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Creative Thinking Techniques

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You'll remember the five creative methods we discussed in the Introduction to Creative Thinking: **evolution, synthesis, revolution, reapplication, changing direction**. Many classic creative thinking techniques make use of one or more of these methods. Note in this section that the goal is to produce a good quantity and a good quality of new ideas and solutions so that the best ones may be chosen. Exactly how those ideas are generated is less important than the ideas themselves. Remember, *the goal is more important than the path.*

Brainstorming

Alex Osborn, advertising writer of the fifties and sixties, has contributed many very powerful creative thinking techniques. Brainstorming is probably the best known and certainly one of the most powerful. For a fuller treatment, see his book, *Applied Imagination*.

Brainstorming is an idea generating technique. Its main goals are (1) to break us out of our habit-bound thinking and (2) to produce a set of ideas from which we can choose. (No one wants to have a choice of only one product when buying detergent or cars, so why have a choice of only one solution when working on a problem?)

Basic Guidelines for Brainstorming

Brainstorming is useful for attacking specific (rather than general) problems and where a collection of good, fresh, new ideas (rather than judgment or decision analysis) are needed.

For example, a specific problem like how to mark the content of pipes (water, steam, etc.) would lend itself to brainstorming much better than a general problem like how the educational system can be improved. Note, though, that even general problems can be submitted to brainstorming with success.

Brainstorming can take place either individually or in a group of two to ten, with four to seven being ideal. (Alex Osborn, brainstorming's inventor, recommends an ideal group size of twelve, though this has proven to be a bit unwieldy.) The best results are obtained when the following guidelines are observed:

1. Suspend judgment. This is the most important rule. When ideas are brought forth, no critical comments are allowed. All ideas are written down. Evaluation is to be reserved for later. We have been trained to be so instantly analytic, practical, convergent in our thinking that this step is very difficult to observe, but it is crucial. To create and criticize at the same time is like watering and pouring weed killer onto seedlings at the same time.

2. Think freely. Freewheeling, wild thoughts are fine. Impossible and unthinkable ideas are fine. In fact, in every session, there should be several ideas so bizarre that they make the group laugh. Remember that practical ideas very often come from silly, impractical, impossible ones. By permitting yourself to think outside the boundaries of ordinary, normal thought, brilliant new solutions can arise. Some "wild" ideas turn out to be practical, too.

For example, when the subway was being dug under Victoria station in London, water began seeping in. What are the ways to remedy this? Pumps, steel or concrete liners? The solution: freeze it. Horizontal holes were drilled into the wet soil and liquid nitrogen was pumped in, freezing the water until the tunnel could be dug and cemented.

We've already talked about gold plating electrical contacts. In another example, it's a fact that electric generators can produce more power if the windings can be kept cool. How would you cool them? Fans, air conditioned rooms? How about a wild idea? Make the electric windings out of copper pipe instead of wire and pump helium through them. That is what's actually done in some plants, doubling the output of the generators.

3. Tag on. Improve, modify, build on the ideas of others. What's good about the idea just suggested? How can it be made to work? What changes would make it better or even wilder? This is sometimes called piggybacking, hitchhiking, or ping ponging. Use another's idea as stimulation for your own improvement or variation. As we noted earlier, changing just one aspect of an unworkable solution can sometimes make it a great solution.

Example problem: How can we get more students at our school? Brainstorm idea: Pay them to come here. That sounds unworkable, but what about modifying it? Pay them with something other than money--like an emotional, spiritual, or intellectual reward or even a practical value-added reward like better networking or job contacts?

4. Quantity of ideas is important. Concentrate on generating a large stock of ideas so that later on they can be sifted through. There are two reasons for desiring a large quantity. First, the obvious, usual, stale, unworkable ideas seem to come to mind first, so that the first, say, 20 or 25 ideas are probably not going to be fresh and creative. Second, the larger your list of possibilities, the more you will have to choose from, adapt, or combine. Some brainstormers aim for a fixed number, like 50 or 100 ideas before quitting the session.

Practical Methodology

1. Choose a recorder. Someone must be put in charge of writing down all the ideas. Preferably, the ideas should be written on a board or butcher papered walls so that the whole brainstorming group can see them. Lacking this, ideas should be put down on paper. In an ideal session, the recorder should be a non participant in the brainstorming session, since it's hard to be thoughtful and creative and write down everything at the same time. But in small sessions, the recorder is usually a participant, too.

For a one-person brainstorming session, using an idea map on a large piece of paper is useful. Butcher paper on the walls is good, too. (Large writing helps keep your ideas in front of you. In fact, some people have said that using 11 by 17 inch paper instead of 8.5 by 11 inch increases their creativity. Why not try it?)

2. Organize the chaos. For groups of more than three or four, have a moderator to choose who will offer an idea next, so that several people don't speak at once. The moderator should prefer those with ideas that tag onto previous ideas, then those with new ideas. If necessary the moderator will also remind members of the group not to inject evaluation into the session (in case a member tsks, sneers, says, "Oh, come on," and so forth).

3. Keep the session relaxed and playful. The creative juices flow best when participants are relaxed and enjoying themselves and feeling free to be silly or playful. Eat popcorn or pizza or ice cream or make paper airplanes or doodles while you work, even if the problem itself is deadly serious like cancer or child abuse. Don't keep reminding everyone that "this is a serious problem" or "that was a tasteless joke."

As an aid to relaxation and a stimulation to creativity, it is often useful to begin with a ten-minute warm-up session, where an imaginary problem is tackled. Thinking about the imaginary problem loosens people up and puts them into a playful mood. Then the real problem at hand can be turned to. Some imaginary problem topics might include these:

- how to heat a house more efficiently
- how to light a house with a single light bulb
- how to improve your travel from home to work
- inventing a new game for the Olympics
- how to improve institutional food without increasing its cost

4. Limit the session. A typical session should be limited to about fifteen or twenty minutes. Longer than that tends to become dragging. You should probably not go beyond thirty minutes, though thirty is the "ideal" length recommended by Alex Osborn.

