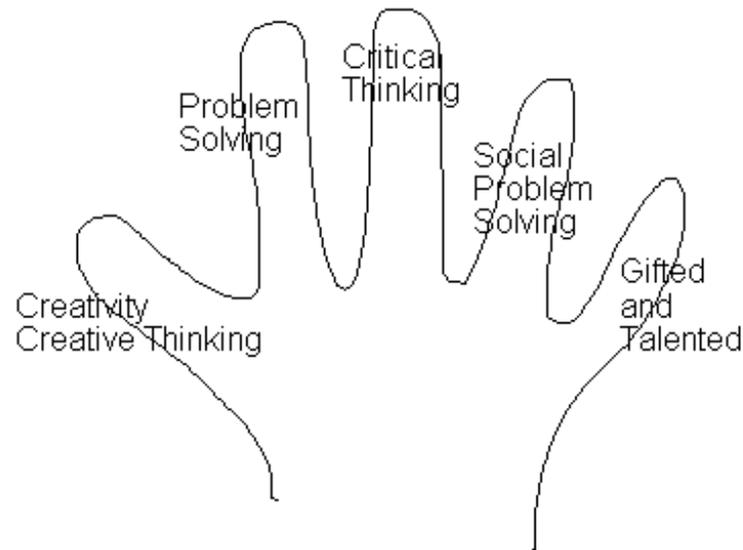


Creativity (offerto da [ARIPS](#))

Dr. John C. Houtz, Professor of Educational Psychology, Fordham University, Graduate School of Education, 2001

THE HAND OF CREATIVITY



The “Hand of Creativity” is a simple way to represent different sub-domains or related areas of study when one speaks of creativity research. Often, terms such as “creative thinking”, “problem solving”, or “creative problem solving” are used interchangeably in casual conversation. There are some differences, however, to the researcher in the field. “Creative thinking” or “creative problem solving” typically refer to situations where new ideas are called for, where both novices and experts do not know the right answers.

On the other hand, plain “problem solving” can be thought of as novices finding solutions to problems that the experts already know the answers to (as in typical teaching or learning situations), and social problem solving as a sub-field can mean creative thinking or simple problem solving but with the problem content being interpersonal behavior. Critical thinking typically refers to situations where a key element is that individuals must judge the worth of alternative solutions. Finally, “gifted and talented” refers to the study of individuals (children and adults of all ages) who are somehow judged to be exceptionally intelligent or who have developed and demonstrated outstanding talents and achievements in any area of human endeavor.

The Four (or Five) “P’s” of Creativity

Quite a number of researchers in the field of creative studies have referred to four or five sub-categories of research in the field. The first “P” stands for studies of the creative person and his or her personality, abilities, backgrounds, habits, styles, etc. The second “P” stands for studies of the thinking and feeling processes or sequences of steps or stages of creative work. The third “P” includes studies of the qualities or characteristics of the products (the inventions, productions, achievements, etc.) of the creative process, and the ways we attempt to measure them.

The fourth “P” stands for “press” and includes the study of all the environmental factors that influence creative development, from deliberate training efforts to general work or learning climate characteristics, from specific interpersonal behaviors among individuals and groups to broader, global cultural conditions. Finally, the fifth “P”, an outgrowth of “press”, stands for “persuasion”, or the study of factors that influence the acceptance of new ideas. It is not enough, obviously, that individuals come

up with new ideas; new ideas often conflict with the status quo and meet with many obstacles to actual implementation. An essential step in the creative process is getting people to be open to and accept new ideas, to support them, to “see the light”, to “get on the bandwagon”, so to speak.

DEFINITIONS OF CREATIVITY

There are many, many definitions of creativity, some very similar in their emphases, while others clearly focus on different aspects of creative phenomena. I have selected a few below. For a more extensive list, see Treffinger, D. J. (1995). Creativity, creative thinking, and critical thinking: In search of definitions. Sarasota FL: Center for Creative Learning, Inc. (www.creativelearning.com)

- Creativity is the encounter of the intensively conscious human being with his world. (Rollo May)
- Creativity is the production of meaning by synthesis. (Myron Allen)
- Creative activity appears to be simply a special class problem solving activity characterized by novelty. (Newell, Shaw, & Simon)
- Creativity is the occurrence of a composition which is new and valuable. (Henry Murray)
- Creativity is the disposition to make and to recognize valuable innovations. (H. D. Lasswell)
- The creative process is the emergence in action of a novel relational product, growing out of the uniqueness of the individual. (Carl Rogers)
- Creativity is the process of sensing gaps or missing elements; forming ideas or hypotheses concerning them; testing these hypotheses, and communicating results; possibly modifying and retesting the hypotheses. (E. Paul Torrance)
- Creativity is defined as the ability to make new combinations of social worth. (John Haefele)
- Creativity is the ability to **see** (or be aware) and to **respond**. (Erich Fromm)
- The creative process is any thinking process which solves a problem in an original and useful way. (H. Herbert Fox).
- The creative process is probably closest to problem solving, but it differs from it in a number of ways. In problem solving the immediate goal is a specific one.....in the creative process there is no such clear goal. (Anne Roe)
- Creative action achieves increased order or unity in some situations. (Ellis Blade)
- Creativity is the marvelous capacity to grasp two mutually distinct realities without going beyond the field of our experience and to draw a spark from their juxtaposition. (Preface to Max Ernst Exhibition-- 1920)

Source: You and creativity. (1968). Kaiser Aluminum & Chemical Corp.

STUDY OF THE CREATIVE PERSON

The Basic Theme is SYNERGY

- 1. Delayed closure
- 2. Converging divergence
- 3. Mindless perception
- 4. Constructive discontent
- 5. Detached involvement
- 6. Disinterested selfishness
- 7. Confident humility
- 8. Relaxed attention

- 9.Flexible Persistence

Specific Characteristics

- Unconventional
- Discerning and observant
- Possesses wide range of information
- Sensitive
- Emotionally responsive
- Report unhappy childhoods
- Early exposure to domain and mentoring
- Perceptive of their own personalities
- Neither conformists nor non-conformists--truly independent
- Unconscious of what others think of them--internal
- Flexible, open to experience
- Concerned not with facts but with meanings and implications of facts
- Communicative
- Intelligent, but not necessarily the highest scorers on IQ tests
- Not a joiner
- Bold, courageous, assertive
- Conventional morality
- Preference for things and ideas over people
- Skeptical, critical
- Precise
- Resourceful and adaptable
- Experimenters
- Tolerant of ambiguity
- Persistent
- Introspective, egocentric
- Less in need to protect one's self
- Spontaneous, enthusiastic
- Stubborn
- Excitable, irritable
- Compulsive
- Dedicated
- Inner maturity
- Strength of character
- Less acceptant of self
- Self-sufficient

- Expressed femininity of interests (males)
- Expressed masculinity of interests (females)

Reference: Dellas, M., Gaier, E. L. (1970). Identification of creativity: The individual. Psychological Bulletin, 73, 55-73.

TEN POLARITIES OF THE CREATIVE PERSONALITY

Source: Csikszentmihalyi, M. (1996). Creativity: Flow and the psychology of discovery and invention. New York: Harper/Collins.

- 1. Creative individuals have a great deal of physical energy, yet they are often quite and at rest.
- 2. Creative individuals tend to be “smart” (in the traditional sense of knowing things) but also can appear to be quite naïve.
- 3. Creative people can appear quite playful and undisciplined, but also can be exceptionally hard-working and responsible.
- 4. Creative people can alternate between imagination and “flights of fantasy” on the one hand and a very “down-to-earth”, concrete sense of reality.
- 5. Creative people seem to harbor opposite tendencies to introversion and extraversion.
- 6. Creative individuals are both very humble and proud of their achievements at the same time.
- 7. Creative persons tend to escape the typical “masculine” and “feminine” gender stereotyping.
- 8. Creative people are thought to be rebellious and independent, yet they cannot create absent the knowledge, rules, conventions of their cultures. They have internalized the values of their domains as well as maintained their instinct for questioning the “givens” and assumptions of their domains.
- 9. Creative individuals are both passionate about their work as well as extremely objective about it.
- 10. The openness and sensitivity of creative persons exposes them to a great deal of pain and suffering as well as enjoyment

ADAPTORS and INNOVATORS

From: Kirton, M.J. (1976). Adaptors and innovators: A description and measure. Journal of Applied Psychology, 61, 622-629.

Kirton describes two different styles of thinking: adaptors and innovators. Both styles are ways of approaching change. Both types of individuals respond to needs for change with analysis and action. But, each style prefers a different form of action:

Adaptors try to make things better, using existing methods, values, policies, and procedures. They rely on accepted standards and consensus to guide the development and implementation of new ideas.

Innovators like to “reconstruct” the problem, think of it in isolation from its background and context of “prevailing thought”. They are more concerned with doing things in a different way rather than in a better way.

In organizations of all sizes, innovators and adaptors may clash. Some ideas may be held back because adaptive supervisors and senior management may be uncomfortable with innovative types.

