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ABSTRACT

This workplace literacy curriculum is based on neuropsychological brain behavior research and the principles of continuous improvement in a learning environment. Section 1 explains the choice of this model. Section 2 defines the need for this type of workplace curriculum. Sections 3 and 4 discuss the method of building the thematic units and delivery model. Section 5 describes three steps in the evolution of this curriculum. Section 6 explains briefly both the form and substance of the daily lesson plans. A curriculum timeline is followed by content outlines for four thematic units developed in this curriculum process: internal job papers, statistical process control and application, quality issues, and cycle times. The thematic units are subdivided into literacy skills--content, thinking, and social--under which subskills are categorized. The appendixes contain examples of materials referenced in the curriculum. Lesson plan samples provide materials list, objective, metacognition, transition/practice, job application, and required handouts. Other appendixes include the following: sample pages from a learning style profile; puzzles to assess simultaneous and sequential processing; materials on teams; materials used during the portion of the training cycle the deals with work related skills and applications; and materials used during the applications session that involves work-related situations and materials. (YLB)

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Champaign County National Workplace Literacy Program
Workplace Literacy Curriculum

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Workplace Literacy Curriculum

A Thematic Unit Method of Building Literacy Content

Champaign County Board of Education
P O Box 269
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Sponsored by:
Department of Education
Washington, D.C.
Workplace Literacy Grant

This workplace literacy curriculum is based on neuropsychological brain behavior research and the principles of continuous improvement in a learning environment. The curriculum is a process that can be adapted to any content and remain flexible to individual needs.While the process remains essentially the same, the final product and the activities involved are different in every teaching situation. This approach has been used by the Project Director in teaching junior and senior high school students and in teacher/administration training sessions for ten years.

The following section provides an explanation for the decision to use this model. Workplace defines the need for this type of curriculum. The method of building the thematic units and delivery model is described in the Assessment and Content sections. The development section describes three steps in the evolution of this curriculum and Lesson Plans briefly explains both the form and the substance of the daily lessons. A timeline and the content of four thematic units developed in this curriculum process are included. Examples of materials referenced in the curriculum are the final section of this report.

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Explanation

Brain behavior research indicates that all people can learn best in a complex, natural environment. This curriculum is designed to allow teachers to become facilitators of a learning environment which encourages students to become active participants. Adult students are expected to be contributors and share their knowledge.

Neuroscience identifies differences in construction of memory and in methods of building knowledge systems. This curriculum is a process of exploration and identification of learning differences. Students share their own methods of learning, retaining information, understanding systems and communication processes. The teacher (hereafter referred to as facilitator) offers students discovery questions and classroom activities to bring out learning differences and share them among the learning group. In this curriculum, the facilitator does not hold "the answer." The facilitator is expected to support this exploration process and assist students in the identification of differences and strategies to optimize those differences.

For this tremendous shift to take place, the facilitator must relinquish some control over the classroom and allow students to ask questions that do not have complete answers. The facilitator must also be prepared to hear many answers to a single question. This type of environment is sometimes chaotic and always a challenge, but its complexity is the foundation of strong learning. As students become comfortable in a learning environment where their contributions affect the result, they will become aware of how they "naturally" learn and transfer this learning process to other areas of their lives, instead of learning being a behavior that is "turned on" for classroom purposes only.

The brain learns through patterns, feelings, wants, choice, reasoning, moral values, and other "things of the mind" (Roger Sperry, 1986, Nobel Prize laureate responsible for the initial "split brain" research). These are a few of the methods students can teach each other in class. As a facilitator, the primary concern is to foster an environment that supports and encourages as many types of learning as possible. Of course, one facilitator cannot provide examples or assist at every level of learning, so orchestrated student contribution through well planned activities is a requirement.

Learning is equated with changes in this model. Learning has not occurred unless a change has occurred. The brain stores patterns with complex connections of such quality and control as to be accessed appropriately in new learning situations. This highly complex and exciting process must be honored in the workplace literacy classroom. All students, whatever their age, come to a classroom with a tremendous ability to learn and grow and change. Their survival in the world is evidence of that ability! The adult population, in particular, requires that facilitators honor the brain patterns and connections which have allowed them to learn and accomplish successfully.

This curriculum model respects the worker as a learner whose attendance in training is to sharpen their learning skills and knowledge. Participants gain increased control of their learning which increases personal responsibility for learning.

Through interviews and observations of potential class participants and through discussions with the staff secretary who had worked in a factory, the Workplace Team determined that workers use approximately 80% of the thinking, problem solving and communication skills targeted by workplace training. Workers are often unaware of the number of skills they routinely incorporate on their job since traditional education does not address how we learn or how to improve learning. Cognitive awareness of learning processes and strategies allows individuals to adapt to new situations and learn more quickly than simply operating from observation of successful results (proactive learning vs reactive learning).

The job of the Workplace Team is to support workers in becoming cognitively aware of skills they already possess and to learn approximately 20% additional skills, tools and strategies. The lesson plans and classroom management are to be based on this assumption; therefore, the learners are to be participants in classroom planning.

Another principle of this curriculum evolves from continuous improvement. Class activities were designed to teach students to be aware of product (content) vs the process (learning). The skills apply to metacognitive strategies, literacy skills and job application exercises.

Principles of continuous improvement and a learning environment provide the second base for this curriculum model. These disciplines teach organizations how to control change to the benefit of the individual and the organization. Traditional organizational management requires that the leaders provide the "right" answers and followers learn these answers. A learning community that continuously improves depends on the leaders to provide the parameters in which change will occur and then to join the "team"which will identify and implement answers.

The parameters of this curriculum are continuously under development by the Workplace Team and members of the Problem Solving Committee. The Problem Solving Committee members were an executive from each company, a participant from each class and the Workplace Team. The results are four thematic units that fit current and projected company goals. The expertise of the Workplace Team must analyze the literacy subskills of each unit while company personnel define the relevance of these units to company goals. The units provide a map and menu for the facilitator and students to determine the specific, daily curriculum of each class.

The workplace training grant from which this curriculum evolved was designed for cost effective training of small, manufacturing companies by forming a collaboration of training. One of the advantages of the collaborative training model is the input of personnel at Problem Solving meetings. The personnel from different companies learned to share and gain ideas from each other and as a group they help the Workplace Team determine the content and form of the curriculum and delivery model. As the company personnel deal with the on-going training they share relevant information that produce quality training that is responsive to company and individual needs.

The Workplace

In the past, learning specific facts to be remembered and produced in predictable situations was adequate. The workplace expected employees to report for work, follow company rules and regulations and clock out with no questions asked. Memorization and repetitive tasks were the order of the day. The industrial revolution forced even the managers and executives into linear, formulaic thinking. When things were going well, there seemed no reason to change or question the process.

Today, global economic concerns demand employees who demonstrate a high level of competence to deal with complexity and change. As "downsizing" and "right sizing" become more common, the management structure becomes looser and employees at all levels are being asked to question the status-quo, improve products and processes and produce answers in problem-solving situations.

This demand dictates that the traditional methods of linear, teacher-directed training be allowed to change. Students who are being asked to contribute at high levels in the workplace must practice those new behaviors in the classroom. Team activities, idea generation and sharing, analysis, global and discriminatory thinking are processes students use in their everyday lives, but they often lack the skills to apply them on the job. It is the facilitator's job, then, to build on existing knowledge and help students transfer what they already know, along with some new skills, to their work. This gives individuals greater control over their learning and decision making skills.

The naturally complex work environment provides excellent content for cognitive, student-directed learning. Students should bring their work lives to the classroom. The class is an extension of the work site, not an independent event. It is important to offer students an opportunity to "try out" new learning in the safe environment of a classroom, but applying skills exclusively to non-work related situations will not produce an easily transferable skill. Bringing the work site into the classroom will give students a reason to learn.

The Content

Curriculum suited to the workplace requires a marriage of information and situations available in the workplace with cognitive thinking and cooperative education methods. Successful job application will depend on the facilitator's ability to recognize opportunities for in-depth analysis and further learning. Students bring situations and context to the content offered by the facilitator. By observing obvious and underlying student needs in the classroom, analyzing test scores and working with personnel outside the classroom, the facilitator should become skilled at bringing appropriate content.

The overall content is outlined in the four thematic units and their list of accompanying literacy skills. The curriculum content for the unit themes evolves from informal Literacy Task Analyses completed prior to the training, feedback from the Problem Solving Committee and collection of work related materials from each job classification. Adjustments to the curriculum are made from information gained from the students' first Job Skill Inventory (a form of self-reporting LTA). All of this information is analyzed to determine the content of the job skills and the correlating types of cognitive thinking and social/communication skills the class requires.

Curriculum content is then both knowledge and process based. All information presented in class is embedded in the process of cooperative education/discovery learning activities. Students are involved in the curriculum development by suggesting content and monitoring individual and team learning progress.
The thematic units serve as menus for teaching possibilities while individual classes determine the specific information to be introduced in class.

The thematic units are subdivided into literacy skills as defined in the Secretary's Commission of Achieving Necessary Skills **(SCANS)** report from the U.S. Department of Labor. Reading, writing, mathematics, math embedded in language, listening and speaking skills are included. Thinking skills are covered in the cognitive component and personal abilities are the basis for the classroom management and the types of delivery methods utilized.

Content for metacognitive awareness/application and cooperative learning activities was obtained from the files of the Director, Lestie Carey. This information has been used in research and application to teach training and student learning for a period of ten years prior to acquisition of this grant. The **National Association for Secondary School Principals Learning Style Profile (LSP)** is used as the basis for selecting cognitive/affective/environmental factors to include in the curriculum. The factors include:

> analytic, spatial, discrimination, categorization, sequential, memory, simultaneous, visual, auditory, emotive, persistence, verbal risk, manipulative, study time, verbal-spatial, grouping, posture, mobility, sound, lighting and temperature

The above metacognitive learning factors will serve as the "menu" for selecting the cognitive and social/communization skill related to each basic skill identified in the unit themes and Literacy Task Analyses. The LSP has been standardized for use with junior and senior high school ages and not with adults. It is not used in this model as a standardized test but as a tool for individual awareness of how learning occurs and the variety of strengths and weaknesses. As a learning tool, students are asked to refer to their individual profile during group activities to build better communication and problem solving strategies. Facilitators teach students to improve these skills through directed teaching exercises such as those developed by NASSP and by incorporating specific skills in group activities.

Classroom activities are also based on awareness and application of metacognitive strategies. The activities combine cooperative education and team problem solving processes. Activities are selected for appropriateness to the specific content, standardized pretest results of each class and job requirements such as level of intercommunication, cross training, etc.

The facilitator and the class participants monitor the content and the process of learning. As participants become more comfortable with the learning environment, they will make specific content requests and analyze the learning that occurs in the classroom. This requires the facilitator to relinquish some control over class planning.

As participants contribute to class planning and recognize the value of their involvement, they gain a sense of control over learning that translates to all parts of life. Students come to class prepare and interested when they participate in planning. The responsibility for learning is transferred to the students and the facilitator's job of being "right" and controlling the situation is lessened. Motivation, application, skill transfer and student participation become non-issues in a classroom of this sort.

The Assessment Process and Materials

Assessment is conducted on many levels and woven into the curriculum on an on-going basis. The Problem Solving Committee determines the parameters of the curriculum through informal assessment of current and future company needs. This assessment has resulted in the formation of four thematic units. Each company at each teaching site determines the prioritization of themes.

Daily lesson plans are formed from a variety of initial and on-going assessment tools.

- Individual Education Plans administered pre and post to training
- Participant Surveys administered pre and post to training
- standardized tests administered pre and post to training
- Job Skills inventory administered pre/post and on-going
- on-going Lifelong Learning Logs administered once weekly at end of class
- GAP reading assessment administered once during the training

Individual Education Plans and pre-Participant Surveys provides information regarding learner expectations and goals. This curriculum model honors the concept that adult learners need to have considerable control over what they are taught so the amount of reading, math, etc. taught is influenced by learner goals.

Class participant information from **Job Skills Inventory** helps determine the content and activities of the daily Lesson Plans. The JSI is a type of Literacy Task Analysis completed by the worker to self-report how many literacy skills they aware of using on their job. It provides the facilitators with a starting point for selecting work application activities by giving a "picture" of what the worker already knows about their job literacy skills. Identification of new information to be introduced is assessed by comparing and contrasting individual current level of awareness with the Workplace Team LTA and the company goals. This curriculum model is built on the thought that eighty percent of the skills covered in the curriculum are probably used by the learner but not with cognitive control which prohibits them from using these skills in a proactive,successful manner. The Job Skills Inventory helps determine the remaining 20% of content to be introduced. The JSI is an adaptation of Study Skills Inventory utilized by Lestie Carey in teaching junior and high school students.

Standardized tests and GAP reading assessment results provides individual and class analysis of specific literacy skills needed to be addressed. This information helps determine what will be included in the daily Lesson Plans. For example, in the unit Job Internal Papers, the test results helps facilitators determine which specific math or reading skills to address in the group activities. Cooperative education activities allow the facilitator to assign targeted literacy skills to specific individuals.

On the **Lifelong Learning Logs**, participants record what training information they have transferred to themselves, their job, and their community/family. My Learning Chart was the original form from Lestie Carey's teaching files that was newly titled Lifelong Learning Log for this project. This information alters daily lesson plans as the Team discovers what the participants saw themselves learning. As an example,the Lifelong Learning Logs might indicate that learners did not recognize they were learning to read since they had not been given worksheets or text books while testing results indicated they were improving their reading skills. Lesson plans would be adjusted to address this issue.

