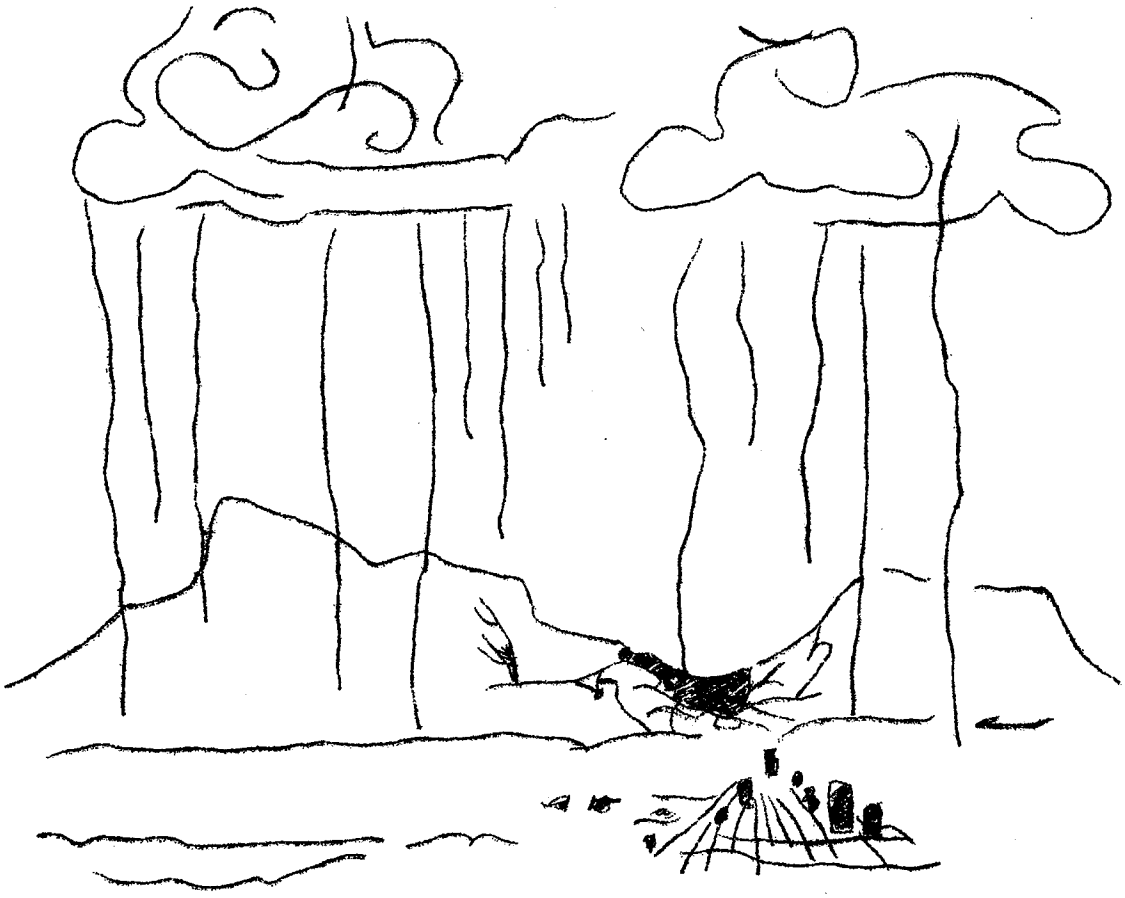
PLEASE GO TO THE NEXT PAGE

JUST SUPPOSE

You will now be given an improbable situation--one that will probably never happen. You will have to just suppose that it has happened. This will give you a chance to use your imagination to think out all of the other exciting things that would happen IF this improbable situation were to come true.

In your imagination, just suppose that the situation described were to happen. THEN think of all of the other things that would happen because of it. In other words, what would be the consequences? Make as many guesses as you can.

The improbable situation--JUST SUPPOSE clouds had strings attached to them which hang down to earth. What would happen? List your ideas and guesses on the next page.



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<u>Do not</u> go to the next page until requested to do so by the experimenter.

Please answer the questions below by circling the alternative which most applies to you or by filling in the blanks.

1. How would you describe the vividness of your fantasies during the break periods?
   1. They were perfectly clear, as vivid as the actual experience.
   2. They were moderately clear and vivid.
   3. They were not clear or vivid, but were recognizable.
   4. They were vague and dim, hardly discernible.
   5. They were not vivid at all.
   6. Nothing came to my mind and I had no fantasy at all.

2. How pleasurable and enjoyable were your fantasies to you during the break periods?
   1. They were very pleasant and enjoyable.
   2. They were moderately pleasant and enjoyable.
   3. They were pleasant and enjoyable, but not much.
   4. They were hardly pleasant and enjoyable.
   5. They were not at all pleasant or enjoyable.
   6. My fantasies were actually unpleasant.

* 3. What was the dominant sense modality of your fantasy?
   1. My fantasies involved things that were visual.
   2. My fantasies involved sounds.
   3. My fantasies involved the sense of touch.
   4. My fantasies involved the sense of taste.
   5. My fantasies involved the sense of smell.
   6. My fantasies involved more than one of the above senses.
   7. My fantasies were more of a general gut feeling.

4. How related were your fantasies to the material on this test?
   1. My fantasies did not involve the material on this test.
   2. My fantasies were primarily related to the problems on this test which I could not solve.
   3. My fantasies were primarily related to the material on this test, but not to the problems which I could not solve.

5. Which of the following most applies to you?
   1. There were some problems in this testbook on which I feel I failed.
   2. I do not feel I failed on any of the items in this testbook.

* 6. In what country were you primarily raised? _____

* 7. What is your sex?

1. Female
2. Male

* 8. What is your birth order?