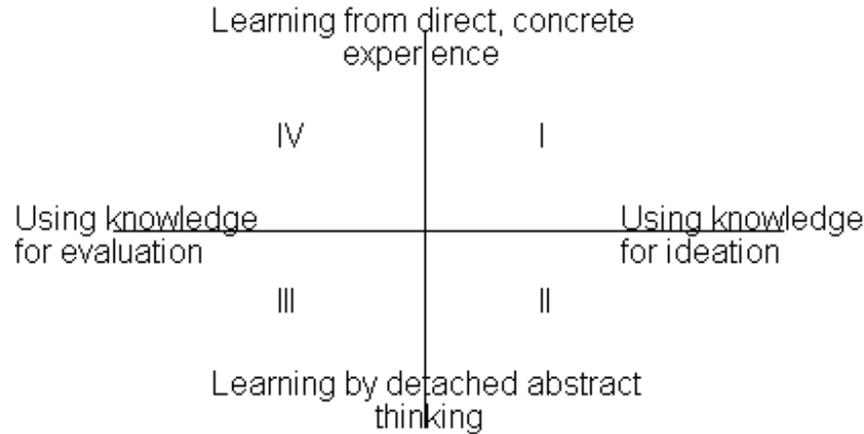
What is a WILD DUCK?

Other references: Kirton, M.J. (1991). Adaptors and innovators: Why new initiatives get blocked. In J. Henry (Ed.), Creative management (pp. 209-220). Newbury Park, CA: Sage.

THE BASADUR CREATIVE PROBLEM SOLVING STYLE PROFILE

From: Basadur, M., Graen, G., & Wakabayashi, M. (1990). Identifying individual differences in creative problem solving style. *Journal of Creative Behavior*, 24, 111-131.

The Basadur Creative Problem Solving Style Profile describes four types of individuals: the generator, the conceptualizer, the optimizer, and the implementor. The four types come from the interaction of two factors: learning from direct vs. abstract experience and using knowledge for evaluation vs. ideation. Creative problem solving is not centered in any one type; rather, the special skills of each type come into play during the problem solving process.



Basadur suggests that his inventory can help individuals recognize their strengths and areas of weakness and use their profile results to improve areas where they do not score as highly. People can "gravitate" towards jobs and life styles which require or reward certain CPS styles.

His model of creative problem solving is described as a "pie chart", with eight slices. The slices are:

- Quadrant 1:
 - 1. Problem finding
 - 2. Fact finding
- Quadrant 2:
 - 3. Problem definition
 - 4. Idea finding
- Quadrant 3:
 - 5. Evaluation and selection of ideas
 - 6. Plan
- Quadrant 4:
 - 7. Gain acceptance of your idea
 - 8. Take action

Generators have strengths in "slices" 2 and 2; conceptualizers do well in "slices" 3 and 4; optimizers are fine in "slices" 5 and 6; and "slices" 7 and 8 are for the implementors.

STUDY OF THE CREATIVE PROCESS

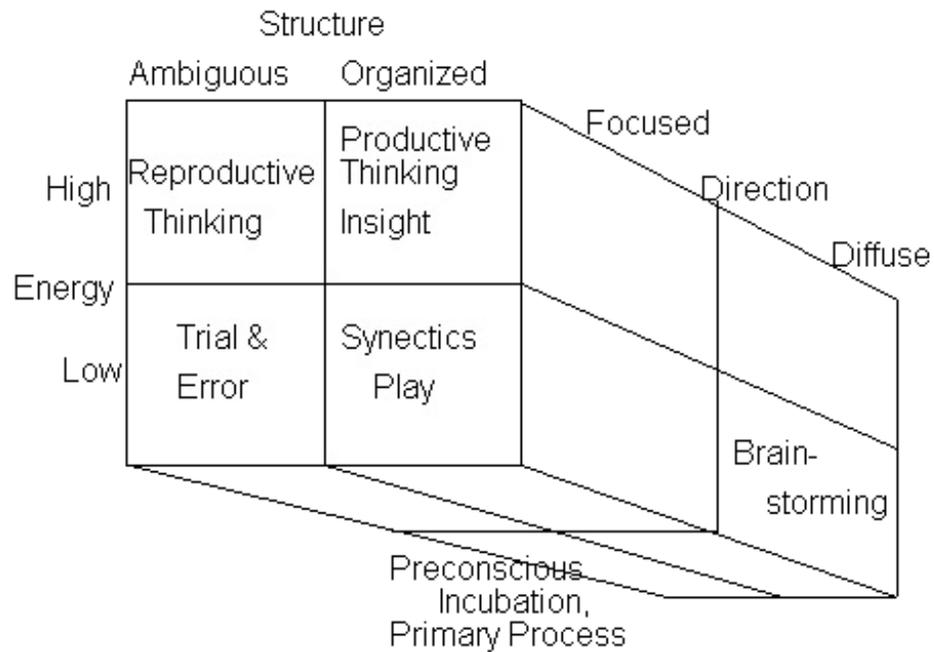
STAGE MODELS

John Dewey (1910)	Graham Wallas (1926)	G. Polya (1945)	Rossman (1952)	Johnson (1955)
Difficulty is felt	Preparation	Understanding the problem	Need or difficulty observed	Preparation
Difficulty is located and defined	Incubation	Devising a plan	Available information surveyed	Production
Possible solutions suggested	Illumination	Carrying out the plan	Solutions formulated	Judgment
Consequences considered	Verification	Looking back	Solutions critically examined	
Solution accepted			New ideas formulated	
			New ideas tested and accepted	
Kingsley & Garry (1957)	Alex Osborn (1963)	Phillip Merrifield (1962)	J. P. Guilford (1967)	Later CPS Models (Treffinger)
Difficulty is felt	Fact-finding	Difficulty is felt	Attention aroused and directed	Mess-finding
Problem clarified and defined	Idea-finding	Problem defined	Problem sensed and structured	Data-finding
Search for clues made	Solution-finding	Hypothesis generated	Answers generated	Problem-finding
Various suggestions appear and are tried out		Hypothesis tested	New information obtained	Idea-finding
A suggested solution is accepted		Solution applied	New answers generated	Solution-finding
Solution is tested		Reapplication		Acceptance-finding

A-theoretical Stage Descriptions of the Creative Process

- A. Sensing that a problem exists
- B. Defining the problem
- C. Gathering new information, clarifying the problem, redefining
- D. Generating alternatives
- E. Incubating
- F. Generating more alternatives
- G. Testing ideas
- H. Obtaining feedback
- I. Re-applying, checking, verifying
- J. Communicating, gaining acceptance, convincing

MODEL OF THE CREATIVE ACT



Synonyms:

Energy Level: High/Low (Easy/Hard)

Structure: Ambiguous/Organized (Random/Systematic)

Direction: Focused/Diffuse (Convergent/Divergent)

Reference: Getzels, J.W. & Csikszentmihalyi, M. (1976). The creative vision: A longitudinal study of problem finding in art. New York: Wiley.

Getzels, J.W. (1975). Problem-finding and the inventiveness of solutions. Journal of Creative Behavior, 9.

Theories of the Creative Process

A. Traditional Learning Theories

- 1. Ideas are associated due to contiguity, frequency
- 2. Greater associations, greater potential for creativity
- 3. Training to increase number and variety of associations

B. Psychodynamic Theories

- 1. Creativity as fantasy thinking, neurotic thinking
- 2. Creativity as “compensatory” thinking
- 3. Creativity as “regression in service to the ego”
- 4. Training to unburden the mind, release inner thoughts, break traditional boundaries, open up to new ideas

C. Social Learning Theories

- 1. We learn by watching others, even very complex behaviors
- 2. Effective models are successful and well-regarded
- 3. Training through mentoring and group activities

D. Cognitive, Information Processing Theories

- 1. Ideas are self-generated, re-constructed by the mind
- 2. Better thinking is “higher-level” thinking--re-organized, re-structured, “manipulated”, elaborated thinking
- 3. Creative ideas are “reorganized”, ‘re-configured” from previous information
- 4. Training to increase perception, actively manipulate ideas, define new problems

E. Humanistic Theories

- 1. Our essential human nature is to be creative, to seek stimulation, to gain mastery
- 2. We are curious; we need to achieve; we need to create meaning, beauty
- 3. If we are creative, we feel positively about ourselves; if we fail, we feel inadequate
- 4. A supportive environment can allow us to accept failure and grow from it; a non-supportive environment will inhibit creative strivings

A “CHEAT SHEET” OF THEORETICAL APPROACHES

A. Associationist--Behavioral

- 1. Prior experiences (response histories) determine possible connections
- 2. Incentives, rewards enhance creativity

B. Gestalt

- 1. Perception of problem elements and overall structure is prerequisite to creativity
- 2. Breaking sets leads to “productive” new arrangements

C. Cognitive

- 1. Step-by-step application of thinking skills is how we solve problems
- 2. Use of strategies to reduce load on memory

D. Psychodynamic

- 1. Personality characteristics predispose to creativity
- 2. Resolution of conflicts promotes creativity

E. Humanistic

- 1. Creativity is a developmental force
- 2. Safety of environments promotes creativity

Notes on “Creativity” by Mihaly Csikszentmihalyi

I. Setting the Stage

- A. A creative idea or product arises from the synergy of many sources, not just one creative mind (the idea of field)
- B. It's easier to enhance creativity by changing the environment than by changing the individual (again, the field)
- C. A genuinely creative idea is NOT the result of a sudden insight, but comes after years of hard work
- D. Creativity is mysterious and strange
- E. We are more alive (fulfilled) when we are being creative
- F. Everything of import is the result of creativity—it is what really distinguishes us from apes
- G. Creativity is the result of the interaction of three elements:

1. The culture or field

2. The domain of knowledge, techniques—the symbol system of the culture—what the experts think is going on

3. The person

- H. Creativity is cultural evolution—the cultural equivalent of genetic evolution
- I. Define creativity as a process by which a cultural change (in the symbols of the domain) takes place
- J. To improve creativity, we need to increase attention to change processes and lower the attention required, given to the contradictory instinct of conservation, self-preservation—“keep it the same”—“basic survival”
- K. Interviews help us understand the process, so we can assist people involved in creative work directly and, indirectly, to help everyone benefit from creative enterprises

PRODUCTIVE THINKING SKILLS

From: Covington, M.V., Crutchfield, R.S., Davies, L., & Olton, R.M. (1960). The Productive Thinking Program. Columbus, OH: Charles Merrill.