Development

The process of developing this type of Workplace Grant Curriculum involves three steps:

- Identify and develop thematic units
- Selection of units appropriate to each site
- Specific design of lesson plans for each site, job classification and individual learner

To identify thematic units, Workplace Team must consult with partner companies and discuss their current challenges. A great deal of this consultation may occur during the process of selecting business partners for the grant. In this case, much of the consultation was a part of the director's work as a representative of the Business Advisory Council for the Office of Education. This experience and time investment of the Office of Education has proven to be highly profitable during the planning process. Resources such as these should not be overlooked.

Plant tours and employee interviews are an orientation process for teachers and employees, managers and company executives. The personal attention makes choosing thematic units more manageable. The on-going Problem Solving meetings provide an additional format for this exchange of ideas. The commonality of company needs is revealed when companies grow comfortable sharing concerns with the grant coordinators and facilitators. As root causes for problems are uncovered, thematic units are more easily identified.

Literacy Task Analyses should also be examined for thematic units. In this case, LTA's revealed that many of the employees at all levels were required to access a definable set of skills about 80% of the time. Although the context differed, the content of jobs fell into similar categories and skills sets. In addition, the thinking and social skills followed the 80% rule. The process of thematic unit development and therefore curriculum content fell into a finite number of clearly delineated units.

The four units developed for the purposes of this grant include Internal Job Papers, Cycle Time, Statistical Process Control and Quality issues. The content, thinking and social/communication skills important to each thematic unit have been identified and prioritized. Content area skills change with each job classification, while the thinking and social skills represent related items chosen from the cognitive/social science field of information.

The attached result is meant to be a starting point, a core set of skills and content areas that grow and change with participant contributions. As emphasized before, the facilitator cannot possibly know all there is to know about the students' work or the answers to questions concerning thinking skill and social skill processes. The thematic unit method is meant to give structure and organization to the discovery learning process.

Problem Solving Committee Meetings provide the expertise to choose the thematic topics most immediately relevant to current and future business needs. Through these meetings, units can be prioritized within each class at each work site. Cross-company discussions in planning meetings such as the Problem Solving Committee improves company planning for transfer of training skills. A committee of company executives, class participants and Workplace Training Team members collaborate and examine unit appropriateness and application.

Prioritizing units should not be a difficult task when current challenges are considered. LTA results and job demands as well as future company direction should be considered in evaluating each unit, as well as the overlap of content, thinking and social skills in certain job classifications. Although all topics are relevant, in depth examination of every topic is not possible.

Customizing unit themes for the particular site, job classification and individual learner involves numerous steps. After company personnel and the Workplace Team prioritize units to be taught at each site, the Workplace Team reviews the Literacy Task Analysis of each job classification. Individual and company job demands are examined to ensure proper content emphasis. Next, content areas are analyzed for the associated thinking and social skills which are essential for employee excellence.

Unit themes are also customized through the review of site-specific paperwork. The Workplace Team collects shop papers, job routers, quality control sheets, management memos, blueprints, employee handbooks, set-up instructions, sample reports, etc. The facilitators examine the paperwork for possible content area topics and the thinking and social skills necessary to successfully complete, discuss and understand materials.

By becoming familiar with job activities and job paperwork, the Workplace Team is able to customize each unit theme. Site-specific paperwork is used to design activities that mirrored actual job requirements. Students are presented with challenges which require them to learn appropriate, immediately transferable new skills and are then given the opportunity to practice new skills on job related issues and materials.

It is important to note that linear, pre-developed worksheets and exercises are not used in this type of curriculum. The importance of avoiding the lure of pre-prepared materials cannot be over emphasized. Existing pre and post-tests and lack of teacher preparation are seductive attributes. However,students presented with workbooks and unrelated exercises will fail to take responsibility for learning, will be reluctant to come to class and participate, will miss the thinking and social skills required for a change in brain patterns and will ultimately be unable to transfer skills to the job.

It is possible to create job-specific learning materials from ideas found in traditional workbooks and basic skills curricula. When creativity, imagination and student-input fail, a review of traditional materials can be a resource for translating job activities and paperwork into job-specific units of instruction.

Lesson Plans

Each lesson plan includes an introduction and directed teaching session averaging 20 minutes. This time is used to create a "safe" environment for learning by using examples and applications not related to the work world and often by focusing on metacognitive learning information. A common base of knowledge and introduction of new information is created during the opening session to ascertain that all class members have the necessary information for proactive participation in group activities.

Introduction time is followed by an applications session involving work related situations and materials. Group activities are usually employed.

The final session involves review of the process and products of the training session and self-monitoring of "real" learning.

The first third of each training cycle focuses time and material on metacognitive learning, evaluating and strategies. The remainder of the cycle increasingly deals with work related skills and applications. This model allows the Team to begin each teaching cycle with metacognitive assessment and awareness activities and adjust daily lesson plans according to the initial and on-going assessments reviewed above.

Each class ends with a Workplace Plan and Assessment designed by classroom participants and supervisors. This plan assists in the transfer of class training to the job floor with an assessment process implemented by the worker and supervisor.

This model copies what Lestie Carey employed in classroom teaching. Students require approximately six weeks of metacognitive awareness/strategies and self-monitoring skills prior to implementation of cooperative learning/discovery activities. Adult students need this introductory time due to their exposure to traditional education and management techniques employed in the workplace.

The introduction sets the stage during the first week by:

Letting students know what they're in for
Placing the training in the framework of company's needs and goals
Reminding participants of the training purpose and limitations
Explaining the uniqueness of meta-learning
Placing the responsibility of success with the students

The Transition and Practice hooks them the first week by:

Letting students see how brain differences affect learning
Allowing students to quickly identify a few strengths and weaknesses
Encouraging open discussion of strengths and weaknesses
Identifying a need for differences
Showing students that learning will be fun

The Job Application wraps it up the first week by:

Depicting an application plan for training
Allowing students to contribute to class direction
Setting personal goals and class goals
Gaining commitments from students and management

Choose an Introduction segment because of its fit with:

The lesson's ultimate direction
The company's needs
The student's needs
Past and future lessons

Choose a Transition or Practice segment because of its:

Relationship to a work-related topic later in the lesson
Ability to set students up to teach themselves a skill
Ability to set students up to teach each other a skill
Appeal to a variety of skill levels
Relationship to the lesson's goal, the unit theme, etc.
Ability to capture interest and encourage participation

Choose a Job Application segment because it:

Shows students how to apply a new skill
Gives them an opportunity to apply the skill immediately
Establishes continuity
Evokes commitment to some action, behavior change, skill use, etc.
Relates to the unit theme, class project, company issue, etc.

CURRICULUM TIME LINE

1st Week of Class

(Note: Standardized Tests administered prior to class)

Goal	Materials
Metacognitive Awareness increased	Examples and literature **Learning Style Profile** (NASSP) administered Informal individual assessment - **Grouper/Stringer**
Participant Goals Defined	**Individual Education Plan** **Participant Survey**
Learner Awareness of Job Literacy Skills	**Job Skills Inventory** administered Students develop list and gather job materials

2nd Week of Classes

Begin Group Process Learning	**Cooperative Education** Group Activity - a Jigsaw
Diagnosis of Individual Reading Strengths/Weaknesses	**GAP** reading assessment administered

3rd Week of Classes

Record of Student Awareness of Classroom Learning	**Lifelong Learning Log** introduced
Metacognitive Awareness increased	LSP results feedback and examples **Metacognitive strategy activity** Lifelong Learning Log journals
Awareness of Individual Math/Reading Skills Strengths/Weaknesses	Standardized test results feedback

4th Week of Classes

Awareness of Individual Math/Reading Skills Strengths/Weaknesses	Feedback of GAP results- individually and group
Appreciation of Individual Metacognitive Differences	Cooperative Education activity
Literacy Skills from Thematic Unit	**Job materials and application/metacognitive practice** **Reading/Math Skills to solve problems**
Record of Student Awareness of Classroom Learning	Lifelong Learning Log entry

5th - 12th Week of Classes**

Awareness of Literacy Skills Used on Job	JSI administered and compared to initial entry Group comparisons and completion of individual entries
Literacy Skills from Thematic Unit Introduced and Applied to Work	Cooperative Education activity designed around job situation- job materials - math/reading/writing/ communication - student generated materials
Appreciation/Application of Individual Metacognitive Differences	Cooperative Education activity designed around job situation- job materials- student generated materials
Record of Student Awareness of Classroom Learning	Lifelong Learning Log entry
Student Monitor Learning	Lifelong Learning Log entry and review of JSI and/or IEP entries

**During these weeks, the unit themes are customized to meet the needs of each class. Information from the LTA's, standardized tests, Job Skills Inventory, Lifelong Learning Logs, job specific paperwork and materials and class discussions help form daily, customized content for each lesson. Classroom cooperative education and problem solving activities are chosen on the basis of individual Learning Style Profiles and communication skills required on the job. Within each group activity, participants are given assignments according to their individual basic, cognitive and personal skill level.

13th Week of Classes

Preparation to Presentation to Supervisors/ Executives	Review LLL, JSI and material from unit of training Prioritize/Categorize above information
Evaluate IEP goals	Review original IEP entries and record comment on results of training
Review Worth of Entire Training	Post administration of Participant Survey

14th Week of Classes

Present to Supervisors/Executives	Student generated materials
Transfer of Learning from Training to Job Procedures and Processes	Student/supervisor complete Workplace Plan and Assessment form

15th Week of Classes

Transfer of Learning from Training to Job Procedures and Processes	Review success of 1st week of Workplace Plan implementation
Comparison of Original JSI with Student View at Completion of Training	Final entry of JSI
Standardized Tests results compared on Pre and Post Basis	Administer standardized tests

Unit Themes

Class content is organized into units of instruction. Based on interviews and consultations with partner companies, the four units chosen as most important to current company challenges are Internal Job Papers, SPC and Application, Quality Issues and Cycle Times.

Based on plant tours, interviews with employees, paperwork and materials collected from partner companies and a review of current business literature, the Workplace Training Team has produced a menu of topic material. Specific applications and the rank of importance will vary between companies. Some menu items may not be appropriate, and teachers/facilitators may find some student needs unlisted. Unit themes are not intended to be all inclusive they are a menu from which to begin.

Classes are organized around the concepts of team instruction, learning styles and metacognition. These areas remain the consistent theme of each class, with workplace application and practice providing the context. The content of individual classes will differ according to the job classifications at each site, tested achievement levels of participants and priorities determined by management. The amount of time devoted to the teaching of learning styles, metacognition and team building will decrease as the participants gain these skills and are therefore prepared to devote more time to the application of these skills.

Internal Job Papers

Content Skills	Thinking Skills	Social Skills
Skimming	Discriminate Prioritize Categorize Visual/Spatial Review	Audience awareness Awareness of relevance to self and others Awareness of how own and others tasks are involved
Scanning	Reflect Relate Discriminate Group Categorize Prioritize Visual/Spatial Review	Audience awareness Relevance to self and others Awareness of how own and others tasks are involved
Summarize	Analyze Discriminate Categorize Group Reflect Relate Combine Focus Synthesize Prioritize	Audience awareness Relevance to self and others Communication with others Questioning
Write	Sentence combining Syntax Analyze Sequencing	Audience awareness Relevance to self and others Awareness of how own and others tasks are involved Jargon

Internal Job Papers

Content Skills	Thinking Skills	Social Skills
Read	Analyze Sequence Discriminate Visualize Listen Feel Reflect Relate Contrast Focus Ranking/Rating Evaluate Question Reason Categorize Visual/Spatial Review	Audience awareness Relevance to self and others Awareness of how own and others tasks are involved Questioning Jargon
Interpret	Clarify Question Evaluate Reason Visual/Spatial Review Relate Contrast Focus Prioritize Analyze Estimation Sequence Discriminate Conceptualize Cause and Effect Compute Application Prediction Critical Review	Audience awareness Relevance to self and others Awareness of how own and others tasks are involved Questioning Jargon Sharing with others

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Internal Job Papers

Content Skills	Thinking Skills	Social Skills
Record	Clarify Sentence combining Syntax Analyze Cause and Effect Compute Prioritize Analyze Estimation Evaluate Sequence Discriminate Conceptualize Critical Review	Audience awareness Relevance to self and others Awareness of how own and others tasks are involved Questioning Jargon
Compute	Estimate Sequence Focus Analyze Evaluate Critical Review Cause and Effect Predict Reflect	

Internal Job Papers

Content Skills	Thinking Skills	Social Skills
Read charts, graphs, tables	Identify Symbols Interpret Symbols Analyze Sequence Discriminate Visualize Listen Feel Reflect Relate Contrast Focus Ranking/Rating Evaluate Question Reason Categorize Visual/Spatial Review	Audience awareness Relevance to self and others Awareness of how own and others tasks are involved Questioning Jargon
Interpret charts, graphs, tables	Clarify Question Evaluate Reason Visual/Spatial Review Relate Contrast Focus Prioritize Analyze Estimation Sequence Discriminate Conceptualize Cause and Effect Compute Application Prediction Critical Review	Audience awareness Relevance to self and others Awareness of how own and others tasks are involved Questioning Sharing with others