5. Make copies. After the session, neaten up the list and make copies for each member of the session. No attempt should be made to put the list in any particular order.

6. Add and evaluate. The next day (not the same day) the group should meet again. First, ideas thought of since the previous session should be shared (entered on the photocopied lists). Then the group should evaluate each of the ideas and develop the most promising ones for practical application.

During the evaluation session, wild ideas are converted to practical ones or used to suggest realistic solutions. The emphasis is now on analysis and real world issues. Some brainstormers divide the ideas found to be useful into three lists:

A. Ideas of immediate usefulness. These are the ideas you will be able to use right now.
B. Areas for further exploration. These are ideas that need to be researched, followed up, thought about, discussed more fully, and so on.
C. New approaches to the problem. These are ideas that suggest new ways of looking at the situation.

Note here that evaluation does not take place on the same day as the brainstorming session. This fact keeps the idea session looser (no fear that evaluation is coming soon) and allows incubation time for more ideas and time for thinking about the ones suggested.

Variations

1. Stop and Go. For stop and go brainstorming, ideas are generated for three to five minutes. Then the group is silent (and thinking) for three to five minutes. Then ideas are given out for another three to five. This pattern alternates for the entire session.

2. Sequencing. In this technique, the moderator goes in order from one member of the group to the next in turn or sequence. Each member gives whatever ideas he then has, and they are written down. If a member has no ideas, he just says, "Pass," and the next member responds. This movement in turn or around the table continues throughout the session. (Sequencing has been said to nearly double the number of ideas generated in a brainstorming session.)

Try It Yourself

Brainstorming. Choose one of the following problems for a brainstorming session. Generate at least 35 ideas for solving the problem. Then distill this list into at least three practical, effective ideas.

1. A new snack food
2. How to keep rowdy children quiet on a schoolbus
3. How to get more tourists into the United States
4. How compatible people can meet each other for romance
5. How to reduce hospital costs
6. How to reduce airport congestion and delays
7. A name for a new laundry detergent
8. How to keep your car keys safe at the beach
9. A new toy
10. A new electronic consumer product

Idea Generating Questions

Asking questions to stimulate curiosity and creativity has proven helpful for all kinds of endeavors, whether problem solving, product development, inventing, or communication. A written list of mind-stimulating questions is useful because it reminds us of approaches and possibilities that we otherwise would not have in mind. Yes, it is sometimes

possible to be creative in a thorough and even orderly way.

The Journalistic Six

These are the six key questions that journalism students are taught to answer somewhere in their news articles to make sure that they have covered the whole story. For creative thinkers, these questions stimulate thinking about the idea in question and allow approaches to it from various angles.

1. Who? (Actor or Agent) Who is involved? What are the people aspects of the problem? Who did it, will do it? Who uses it, wants it? Who will benefit, will be injured, will be included, will be excluded?

2. What? (Act) What should happen? What is it? What was done, ought to be done, was not done? What will be done if X happens? What went or could go wrong? What resulted in success?

3. When? (Time or Timing) When will, did, should this occur or be performed? Can it be hurried or delayed? Is a sooner or later time be preferable? When should the time be if X happens?

4. Where? (Scene or Source) Where did, will, should this occur or be performed? Where else is a possibility? Where else did the same thing happen, should the same thing happen? Are other places affected, endangered, protected, aided by this location? Effect of this location on actors, actions?

5. Why? (Purpose) Why was or is this done, avoided, permitted? Why should it be done, avoided, permitted? Why did or should actor do it? Different for another actor, act, time, place? Why that particular action, rule, idea, solution, problem, disaster, and not another? Why that actor, time, location, and not another?

6. How? (Agency or Method) How was it, could it be, should it be done, prevented, destroyed, made, improved, altered? How can it be described, understood? How did beginning lead to conclusion?

Historical Examination

These questions are especially useful for generating ideas for improving something (the evolutionary approach), but they also help to break thinking out of the evolutionary mode and put it into the revolutionary mode by returning the thinker to the origin and purpose of the idea or solution. By returning to the roots of the problem, a new vision can be created.

1. Essence. What is it? object, concept? What is it made of? What is its real, elementary nature? What are its parts? What is it like, unlike? (Similes and metaphors help in understanding abstractions). What is it related to? What are its various kinds, facets, shades? What is it a part of? Which part of it is unusual or outstanding? In what forms does it appear? Is it typical or atypical of its kind? What is it not? What is it opposed to? How is it different? What makes it different?

2. Origin. Where did it come from? How was it made or conceived or developed? What caused it? If an idea, how did it arise? Are its origins meaningful now? What makes it spread or multiply or gain adherents? What was the reason behind it? Is the reason still valid or useful? Why? Why not? Is it still needed? What influences it? Does it change? Can it, should it be changed, strengthened, eliminated? What could have prevented, delayed, encouraged it?

3. Purpose. What does it do? How does it work? What is its purpose? Is the purpose fulfilled? Better than by its predecessor? Can it, should it be improved? Is it helpful or harmful in intent? What are its implications; what does it lead to? Does it have obvious or hidden consequences? Does it have more than one purpose? What are its immediate effects and its long-term effects? Is its actual function the same as the original purpose intended by its originator? Can it be put to other uses?

4. Import. What is its overall significance? What is its significance to man, environment, civilization, happiness, virtue, safety, comfort, etc.? How is it important? Is it a key element in life, civilization, local area, one man's existence? Is it necessary? Is it desirable?