I. Discovery and formulating problems

- A. Being sensitive to problems and puzzling phenomena
- B. Determining the real problem
- C. Formulating the problem in workable terms
- D. Reflecting on the problem
- E. Keeping an open mind--not jumping to conclusions
- F. Being planful--laying out systematic steps for problem attack

II. Organizing and making use of information

- A. Getting the known facts well in mind
- B. Classifying information
- C. Distinguishing between relevant and irrelevant data
- D. Deciding what additional data are needed
- E. Inquiring--asking fruitful, fact-finding questions
- F. Drawing inferences--reasoning and analyzing
- G. Reviewing the facts

III. Generating ideas

- A. Thinking of many possibilities
- B. Searching by systematic scanning of problem elements
- C. Searching by systematic outline of possible solutions
- D. Using similarities, analogies, and metaphors
- E. Thinking of appropriate but unusual ideas
- F. Creating hypotheses that account economically for a puzzling set of facts

IV. Evaluating and improving ideas

- A. Checking ideas against available facts
- B. Experimenting--devising ways to test hypotheses
- C. Decision-making: selecting the best ideas and plans
- D. Seeing implications of ideas and considering consequences
- E. Elaborating--bringing ideas to full development
- F. Modifying--changing a good idea to make it even better

V. Creating new perspectives

- A. Reformulating--looking at problems in new ways
- B. Seeing problems and issues from the viewpoint of others
- C. Combining ideas into new and surprising forms

- D. Transforming unlikely ideas into productive possibilities

WHAT QUESTIONS TO ASK? FROM "HOW TO SOLVE IT"

From: G. Polya (1971). How to solve it (2nd ed.). Princeton, NJ: Princeton University Press.

Step 1: Understanding the problem:

- 1. What is the unknown?
- 2. What are the data?
- 3. What is the condition?
- 4. Is it possible to satisfy the condition?
- 5. Is the condition sufficient to determine the unknown? Insufficient? Redundant? Contradictory?
- 6. Can you draw, write down, display, show, etc., the conditions?

Step 2: Devising a plan:

- 1. Have you seen this problem before?
- 2. Have you seen the same problem in a different form?
- 3. Do you know a related problem?
- 4. Can you think of a familiar problem having the same or similar unknowns?
- 5. Have you solved a similar problem before?
- 6. Can you use the same method for this problem?
- 7. Should you introduce new elements to this problem to make it easier?
- 8. Can you restate this problem? Simplify it? Look at only part of it?
- 9. Have you looked at all the problem conditions? Used them all?
- 10. Do you need additional data?
- 11. What are the criteria for success? What should a good response look like?

Step 3: Carrying out the plan:

- 1. Can you see clearly that each next step is correct?
- 2. Can you prove that each step is correct?

Step 4: Looking back:

- 1. Can you check the result? Can you check the conditions?
- 2. Can you derive the result differently? Can you see it at a glance?
- 3. Can you use the result or method for some other problem?

CREATIVE PROBLEM SOLVING: THE PROCESS

ALEX OSBORN'S STAGES (circa 1963)

Creative Education Foundation, and the Center for Studies in Creativity, Buffalo State College, Buffalo, NY):

1. Fact Finding

- Problem definition
- Information gathering and analysis

2. Idea Finding

- Idea production
- Idea development

3. Solution finding

- Evaluation--verification
- Adoption--decision making

DONALD TREFFINGER (circa 1990's) (Center for Creative Learning, Inc., Sarasota, FL):

- 1. Mess-finding
- 2. Data-finding
- 3. Problem-finding
- 4. Idea-finding
- 5. Solution-finding
- 6. Acceptance-finding

In each of the above steps, there are both diverging and converging components

Interaction of Cognitive and Affective Traits in the Problem Solving Process

Stages of Problem Solving Traits	Expected Form	Predominant Cognitive Traits	Predominant Affective
Preparation sustained	Neat, well-organized	Memory, logical thinking	Studiosness, attention
Incubation freedom, defensiveness	Sloppy, unclear	Unconscious processing, fantasy thinking	Intellectual lack of openness
Illumination tolerance of and/or failure	Often confused, incoherent, unexplainable	Divergent thinking, fluency	Risk-taking, ambiguity, spontaneity
Verification dependability,	Neat, well-organized, clarity	Convergent and evaluative thinking	Discipline, planfulness

CREATIVITY THEORY OF MIHALY CSIKSZENTMIHALYI

A "SYSTEMS" MODEL

Source: Csikszentmihalyi, M. (1996). Creativity: Flow and the psychology of discovery and invention. New York: Harper/Collins.

THERE ARE THREE COMPONENTS TO THE SYSTEM:

THE DOMAIN:

- A domain is a discipline, an area of knowledge and content, of study, of skills, of techniques, of symbols and forms, rules and procedures.
- Domains are nested (embedded) within one's culture and/or cultures

THE FIELD:

- The field consists of the people who are involved with the field, as experts, as authorities, as "gatekeepers" to the domain.
- The people of the field "select" what is to be recognized as new and worthwhile and should be included in the domain.

THE INDIVIDUAL:

- His or her background, experiences, training, abilities, and personality

CREATIVITY WITH A CAPITAL "C" CONSISTS IN CHANGING A DOMAIN

The systems model implies that no one component is sufficient to predict or foster creativity. For example, training in creative problem solving for the employees of a company (the individual component) won't do much good unless the employees will have easy access to the domain (increased research budgets, resource availability, etc.) and the organization, itself, and its managers and administrators (the field) also recognize and encourage creativity.

Mihaly Csikszentmihalyi's Theory of Creativity

I. Problems with Person-centered Views of Creativity

- A. Individual abilities not enough
- B. The nature of creative accomplishment transcends the individual
- C. The importance of the external, social environment is overlooked

II.A "Systems" View

- A. A system is a collection of individual elements that operate together to achieve some goal; each element may influence the functioning of another element
- B. The advantages of a "systems" view:
 - 1. Complexity better predicts complex phenomena; more factors permit more accurate judgments
 - 2. The "process" may transcend the individual elements; individual elements "blend" together and the "process" takes on its own identity

III. The Theory—Creativity Is an Interaction of Three Elements in a Social System

- A. The “domain” is the existing knowledge about a phenomena (includes facts, beliefs, methods, techniques, customs, values, rules, etc.)
- B.The “field” is the existing expertise in that domain(includes judgments about new ideas)
- C.The “individual” is the skills, motivations, personality traits, experiences, education, etc., of the person

IV. Definition of Creativity

- A.Creativity results in a transformation of the domain
- B.Creativity is finding new problems (in the domain) to work on that expand the domain and field

V. His Research

- A.Studies individuals who have achieved; who have transformed their domains and fields
- B.Reveals personal and social interactive factors affecting development of expertise and achievement
- C.Reveals the insights that led to “discovery”; problem finding is more central to creativity than previously thought; in reality, creative individuals engage in more problem finding than problem solving; they have already mastered technique

WHAT IS FLOW?

“Flow” is that “optimal” experience one feels when things are going well, when one’s actions seem almost automatic, effortless, and yet one is highly focused on one’s activity.

Characteristics of the Optimal Experience:

- 1. There are clear goals every step of the way.
- 2. There is immediate feedback to one’s actions.
- 3. There is a balance between challenges and skills.
- 4. Actions and awareness are merged.
- 5. Distractions are excluded from consciousness.
- 6. There is no worry of failure.
- 7. Self-consciousness disappears.
- 8. The sense of time becomes distorted.
- 9. The activity becomes autotelic (i.e., generating its own enjoyment)

Source: Csikszentmihalyi, M. (1996). Creativity: Flow and the psychology of discovery and invention. New York: Harper/Collins.