1. I am the first child
2. I am the second child
3. I am the third child
4. I am the fourth child
5. Other (Please specify the order: _____)

* 9. What is the total number of children in your family?

1. I am the only child
2. There are two children in my family
3. There are three children in my family
4. There are four children in my family
5. There are more than four children in my family (Please specify the number: _____)

* 10. My major in university is

1. Arts
2. Science

* 11. Specifically, my major field of study is _____

A dimension of personality, important in describing people, is the degree of consistency in their behavior. Some people behave in a similar way across different situations and as such may be characterized as consistent. Others behave in ways which may be very different from one occasion to the next. For example, they may act in ways that seem contradictory or even opposite, such as being both kind and cruel. Such persons may be characterized as variable. With regards to this difference please respond to the following items.

12. Circle the one alternative which describes you best.

1. I am very consistent
2. I am moderately consistent
3. I am moderately variable
4. I am very variable

13. Do you consider this dimension of consistency-variability relevant in describing you as a person?

1. Yes, it is relevant
2. No, it is irrelevant

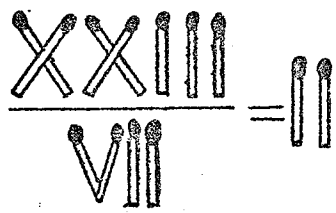
THANK YOU VERY MUCH FOR TAKING PART IN THIS STUDY

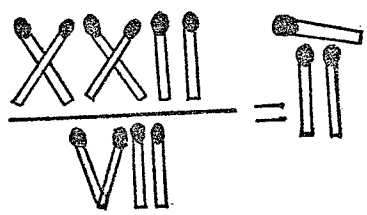
*These items were not used in the present study.

APPENDIX H

MATCH PROBLEM

The following equation can be corrected by rearranging only one match. Make this rearrangement and draw your solution below. (None of the matches are to be discarded and only one can be rearranged. There is only one correct solution to this problem.)





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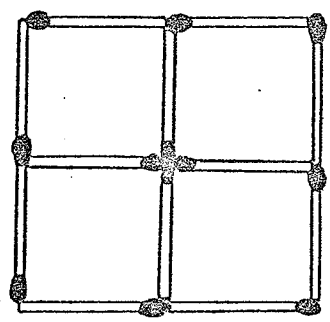

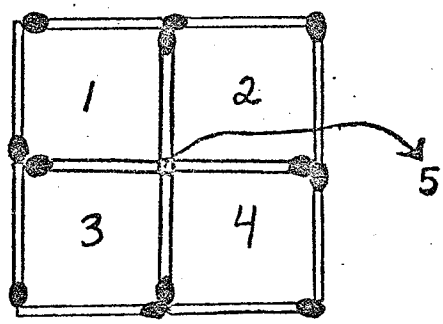

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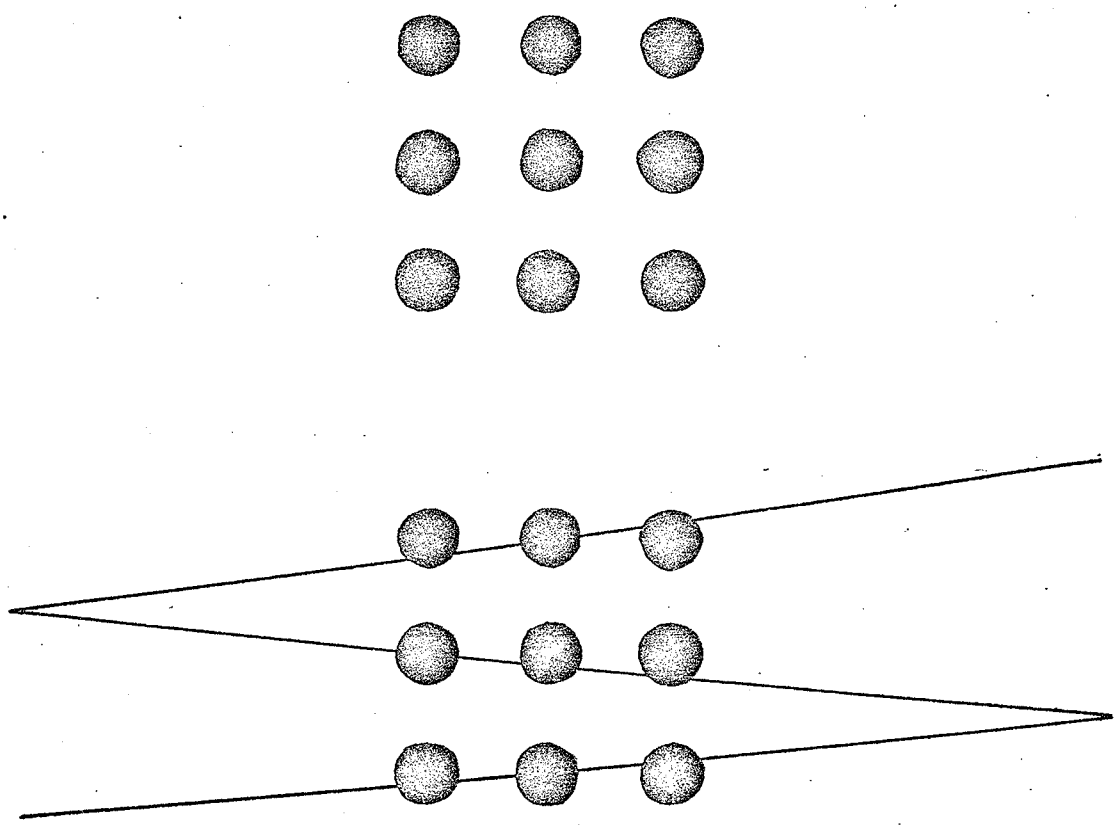

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