5. Reputation. What do you think about it? What are your underlying assumptions? What do others think about it? Do

you find consensus, division? Is it good, bad, helpful, harmful in fact or in the opinion of others? Can you resolve any differences between truth and opinion, intent, and actuality, pro and con members? What weaknesses are commonly identified? Are there obvious areas of desired change or improvement or elimination?

Blocking and Block Busting

Many people complain of not being creative when in fact their creativity has merely been blocked. Once the blocks are removed, nearly everyone can exercise a high degree of creativity. Several techniques exist which will help remove the usual blocks to creativity, but before we discuss these, we should say a few words about the blocks themselves.

Sources of Blocking

1. Functional Fixation. As we mentioned earlier, functional fixation arises when someone is unable to see beyond the historical or accepted use for an item, often identified by its name or label. Thus, for example, a screwdriver is a tool for tightening or loosening screws, just as its name says. A person suffering from functional fixation would be unable to see any other uses for the item. But, of course, a screwdriver can also be used as a paint can opener, an ice pick, a plumb bob, a paper weight, and so on.

Similarly, to see a length of water pipe and to think only of water pipe may block your thinking if you are need of pry bar, a blow gun, a plant prop, a flag pole, a fishing rod, a measuring stick, or something else that the pipe might serve for.

An interesting example of how people are almost by nature functionally fixated comes from an experiment. Several people were placed in a room where a short length of pipe containing a ping pong ball was anchored in the floor. The task of the people was to remove the ball from the pipe without damaging either. Several sets of people were given this same task. For some of the sets, a bucket of water was placed on the floor. When this was the case, over 80 percent of the groups solved the problem by pouring water into the pipe and floating the ball out. For some of the other sets, a pitcher of ice water and some drinking glasses were placed on a table in the room. When this was the case, fewer than 40 percent of the groups solved the problem by using the water in the pitcher. The pitcher of water and the drinking glasses so fixated them on the idea of refreshment, that they could not see beyond the ostensible purpose of the pitcher to its use as a solution to their problem.

Block Busting Techniques

1. Uses For. This is a simple technique that can be used for mental stimulation or practical application, depending on what you have in mind at the time. It is an excellent tool for breaking you out of a functionally fixated mindset. To use this technique, think of an item or object, usually a common one like a brick, toothpick, pencil, or bucket, and set the task of thinking of all the possible uses for that object, without regard to what the object is normally used for, what it is named, or how it is usually thought of.

Sometimes a time limit, like three to five minutes, is given. Other times a quantity limit, like 25 to 100 is given. All the techniques of idea generation are used, from checklist to attribute analysis to random stimulation.

For example: What are the possible uses for a brick?
Ideas: doorstop, boat anchor, build a wall, build a walk, ballast, sanding block, powder and make dye, put on white background and make a sign (red letters), nut cracker, shoes, straightedge, red chalk, stop signal (use something green like a cucumber for go), heat reservoir, leaf press, paper weight, step stool, target for shooting, children's toys, scale weight standard, distance standard, definition of red, water holder (soaked), tamper, pattern maker (in soft material), pendulum weight, bell clapper, roofing material (crushed)

Another example: What are the possible uses for a steak knife?
Ideas: hot pad, planter stick or prop, hole digger, popsicle stick, bubble wand (through hole in handle), flipping tool or spring, hammer, gun sight, fishing weight/float, compass (magnetize the steel), plumb bob, drill, can opener, carving tool, electrical (knife) switch or other electrical conductor use, awl, measuring device (two knives long and three knives wide), shim, design maker in wet plaster (serrated edge), writing instrument (dip in ink), all cutting and chopping uses,

guitar pick, branding or soldering device (get red hot first), ice climbing aid (hook or glue to boots with part of blade down into ground)

Try It Yourself

Uses For. Choose one of the items below and think of at least 25 original uses for it. (That is, you cannot list things that the item is already used for.) The uses can be fanciful, but should at least approach practicality. Describe each use in a sentence or two.

Example: Uses for a steak knife.
1. Drill a hole in the tip and use it as a "knife switch" to turn electricity on and off.
2. Use the wood or plastic handles of two or three to make a hot pad for serving casseroles or soup in hot containers.
3. Use it to measure a spot for a new sofa, so when you go to the store you will know how many "steak knife units" long your new sofa can be.
4. Use it to drill holes in plasterboard walls.

a cardboard box	a towel
a nail	a sheet of paper
a spoon	a fan
a roll of adding machine paper	a ball point pen
the yellow pages	an inner tube
a candle	three feet of Scotch tape
popsicle sticks	a plastic drinking glass
a toothpick	a marble
old newspapers	ball bearings that aren't round
worn out automobile tires	non-returnable soda bottles
tons of broken rubber bands)	pencils

Versa Tarp. You have been hired by Acme Manufacturing to write an advertising brochure for its new product, Versa Tarp. The product is an 8 by 10 foot plastic tarp with the usual spaced grommets and reinforcing. (You can see tarps like this at most hardware stores.) In the brochure, Acme wants you to list as many good, practical uses for this tarp as you can, to show just how versatile it is. List at least 25 practical uses, with explanations if necessary. Drawings would be good, too.

Hole Punch. Redwood Mills, Incorporated is a manufacturer of paper. A principal product of theirs is three-hole punch notebook paper for schools. A byproduct of making this paper is tons and tons of punched paper holes. You have been hired to suggest as many uses for these punched pieces of paper as possible. Be imaginative and practical. Think of at least 25 uses.