Treffinger's C-O-C-O Model of Creative Problem Solving

Donald Treffinger, President and founder of the Center for Creative Learning, Inc., in Sarasota, Florida, proposes the following four-component model of creative problem solving:

1. Characteristics of people
 - a. How creative you are
 - b. Your style of thinking and creating
2. Operations they perform
 - a. Specific "tools" for thinking
 - b. Process of solving problems
3. Contexts in which operations are performed
 - a. Personal "blocks" to new ideas
 - b. Organizational climates and barriers
4. Outcomes that result
 - a. Criteria for judging "creativity"

Reference: Treffinger, D.J. & Isaksen, S.G. (1992). Creative problem solving: An introduction. Sarasota, FL: Center for Creative Learning, Inc., 4152 Independence Court, Suite C-7, Sarasota, FL 34234.

Brainstorming: A Technique of Idea-Finding

Source: A. Osborn

Assumptions:

- 1. Ideas can be more productive if criticism is excluded.
- 2. The more ideas the better.

The Group Process:

- 1. Preparation or Fact-finding includes problem analysis, selection of group members, distribution of materials, study, identification of possible areas for idea generation, communication to members, motivation
- 2. Idea-Finding
 - a. Leader explains the problem and the rules
 - b. Idea collectors are identified (recorders, secretaries, or recording devices)
 - c. Pace-setting members identified
 - d. Call for goal of 50, 100, etc., ideas
 - e. The Brainstorm:
 - Criticism is ruled out

- Free-wheeling is encouraged (any idea accepted)
 - Quantity is wanted
 - Piggy-backing on another idea encouraged (combining and improving are sought)
 - Leader may direct to new areas
 - Explanations and clarifications are permitted
- f. After the session is over, leader may follow-up on new ideas as a result of incubation (one day later, one week, etc.)
- 3. Solution-finding
 - a. Tally of all ideas sent to members
 - b. Evaluation conducted based on a checklist of criteria
 - c. Later "decision sessions" held where "nuts and bolts" issues are discussed
 - d. Implications of ideas are discussed

SYNECTICS ---- INVENTING BY THE "MADNESS METHOD"

Source: W. J. J. Gordon

Basic Assumption: In the creative process, the emotional component is more important than the intellectual; the irrational is more important than the rational

The Synectics Session:

- 1. Problem as Given (PAG)
 - Analysis and explanation by experts
- 2. Purge ideas which seem old, irrelevant, uninteresting traditional, etc.
- 3. Generation of problems as understood (PAU) by members
- 4. Choice of PAU
- 5. Evocative question for example
- 6. Choice of example
- 7. Evocative question for personal analogy
- 8. Choice of "Book Title"
- 9. Evocative question for example
- 10. Choice of example
- 11. Examination of example
- 12. Force Fit into New Viewpoint

The synectics session differs from typical problem solving in that the sessions do not necessarily seek solutions. The primary goal is to seek new viewpoints or speculations about the problem. Then, perhaps, a solution to the specific problem will be forthcoming.

The operational mechanisms of synectics include the use of questions by the leader calling for examples of how members view the problem or feel about the problem. Members are to respond with analogies; that is, trying to think about the problem in other terms, "as if" terms. For example, look at the examples of analogies below:

ANALOGIES

Personal Analogy

A scientist imagines him/herself to be a "dancing molecule" to help explain some physical, photochemical, electrical process.

Kekule is reported to have dreamt of an image of a snake swallowing its tail" and thus developed the idea of the benzene ring

Role play techniques in school, in counseling or therapy, in psychology classes, etc.

Direct Analogy

Sir I. M. Brunel developed the caisson by observing that the worm creates its own tunnel as it moves through the ground

A. G. Bell observed that the "massive" bones in the human ear could be moved by a thin membrane; therefore, a stouter piece of membrane should be able to move a piece of steel. Hence, the telephone. Think of other examples from the natural world.

Symbolic Analogy

Book Titles--focusing on crucial words or phrases which capture the essence of meaning or "feel" of an object or activity or problem

Examples:

ratchet	dependable intermittency
viscosity	hesitant displacement
solidity	enforced togetherness
forest fire	progressive ingestion
machine - gun burst	connected pauses
target	focused desire
mixture	balanced confusion
multitude	discrete infinity
acid	impure aggressor
receptivity	involuntary willingness

ACTIVITY

Book Titles

Directions:For each of the objects, concepts, functions, or activities listed below, generate as many "book titles" as you can. "Book titles" are short, two-, three-, or four- word combinations or phrases which capture the essence, the basic meaning to you) of the object, concept, function, or activity. There are no right or answers. Think of as many "book titles" as you can.

- 1.Commuting to and from work (or school):
- 2.Babysitting
- 3.Cooking a holiday dinner
- 4.A business meeting
- 5.A doctor's appointment
- 6.Diploma
- 7.Teenager
- 8.Mountain climbing

HOWARD GRUBER'S EVOLVING SYSTEMS THEORY OF CREATIVITY

Source: Gruber, H. E. (1999). Evolving systems approach. In M. A. Runco, & S. R. Pritzker (Eds.), Encyclopedia of creativity (pp. 689-693).

I.Evolving Systems Theory is a theory of the individual

- A.Goal is to construct an accurate account of the creativity of an Individual
- B.There is no presumption that generalizations to other cases can be made
- C.The description starts whenever and wherever in the life and work of the individual that is feasible
- D. Any facet (aspect) of the individual's life and experience that can be distinguished is fair game for study, whether "process", "product", "person", or "context "
- E. An accumulation of case studies is required for this approach

II.Evolving Systems Theory consists of Three Sub-systems:

- A.Knowledge—how the individual acquires and uses it
- B.Purpose—how the individual seeks out and discovers problems to work on
- C.Affect--how the individual maintains motivation and habits of work; how the individual responds to and interacts with others who have influence on one's life and work

III. Implications of the Systems Approach

- A.Creativity can be understood through examining not single events or products, but through "networks of enterprise" over time (that keep the individual interested, motivated, etc.)
- B.Sudden insight (the "Eureka!" or "Aha!" experience) is but a manifestation of prior preparation, hard work and extended involvement with one's work
- C.Collaboration is an important aspect of creativity
- D.Pluralism is essential for creativity; creative work always takes place in a multiplex environment

Sternberg's Investment Theory of Creativity

- “Buy low, sell high”
- Creativity requires an “investment view”: “Anyone can do it”
- “Buying low and selling high is a way of life”
- “What’s low and high changes with time and place”
- “You must be attentive”
- “You must be selective”
- “You may be ignored and opposed”
- “You will need courage”

I.Cognitive Ability

- A. Intelligence
 - a.You need to know things to generate ideas—declarative knowledge
 - b.You need to know how to proceed (the process)—procedural knowledge
 - c.You need to know how to make things happen—metacognition
- B.Knowledge—from your experience
 - a. Formal knowledge—from education
 - b. Informal, tacit understandings—from experience

II.Affective Characteristics

- A.Supportive style
 - a.Legislative, executive, judicial styles
 - b.Forms of mental self-government:
 - 1) monarchistic
 - 2) hierarchical
 - 3) oligarchic
 - 4) anarchic
 - c.Levels of mental self-government
 - 1) global
 - 2) local
 - d.Scope of mental self-government
 - 1) internal
 - 2) external
 - e.Orientations of mental self government
 - 1) liberal
 - 2) conservative
- B. Personality traits
 - a.Perseverance

- b.Willingness to take sensible risks
- c.Willingness to grow
- d.Tolerance of ambiguity
- e.Openness to new experience
- f. Belief in yourself and courage of your convictions
- C. Motivation
 - a.Intrinsic motivation
 - b.Extrinsic motivation
 - c.Achievement motivation

III. Social, Environmental Factors

- A.A “Bullish” Environment - Creativity exists in everyone; it’s natural; creativity is self- Actualization
- B. A “Bearish” Environment Creativity requires challenge, obstacles, dissatisfaction, unhappiness
- C. Characteristics of Creative Environments
 - 1) Rich contexts, stimulating, playful, humor is present
 - 2) Some limits to provide challenge, guidance
 - 3) Evaluation is useful, non-threatening
 - 4) Competition and cooperation can help or hinder creativity, depending.... Competition with challenge is good, with punishment is bad. Cooperation without challenge is bad, with mutual encouragement and support is good.
 - 5) Home climate is flexible, challenging
 - 6) Role models, mentors
 - 7)School and organizational climates support innovation, reward new ideas

MEASUREMENT OF THE CREATIVE PRODUCT

A. THE PROBLEM OF MULTIPLE DEFINITIONS OF CREATIVITY

- 1.FLUENCY
- 2.FLEXIBILITY
- 3.ORIGINALITY, NOVELTY
- 4.ELABORATION
- 5.CONNECTEDNESS
- 6.RESISTANCE TO CLOSURE
- 7.“SURPRISE”
- 8.USEFULNESS, ACCEPTANCE

ISSUE: “AVERAGE” CREATIVITY VS. EXTREME EXCEPTIONALITY

B. ASSESSMENT METHODS

- 1.PAPER-AND-PENCIL TESTS
- 2.PERSONALITY MEASURES
- 3.SELF-REPORTS OF INTERESTS, ACTIVITIES, ACHIEVEMENTS
- 4.NOMINATIONS BY PARENTS, TEACHERS, SELF, AND OTHERS
- 5.BEHAVIORAL OBSERVATIONS
- 6.PRODUCT EVALUATIONS (EXPERT JUDGES OR CONSENSUAL ASSESSMENT)