SPC and Application

Content Skills	Thinking Skills	Social Skills
Computation	Cause and Effect Relate Contrast Focus Prioritize Analyze Clarify Question Evaluate Reason Estimation Sequencing Discrimination Conceptualization Prediction Critical Review	Questioning Process Communication Clarification Audience awareness Relationship to self and others Awareness of how own and others tasks are related
Information Gathering	Discrimination Categorization Cause and Effect Simultaneous thinking Lateral thinking Focus Visual Clarify Question Relate Contrast Prioritize Conceptualize	Questioning Answering Process Communication Clarification Audience awareness Relationship to self and others Awareness of how own and others tasks are related Listening Environmental awareness Jargon Paraphrasing Prompting Nonverbal Cues

SPC and Application

Content Skills	Thinking Skills	Social Skills
Create Charts	Clarify Question Relate Contrast Prioritize Conceptualize Focus Encode Decode Transfer Eye Tracking Visual/Spatial Review Discrimination Categorization Cause and Effect	Environmental awareness Jargon Questioning Answering Process Communication Clarification Audience awareness Relationship to self and others Awareness of how own and others tasks are related
Problem Identification	Categorize Cause and Effect Simultaneous thinking Lateral thinking Focus Visualize Clarify Question Relate Contrast Prioritize Conceptualize Analyze Sequence Discriminate Reflect Ranking/Rating Evaluate Reason	Environmental awareness Questioning Answering Process Communication Clarification Audience awareness Relationship to self and others Awareness of how own and others tasks are related Paraphrasing Prompting Nonverbal Cues

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SPC and Application

Content Skills	Thinking Skills	Social Skills
Read charts, graphs, tables	Identify Symbols Interpret Symbols Analyze Sequence Discriminate Visualize Listen Feel Reflect Relate Contrast Focus Ranking/Rating Evaluate Question Reason Categorize Visual/Spatial Review	Audience awareness Relevance to self and others Awareness of how own and others tasks are involved Questioning Jargon
Interpret charts, graphs, tables	Clarify Question Evaluate Reason Visual/Spatial Review Relate Contrast Focus Prioritize Analyze Estimation Sequence Discriminate Conceptualize Cause and Effect Compute Application Prediction Critical Review	Audience awareness Relevance to self and others Awareness of how own and others tasks are involved Questioning Sharing with others

SPC and Application

Content Skills	Thinking Skills	Social Skills
Process Investigation	Categorize Cause and Effect Simultaneous thinking Lateral thinking Focus Visualize Clarify Question Relate Contrast Prioritize Conceptualize Analyze Sequence Discriminate Reflect Ranking/Rating Evaluate Reason	Environmental awareness Questioning Answering Process Communication Clarification Audience awareness Relationship to self and others Awareness of how own and others tasks are related Paraphrasing Prompting Nonverbal Cues
Process Understanding	Cause and Effect Simultaneous thinking Lateral thinking Visualize Clarify Relate Contrast Conceptualize Analyze Sequence Discriminate Reflect Reason Predict	Environmental awareness Questioning Answering Process Communication Clarification Audience awareness Relationship to self and others Awareness of how own and others tasks are related

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Quality

Content Skills	Thinking Skills	Social Skills
Measure the Product	Evaluate Analyze Interpret Focus Visual Spatial Review Discriminate Critical Review Eye Tracking	Jargon Questioning Clarification Environmental awareness
Read Charts, Graphs, Tables	Identify Symbols Interpret Symbols Analyze Sequence Discriminate Visualize Listen Feel Reflect Relate Contrast Focus Ranking/Rating Evaluate Question Reason Categorize Visual/Spatial Review	Audience awareness Relevance to self and others Awareness of how own and others tasks are involved Questioning Jargon

Quality

Content Skills	Thinking Skills	Social Skills
Interpret Charts, Graphs, Tables	Clarify Question Evaluate Reason Visual/Spatial Review Relate Contrast Focus Prioritize Analyze Estimation Sequence Discriminate Conceptualize Cause and Effect Compute Application Prediction Critical Review	Audience awareness Relevance to self and others Awareness of how own and others tasks are involved Questioning Sharing with others
Read Tolerances	Identify Symbols Interpret Symbols Sequence Discriminate Focus Ranking/Rating Eye Tracking Clarify Critical Review	Audience awareness Jargon Environmental awareness

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Quality

Content Skills	Thinking Skills	Social Skills
Read Numbers, Decimals, Percents, Fractions	Sequence Discriminate Focus Ranking/Rating Eye Tracking Clarify Critical Review Evaluate Reason Relate Contrast Analyze Conceptualize Compute Prediction Compilation Application	Questioning Clarification
Read Math Embedded in Language	Sequence Discriminate Focus Ranking/Rating Eye Tracking Clarify Critical Review Evaluate Reason Relate Contrast Analyze Conceptualize Compute Prediction Application Cause and Effect Estimation Application Compilation Interpretation Computation	Relevance to self and others Awareness of how own and others tasks are related Environmental awareness Questioning Answering Process Communication Clarification

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Quality

Content Skills	Thinking Skills	Social Skills
Record Results	Sequencing Clarify Question Relate Contrast Discriminate Eye Tracking Focus Encode Decode Transfer Synthesis	Jargon Paraphrasing Environmental awareness Questioning Answering Process Communication Clarification Relevance to self and others Awareness of how own and others tasks are related Audience awareness
Process Understanding	Cause and Effect Simultaneous thinking Lateral thinking Visualize Clarify Relate Contrast Conceptualize Analyze Sequence Discriminate Reflect Reason Predict	Environmental awareness Questioning Answering Process Communication Clarification Audience awareness Relationship to self and others Awareness of how own and others tasks are related

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Full Text Provided by ERIC

Quality

Content Skills

Process Investigation

Thinking Skills

Categorize
Cause and Effect
Simultaneous thinking
Lateral thinking
Focus
Visualize
Clarify
Question
Relate
Contrast
Prioritize
Conceptualize
Analyze
Sequence
Discriminate
Reflect
Ranking/Rating
Evaluate
Reason

Social Skills

Environmental awareness
Questioning
Answering
Process Communication
Clarification
Audience awareness
Relationship to self and others
Awareness of how own and others tasks are related
Paraphrasing
Prompting
Nonverbal Cues

Cycle Times

Content Skills	Thinking Skills	Social Skills
Read/Understanding Time	Estimation Predicting Guessing Sequencing Cause and Effect Relate Contrast Sequence Conceptualize Analyze Focus Discriminate Visual/Spatial Review Evaluate Ranking/Rating	Relevance to self and others Awareness of how own and other tasks are involved Questioning Process Communication Environmental awareness
Determine Work Flow	Prioritizing Estimation Predicting Sequencing Critical Thinking Optimizing Conceptualize Visualization	Relevance to self and others Awareness of how own and other tasks are involved Questioning Answering Process Communication Environmental awareness Clarification

Cycle Times

Content Skills	Thinking Skills	Social Skills
Time Management	Predicting Prioritize Cause and Effect Optimizing Conceptualization Critical Thinking Sequencing Discrimination Visualization Guessing Reflect Relate Contrast Analyze Focus	Relevance to self and others Awareness of how own and other tasks are involved Questioning Answering Process Communication Environmental awareness Clarification Audience Awareness Nonverbal Cues
Process Investigation	Categorize Cause and Effect Simultaneous thinking Lateral thinking Focus Visualize Clarify Question Relate Contrast Prioritize Conceptualize Analyze Sequence Discriminate Reflect Ranking/Rating Evaluate Reason	Environmental awareness Questioning Answering Process Communication Clarification Audience awareness Relationship to self and others Awareness of how own and others tasks are related Paraphrasing Prompting Nonverbal Cues

Cycle Times

Content Skills	Thinking Skills	Social Skills
Process Understanding	Cause and Effect Simultaneous thinking Lateral thinking Visualize Clarify Relate Contrast Conceptualize Analyze Sequence Discriminate Reflect Reason Predict	Environmental awareness Questioning Answering Process Communication Clarification Audience awareness Relationship to self and others Awareness of how own and others tasks are related
Knowledge of continuous Improvement	Integration Conceptualization Analyzing Lateral Thinking Critical Thinking Cause and Effect Estimation Hypothesizing Guessing Predicting Relate Contrast Question Visualization Listening Analyze Simultaneous	Awareness of how own and other tasks are involved Questioning Answering Process Communication Environmental awareness Clarification Audience Awareness Prompting

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Appendix A

Lesson Plans

Jigsaw Exercise

Materials

Copies of completed LSPand the problem solving pages that accompany them
Jigsaw exercise - any designed by facilitator and following best practices of cooperative education

Objective

This lesson graphically demonstrates the need for team members to obtain clear information as well as recognize that the team working as a whole produces the best results.

Note

In order to set up the best expert teams, the facilitator should be aware of the literacy strengths of her students so that the groups can be appropriately challenged. She may want to group students in either their area of strength or weakness, or mix the groups so that peer teaching occurs.

Metacognition

In small groups, have the participants discuss their particular learning style, and the strengths and weaknesses of each style. Brainstorm concrete examples of how each participant can develop their weaknesses.

Transition/Practice

Group students together, and without giving much direction, have them solve the Jigsaw exercise. This will probably take two class periods. The students should be free to go from their home to their expert groups as they decipher information. See chart below:

Yellow Home Group Red Home Group Green Home Group

(each home group has one piece of information that needs to be made complete in the expert group)

Expert Group #1 Expert Group#2 Expert Group #3

Depending on the number of participants, one or two students from each home group will meet in his appropriate expert group to share information, and create a whole part of the jigsaw to bring back to his home group.

Job Application

After the group has completed the task, discuss with them the outcome, and how this relates to day-to-day problem solving on the job. The chart on "The Comparison of the Learning Cycle with Problem Solving Skills" will help prompt discussion as to the role each learning style might play in the problem solving process.

LEARNING STYLE PROFILE

THIS PROFILE IS FOR: DONNELL CRAIG A

BIRTHDATE: 12/22/67 SEX: M GRADE: 12 RACE:
DATE: 01/21/94 SCHOOL: 1 CLASS: 0

SKILLS -- GENERAL APPROACH TO PROCESSING INFORMATION

	SCORE	WEAK	AVERAGE	STRONG
ANALYTIC	44		XXXX	
SPATIAL	49		XXXXX	
DISCRIMINATION	51		XXXXX	
CATEGORIZATION	60			XXXX
SEQUENTIAL	42		XXXX	
MEMORY	49		XXXXX	
SIMULTANEOUS	56		XXXX	

PERCEPTUAL RESPONSES -- INITIAL RESPONSE TO VERBAL INFORMATION

	SCORE	WEAK	AVERAGE	STRONG
VISUAL	61			XXXX
AUDITORY	32	XXXX		
EMOTIVE	55		XXXX	

ORIENTATIONS AND PREFERENCES -- PREFERRED RESPONSE TO STUDY OR INSTRUCTIONAL ENVIRONMENT

	SCORE	LOW	AVERAGE	HIGH
PERSISTENCE	47		XXXX	
VERBAL RISK	28	XXXX		
MANIPULATIVE	60			XXXX
STUDY TIME:				
EARLY MORNING	50		XXXXX	
LATE MORNING	49		XXXXX	
AFTERNOON	51		XXXXX	
EVENING	55		XXXX	

	SCORE		HIGH	NEUTRAL	HIGH	
VERBAL-SPATIAL	51	SPATIAL		XXXXX		VERBAL
GROUPING	46	SMALL		XX		LARGE
POSTURE	31	INFORMAL	XX			FORMAL
MOBILITY	44	STILLNESS		XX		MOVEMENT
SOUND	52	QUIET		XXXXX		SOUND
LIGHTING	27	DIM	XX			BRIGHT
TEMPERATURE	64	COOL			XX	WARM

CONSISTENCY SCORE: 6 NORMATIVE SAMPLE: 1986 -- NATIONAL
NASSP -- NATIONAL ASSOCIATION OF SECONDARY SCHOOL PRINCIPALS, RESTON, VA.

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LSP Overview

Simultaneous Thinking
: Integration of parts or separate elements of experience into a whole. Entire meaning is grasped at once. Seeing many possibilities or ways of doing something.

Analytical Thinking
: Identification of figures in a complex background field. Separating part from whole and using parts in new or different ways. Examining parts and how they might fit together or could fit together differently.

Spatial Thinking
: Identification of a pattern, remembering it and discriminating it from other similar patterns. Rotation of objects in the imagination.

Discriminatory Thinking
: Focus of attention on required dimensions of a task and avoiding distractions. Finding important details and important elements of a task.

Categorization Thinking
: Judging differences or similarities in objects or ideas. Creating categories or organizing information, ideas, etc. based on categories.

Sequential Thinking
: Step-by-step, linear processing. Ordering or organizing in a beginning-to-end fashion. Developing a strategy, plan or serialized direction.

Memory
: Retention of an image and judging the similarity or difference of subsequent versions of the figure. Capability to retain distinct rather than vague images.

Visual Perceptual Response
: Immediate reaction to sensory stimuli is in a visual or pictorial fashion. Visual learners prefer visual, pictorial or graphic representations of an experience.

Auditory Perceptual Response
: Responds to new information in auditory or listening fashion. Prefer listening and talking to others about experience.