Steamer. The Heiss manufacturing company of Germany has been making a steam-producing home appliance, designed to be used to steam milk in the making of cappuccino. Unfortunately for the company, its competitors now incorporate a steam maker right into the cappuccino maker, so that a steamer-only design no longer sells. You have been hired by a

liquidator company that has acquired 40,000 of these steamers to write an advertising brochure, describing as many practical uses for this steamer as you can. Your basic task is to think of what steam can be used for. Describe at least 25 good uses, with any necessary explanations or drawings.

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2. Improvements to. "Improvements to" is the counterpart of "uses for." Whereas "uses for" concentrates on using a given item, often unchanged, for multiple purposes different from the item's original purpose, the "improvements to" technique focuses on altering an item to enhance its original, given purpose. The item in question can be any of several kinds and is not limited to objects.

A. Objects. The first and most obvious "thing" to improve is an object, usually something common that most people would never think of changing. The classic, textbook example item is the coffee cup. Suggested improvements have included things like

- multiple handles
- anti skid
- anti tip over
- anti spill (lids)
- built-in heater
- decorations
- wheels
- tea bag holder on side
- insulated
- self brewing
- self cleaning

and so forth. The improvements ideally should move away from obvious bolt-on things, however. For example, in the problem, "Think of several ways to improve books," the first things that come to mind might be the addition or repair ones like

- better binding
- lighter weight
- lower cost
- clearer type
- more color pictures
- better indexes

but we might also think about more imaginative improvements like

- books that read themselves (talk to you)
- books with three dimensional pictures
- books with multiple reading paths
- books that explain their hard parts (better glosses?)
- books that project on the wall so you don't have to hold them

B. Places, Institutions, Things. In addition to the object, a second kind of thing that improvements for can be applied to is a place, institution, or thing. For example, list ten ways to improve a college, or a marriage, or a shopping mall, or the local church, or the road system, or communications channels (telephone, TV, radio). Improvements to these areas require more thoughtful and elaborate proposals, often involving improvements in attitudes, beliefs, behavior, relationships, or other non-tangible things, as well as changes in physical technology. A piece of wood and a tube of glue are no longer sufficient to effect improvement.

C. Ideas. A third area of improvement is even more removed from wood and glue: the improvement of ideas or abstractions. How can we improve art or the writing of history or the application of personal values to our actions?

In all of these cases, problem exploration (an exploration and articulation of needs) is usually the first step. What is there about a coffee cup that is deficient or that could be made better? What about shopping malls do you (and most people) dislike? How is the bulk of recorded or taught history insufficient or imperfect--what keeps it from being described as excellent?

Again, remember the constructive discontent philosophy. The coffee cup, the local church, the college, art, all may be really good and suitable and "satisfactory" in what they do; to look for ways to improve them should not imply condemnation or rejection. This "either it's fine or it's bad" attitude often gets in the way of thinking calmly about improvements. In personal relationships, romantic or supervisor/employee, in techniques and policies, whenever someone suggests an improvement, the typical response is, "So what's so terrible about it now?" Be sensitive, therefore, to the ego needs of the human element involved in improving things. Don't rush into the cafeteria and declare that you are there to make the putrid food edible at last--think of the people who make it now. Don't rush up to your boss and declare that you are about to reveal why his management style stinks. Don't call your best friend and offer to reform her disgusting and selfish personality.

Try It Yourself

Improvements To. Choose one of the following and think of at least ten practical ways it can be improved. Describe each improvement in a sentence or two (why is it an improvement?) and supply any needed drawings.

pencil	calculator	spoon
paper	postal system	tires
lighting in a room	desk	controlling a car
museums	dating	spelling rules
court system	telephone	ball-point pen
textbook	hamburgers	telephone book
flashlight	bicycle	postage stamp
hair dryer	bus	window shades

You will probably want to submit drawings with this project to show what your improvements will look like.

An Idea List of Ways to Improve Something

- Simplify--remove complexity
- Apply to new use
- Automate
- Reduce Cost
- Make easier to use, understand
- Reduce fear to own, use
- Make safer
- Give more performance, capacity
- Make faster, less waiting
- Provide more durability, reliability

- Give better appearance
- Create more acceptance by others
- Add features, functions
- Integrate functions
- Make more flexible, versatile
- Make lighter weight--or heavier
- Make smaller--or larger
- Make more powerful
- Reduce or eliminate drawbacks, bad side effects
- Make more elegant
- Give better shape, design, style
- Provide better sensory appeal (taste, feel, look, smell, sound)
- Provide better psychological appeal (understandable, acceptable)
- Provide better emotional appeal (happy, warm, satisfying, enjoyable, fun, likable, "neat")
- Aim toward ideal rather than immediate goals
- Give larger capacity
- Make portable
- Make self-cleaning, easy to clean
- Make more accurate
- Make quieter

Note: Remember that some of the major problems in modern living are too much noise, too much information, too many decisions, too much complexity, together with a general lack of quality and reliability. Intelligent addressing of these problems in connection with your idea should produce welcome improvements to it.

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3. What-Iffing. A major block to creativity for many of us is the mind's fierce grasp on reality. This very factor that keeps us sane also keeps us from thinking beyond what we know to be true. What-iffing is a tool for releasing the mind, for delivering us from being blocked by reality.

In its simplest form, what-iffing involves describing an imagined action or solution and then examining the probable associated facts, consequences, or events. Instead of quickly saying, "That sounds dumb," or "That would never work," and leaving our criticism vague, we trace as exactly as our reasonable minds can generate the specific implications or consequences of the newly imagined fact.

For example, what if automobiles were all owned by the government and everybody had a key and could use any car that was handy? Consequences: Parking lot size could be reduced. There would probably be more car pooling with strangers. If cars were maintained by the government, too, some would be in better shape than now, but others would be in worse shape--no pride in personal ownership. On sunny days cars would be plentiful, but on rainy days, you might get stuck at the shopping center. Cars that broke down would be abandoned. You couldn't lock things in your car. You'd never know if the car you drove to a location (like the movie theater at night) would be there when you got out.