ISSUE: PREDICTION OF REAL-LIFE CREATIVITY

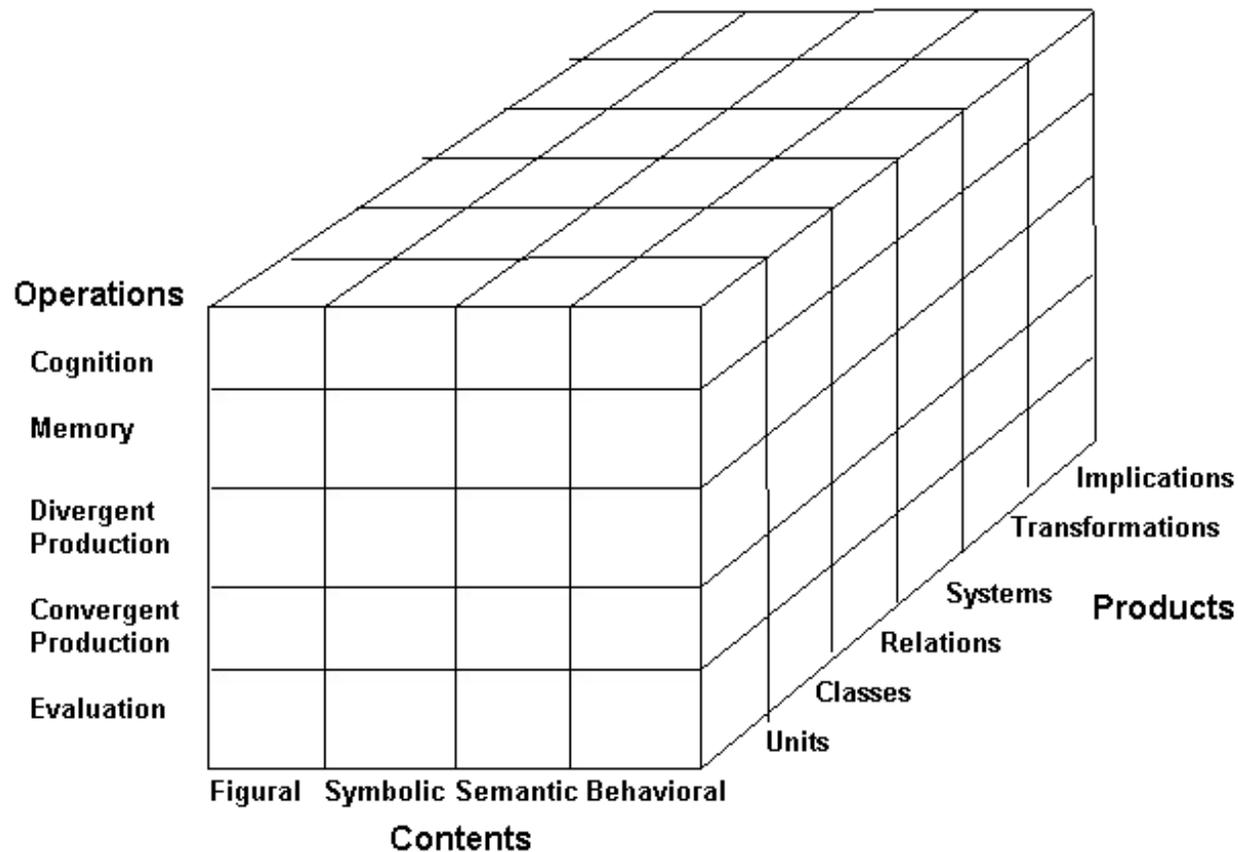


Figure 1. The Original Structure of Intellect Model

Sternberg's Propulsion Theory of Creativity

(from 1999 APA Address)

There are seven (7 types of creative productions, from simple replication to creating a whole new field, set of questions, methods, etc.

- a.Replication
- b.Redefinition
- c.Forward incrementalism, most common type, involving forward movement of an existing field
- d.Advanced forward incrementalism, an idea that is ahead of its time, accelerating the field beyond where people are willing to go
- e.Redirection, taking a field that is moving in one direction and branching it off into a new direction
- f.Reconstruction redirection, which is backward divergent motion. It involves recognizing that we should go back to an earlier paradigm and go on from there. We made a mistake earlier; we went off-track.
- g.Re-initiation. A field has exhausted itself. The paradigm is shot. Let's question all our assumptions. We need a major paradigm shift. Let's start again from an entirely different point. We must challenge our existing ideas.

Propulsion means pushing the field, changing to new fields, new questions, new methods

The type of creativity most valued is forward incrementalism

The kinds of creativity that are typically ignored, rejected, punish, etc., are the more radical forms

SOMETHING ABOUT MYSELF (SAM) AND WHAT KIND OF PERSON ARE YOU (WKOPAY)

The Something About Myself (SAM) and What Kind of Person Are You (WKOPAY) instruments are self-report inventories/checklists designed to assess an individual's self perception of creativity (Khatena & Torrance, 1976). Together, these two instruments make up Khatena and Torrance's (1976) Creative Perception Inventory. The SAM asks individuals to check-off activities which they have engaged in which might be indicative of creative potential. Items include such things as having hobbies, taking trips, writing a poem or a play, inventing something, etc. Other items on the SAM ask individuals to agree or disagree with certain self-descriptors, such as "I am talented in many different ways" or "I am resourceful". The WKOPAY asks individuals to check personality traits or characteristics which they feel typify their own behavior.

These instruments are based on the work of E. Paul Torrance, Joseph Khatena, and the accumulated literature about the personality characteristics of creative

persons. Much of this literature consists of the results of personality tests administered to individuals identified as creative in various domains or disciplines or non-creative individuals. There also is a large literature based on biographical and historical study of the lives of well-known, creative persons.

- Khatena, J. (1971). Something about myself: A brief screening device for identifying creatively gifted children and adults. Gifted Child Quarterly, 15, 262-266.
- Khatena, J. & Morse, D. (1994). Khatena-Morse Multitalent Perception Inventory. Bensenville, IL: Scholastic Test Service, Inc.
- Khatena, J. & Torrance, E.P. (1976). Khatena-Torrance Creative Perception Inventory. Chicago, IL: Stoelting Company.

MYERS-BRIGGS TYPE INDICATOR (MBTI)

The Myers-Briggs Type Indicator (MBTI) (Briggs & Myers, 1976; Myers & McCaulley, 1985) is a self-report measure designed to assess individuals' preference for different types of information processing. From nearly 300 forced choice items, individuals are rated on four dimensions: introversion-extraversion (I vs. E), sensing-intuitive (S vs. N), thinking-feeling (T vs. F), and judging-perceiving (J vs. P). Thus, there are 16 (2 x 2 x 2 x 2) distinct types. The Myers-Briggs has an extensive following and information to support the teaching/learning process (Kroeger & Thueson, 1988; Myers & Myers, 1980), with suggested teaching strategies for each type and sources of conflict among particular types.

The MBTI is based on Jungian psychological theory. There is a considerable body of MBTI literature suggesting a pattern among the four dimensions most closely associated with creativity (introversion, intuitive, thinking, perceiving). A most recent review of research on the MBTI, however, questions the existence of the 16 discrete typologies proposed by the theory (Pittenger, 1993). Many recommend using "continuous" scores on the dimensions rather than the individual typologies to best describe a person's preferences.

- Briggs, K. & Myers, I. (1976). The Myers-Briggs Type Indicator. Palo Alto, CA: Consulting Psychologists Press
- Kroeger, O. & Thueson, J. (1988). Type talk. New York: Dell.
- Myers, I. & McCaulley, M. (1985). Manual: A guide to the development and use of the Myers-Briggs Type Indicator. Palo Alto, CA: Consulting Psychologists Press.
- Myers, I. & Myers, P. (1980). Gifts differing. Palo Alto, CA: Consulting Psychologists Press.
- Pittenger, D.J. (1993). The utility of the Myers-Briggs Type Indicator. Review of Educational Research, 63, 467-488.

THE CREATIVE PROBLEM SOLVING PROFILE (CPSP)

Min Basadur and associates have developed the Creative Problem Solving Profile Inventory (CPSP) (Basadur, Graen, & Wakabayashi, 1990), which they claim provides a global and inclusive approach to identifying potentially creative individuals. Individuals are presented with 18 sets of four adjectives. Within each set, individuals rank order the four adjectives as to their appropriateness as descriptive of themselves. The adjectives fall along two orthogonal dimensions. Experiencing vs. thinking is the top-to-bottom, vertical dimension. Ideation vs. evaluation is the right-to-left dimension. The four "quadrants", or personal styles: generator, conceptualizer, optimizer, or implementor (clockwise, with generator being top right).

Basadur's approach is based on the idea that the entire creative problem solving process requires a variety of preferences associated with all four quadrants. Nonetheless, individuals may exhibit clear preferences (fall within one quadrant, for example). The usefulness of the CPSP profile, as with the MBTI and other such instruments, lies in its ability to show individuals more than one point of view, to show strengths as well as areas which may be in need of development.