Emotive Perceptual Response
: Responds to new information in terms of its feeling. Emotive learners react to physiological or emotional tone of an experience.

Persistence

Willingness to sustain behavior, work until task completion, face the prospect of failure, seek whatever help is needed to persevere.

Verbal Risk

Willingness to speak out, defend thoughts or ideas.

Manipulative

Prefers "hands-on" activities (assesses orientation to *tasks*, not to *stimulus*).

Verbal-Spatial Preference

Shows conceptual orientation for dealing with verbal or spatial *tasks* (not orientation to *stimulus*). Focuses on cognitive factors in the task.

What are some of the strengths and weaknesses of your learning style?

How do you adapt to other styles?

How do differences in learning style affect the job site?

How can you improve your thinking and problem solving skills?

How will you know you're improving?

How can you help any team function better, now that you know what you know about learning styles?

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Sample Lessons

IEP Lesson

Materials

old magazines
scissors
glue
poster board
copies of LSPs and explanation text
IEP (Individualized Education Plan) form

Objective

To personalize the learning, each student needs to draw up his own educational goals and some measure of knowing if he has reached his goals by the end of the course.

Metacognition

Introduce the Learning Styles Inventory (LSP), and open up discussion on how this impacts the way in which students take in information--both verbally and in written form. Discuss in small groups what learning style they have identified. Have students brainstorm "gimmicks" of how they would remember these four terms.

Transition/Practice

Individually, have students cut out pictures which describe the duties they encounter on the job. The job tasks should generally deal with the actual tasks done on the job, the communication (both verbally and written), and the thinking involved on the job. In small groups have each member explain the significance of each item pasted on the poster board.

Job Application

Next on the IEP form, have students identify educational goals they wish to accomplish in the duration of this course. (This is a good time to meet individually with students and help them identify areas in which they would like to improve). have them decide how they would measure whether or not they met their goals.

Next, do a mini-LLL by having students identify one thing they have learned about their thinking that applies to their job, family, and self.

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LEARNING STYLE PROFILE

THIS PROFILE IS FOR: DONNELL CRAIG A

BIRTHDATE: 12/22/67 SEX: M GRADE: 12 RACE:
DATE: 01/21/94 SCHOOL: 1 CLASS: 0

SKILLS -- GENERAL APPROACH TO PROCESSING INFORMATION

	SCORE	WEAK	AVERAGE	STRONG
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SPATIAL	49		XXXXX	
DISCRIMINATION	51		XXXXX	
CATEGORIZATION	60			XXXX
SEQUENTIAL	42		XXXX	
MEMORY	49		XXXXX	
SIMULTANEOUS	56		XXXX	

PERCEPTUAL RESPONSES -- INITIAL RESPONSE TO VERBAL INFORMATION

	SCORE	WEAK	AVERAGE	STRONG
VISUAL	61			XXXX
AUDITORY	32	XXXX		
EMOTIVE	55		XXXX	

ORIENTATIONS AND PREFERENCES -- PREFERRED RESPONSE TO STUDY OR INSTRUCTIONAL ENVIRONMENT

	SCORE	LOW	AVERAGE	HIGH
PERSISTENCE	47		XXXX	
VERBAL RISK	28	XXXX		
MANIPULATIVE	60			XXXX
STUDY TIME:				
EARLY MORNING	50		XXXXX	
LATE MORNING	49		XXXXX	
AFTERNOON	51		XXXXX	
EVENING	55		XXXX	

	SCORE		HIGH	NEUTRAL	HIGH	
VERBAL-SPATIAL	51	SPATIAL		XXXXX		VERBAL
GROUPING	46	SMALL		XX		LARGE
POSTURE	31	INFORMAL	XX			FORMAL
MOBILITY	44	STILLNESS		XX		MOVEMENT
SOUND	52	QUIET		XXXXX		SOUND
LIGHTING	27	DIM	XX			BRIGHT
TEMPERATURE	64	COOL			XX	WARM

CONSISTENCY SCORE: 6 NORMATIVE SAMPLE: 1986 -- NATIONAL
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Willingness to sustain behavior, work until task completion, face the prospect of failure, seek whatever help is needed to persevere.

Verbal Risk

Willingness to speak out, defend thoughts or ideas.

Manipulative

Prefers "hands-on" activities (assesses orientation to *tasks*, not to *stimulus*).

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Shows conceptual orientation for dealing with verbal or spatial *tasks* (not orientation to *stimulus*). Focuses on cognitive factors in the task.

What are some of the strengths and weaknesses of your learning style?

How do you adapt to other styles?

How do differences in learning style affect the job site?

How can you improve your thinking and problem solving skills?

How will you know you're improving?

How can you help any team function better, now that you know what you know about learning styles?

INDIVIDUAL EDUCATIONAL PLAN

COMPANY NAME: Grimes

DENTIFICATION # 2 0 7 9

DATE: 2/15/94

Goal Statement: "What are your work related goals for this class?" (How might it affect your future at work?)

To understand How People Learn

Short Term Objectives:

Comments:

To be able to pass Information/Knowledge to other People So they can Do Their Jobs Better

To Better the Competition to keep the work Here

Outside Resources Needed/Available:

All Resources Needed to Do the Job Now are available Better Than other Major Corp I Have Worked For

Simultaneous and Sequential Thinking in Manufacturing

Materials

Results of the LSP
LSP Vocabulary
Examples of flow charts
Job Skills Inventory (either ready to be revised or never completed)
Various Household Items

Objective

To make students aware of the similarities and differences between simultaneous and sequential thinking and how each is used on the job to complete a process.

Metacognition

Give some preliminary instructions on how to construct a simple flow chart. Next, have each student make a flow chart of their day so far, starting with when they got up this morning. Off to the right of the chart, have them list all the activities that are happening at the same time they are getting ready for work, eating breakfast, starting off at their desk or work station, etc. Have each student show how this activity to the right relates to their flow chart on the left. Ask the students to describe and/or name which process is occurring on the right and left.

Transition/Practice

Hand out a household item to each group and have them sequentially describe the process in which it was manufactured. Have them make good guesses--complete accuracy is not important. What parts of this object could not be manufactured sequentially? Why? How would they be manufactured simultaneously?
What job papers would be necessary for manufacturing this item?

Job Application

Have people from similar work areas flow chart their job both simultaneously and sequentially, and discuss how their jobs interrelate with each other. Have them then transfer their flow chart onto the Job Skills Inventory.

LEARNING STYLE PROFILE

THIS PROFILE IS FOR: DONNELL CRAIG A

BIRTHDATE: 12/22/67 SEX: M GRADE: 12 RACE:
DATE: 01/21/94 SCHOOL: 1 CLASS: 0

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SPATIAL	49		XXXXX		
DISCRIMINATION	51		XXXXX		
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SEQUENTIAL	42		XXXX		
MEMORY	49		XXXXX		
SIMULTANEOUS	56			XXXX	

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VISUAL	61				XXXX
AUDITORY	32	XXXX			
EMOTIVE	55			XXXX	

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	SCORE	LOW	AVERAGE		HIGH
PERSISTENCE	47		XXXX		
VERBAL RISK	28	XXXX			
MANIPULATIVE	60				XXXX
STUDY TIME:					
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LATE MORNING	49		XXXXX		
AFTERNOON	51		XXXXX		
EVENING	55			XXXX	

	SCORE		HIGH	NEUTRAL		HIGH	
VERBAL-SPATIAL	51	SPATIAL		XXXXX			VERBAL
GROUPING	46	SMALL		XX			LARGE
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What are some of the strengths and weaknesses of your learning style?

How do you adapt to other styles?

How do differences in learning style affect the job site?

How can you improve your thinking and problem solving skills?

How will you know you're improving?

How can you help any team function better, now that you know what you know about learning styles?

JOB SKILLS INVENTORY

Name: Annetta Cottrill Company: Hall Co.

Date: 1-6-94 Job Position: group leader

Unit: SPC

What I Do	What I Think	What I Say/Write
ASSEMBLE Ohio IMAGing from start tofinish.	which step comes first, Do I have the resources I need, Can I fix the problem,	If unsureabout something, go to knowledgeable person for answer.

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IEP Lesson for Bringing Together All the Metacognitive Tools

Materials

Each students' copies of all evaluations (any TALS tests and metacognitive tools such as the LSP
Copies of the IEP form

Objective

Each student will evaluate her strengths and weaknesses and determine on a personal level the goals in learning for this class.

Metacognition

The facilitator and students will go over any evaluative tools with the emphasis on strategies for answering the questions and the process of thinking behind each question. Students can work in pairs, groups or individually to discuss the success of their strategies and how they could better approach the questions next time.

Transition/Practice

In a group discussion, talk about how the question relates to a document or text that they use on the job. Talk about the types of thinking and strategies that are used to problem solve these questions--and how this kind of strategizing and problem solving is used on the job.

Job Application

Students will them write up their own IEP which will identify their overall goal for learning and how they hope to acheive their goal to improve their job performance and communication skills.

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LEARNING STYLE PROFILE

THIS PROFILE IS FOR: DONNELL CRAIG A

BIRTHDATE: 12/22/67 SEX: M GRADE: 12 RACE:
DATE: 01/21/94 SCHOOL: 1 CLASS: 0

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	SCORE	WEAK	AVERAGE		STRONG
ANALYTIC	44		XXXX		
SPATIAL	49		XXXXX		
DISCRIMINATION	51		XXXXX		
CATEGORIZATION	60				XXXX
SEQUENTIAL	42		XXXX		
MEMORY	49		XXXXX		
SIMULTANEOUS	56			XXXX	

PERCEPTUAL RESPONSES -- INITIAL RESPONSE TO VERBAL INFORMATION

	SCORE	WEAK	AVERAGE		STRONG
VISUAL	61				XXXX
AUDITORY	32	XXXX			
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ORIENTATIONS AND PREFERENCES -- PREFERRED RESPONSE TO STUDY OR INSTRUCTIONAL ENVIRONMENT

	SCORE	LOW	AVERAGE		HIGH
PERSISTENCE	47		XXXX		
VERBAL RISK	28	XXXX			
MANIPULATIVE	60				XXXX

STUDY TIME:					
EARLY MORNING	50		XXXXX		
LATE MORNING	49		XXXXX		
AFTERNOON	51		XXXXX		
EVENING	55			XXXX	

	SCORE		HIGH	NEUTRAL		HIGH	
VERBAL-SPATIAL	51	SPATIAL		XXXXX			VERBAL
GROUPING	46	SMALL		XX			LARGE
POSTURE	31	INFORMAL	XX				FORMAL
MOBILITY	44	STILLNESS		XX			MOVEMENT
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TEMPERATURE	64	COOL				XX	WARM

CONSISTENCY SCORE: 6 NORMATIVE SAMPLE: 1986 -- NATIONAL
NASSP -- NATIONAL ASSOCIATION OF SECONDARY SCHOOL PRINCIPALS, RESTON, VA.

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INDIVIDUAL EDUCATIONAL PLAN

COMPANY NAME: Corimes

IDENTIFICATION # 2 0 7 9 **DATE:** 2/15/94

Goal Statement: "What are your work related goals for this class?"
(How might it affect your future at work?)

To understand How People Learn

Short Term Objectives: **Comments:**

To be able to pass Information/Knowledge to other People So they can Do Their Jobs Better

To Better the Competition to keep the work Here.

Outside Resources Needed/Available:

All Resources Needed to Do the Job Now are available Better Than other Major Corp I Have Worked For

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Transition to Redesigning Job Papers for Different Learners

Materials

4 sets of job routers
Poster sized paper
Legos-2 matching sets of pieces
Markers
Rulers

Objective

This exercise offers the students opportunities to see how communication on a set of instructions can go awry, what kind of thinking occurs when deciphering a shop paper, and what processes are involved in institutionalizing a revised shop paper. (Who, what, when and where would communication need to occur when implementing a change on a shop paper)

Metacognition

Present an unknown object to the group--and have them make good guesses on what the object is and what it is used for. Discuss the responses in terms of differing prior knowledge,and perceptions.

Group the students by 4's. With the Legos, have each group design a model and a set of directions to complete the model. Have each group keep their copies of the model and exchange identical pieces and their set of directions. Then, each group will attempt to duplicate the model , and hand it back to the original group for evaluation. The group will then make corrections and then hand the revised directions back to the group for a second trial.

Transition/Practice

Briefly have the class discuss how this simulates the job site and how communication occurs or does not occur.

Job Application

Hand out a copy of an actual job router, and have them redesign the job router to be more user friendly based on their learning style.

After they have completed the redesigned router, tack one of them on the board, and have them brainstorm the process that surrounds the job router and what communication would need to occur to insure that particular revision would be implemented.

The Process of Implementing
Workplace Plan and Assessment Teams
may include.....

- class participants applying metacognition information to team processes as well as to job related materials
- class participants preparing to share with supervisors selected information they have learned in the classes
- invitations to the selected supervisors (identify those that are directly impacted by any plans developed by the class participant or those that can have an impact on the plans)
- class participants share class information with the supervisors to produce a common base of knowledge
- classroom facilitator lead the participants and supervisors through a short teaming process to produce a plan to transfer classroom learning to the job floor
- plans will include dates for implementation
- dates for the teams to report back to the class will need to be determined
- individual consideration will be given to each plan to determine what will occur next, ie., nothing, modifications, report to other groups or individuals, etc.