Another example might be to ask, "What if we do nothing about the problem?" Then seek as accurately as possible the consequences.

On another level, what-iffing allows us to create a completely new reality, to establish a new chain of being or relationships, to change the unchangeable in hope of generating a new perspective on a problem or a new idea.

For example: What if rocks were soft? We could put big ones in our houses like pillows to lean on in the living room. We could use them like "medicine balls" to toss to each other for exercise. We could line roads with piles of rocks to keep cars from damage when control was lost on dangerous corners. We could jump off high buildings onto rock piles. Crushed rock pits could be used to jump into by athletes. On the other hand, rock grinding wheels wouldn't work anymore. Concrete, made of rock, would be soft. A cinderblock cell would be a padded cell.

Another example: What if we could see odors? You'd know the source of the bad smell in the kitchen--a plant, garbage disposal, wastebasket, old food in the refrigerator. You could see the perfume as it wafted off the girl wearing it--a visible "come on." Since we can see farther than we can smell, you could see who had an orange or banana or Limburger cheese sandwich in his lunch bag from across the room. Visible odors could be socially embarrassing in ways not necessary to detail.

Whether or not the "seeing odors" thought suggests the invention of an odor detecting device, a super sniffer like the ones used by the U.S. military to sniff out enemy soldiers, a main benefit of practicing what-iffing is to train the mind to explore unreality or imagined reality, to think about, for a few minutes, the necessary, logical consequences or facts needed to support such a change in real things. Too often when someone gets a new idea, little attempt is made to think about its logical consequences for a few minutes.

For example, we have heard some people say that the United States should legalize drugs like cocaine because then the pushers and organized crime couldn't make money and would stop pushing them and the drug problem would go away. Okay, what if drugs were legal? Would they be legal for everyone, even children? Well, no, you'd have to be 18 to buy them. But then wouldn't the pushers concentrate on selling drugs to those under 18 instead of to adults, which would be a worse situation than we have now? Or, would adults stop using cocaine if it were legal and cheap? Or would it be legal and expensive? And so on.

As I said, too often we simply stop thinking altogether when something contrary to fact comes across our minds or else we think about it in the most illogical and impractical way. When we ask, "What if the sky were green?" the response we tend to get, either from others or from ourselves, is, "Well, the sky isn't green, so why think about it?" But if nothing else, thinking about it is good practice at logical thinking.

In more practical terms, though, thinking about what does not exist is about the only way we have of eventually making it exist. In other words, the first step to implementing a new reality is to imagine it.

Notice when you mention a "what if" to your friends, their reaction will probably be to laugh and change the subject, or to laugh and suggest one funny consequence. There is little attempt to trace probable consequences thoroughly, to outline a full set of associated realities. By not doing so, we are in danger of cutting off many new ideas.

Try It Yourself

What If. Choose one of the questions below and then trace the reasonable and logical consequences that would follow. You might be sure to think of both good and bad (and perhaps indifferent) consequences. List or describe (in a sentence or two each) at least ten consequences.

1. What if anyone could set up as a doctor?
2. What if each home could run the television only one hour a day?
3. What if a citizen could serve only one term in one office during a lifetime?
4. What if gasoline grew on trees and was a renewable resource?
5. What if exams and grades were abolished in college?
6. What if our pets could talk?
7. What if gasoline cost $25 a gallon?
8. What if we never had to sleep?
9. What if we could read other people's minds (and they could read ours)?
10. What if all marriages were automatically cancelled by the state every three years?
11. What if everybody looked almost exactly alike?
12. What if clocks and watches didn't exist and daylight lasted six months?

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4. Attribute Analysis. Attribute analysis is the process of breaking down a problem, idea, or thing into attributes or

component parts and then thinking about the attributes rather than the thing itself.

For example, let's say you work for a ball bearing manufacturer and you discover that a flaw in one of the machines has caused the production of 800 million slightly out-of-round ball bearings. You could ask, "What can I do with 800 million slightly out-of-round ball bearings?" and, of course, a few things come to mind, like sling shot ammo and kid's marbles. But you could also break the ball bearings down into attributes, such as roundish, heavy, metal, smooth, shiny, hard, magnetizable. Then you could ask, "What can I do with 800 million heavy things?" or "What can I do with 800 million shiny things?"

Further, you can focus on each identified attribute and ask questions about it, like this:

What can heavy things be used for? paperweights, ship ballast, podium anchors, tree stands, scale weights, and so on
What can be done with metal things? conduct electricity, magnetize them, melt them, make tools with them

To solve the problem of poverty, ask, what are the attributes of poverty
Some answers: people, crime, lack of food, lack of goods, large families, psychological lacks, low self esteem, welfare, lack of jobs, lack of job skills, lack of value-rich upbringing, lack of education, lack of motivation, poor economic judgment (poor buying skills), poor quality housing, poor quality transportation.

Then, each of these attributes can be addressed, either directly, or through further attribute analysis. For example, take "poor economic judgment." What are the attributes of that?
Some possibilities: buying low quality items, buying smaller packages at higher price per ounce, wasteful spending habits, tendency to "blow a wad" on payday, inefficient food buying (expensive rather than quantity or health considerations), lack of market competition (and hence higher prices), lack of ability to budget, tendency to use money for non food items like alcohol, inability to calculate price per ounce, etc. to determine greatest economy

Discovering attributes can be aided by the use of checklists. For example:
Physical: color, weight, material, speed, odor, size, structure, taste
Psychological: appearance, symbolism, emotive ("happy smell of detergent")
Functional: intended uses, applications, how it does what it does
People: who's involved
Miscellaneous: cost, reputation, origin, class it belongs to, definition

Attribute analysis is sometimes described as a smashing technique, because it smashes our fixed and frozen collection of thoughts about a problem or idea. Notice that this is accomplished by refocusing onto something belonging to the problem but more general or abstract or more specific and concrete. Often, attribute analysis is another way of recognizing that a given problem is really a collection of interrelated smaller problems. And often it is a way of perceiving the variables that make up a situation or thing in a way that allows us to change one or more and improve the whole thing.