- Basadur, M. (1994). Managing the creative process in organizations. In M. A. Runco (Ed.), Problem finding, problem solving, and creativity (pp. 237-268). Norwood, NJ: Ablex.
- Basadur, M. (1997). Organizational development interventions for enhancing creativity in the workplace. Journal of Creative Behavior, 31, 59-72.
- Basadur, M., Graen, G., & Wakabayashi, M. (1990). Identifying individual differences in creative problem solving style. Journal of Creative Behavior, 24, 111-131.

THE KIRTON ADAPTION-INNOVATION INVENTORY (KAI)

The Kirton Adaption--Innovation Inventory (KAI) (Kirton, 1976; 1987) has been used to identify two broad styles of problem solvers. Adaptors are individuals who define and approach problems within existing frameworks and structures. "They are resourceful, efficient, organized, and dependable...[They] seem to supply stability, order, and continuity" (Selby, Treffinger, Isaksen, & Powers, 1993, p. 224). On the other hand, innovators "solve problems by creating a new framework...They are original, energetic, individualistic, spontaneous, and insightful." (Selby, et al., p. 224).

The KAI also provides three subscores, on Sufficiency of Originality ("Let's have one good idea" vs. "Let's generate many ideas"), Efficiency ("Broad strokes" vs. "Attention to follow-up details"), and Rule Conformity ("Let's go by the book" vs. "Let's ignore the rules").

The key point of Kirton's work is that creativity (that is, new and useful solutions to problems) can come about for both adaptors and innovators. The stereotype

of creativity “equated with” innovation is inappropriate. Adaptors are creative in different ways. They are not uncreative.

- Kirton, M. (1976). Adaptors and innovators: A description and measure. Journal of Applied Psychology, 61, 622-629.
- Kirton, M. (1987). Adaptors and innovators: Cognitive style and personality. In
- S. Isaksen (Ed.), Frontiers of creativity research: Beyond the basics (pp. 282-304). Buffalo, NY: Bearly Limited.
- Selby, E.C., Treffinger, D.J., Isaksen, S.G., & Powers, S.V. (1993). Use of the Kirton Adaption--Innovation Inventory with Middle School Students. Journal of Creative Behavior, 27, 223-235.

THE PRODUCTIVITY ENVIRONMENTAL PREFERENCE SURVEY (PEPS)

The Productivity Environmental Preference Survey (PEPS), for adults, and the Learning Style Inventory (LSI), for children, are designed to assess individual learning styles. Both instruments provide a profile across 20 types of stimuli, arranged into the categories of environmental (preference for noise, light, temperature, and design of the workspace), emotional (motivation, persistence, responsibility, structure), sociological (prefers to work alone, with peers, with adult presence, or varied settings), physiological, (visual, auditory, tactile, kinesthetic modes, intake of food or drink, time of day, mobility), and psychological (global vs. analytic, hemisphericity, impulsive vs. reflective).

The thesis of the work of Rita and Kenneth Dunn, and their colleagues, is that learning will be easier for children and adults in situations and on tasks which “match” their individual preferences, or styles, for working and processing information. Many people have no clear preferences and can adapt to a wide variety of stimuli in the learning environment. However, some people have developed clear preferences and their performance can be aided (or impeded) by complementary (or contradictory) characteristics of the learning environment.

- Dunn, R., & Dunn, K. (1977). Teaching students through their individual learning styles: A practical approach. Englewood Cliffs, NJ: Prentice-Hall.
- Dunn, R., Dunn, R., & Treffinger, D. (1992). Bringing out the giftedness in your child: Nurturing every child's unique strengths, talents, and potential. New York: John Wiley.

STUDY OF THE CONTEXT OR ENVIRONMENT IN WHICH CREATIVITY OCCURS

A. ENVIRONMENTAL FACTORS IN THE IMMEDIATE PERSONAL, SOCIAL ENVIRONMENT AND IN THE LARGER CULTURAL CONTEXT

- 1. FREEDOM TO EXPLORE

- 2.TOLERANCE OF DIFFERENCES, OPENNESS TO NEW IDEAS
- 3.REWARD OF EFFORT

ISSUE:ROLE OF EVALUATION

B.TRAINING, DEVELOPMENT EFFORTS BOTH INDIVIDUALLY AND WITHIN THE LARGER CULTURE AND/OR ORGANIZATIONAL ENVIRONMENT

- 1. GENERIC SKILLS, TOOLS, CREATIVE PROBLEM SOLVING, CRITICAL THINKING PROGRAMS
- 2. SPECIFIC TRAINING WITHIN A DISCIPLINE
- 3. METACOGNITIVE STRATEGIES, SELF-REGULATION
- 4. MODELING, MENTORING

ISSUE: GENERALIZABILITY OF TRAINING ACROSS DOMAINS

C.SUPPORT SYSTEMS

- 1.ASSESSMENT AND COUNSELING
- 2.NETWORKING, FREE COMMUNICATION
- 3.CHANGING THE CONTEXT OR CULTURE

The Nature--Nurture Debate and Creativity

As you can imagine, there is great interest in what factors lead to a person be or become creative. Are creative forces innate? Are they environmental? There is suggestive evidence on both sides of the “nature—nurture” debate:

A.Biological Factors and Creativity

- 1.Creative talents can run in families
- 2.Personality and styles can exhibit themselves shortly after birth
- 3.Integration of the brain hemispheres

B.Evidence for Environmental, Cultural Influences

- 1.Birth orders and family constellation
- 2.Torrance and the “fourth-grade slumps”

- 3.Torrance and cross cultural research: “What is honored in a culture will be cultivated there”
- 4.Creative persons report unhappy childhoods, challenges to overcome; also early encouragement, mentors
- 5.Training programs improve scores
- 6.Creative climates in workplace and classroom make a difference

C. Confounding Issues

- 1.Biological factors more important for understanding the super genius
- 2.Environmental factors influence for all (“super” and “average”creativity) Effects of Evaluation (Including Feedback) as a Form of Extrinsic Motivation on Creativity

Operational Definitions:

- Evaluation:Feedback about task performance, surveillance, expectation of feedback or evaluation, rewards, sanctions, punishments, etc.
- Heuristic task: An open-ended, poorly defined task, with multiple possibilities and criteria for success
- Algorithmic task:A task with a clear goal, clear method, clear criteria for success
- Extrinsic motivation:An externally imposed or available reward or incentive
- Intrinsic motivation:A natural desire, interest, or inclination to pursue a task for its own sake and enjoyment
- Controlling value:Incentives or rewards (feedback or other forms of evaluation) that serve to limit choices or behaviors
- Informational value:Incentives or rewards that provide useful alternatives, ideas, or relevant directions that enable the problem solving process to continue

		Evaluation			
		Positive		Negative	
		Controlling	Informational	Controlling	Informational
Task Type	Heuristic	Can hinder creativity			
	Algorithmic				Can help creativity

Amabile’s Deductions and Transformations:

- 1. Intrinsic motivation enhances creativity whereas extrinsic motivation inhibits creativity; intrinsic motivation is reduced by extrinsic motivation.
- 2. Then, since evidence exists that external rewards can increase creativity test scores, a distinction is made between heuristic and algorithmic creativity tasks; extrinsic motivation can positively affect algorithmic tasks, but not heuristic ones.
- 3. Then, the mechanism by which extrinsic motivation negatively affects creativity is supposed to be the concomitant reduction in self-perceptions of competence, self-esteem, increases in self-doubt, decreases in initiative, courage, risk-taking behavior, etc. These are the “controlling” aspects of feedback or rewards.
- 4. Then, extrinsic motivation can be a positive influence, even if it is “negative” reward or feedback, if the informational value of the reward or feedback does not suggest personal incompetence, but rather provides useful ideas or knowledge that serve to spur on the creative process.
- 5. Extrinsic motivation can enhance creativity if it is “enabling” of the process and initial levels of intrinsic motivation are high. “Enabling” means being supporting of autonomy, competence, and personal control.

Amabile’s Old and New Models

The Old “Componential” Model:

- A. Domain-relevant skills (knowledge, technical skill, and talent)
- B. Creativity skills (cognitive and work styles, idea generation, manipulation, and evaluation skills--heuristics). NOTE: This is where the CPS model of CEF and Treffinger and other efforts at creativity training are directed.
- C. Motivation (attitudes towards the task and one’s own perceptions of motivation for work)

The New Model of the Creative Problem-Solving Process

- A. Problem Presentation (external or internal stimulus) is affected by motivation
- B. Preparation Activities (research, data gathering, formal education) is affected by domain-relevant skills
- C. Response Generation is affected by both motivation and creativity- relevant skills
- D. Response Validation (evaluation, judgment) is affected by domain- relevant skills

The Creativogenic Society

Arieti, S. (1970). Creativity: The magic synthesis. New York: Basic Books.