Workplace Plan and Assessment

Company ____________________ Location ______________________________

Class Participation(s) Job Classification Supervisor

____________________ ____________________ ____________________

____________________ ____________________ ____________________

General Goals ____

____

Methods of Assessment ____

____

Constraints ____

____

Date	Assignment/ Situation	Method/ Action		Assessment
		Who	What	

Results ____

____

What next ? ____

____

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Sample Packet
Teacher/Student Preparation for Beginning Training Cycle

AWARENESS

ACCEPTANCE

APPLICATION

NAME________________________ DATE________________________

Why I am in this class?????

- industry reasons____

____

- company reasons____

____

- personal reasons____

____

What I expect to learn regarding. . . . .

- job skills____

____

- personal skills____

____

- community skills____

____

What is expected from me!!!!!

- class procedures____

____

- team responsibilities____

____

- individual accountability for learning__________________________

____

What is expected from the facilitator!!!!!

- class procedures____

____

- ____

ERIC

NOTES ON THE LIFETIME LEARNING LOG

The whole focus of the LLL is to give both student and instructor an idea of the metacognitive strategies, communication and literacy tools the learner has institutionalized into his learning. The format of the log is flexible; it could be a series of short, bulleted outlines, paragraphs, illustrations, lists, phrases, letters--the learner can choose a variety of formats with which to document his learning.

Entries can be made every class period, and should emphasis how the material presented can be applied to community, self, and life. As a strategy is presented in class, immediate application is emphasized. The learner writes up how he will institutionalize this new strategy to impact his surroundings. In a sense, this is the learner's homework.

Included in the log will be a series of appendages. The number and length of these appendages depends solely on the needs of the learner. Some suggested ones are vocabulary and spelling lists, literacy task analyses, (both pre-, post-, and progressive), unit pre- and post tests. The key to creating any new appendage is that it must be functional for the student in the sense that student should be able to continually rethink and revise previous ideas.

ERIC
Full Text Provided by ERIC

LIFELONG LEARNING LOG
OF

____

DATE	SELF	JOB	COMMUNITY/FAMILY

WORD RESOURCE LIST

Name ____

Class ____

Word	Memory Technique
______________________	
______________________	
______________________	
______________________	
______________________	
______________________	
______________________	
______________________	
______________________	
______________________	
______________________	
______________________	
______________________	

TENTATIVE SCHEDULE

1st Class	Introduction Project Overview Learning Style Profile and Metacognition Worksheets - (Lestie Carey) Set Stage For Assessment
2nd Class	Company Welcome Communications Assessment - TALS - (Tests of Applied Literacy Skills
3rd Class	Math Assessment - ABLE - (Adult Basic Learning Exam) Instructional Exercise Based on the Workplace
4th Class	Learning Style Profile (LSP) * Vocabulary * Survey Cooperative Learning - Projects * Review LTA and Rewrite in Groups * Set Measurable Goals
5th Class	Learning Style Profile Related to Test Scores Literacy Task Analysis Reviews - Learners Review Their Own Jobs - Continuation

Appendix B

Learning Style Profile (LSP)

LEARNING STYLE PROFILE

THIS PROFILE IS FOR:

BIRTHDATE: SEX: GRADE: RACE:
DATE: SCHOOL: CLASS:

SKILLS—GENERAL APPROACH TO PROCESSING INFORMATION

	SCORE	WEAK	AVERAGE		STRONG
ANALYTIC					
SPATIAL					
DISCRIMINATION					
CATEGORIZATION					
SEQUENTIAL					
MEMORY					
SIMULTANEOUS					

PERCEPTUAL RESPONSES—INITIAL RESPONSE TO VERBAL INFORMATION

	SCORE	WEAK	AVERAGE		STRONG
VISUAL					
AUDITORY					
EMOTIVE					

ORIENTATIONS AND PREFERENCES—PREFERRED RESPONSE TO STUDY OR INSTRUCTIONAL ENVIRONMENT

	SCORE	LOW	AVERAGE		HIGH
PERSISTENCE					
VERBAL RISK					
MANIPULATIVE					
STUDY TIME:					
EARLY MORNING					
LATE MORNING					
AFTERNOON					
EVENING					

	SCORE		HIGH	NEUTRAL		HIGH	
VERBAL-SPATIAL		SPATIAL					VERBAL
GROUPING		SMALL					LARGE
POSTURE		INFORMAL					FORMAL
MOBILITY		STILLNESS					MOVEMENT
SOUND		QUIET					SOUND
LIGHTING		DIM					BRIGHT
TEMPERATURE		COOL					WARM

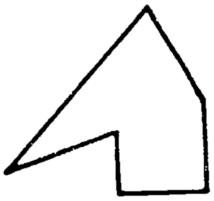
CONSISTENCY SCORE: NORMATIVE SAMPLE:

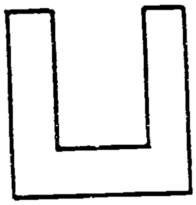
nassp National Association of Secondary School Principals, Reston, VA 22091

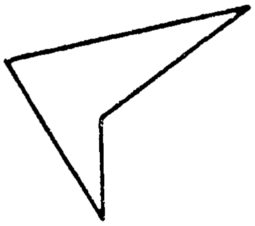
Sample page from LSP

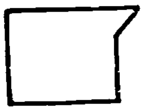
ONE of the five simple forms below is hidden in each of the figures on this page. The hidden form is the SAME SIZE, SAME SHAPE, AND FACING THE SAME WAY as ONE of the simple forms. Mark the letter of the form hidden in each figure on your answer sheet.

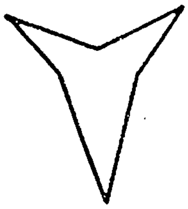
SIMPLE FORMS:


A.

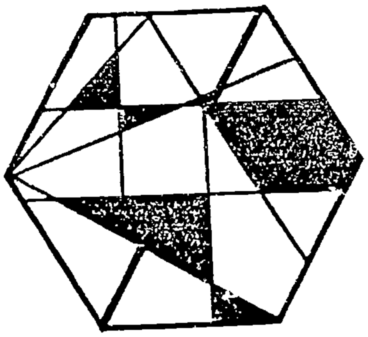

B.


C.

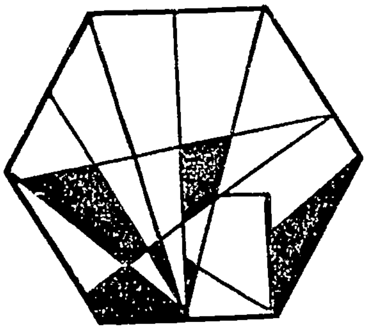

D.


E.

28. Find the HIDDEN FORM in this FIGURE.



29. Find the HIDDEN FORM in this FIGURE.



CHECK YOUR ANSWER SHEET NOW

YOU SHOULD BE READY TO BEGIN THE BOTTOM OF THE SHEET

YOU SHOULD NOW BE AT QUESTION NUMBER 30

---

imultaneous Thinking

Entire meaning is seen at once
Looking from many angles at the same time
Seeing many possibilities or ways of doing something
Attacking a task based on the outcome or ending

nalytical Thinking

Separating the parts from a whole - breaking down a probl.
Using the parts in new or different ways
Examining the parts and how they fit together or
could fit differently

pacial Thinking

Pattern identifications & comparisons
Rotate object in imagination

scrimination Thinking

Focusing - avoiding unimportant distractions
Finding important details

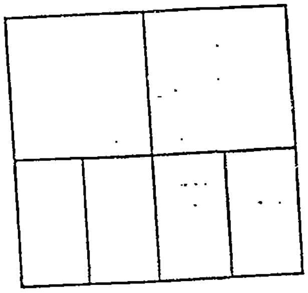
ategorization Thinking

Judging differences or similarities in object or idea
Creating categories
Organizing by categories

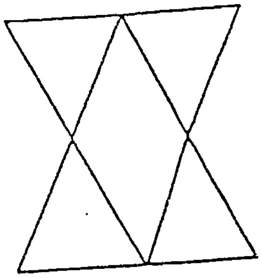
quential Thinking

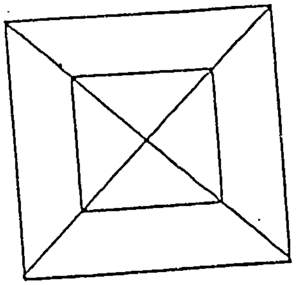
Step-by-Step
Ordering or organizing in a beginning-to-end fashion
Developing a strategy for planning or direction

Procedure: How many *squares* can you find in the shape below?



How many *triangles* can you find in these shapes?





Audience Level: 6th–12th Grade

Cognitive Skill: Analysis

Practice Activity: Writing Directions

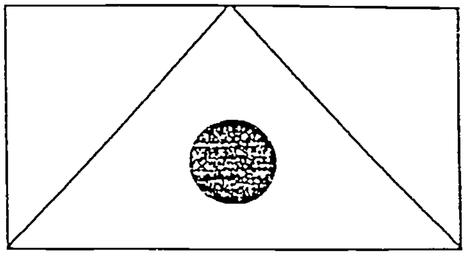
Objective: To critically examine a figure and systematically break it down into parts.

Materials: An activity worksheet for each student.

Procedure: Provide each student with an activity worksheet. In the first box students are to examine the figure and write a set of directions for drawing that figure. Encourage the practice of numbering the directions and using words that communicate precise information. In the second box students have the opportunity to draw their own figures and write the directions for them. Students may want to read the directions to a partner to see if they effectively communicate the information.

Analytic Skill: Writing Directions

Closely examine the design below. Write a set of directions for drawing the design.



1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________

Draw your own design in the space below. Write the directions for drawing the design in the space below. Trade papers with a partner and see if he/she can use your directions to accurately draw the design.

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________

Audience Level: 6th–12th Grade

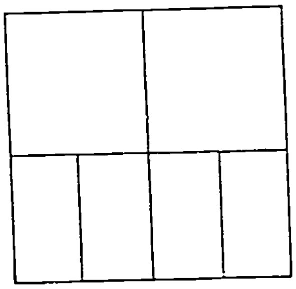
Cognitive Skill: Spatial

Activity: Pattern Recognition

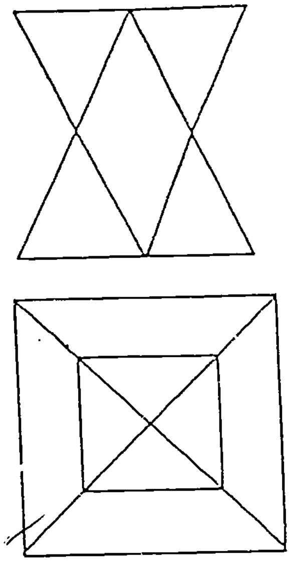
Objective: To identify identical but different-sized forms within a larger figure or shape.

Materials: A copy of this worksheet for each student or an overhead transparency showing the figures.

Procedure: How many *squares* can you find in the shape below?



How many *triangles* can you find in these shapes?



Audience Level: 6th–9th Grade

Cognitive Skill: Categorization

Practice Activity: Differences

Objective: To judge the differences and the relationships among similar concepts, based on some standard.

Procedure: Give students a copy of this sheet or write the sets of alternatives below on the blackboard or a transparency. Have students number the alternatives in the order of the least to the most differences from the standard. Number each list in order by writing the numerals 1, 2, 3, 4, 5 in front of the words.

1. From *hot* to *cold*
_____ sunshine
_____ ice cube
_____ water
_____ chilly
_____ flame

2. From *big* to *little*
_____ gorilla
_____ bee
_____ boy
_____ skyscraper
_____ dog

3. From *slow* to *fast*
_____ moving car
_____ turtle
_____ rabbit
_____ fish
_____ glacier

4. From *young* to *old*
_____ grandmother
_____ colt
_____ fossil
_____ bird
_____ infant

Audience Level: 6th–9th Grade

Cognitive Skill: Categorization

Practice Activity: Alphabetizing

Objective: To create simple but practical categories for relating information.

Procedure: Give students a copy of this sheet and ask them to write down the alphabet:

1. Write the words below in alphabetical order.

kind hen take fork
put wool big play
good new step again

2. Number the following words in alphabetical order. Watch the first three letters at the beginning of each word as you alphabetize.

List 1
__ anxious
__ ancestors
__ broader
__ breeze
__ brushed
__ brilliant
__ choice
__ collie
__ charged
__ coal

List 2
__ exercise
__ expected
__ figure
__ failed
__ filtered
__ furniture
__ fawn
__ faucets
__ future
__ fuse

List 3
__ probably
__ price
__ pressed
__ refuse
__ remaining
__ recognized
__ restocked
__ realized
__ shy
__ shocks

Audience Level: 6th–8th Grade

Cognitive Skill: Discrimination

Content Application: Social Studies—Stock Market

Materials: A pictorial stock market page and a question sheet.