Example problem: How can we read and remember better? First, what are the attributes of reading and remembering?
Possibilities: books, repetition, visualization, understanding (comprehension), quantity of material and number of details, length of time desired to remember (short or long or permanent)
What are the attributes of visualization? ... Solution: draw pictures of what you read.
What are the attributes of understanding? ... Simplify text by rewriting it or summaries of it into your own words

Another problem: What are the uses for a yellow pencil? What are the attributes?
Possibilities: yellow paint, hexagonal, pointed, rubber end, metal ring, wood, graphite rod, long and stick-like shape
What are the attributes of wood? burns, floats, electrical insulator, nailable, paintable, gluable, structural component, soaks up liquid slowly, can be sanded or carved

5. Morphological Analysis. Morphological analysis builds upon attribute analysis by generating alternatives for each attribute, thereby producing new possibilities.

The rules are simple:

A. List the attributes of the problem, object, or situation as you would in a standard attribute analysis.
B. Under each attribute, list all the alternatives you can think of.
C. Choose an alternative from each column at random and assemble the choices into a possibility for a new idea. Repeat the choosing and assembly many times.
Example problem: Develop a better bandaid.
What are the current attributes of a bandaid? In the table below the attributes are listed in the first row and alternates are listed under each attribute:

stick on	***flesh colored***	***plastic***	***rectangular***	***gauzed***
magnetic	*red or green*	*cloth*	*round*	*medicated*
tie on	*flower pattern*	*paper*	*triangular*	*cellulose*
glue on	*transparent*	*Tyvek*	*octagon*	*sawdust*
paint on	*black*	*metal*	*square*	*plastishred*
velcro	*words (ouch)*	*wood*	*trapezoid*	*plastic*
clamp on	*stripes*	*rubber*	*animals*	*cotton*

Example problem: Improve the textbook
What are the current attributes of a textbook?

size/shape	***binding***	***cover***	***pages***	***type***	***pictures***
small	*perfect*	*hardback*	*large*	*Roman*	*photos*
large	*sewn*	*paper*	*small*	*varied*	*drawings*
long	*spiral*	*plastic*	*glossy*	*color*	*color*
round	*left*	*none*	*thick*	*highlighted*	*holograms*
micro	*top*	*thin*	*large*	vertical	*U-draw*

Try It Yourself

Morphological Analysis. Use morphological analysis to improve or solve one of the following. List at least six attributes and at least six alternatives for each. Then choose one set that forms a practical, useful improvement.

- improve a bus
- improve a telephone
- solve flat tires
- improve a chair
- solve the problem of low participation in recycling efforts
- improve a shoe
- improve the game of basketball

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6. Manipulative Verbs. Taking a hint from Osborn's questions above, some creative thinkers have asked, Why not use a large list of action verbs to stimulate creative thinking? And that is just what manipulative verbs are all about. The list could be very long; here we have just a few. You can make your own list if you like. Choose one of the verbs and think about how it can be applied to your idea or problem.

For example: The problem is to improve a table. The verb is inflate. What does that suggest? Make the table larger, floating, made of inflated vinyl, thick top and legs, high price to cater to upscale consumers, air vents in table to blow out cool or heated air or to suck in smoke from cigarettes. And so on. Here are a few verbs to begin with:

freeze	crush	rotate
heat	bend	transpose
melt	paint	display
loosen	stretch	submerge
twist	repeat	automate

7. Reversal. The reversal method for examining a problem or generating new ideas takes a situation as it is and turns it around, inside out, backwards, or upside down. A given situation can be "reversed" in several ways; there is no one formulaic way.

For example, the situation, "a teacher instructing students" could be reversed as

- *students instructing the teacher*
- *the teacher uninstructing students*
- *students instructing themselves*
- *students instructing each other*
- *teacher instructing himself*
- *students uninstructing (correcting?) the teacher*

Example problem: a motorist came up behind a flock of sheep in the middle of the road and told the shepherd to move the sheep to the side so that he could drive through. The shepherd knew that on such a narrow roadside, he could not easily keep all his sheep off the road at once. Reversal: Instead of "drive around the sheep," drive the sheep around the car: have the car stop and drive the sheep around and in back of it.

Example: going on vacation: bring vacation home, stay on vacation most of year and then "go on work" for two weeks, make work into a vacation, send someone on vacation for you to bring back photos and souvenirs, etc.

Example: how can management improve the store?

- *how can the store improve management?*
- *how can the store improve itself?*
- *how can management make the store worse?*
- *how can the store make itself worse?*
- *how can the store hinder management?*

Note that in some reversals, ideas are generated which then can be reversed into an idea applicable to the original problem. Example from reversal, "How can management hurt the store?" Hurt it by charging high prices on low quality goods, dirty the floors, be rude to customers, hire careless employees, encourage shoplifting, don't put prices on anything and charge what you feel like, or have to ask for a price check on every item. These bad things can then be reversed, as in, be nice and helpful to customers, make sure all items are priced, etc., and supply a good number of ideas. Sometimes it's easier to think negatively first and then reverse the negatives.

Example: What can I do to make my relationship with my boss or spouse better? Reversal: what can I do to make it worse? Have temper tantrums, use insults, pretend not to hear, etc. Reverse: control temper, use compliments, be solicitous to needs and requests.