The Creativogenic Society:

- 1. Has available to its citizens the means of creative expression, including physical resources,
- 2. Is open to cultural stimuli, that is, people want new ideas,
- 3. Stresses the process of becoming, not being,
- 4. Has free access to cultural media, without discrimination,
- 5. Offers freedom (or even moderate discrimination) after severe oppression or absolute exclusion of some individuals or groups,
- 6. Is exposed to different and contrasting cultural stimuli
- 7. Is tolerant of diverging views,

- 8.Provides opportunities for significant individuals to interact,
- 9.Promotes incentives and rewards

BARRIERS TO CREATIVE THINKING

Perceptual Blocks

- 1. Difficulty in isolating the problem "*TIME FLIES YOU CANNOT THEY FLY TOO FAST*"
- 2. Difficulty caused by narrowing the problem too much (How can you make four nines equal one hundred? Do anything you want to with the nines.)
- 3 .Inability to define relevant terms
- 4. Failure to use all of the senses in observing
- 5. Difficulty in seeing remote relationships
- 6. Difficulty in not investigating the obvious
- 7. Failure to distinguish cause and effect

Cultural Blocks

- 8. Desire to conform to a pre-existing or accepted pattern
- 9. Overemphasis on the practical or economical
- 10. Being too polite
- 11. Too much competition or cooperation
- 12. Too much faith in statistics
- 13. Overgeneralization
- 14. Too much emphasis on reason or logic
- 15. An "all-or-nothing" attitude
- 16. Too much or too little knowledge
- 17. Belief that indulging in fantasy is worthless

Emotional Blocks

- 18. Fear of being wrong
- 19. Grabbing the first idea that comes along
- 20. Rigidity of thinking
- 21. Overmotivation to succeed quickly
- 22. Desire for security
- 23. Fear of supervision or distrust of colleagues and subordinates
- 24. Lack of drive in carrying a problem through

From: Simberg, A. L. (1964). Creativity at work. Boston, MA: Industrial Education Institute (pp. 41-69). Reprinted in G.A. Davis & J.A. Scott (Eds) (1971). Training creative thinking. New York: Holt, Rinehart, & Winston.

OBSTACLES TO CREATIVITY AND PROBLEM SOLVING

"The Nasty Nine"

- 1. Pressure to conform
- 2. Authoritarian attitudes
- 3. Ridicule
- 4. Rigidity of personality
- 5. Overemphasis on external rewards
- 6. Excessive quest for certainty
- 7. Overemphasis on success
- 8. Hostility toward divergent personality
- 9. Intolerance of the "play" attitude

From: Hallman, R., (1967). Creativity in the classroom, Journal of Creative Behavior, 1, 325-330

THE CREATIVE ENVIRONMENT

- Chance to fail intelligently
- Open communication, feedback to individuals
- Rewards for new ideas
- Plentiful equipment/supplies for experimentation
- Boat-rocking is permitted
- Sufficient time for creation
- Climate of acceptance
- Opportunities for privacy and sanctuary
- Inquiry rewarded and encouraged
- Peer groups allowed to form
- Encouragement of deep involvement
- Non-punitive atmosphere
- Enthusiasm for ideas shown
- Tolerance of complexity and disorder
- Consideration of multiple hypotheses
- No fear of showing emotions
- Playing with ambiguities and uncertainties permitted
- Encouragement of questioning
- Provision for concrete development of ideas
- Open discussion of problems
- Higher expectations
- Respect for individual's worth

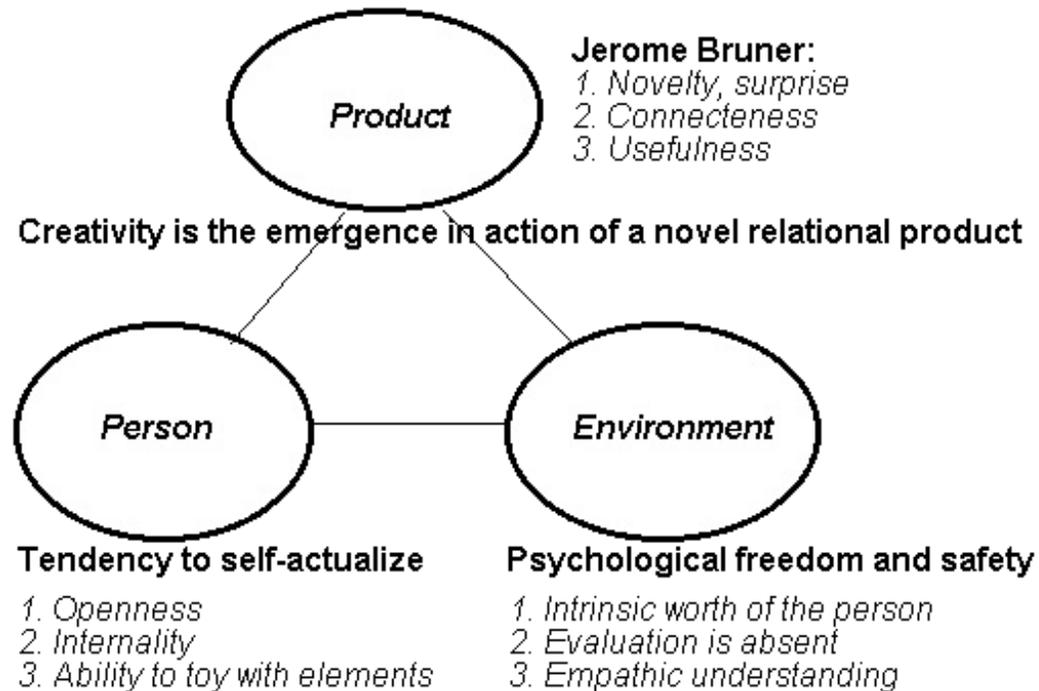
- Valuing of ideas
- Evaluation tied closely to cause and effect
- Chance to practice or experiment without fear of evaluation
- Opportunities to share specialties and for teamwork

Reference:Houtz, J. C. (1990). Environments that support creative thinking. In C. Hedley, J. Houtz, & A. Baratta (Eds.), Cognition, curriculum, and literacy (pp.61-76). Norwood, NJ: Ablex.

PERSON--ENVIRONMENT INTERACTION

Carl Rogers: "Towards a Theory of Creativity"

From: Rogers, C. (1954). Towards a theory of creativity. ETC: A Review of General Semantics, 11, 249-260.



PERSUASION TECHNIQUES OF CREATIVE TEACHING

Modeling Creativity

- Mentoring
- Demonstrating
- Showing curiosity, questioning

- Make predictions, hypotheses
- Conduct experiments
- Showing awareness of problems, possibilities
- Presenting ambiguities, uncertainties, mysteries
- Connecting ideas from different disciplines

Rewarding Creative Behavior

- Making clear that original thinking is expected
- Rewarding question-asking
- Asking for predictions, guesses, possibilities
- Training hypothesis-making and testing
- Practicing elaborating ideas
- Using puzzles or problems as rewards for work
- Suspending judgment

Create a Supportive Environment

- Providing time, resources for extended work
- Looking for honesty and realism
- Stressing divergent thinking
- Varying the modes of communication
- Asking for competing views
- Indulging wishful thinking, playfulness
- Using student-centered, cooperative methods
- Requiring constructive evaluation
- Praising failures for the effort
- Encouraging sense of humor

Reference: Esquivel, G. B. (1995). Teacher behaviors that foster creativity. [Educational Psychology Review](#), 7, 185-202.

Creative Counselors, Teachers, and Administrators

Source: Torrance, E.P. (1962). [Guiding creative talent](#). Englewood Cliffs, NJ:

Prentice-Hall.

I. Creative counselors should:

- A. Have fused primary and secondary creativeness
- B. Be open, warm

- C. Understand the creative process
- D. Have good contact with reality
- E. Be relatively free of threat
- F. Be tolerant of divergency
- G. Have some training in personal psychotherapy and intuitive thinking

II. Creative teachers should be...

- A. Very sensitive to the needs and potentialities of students
- B. Able to maintain their own uniqueness
- C. Able to maintain good relationships with students
- D. Resourceful, flexible, willing to "get off the beaten track"
- III. The creative administrator...
- A. Lets teachers know he/she respects creativity and creative teaching
- B. Uses some regular system for obtaining teachers' ideas
- C. Tolerates disagreement with his/her own ideas
- D. Encourages experimentation
- E. Avoids loading teachers with too many extra duties
- F. Makes it possible to try out new ideas without failure being "fatal"
- G. Avoids overemphasis on teamwork
- H. Makes the school atmosphere an exciting, adventurous one
- I. Holds meetings in which ideas are evaluated honestly
- J. Helps develop sound but exciting ideas from failure experiences
- K. Exposes teachers to creative work of other teachers
- L. Makes it easy for new teachers to generate new ideas and stimulate the staff
- M. Facilitates communication between his/her teachers and teachers elsewhere who are working on related problems
- N. Occasionally questions established concepts and practices
- O. Carries on a continuous program of long-range planning
- P. Recognizes and tries to relieve tension when frustration becomes too severe
- Q. Maintains frequent communication with individual teachers but lets them make most decisions alone

TECHNIQUES OF CREATIVE TEACHING

Source: Hallman, R. (1967). Journal of Creative Behavior, 1, 325-330.