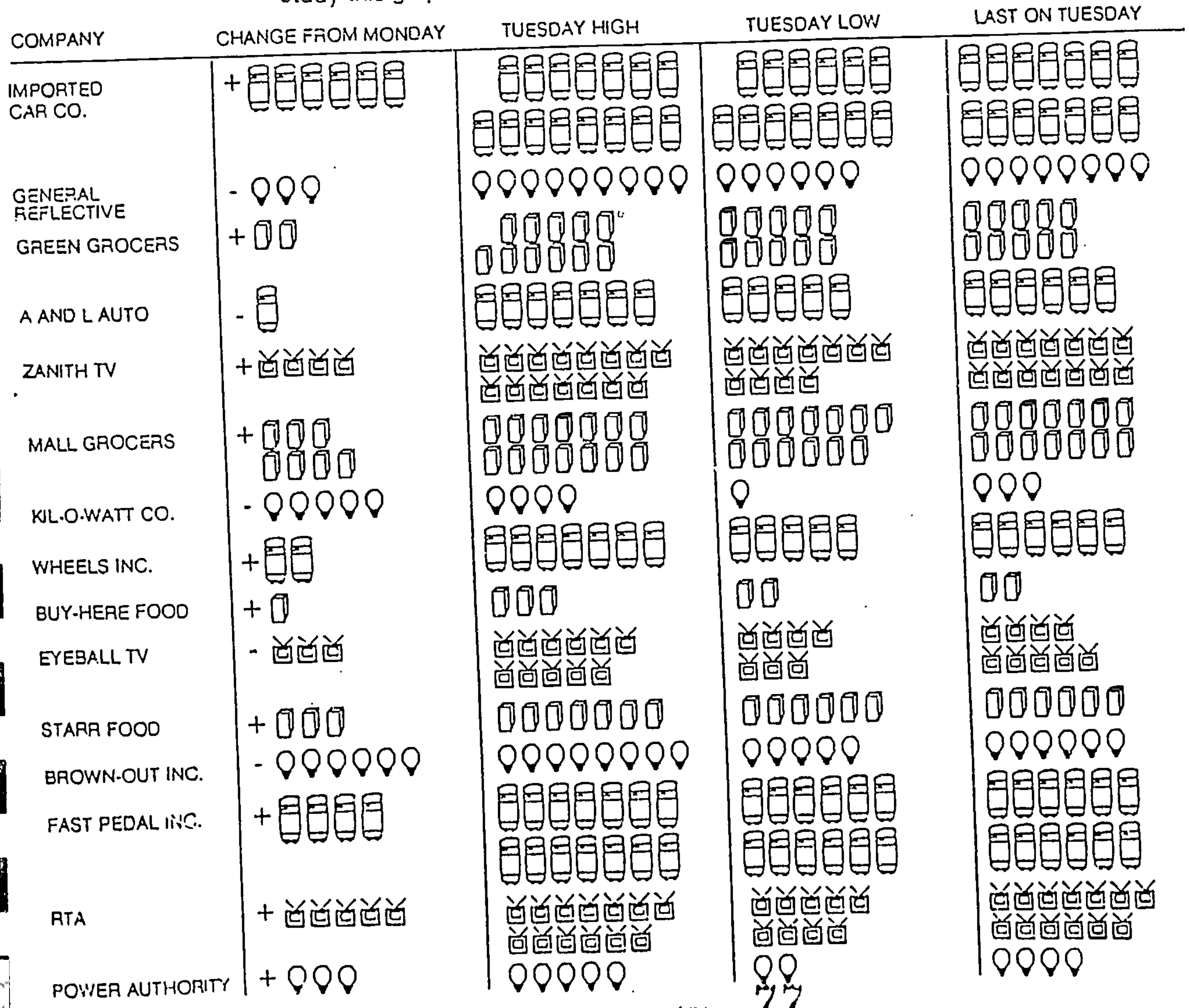
Procedure: Give each student a pictorial stock market report. Ask them to scan the chart to see what information is recorded and in what format. They may work individually, in pairs, or in small groups. After they have become familiar with the chart give them the specific questions at the right. All the information needed to answer the questions is contained in the stock market report.

Questions About the Pictorial Stock Market Report

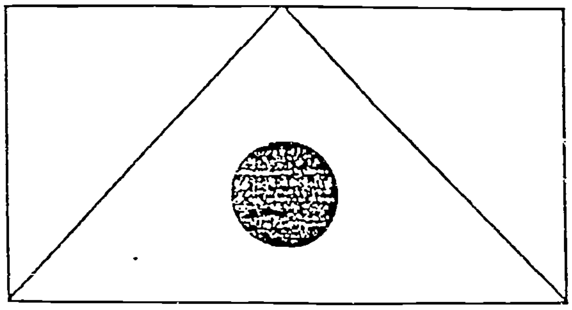
1. Write the names of all the automobile companies.
2. Write the names of all the television companies.
3. Write the names of all the electric companies.
4. Write the names of all the food companies.
5. Write the names of all the companies that had a positive change from Monday.
6. Write the names of all the companies whose low on Tuesday was below 9.
7. Write the names of all the companies whose low on Tuesday was below 6.
8. Write the names of all the companies whose last on Tuesday was below 6.
9. Write the names of all the companies whose last on Tuesday was the same as the high on Tuesday.
10. Write the names of all the companies whose last on Tuesday was the same as the low on Tuesday.

PICTORIAL STOCK MARKET REPORT

Study this graph from the stock market page of a newspaper.



Closely examine the design below. Write a set of directions for drawing the design.



1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________

Draw your own design in the space below. Write the directions for drawing the design in the space below. Trade papers with a partner and see if he/she can use your directions to accurately draw the design.

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________

Audience Level: 6th–12th Grade

Cognitive Skill: Analysis

Content Application: English/Writing

Objective: To apply analytic skill to a writing assignment by looking at an issue, topic, or object from a new perspective.

Procedure: Write a statement on the chalkboard.

Example: Every male at age 16 should serve one year in a military training program.

Form small groups and assign the task of writing three paragraphs in support of the statement and three paragraphs against the statement. Bring the entire group together and generate a class list of pros and cons for the issue.

Optional Procedure: Choose a vacation.

Present the two vacation packages listed below and ask students to pick the vacation they would prefer to take (record who picks which vacation). Assign everyone the task of writing a travel brochure promoting the vacation he/she did *not* choose.

Vacation Package #1:
A mountain climbing expedition with seven of your friends and an experienced guide.

Vacation Package #2:
A stay at a tropical island beach resort with two of your friends.

Note: Both writing assignments are intended to promote brainstorming and analytical thinking.

Audience Level: 6th–12th Grade

Cognitive Skill: Analysis

Content Application: Social Studies—MAP SKILLS

Material: A map for each student or pair of students. Develop a worksheet that assists students in preparing written directions from one place to another.

Procedure: Orient students to the symbols on the map (mileage chart, borderlines, etc.). Have each student locate the point to begin the directions and establish guidelines for the trip; i.e., map the fastest route or the most scenic route. Model the first direction and then allow independent work time. After everyone has completed the activity, share the results with the group and compare the different ways that directions can be communicated. Have students determine which words seem to communicate the information most effectively.

Appendix C

Puzzles

Simultaneous and Sequential Processing

Tangrams

The tangrams are designed to test your flexibility in using both simultaneous and sequential processing. As you figure these puzzles out, what kind of processing is going on inside your head? (self) Write down the type of processing do you do on the job? Describe it. With your spouse or family, what processes do you use to run your family,your life? Record these observations in your learning log.

Household Objects

Each group is given one common object to describe how it was produced both sequentially and simultaneously.

Sequentially...
1. Make a flow chart the steps your group feels it took to produce this object.

Simultaneously...
1. Make a list of all the possible uses of this object.

Simultaneous and Sequential Processing

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The tangrams are designed to test your flexibility in using both simultaneous and sequential processing. As you figure these puzzles out, what kind of processing is going on inside your head? (self) Write down the type of processing do you do on the job? Describe it. With your spouse or family, what processes do you use to run your family,your life? Record these observations in your learning log.

Household Objects

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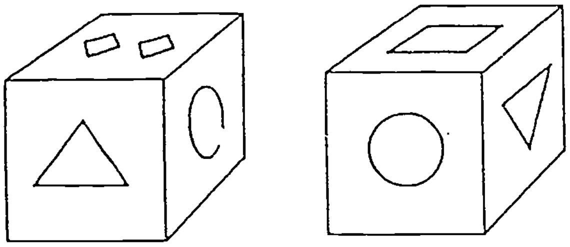
Sequentially...
1. Make a flow chart the steps your group feels it took to produce this object.

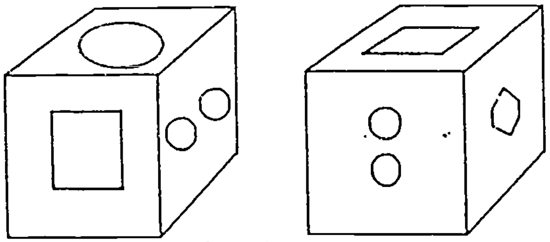
Simultaneously...
1. Make a list of all the possible uses of this object.

Procedure: All the cubes below have *different symbols* on each of their six sides. Compare each *pair* of cubes to decide whether they are of the same design or different ones. The first pair. for example. are the SAME. If the right cube is flipped so that the triangle is facing you and the circle is on the right. the square would be hidden and the small triangles could appear. The two cubes could be the same. Look at the other pairs and circle your choice of answer.

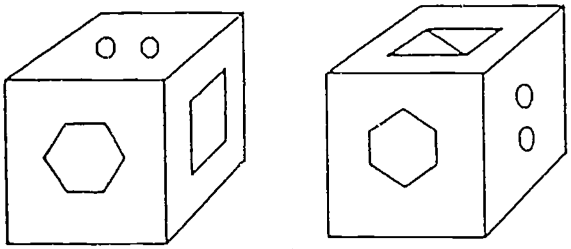
(Adapted from Educational Testing Service Cube Comparison Test.)



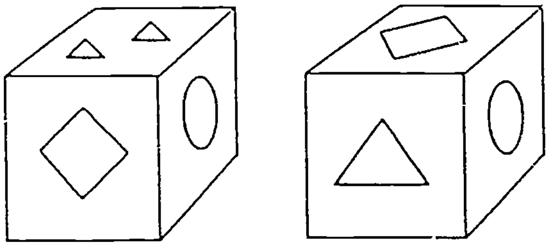
1. SAME
DIFFERENT



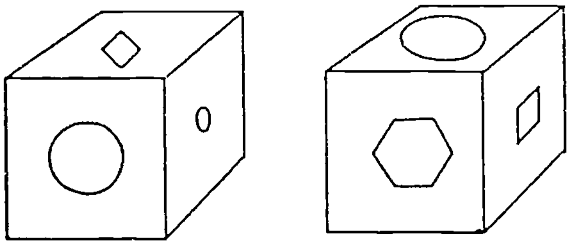
2. SAME
DIFFERENT



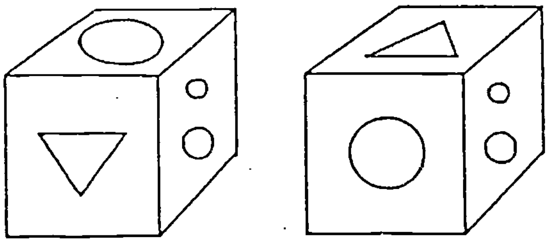
3. SAME
DIFFERENT



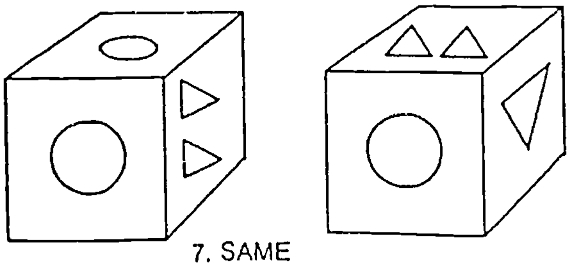
4. SAME
DIFFERENT



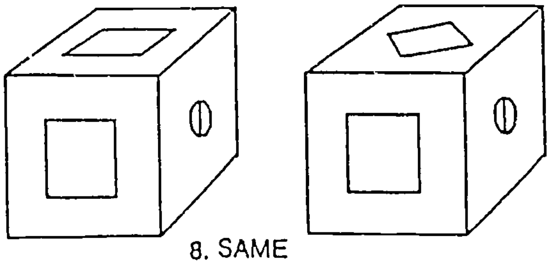
5. SAME
DIFFERENT



6. SAME
DIFFERENT



7. SAME
DIFFERENT



8. SAME
DIFFERENT

Audience Level: 6th–12th Grade

Cognitive Skill: Spatial

Activity: Cubes

Procedure: All the cubes below have *different symbols* on each of their six sides. Compare each *pair* of cubes to decide whether they are of the same design or different ones. The first pair, for example, are the SAME. If the right cube is flipped so that the triangle is facing you and the circle is on the right, the square would be hidden and the small triangles could appear. The two cubes could be the same. Look at the other pairs and circle your choice of answer.