In another example, a variety store chain was being hurt by the competition. Some possible reversals include these:

- *how can the store hurt competition?*
- *how can competition help the store?*
- *how can the competition hurt itself?*
- *how can the store help itself?*

The second reversal, "How can competition help the store?" was chosen and was implemented by sending employees to competing stores every week to examine displays, sales, floor plans, goods quality and selection, anything that appeared to be effective or useful. The employees brought these ideas back to company, compared, and implemented the best in the store. Result: competition helped the store.

The value of reversal is its "provocative rearrangement of information" (de Bono's term). Looking at a familiar problem or situation in a fresh way can suggest new solutions or approaches. It doesn't matter whether the reversal makes sense or not.

Try It Yourself

Reversals. Choose on of the following situations and suggest at least five reversals for it.

1. street cleaner cleaning streets
2. workers striking against the company
3. clerk helping customer
4. how can a student improve his ability to write?
5. how can society solve the drug problem?

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8. Analogy and Metaphor. Whether you are teaching someone else something new or trying to learn something yourself or trying to solve a problem, one of the best ways for doing that is to compare the unfamiliar, unknown, or problematic with something familiar and understandable. This is the method of analogy, to find a familiar thing or process that seems somewhat like the idea or problem to be clarified.

In creative thinking, analogies are used for their suggestive qualities, to see what ideas they can break loose, and especially for helping to examine the problem better. By searching for several points of similarity between the analogy and the problem, new aspects of the problem are revealed and new approaches arise.

Example problem: Devise a better way to find your way driving through the fog.
Analogy: This is like a nearsighted person finding his way around. How does he do that? feels with his hands, looks at the ground, uses glasses, waves a cane, asks directions.
Ideas: feel around--a radar system or fog lights or other feelers, uses glasses--develop a vision enhancing device, such as night light amplification, looks at ground--develop system for car to follow a track on the ground.

Another analogy for the same problem: This is like a traveler in a strange country trying to find his way to a particular location. Use direction signs, radio stations with tourist broadcasts. The traveler goes slow, asks directions, uses guidebook and perhaps foreign language dictionary. What is similar in the problem?
Ideas: direction signs--put signs or lights along the side of fog shrouded roads, asks directions--an electronic query system in the car?

A metaphor is a comparison between two unlike things, in which one thing is identified with the other. In problem solving, the use of metaphor helps to break out of a stereotyped or obvious view. Again, similarities between these two essentially unlike things are looked for.

For example: This problem is a real doughnut. My work schedule is a tree or barbed wire fence or brick wall or flowerpot.
Hmm. My work schedule is a flowerpot, and right now there are too many flowers in it and not enough water. So I need more water or fewer flowers if I want healthy blossoms. I had been thinking in terms of fewer flowers (fewer things to do), but now I see that if I use more water (get some help and support), then I can do the same amount of work without suffering.

There is still some good thinking in traditional metaphors, like society as a ship, hierarchies as a great chain, and so on. For example, "History's not my cup of tea." Well, what is your cup of tea? What do you really like? A subject that's hot, sweet, strong, clear, weak, brimming over, aromatic, mixed with cream, flavored with honey or orange blossoms? What are the corresponding realities to each part of the metaphor? Strong equals weighty, technical, concrete? Or orange blossom equals improved with esthetics, etc. But new metaphors are often the most revealing. So discover your own.

Try It Yourself

Analogy and Metaphor. Think of a good, original analogy or metaphor for one of the following and the trace at least four similarities. Describe the similarities in complete sentences.

1. studying
2. driving a car
3. solving problems
4. using a computer
5. education
6. love
7. painting

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9. Trigger Concepts. A trigger concept (or idea seed or random seed) is an idea creating technique operated by bringing an unrelated idea into the problem and forcing connections or similarities between the two.

Example problem: improve TV programming
Trigger concept: road
Questions of association: How is TV programming like a road? (a journey, dangerous curves, linear progress--would better continuity improve TV? scenery makes roads interesting); Does TV programming have a road in it? (bumpy, rough, leading astray); What do roads do? They take you somewhere. Does TV programming take you somewhere? Could improved programming do this better? More location filming? More programs from abroad? Programs that take viewers on intellectual journey?
What are roads like? ribbons, tourist havens between the scenery, the route to something else, a path toward real life. What about TV programs that are the route to something else, like happiness, education, thinking, art, escape

Another Example Problem: How can we individualize mass education so that students receive as much personal attention and instruction as possible?
Trigger concept: Hatmaker
Ideas: put it on your head, iron each one out, custom made hats, custom made heads, custom made textbooks or information (computer generated?), hatboxes of knowledge, students choose a boxful of information to master, multiple hats like multiple disciplines, one hat at a time, one subject at a time? one student at a time? meet twenty students for fifteen minutes each

As strange as the trigger concept method may sound at first, it can work quite well. And, oddly enough, any random seed will be fruitful if you are patient and energetic.

For example, in his book, The Care and Feeding of Ideas, James Adams gives the following problem and random seed as an exercise: "Assume that you have been hired as a consultant by a restaurant that is having business problems. See how many ways you can think of to improve the business of the restaurant using the concept of a runover dead cat."
What are the possibilities here? Cat guts, catgut, tennis racket--make the restaurant a sports club like place or decorate it with a sports theme (The Avon River Rowing Club?), or install game machines (video) or put in a giant screen TV and show football games on Monday nights. Flat cat, tire tread marks, artsy in the avant garde area--add to the restaurant an art gallery with modern art on the walls, put in chrome and glass and high tech furnishings. Decorated dining plus art sales. Who killed the cat? Offer surprise menu items that guests won't know what they are until the food arrives. Cats, catsup, the Catsup Supper Club--a burger place. The cat was greased, hit--did the Mafia do it? Is the cat run over repeatedly? Build repeat business by giving a free meal, drink, gift after nine (cat's lives) visits.