The creative teacher.....

- 1. Provides for self-initiated learning
- 2. Sets up non-authoritarian learning environments
- 3. Encourages pupils to overlearn

- 4. Encourages creative thought processes
- 5. Defers judgment
- 6. Promotes intellectual flexibility
- 7. Encourages self-evaluation of individual progress and achievement
- 8. Helps the student become a more sensitive person
- 9. Knows how to make use of the question
- 10. Provides opportunities for students to manipulate materials, ideas, concepts, tools, and structures
- 11. Assists the student in coping with frustration and failure
- 12. Urges pupils to consider problems as wholes

METHODS FOR FINDING PROBLEMS

- 1. READ WIDELY ON MANY SUBJECTS
- 2. LISTEN TO WHAT OTHERS HAVE TO SAY
- 3. TRY DIFFERENT ROUTINES
- 4. READ DEEPLY ON ONE SUBJECT
- 5. TRAVEL, GO TO MUSEUMS, PLAYS, EVENTS, ETC.
- 6. WRITE FOR DIFFERENT AUDIENCES
- 7. ASK "WHAT-IF" QUESTIONS
- 8. KEEP A DIARY, NOTEBOOKS OF IDEAS, LISTS OF THINGS TO DO
- 9. TAKE A COURSE
- 10. DO EXPERIMENTS
- 11. TRY USING DIFFERENT SENSES
- 12. PLUNGE RIGHT IN

METHODS FOR BETTER UNDERSTANDING PROBLEMS

- 1. WRITE IT DOWN
- 2. DRAW CHARTS OR GRAPHS
- 3. MAKE A TREE-DIAGRAM
- 4. MAKE A MATRIX
- 5. BUILD MODELS
- 6. ASK ANOTHER PERSON TO EXPLAIN IT
- 7. CHECK THE EXPERTS
- 8. READ THE RESEARCH
- 9. LOOK AT THE PARTS
- 10. GET THE "FEEL" OF IT ALL TOGETHER; "LIVE" WITH IT

METHODS FOR IDEA FINDING

- 1. Brainstorming and Brainwriting
- 2. Synectics
- 3. Idea Checklists
- 4. Attribute Listing
- 5. Morphological Analysis
- 6. Bionics
- 7. Forced Associations
- 8. Imagery

METHODS FOR SOLUTION FINDING

FOR WELL-DEFINED PROBLEMS

- 1. USING RULES
- 2. WORKING BACKWARDS
- 3. MEANS-ENDS ANALYSIS/ USING SUBGOALS
- 4. HILL-CLIMBING
- 5. CLASSIFICATION OF ACTION SEQUENCES
- 6. INFERENCE-MAKING
- 7. SPLIT-HALF
- 8. CONTRADICTION

FOR ILL-DEFINED PROBLEMS

- 1. RESTATE THE PROBLEM
- 2. GENERALIZE OR SPECIALIZE
- 3. FIND ANALOGIES
- 4. SEEK COLLECTIVE VIEWS

METHODS FOR GAINING ACCEPTANCE OF IDEAS

METHODS FOR EVALUATING ALTERNATIVES

- 1. State pros and cons, advantages and disadvantages
- 2. Debate the implications

METHODS FOR CONVINCING OTHERS

- 1. Adapt to your audience
- 2. Identify the essence of your message
- 3. Plan for contingencies, “what ifs”

- 4. Give details
- 5. Know the costs

The Tools of Creative Problem Solving

Solving problems typically involves divergent and convergent thinking processes. Problem solvers often “cycle” back and forth between generating possible ideas or tentative solutions, on the one hand, and evaluating those ideas, testing them to see if they will work or be the best solution from several possible options.

Divergent Thinking Tools (Generating Options)

- 1. Brainstorming
- 2. Braindrawing
- 3. Forced Relationships
- 4. SCAMPER (Substitute, Combine, Adapt, Modify, Put to other uses, Eliminate, Rearrange)

Convergent Thinking Tools (Focusing on a Few Good Ideas)

- 1. Hits and Hot Spots
- 2. Highlighting
- 3. Using an Evaluation Matrix
- 4. ALoU, Advantages, Limitations to be overcome, Unique characteristics)

Some Suggestions for Increasing Your Creative Problem Solving

- A. Make lists...of things that bug you, of unfinished tasks, of things to do, of ideas you have...any time, day or night
- B. Think of alternatives...never stop at “just one” idea, just one way of doing something
- C. Do something different: reading a different kind of book, visiting a different place, meeting new people, seeing a different kind of movie
- D. Make time in your daily schedule to “just think”, to incubate, to relax and “do nothing”; practice meditation, take long walks, etc.
- E. Try drawing or painting, creating music, writing poetry or short stories, taking pictures, “acting”, etc., to express an idea
- F. Buy different kinds of gifts for birthdays, holidays, etc.
- G. Ask what would happen if the rules were changed
- H. Solve puzzles
- I. Talk to someone about your ideas
- J. Take a course, go to a lecture; get training in CPS
- K. Learn a new dance, practice a new skill
- M. Learn and use a second language

ENHANCING PERSONAL CREATIVITY

Source: Csikszentmihalyi, M. (1996). Creativity: Flow and the psychology of discovery and invention. New York: Harper/Collins.

A. Curiosity and Interest

- 1. Try to be surprised by something every day.
- 2. Try to surprise at least one person every day.
- 3. Write down each day what surprised you and how you surprised others.
- 4. When something strikes a spark of interest, follow it.

B. Cultivating “flow” in everyday life

- 1. Wake up in the morning with a specific goal to look forward to.
- 2. If you do anything well, it becomes enjoyable.
- 3. To keep enjoying something, you need to increase its complexity.

C. Habits of strength

- 1. Take charge of your schedule.
- 2. Make time for reflection and relaxation.
- 3. Shape your space.
- 4. Find out what you like and what you hate about life.
- 5. Start doing more of what you love, less of what you hate.

D. Internal Traits

- 1. Develop what you lack.
- 2. Shift often from openness to closure.
- 3. Aim for complexity

E. Application of your creative energy

- 1. Find a way to express what moves you
- 2. Look at problems from as many viewpoints as possible
- 3. Figure out the implications of problems
- 4. Implement the solution

F. Think divergently

- 1. Produce as many ideas as possible
- 2. Have as many different ideas as possible
- 3. Try to produce unlikely ideas

Source: Sternberg, R. J., & Lubart, T. (1995). Defying the crowd: Cultivating creativity in a culture of conformity. New York: The Free Press.

- 1. Redefine problems. Don't just accept what you're told about how to think or act.
- 2. Look for what others don't see. Put things together in ways that others don't; and think about how past experiences, even ones that may initially seem irrelevant, can play a part in your creative endeavors.
- 3. Learn to distinguish your good from your poor ideas, and pay attention to their potential contribution.
- 4. Don't feel that you have to know everything about the domain in which you work before you are able to make a creative contribution.
- 5. Cultivate a legislative, global style.
- 6. Persevere in the face of obstacles, take sensible risks, and be willing to grow.
- 7. Discover and tap into your intrinsic motivations.
- 8. Find or create environments that reward you for what you like to do.
- 9. Resources needed for creativity are interactive, not additive.
- 10. Make a decision about a way of life that fosters creativity.

DEVELOPING A PERSONAL MODEL OF PROBLEM SOLVING(Combining Divergent and Convergent Processes)

As you saw from Polya's little book, "How to Solve It", a useful technique for trying to understand and solve problems is asking questions. Questions help us "systematize" our thinking. Questions give us guides. They can direct us to seek out information that we need to solve our problem. They also can point us in new directions when we are "stumped" and think we have no alternatives.

Most often, problem solving is NOT a function of poor intelligence. It's a function of poor thinking. Like many other things in life, we can improve our thinking, with training and practice. If you wish to become a better thinker and problem solver, try to develop your own personal system or model of problem solving. Below is a set of questions that you might ask yourself when you next face difficult problems. By all means, feel free to modify this list—to add, subtract, or change words and phrases. Make it your "system".

STEP ONE: ASSESS YOUR STRENGTHS AND WEAKNESSES

- D1. WHAT IS MY BACKGROUND AND TRAINING ?
- C2. HOW DOES THIS PROBLEM RELATE TO ME ?

STEP TWO: UNDERSTAND THE PROBLEM

- D1. HOW BIG IS THIS PROBLEM ?
- C2. DO I NEED TO REDEFINE (OR LIMIT) THE PROBLEM ?

STEP THREE: DEVELOP A PLAN OF ACTION

- D1. WHAT METHOD SHALL I TRY ?
- C2. WHAT INFORMATION AND RESOURCES DO I NEED ?

STEP FOUR: ACT

- D1. WHAT THINGS MUST I WATCH OUT FOR ?
- C2. HOW CAN I OVERCOME THESE OBSTACLES ?

STEP FIVE: EVALUATION

- D1. WHAT HAVE I MISSED ?
- C2. AM I SATISFIED ?

STEP SIX: COMMUNICATION

- D1. WHAT IS MY AUDIENCE EXPECTING ?
- C2. WHAT IS MY MAIN IDEA ?