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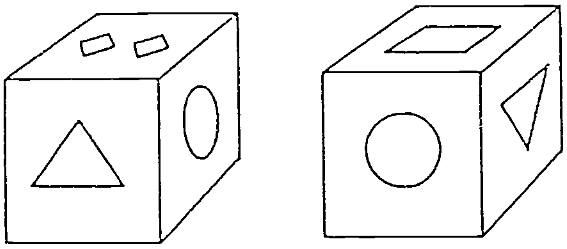
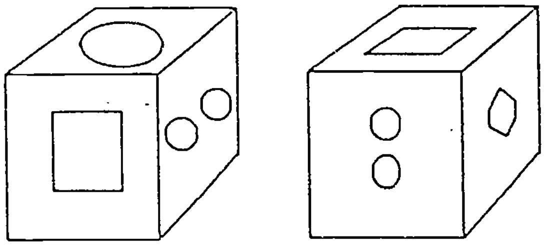
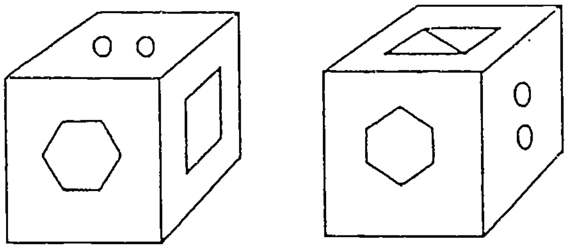


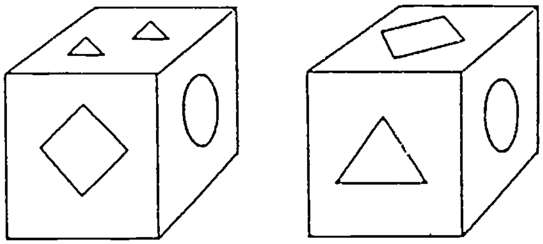
1. SAME
DIFFERENT



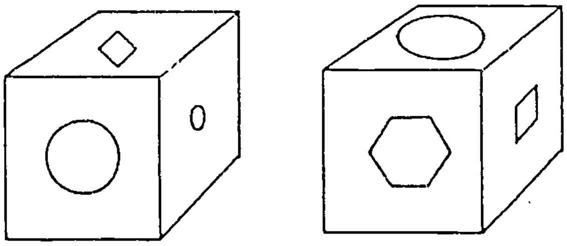
2. SAME
DIFFERENT



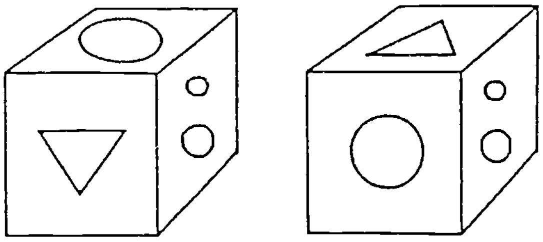
3. SAME
DIFFERENT



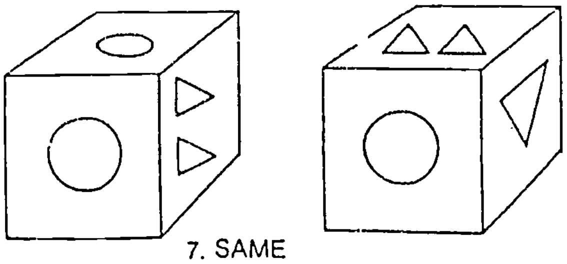
4. SAME
DIFFERENT



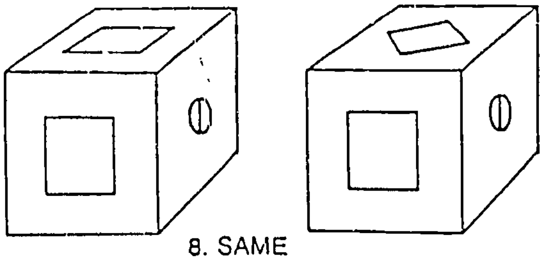
5. SAME
DIFFERENT



6. SAME
DIFFERENT



7. SAME
DIFFERENT



8. SAME
DIFFERENT

Procedure: Have students number the alternatives in the order of the least to the most differences from the standard. Number each list in order by writing the numerals 1, 2, 3, 4, 5 in front of the words.

1. From *hot* to *cold*
_____ sunshine
_____ ice cube
_____ water
_____ chilly
_____ flame

2. From *big* to *little*
_____ gorilla
_____ bee
_____ boy
_____ skyscraper
_____ dog

3. From *slow* to *fast*
_____ moving car
_____ turtle
_____ rabbit
_____ fish
_____ glacier

4. From *young* to *old*
_____ grandmother
_____ colt
_____ fossil
_____ bird
_____ infant

Procedure:

Number the following words in alphabetical order. Watch the first three letters at the beginning of each word as you alphabetize.

List 1
___ anxious
___ ancestors
___ broader
___ breeze
___ brushed
___ brilliant
___ choice
___ collie
___ charged
___ coal

List 2
___ exercise
___ expected
___ figure
___ failed
___ filtered
___ furniture
___ fawn
___ faucets
___ future
___ fuse

List 3
___ probably
___ price
___ pressed
___ refuse
___ remaining
___ recognized
___ restocked
___ realized
___ shy
___ shocks

Procedure: Give each student a pictorial stock market report. All the information needed to answer the questions is contained in the stock market report.

Questions About the Pictorial Stock Market Report

1. Write the names of all the automobile companies.
2. Write the names of all the television companies.
3. Write the names of all the electric companies.
4. Write the names of all the food companies.
5. Write the names of all the companies that had a positive change from Monday.
6. Write the names of all the companies whose low on Tuesday was below 9.
7. Write the names of all the companies whose low on Tuesday was below 6.
8. Write the names of all the companies whose last on Tuesday was below 6.
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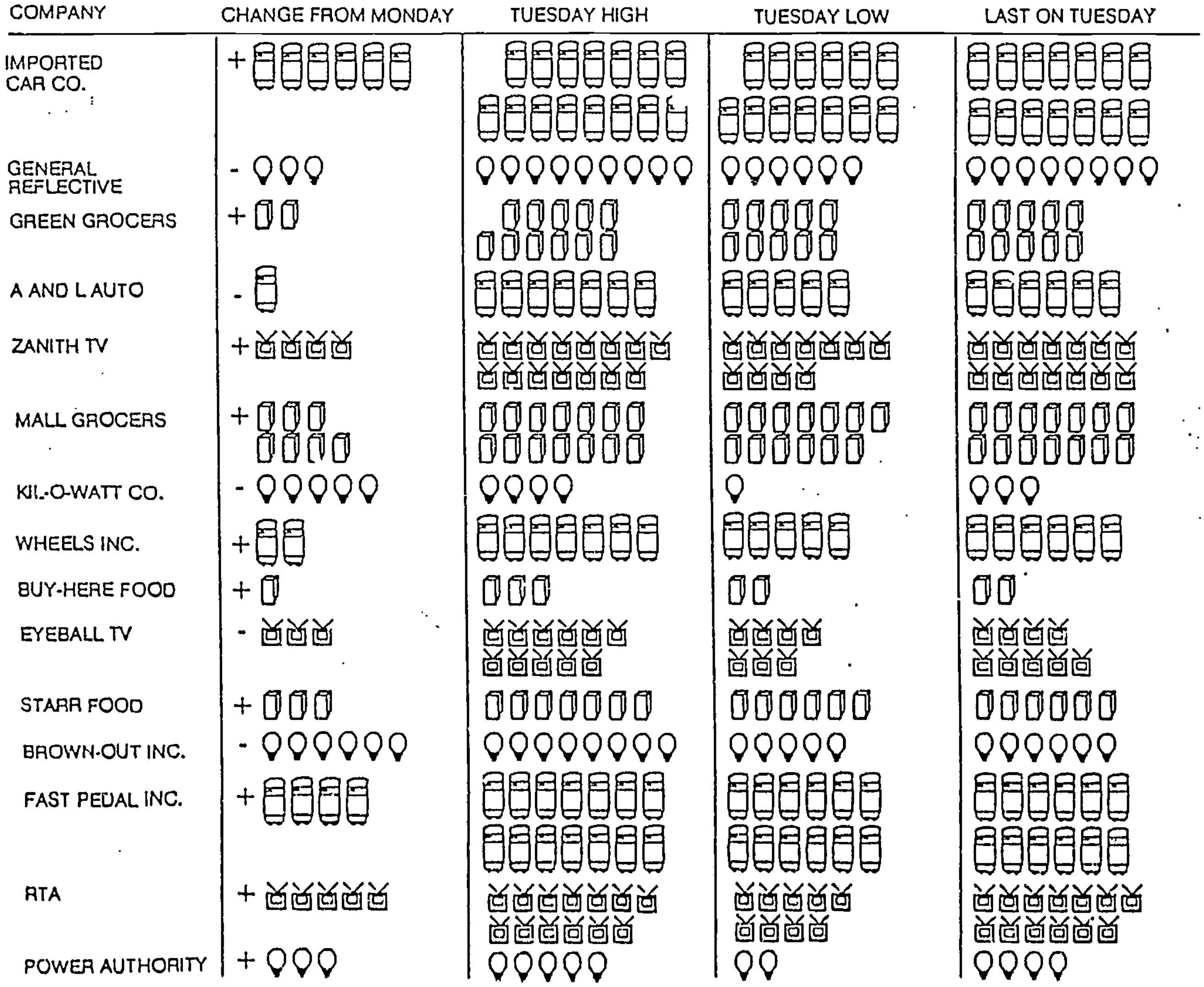
PICTORIAL STOCK MARKET REPORT

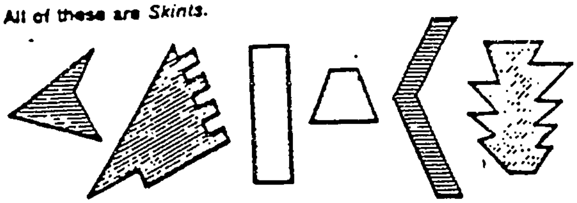
Study this graph from the stock market page of a newspaper.



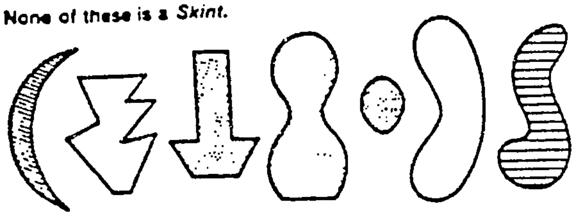
(12)