That's my list, and you can see that what Adams suggests is true: "One of the underlying theories of creativity techniques is that wild ideas are valuable because the normal forces of life will tend to convert them rapidly into practicality."

Final Example Problem: Get a friend who is behind in his payments to the store to catch up and pay regularly.
Trigger concept: Potato
Ideas: feed him, peel him, slice him up--divide his payments into smaller pieces, as in every week, and send in the monthly payment made up from that. fry him when he doesn't pay, plant him in the ground. salt him--give him some "flavorful" incentive to pay, as in some gift or verbal reward. Baked potato, butter and sour cream. Potato eyes--growth--convince him his credit rating will grow and be valuable to him if he pays regularly.

Some useful questions to ask that will help you connect your trigger concept to your idea include these:
A. How is the problem or idea like the trigger concept?
B. Does the problem have the trigger concept in it?
C. What does the concept do?
D. What is the concept like?
E. What is it not like?
F. What does the concept suggest?

Try It Yourself

Trigger Concepts. Choose one of the following items and use its assigned trigger concept to stimulate ideas for improving the item. On the first part of a page, write down the ideas and associations that first occur to you when using the trigger concept. Then on the last part of the page, list at least five improvements, each described in a sentence or two, that resulted from your thinking.

1. improve an automatic dishwasher using the trigger concept of a stone.
2. improve a toy store using the trigger concept of hair
3. improve a library using the trigger concept of candy

Checklists

A checklist is a standard collection of items (things, verbs, questions, approaches, attributes) used to remind the creative thinker of possible ways to approach a problem or shape a solution. When running through a typical checklist, the creative thinker might ask, "Have I taken this into account? How might I change or use this aspect? What effect will this attribute have on my problem or solution or idea?"

Here are a few checklists, which you should supplement with your own customized ones, developed for your particular

problem, or the kind of work your do. You might also locate or develop some additional general lists like these:

I. The Five Senses

1. Touch. Feeling, texture, pressure, temperature, vibration.
2. Taste. Flavor, sweet/salt/bitter.
3. Smell. Aroma, odor.
4. Sound. Hearing, speech, noise, music.
5. Sight. Vision, brightness, color, movement, symbol.

II. Human Needs

1. Physical Comfort. Food, clothing, shelter, warmth, health.
2. Emotional Comfort. Safety, security, freedom from fear, love.
3. Social Comfort. Fellowship, friendship, group activity.
4. Psychological Comfort. Self-esteem, praise, recognition, power, self-determination, life control.
5. Spiritual Comfort. Belief structure, cosmic organizing principle.
(Note: some needs cross boundaries. These include: pleasure, recreation, activity.)

III. Physical Attributes

1. Shape.
2. Color.
3. Texture.
4. Material.
5. Weight.
6. Hardness/Softness.
7. Flexibility.
8. Stability. (rolls, evaporates, decomposes, discolors, etc.)
9. Usefulness. (edible, tool, esthetic, etc.)
10. State. (powdered, melted, carved, painted, etc.)

IV. Aristotle's Categories

1. Substance or essence. What is it and what makes it unique or individual?
2. Quantity or magnitude. How many, how much, what degree?
3. Relation. Rank, comparison, derivation.
4. Quality. Value, attributes, shape, habits.
5. Action. What is it doing or does it do?
6. Affection. Reputation, attitudes toward.
7. Place. Where is it?
8. Time. When? (now? historical? future?)
9. Position. Sitting, standing, displayed, hidden
10. State. Planned, broken, untried, changing.

V. General Comments

Customized checklists should be developed for individual problems or ideas when several factors must be considered. Listing each condition to be met or part to be covered will assure that none are overlooked. The mind can attend to only about seven items at one time; more than that will have to be recalled from memory, either by force of will or through a checklist. Checklists help enormously in keeping the idea maker or problem solver alert to multiple aspects of the issue at hand.

A checklist of available tools used in your ordinary work can also be helpful. These lists might be called availability reminders. An electrician might have a list (or even a board with samples) of the various kinds of wires and fasteners available. A student might have a list of common reference tools, outlining styles, and information storage methods (like writing, drawing, typing, voice and video recording, model building, memorizing, and so forth). These checklists simply save the mental effort required to bring up what's available when that list gets longer than six or seven.

Try It Yourself

Use one or more of the concepts in this article to respond to one of the following challenges. List the concept(s) you chose to use, and describe how you used it. Then list your suggested names.

Product Name. The KellMills Cereal Company has just created a new breakfast cereal made from formed wheat chunks. Instead of targeting this cereal either to the children's or adult's market, the company would like to target it toward young adults in the 13-19 year-old range. Your task is to think of ten possible names for this product and then to choose one of these names. Explain in a few sentences why the name is appropriate and appealing, and then in a paragraph sketch out a possible advertising campaign or advertisement that will appeal to the targeted group.

You may want to design the look of the cereal box also as part of the advertisement.

Company Name. A new company has been formed through the merger of two conglomerates, AXA Inc. and Flubco Industries. The new company now makes food items (bread, cake mix, cereal, soup), household products (light bulbs, telephones, dishwashing detergent), and original equipment for manufacturers (automobile mufflers and shock absorbers).

Your task is to create a new name for this company that will be attractive, memorable, and distinctive, and if possible, reflect the kinds of products the company makes and the market it serves. Suggest ten possible names and then choose one that seems to be the best. In a few sentences explain why this is the best choice.

Finally, generate a motto to go with the new name. (For example, "Flubco--Our light bulbs are a bright idea.")

For more information on creative thinking and a free creative thinking e-book, visit Sly as a Fox.

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