Creature Card 9 *Skints*

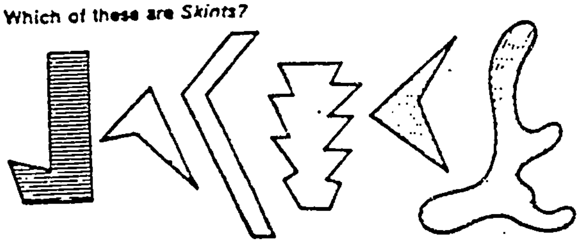
All of these are *Skints.*



None of these is a *Skint.*

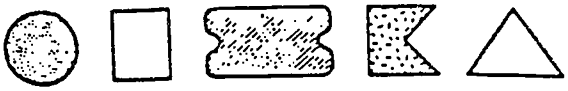


Which of these are *Skints?*

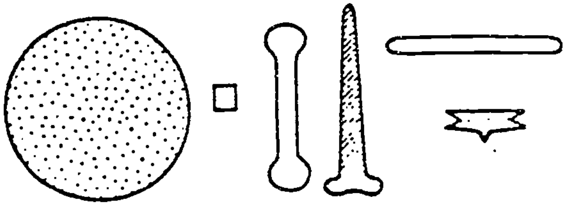


Creature Card 10 *Mokes*

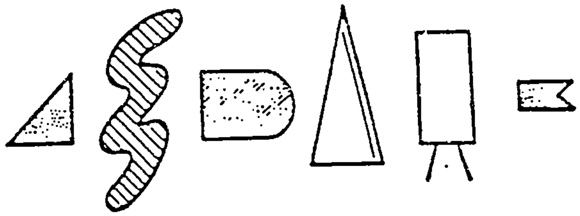
All of these are *Mokes.*



None of these is a *Moke.*

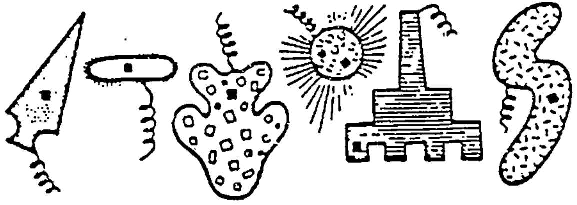


Which of these are *Mokes?*

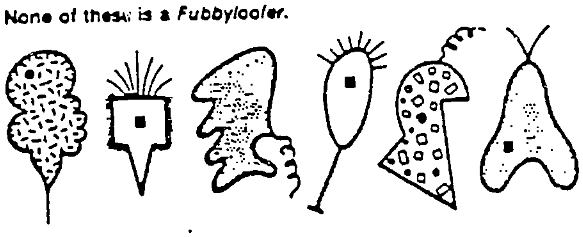


Creature Card 11 *Fubbyloofers*

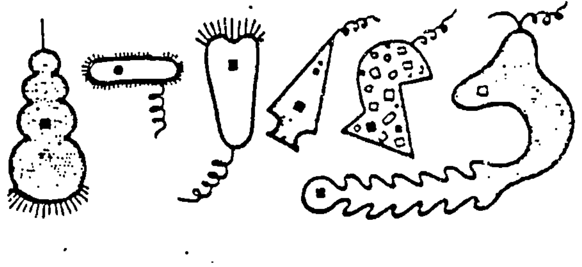
All of these are *Fubbyloofers.*



None of these is a *Fubbyloofer.*

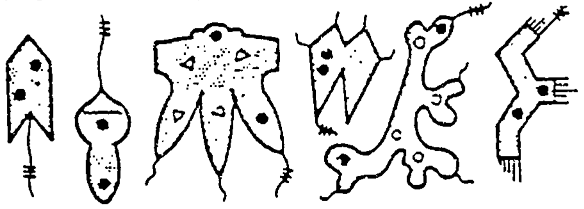


Which of these are *Fubbyloofers?*

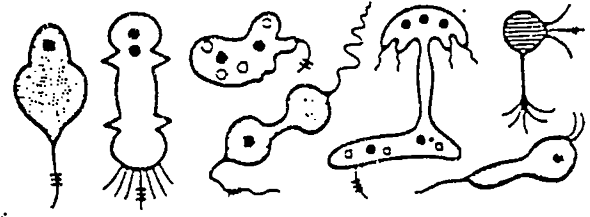


Creature Card 12 *Norleys*

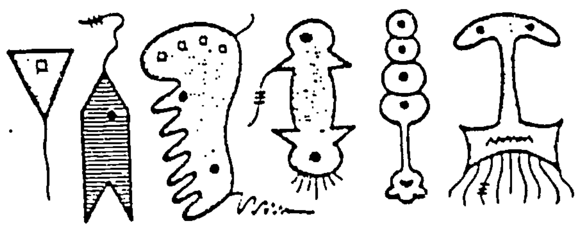
All of these are *Norleys.*



None of these is a *Norley.*



Which of these are *Norleys?*



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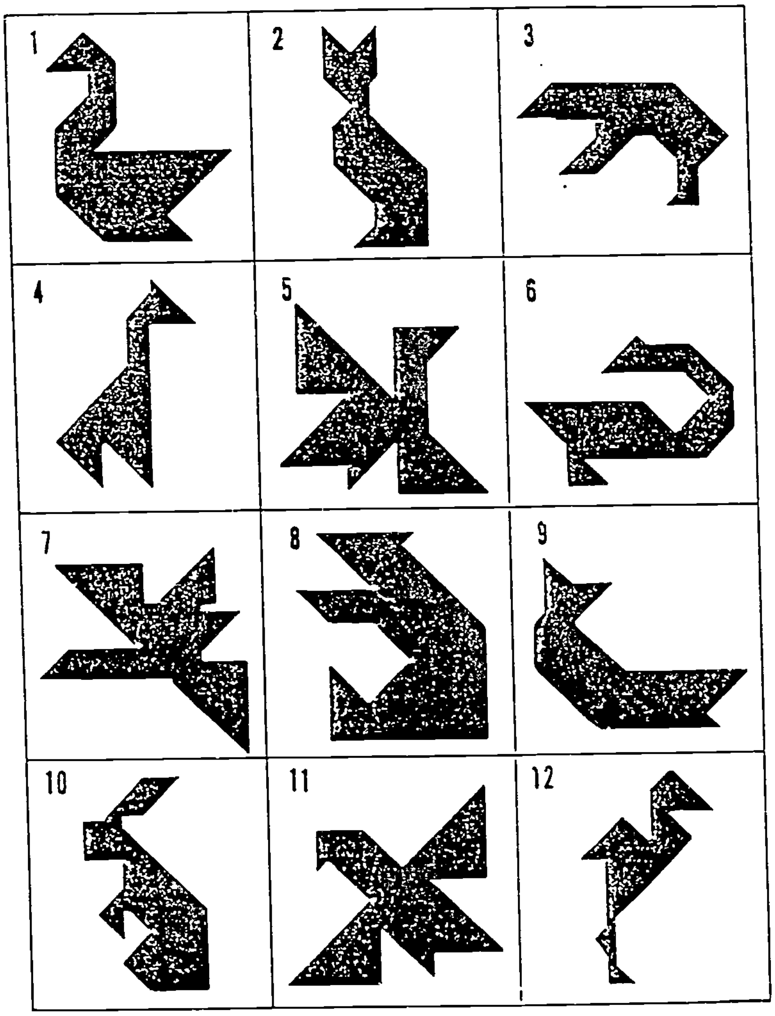
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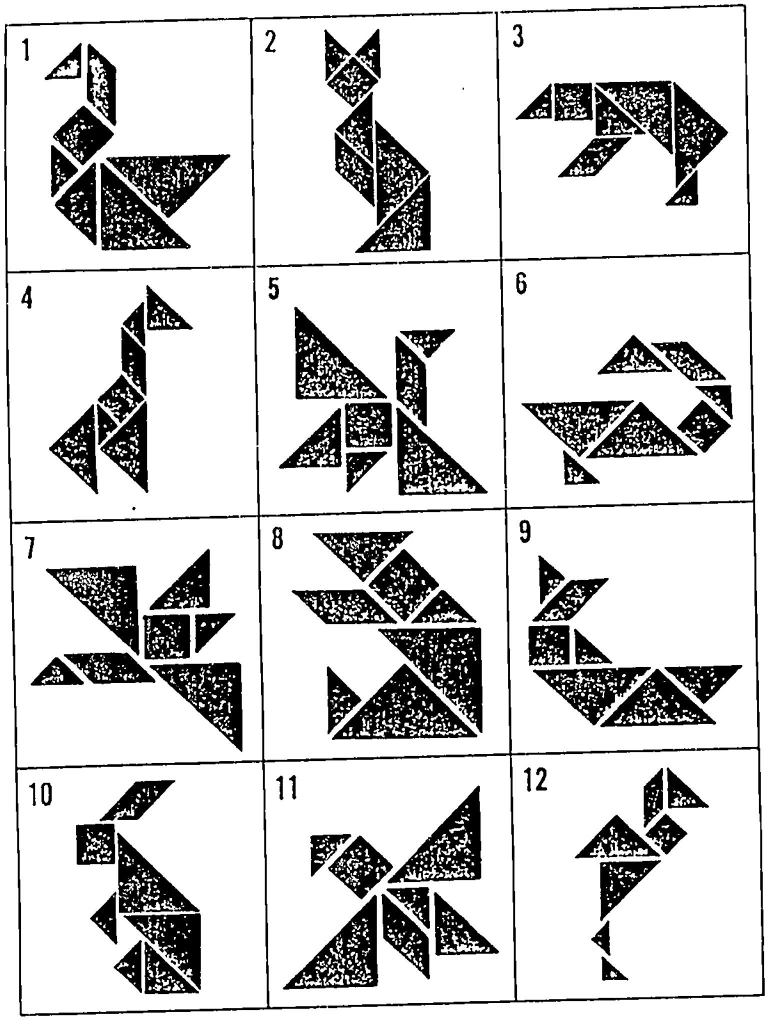

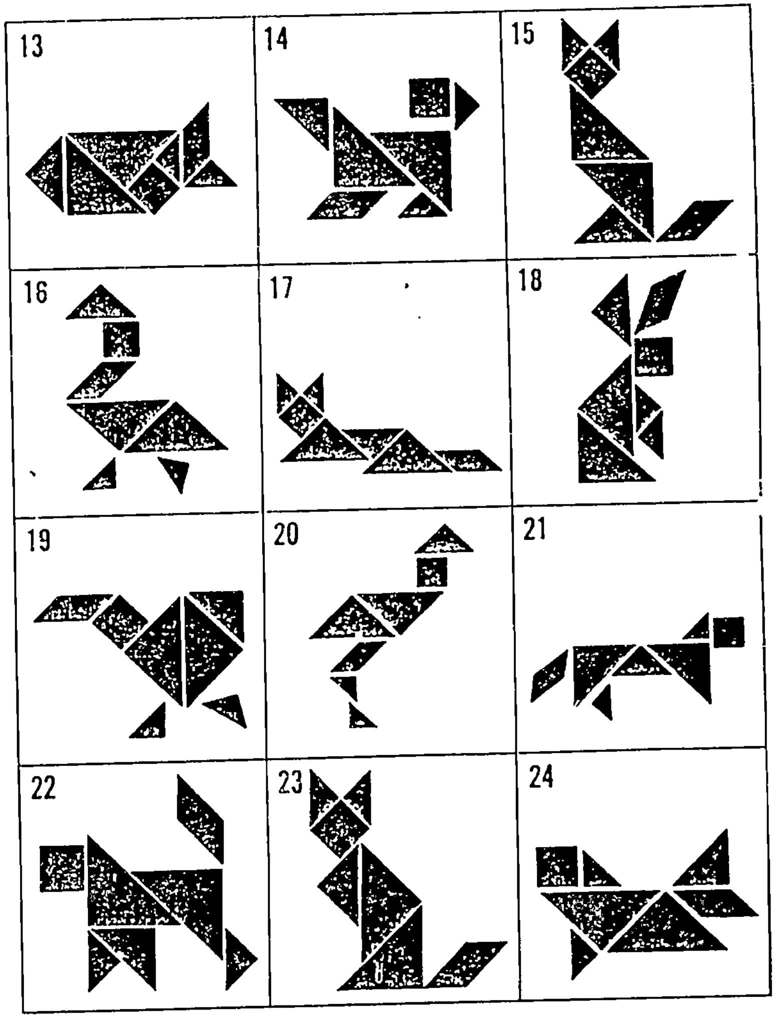

Appendix D

Teams

Troubleshooting Log

As you discover new and better ways of solving problems on the job, you need to record in some way your successes and trials so that figuratively speaking, some "history does not repeat itself." On the following chart, record some of your past attempts and the resources involved in the process.

Description of the troubleshooting situation

Description of attempts to solve the problem

Trial one--

Trial two--

Trial three--

Description of the successful plan

Resources Used

TRADE Winds

IN WORK BASED LEARNING

Monthly notes for the practitioner

January 1994 Vol. 3 No. 1

Why Didn't I Think Of That??!!

Light Competition Enlivens Reviews

Try using an "alphabet review" as a competitive and fun way to review material.

Prior to class, prepare a list of 26 questions and answers related to course material--one for each letter of the alphabet--and write them on the back of index cards, each with a different letter on the front.

Split the class into teams and gives each team a bell like those found on service counters. List the letters on a flip-chart page. Teams take turns selecting letters. As they do so, cross off that letter from the flip chart and read the corresponding card.

The first team to "ring in" tries to answer the question (should that answer be wrong, the first team to recognize that and ring in again gets a shot at it). When a question is answered correctly, hand the card to the successful team.

In its shortened version, the game ends when all 26 questions have been read, with prizes going to the team with the most cards. If time permits, allow five minutes for the teams to spell as many course-related words as possible, beginning with only the letters they've earned. Award prizes to the team with the longest list.

Source: Bob Parsons, training coordinator with Deluxe Corp. of Shoreview, MN, (612) 787-1331, as quoted in Creative Training Techniques Newsletter, Jan. 1994, Vol. 7, No. 1, p. 7, Lakewood Publications, Inc., 50 South Ninth Street, Minneapolis, Minnesota 55402, (800) 328-4329.

This Month Don't Miss...

Getting the group to "buy-in" to a problem. Pg. 3.
The trouble with training troubleshooters. Pg. 6

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Diana P. Cecala

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Notes From The Editor

How many times have you been in a meeting where the group has supposedly been called together to solve some urgent problem and nothing gets done? Half of the group probably doesn't think the "problem" was worth their attention in the first place. This is a tremendously frustrating situation, whether you are the person who called the meeting or someone who has been dragged to the meeting. Such a meeting wastes everyone's time, undermines team spirit and usually results in a loss of respect for the person who called the meeting.

"Problem Solving In A Team Meeting" offers us a very useful set of activities on how to avoid such meetings and obtain "buy-in" of the problem before trying to find solutions. I liked this lesson because it so clearly identifies and addresses the "buy-in" problem in organizations. As we all hopefully move away from hierarchical problem solving on the job, such lessons become more and more valuable.

Good troubleshooters are invaluable in any system whether it's in an automobile or in a bank. While most of us are stumped and frustrated when the system fails, these guys come in and with common sense, patience and technical experience, manage to figure out what's wrong. Once it's clear what is wrong, many people can make the repair, but doing the diagnostic work is tricky. Scott Johnson, an associate professor in the Department of Vocational and Technical Education at the University of Illinois at Urbana-Champaign, has made a career analyzing and teaching the troubleshooting process. His findings, presented in "The Trouble With Training Troubleshooters" this month, make a fascinating study in logic and human psychology. He clearly describes both the logical, analytic requirements of troubleshooting and how people try to adjust these to their own style with greater or lesser degrees of success. More importantly, he suggests concrete training methods that can help train good troubleshooters for all of us. Perhaps best of all, his conclusions offer us all wonderful food for thought, whether or not we train troubleshooters.

This month also features the annual Trade Winds Subscriber Survey. Please take a minute to fill this form out and send it back to us. Your feedback to a large extent determines what shape the newsletter takes. I will also tell you candidly that this year's survey is especially critical because the future of Trade Winds is not clear at this point. What is clear is that, at the current rates, Trade Winds is barely making enough money to cover its printing and direct mail marketing costs, and has not even begun to cover staff costs of researching, writing and desktop publishing. Thus far, the newsletter has really been a labor of love for its parent company, Partners In Performance, Inc., but it's just not clear how much longer Trade Winds can go on in its current subsidized state. We're exploring a number of options at this point and we'll be sure to keep you posted. Please write or call with any suggestions. Our address and phone numbers are on the front page.

As always, we appreciate your ongoing support!

Best,

Diana

Diana Cecala
Editor

Note: For further information or workshops on troubleshooting, Scott Johnson may be reached at 345 Education Building, 1310 S. Sixth St. Champaign, IL 61820; 217/333-0807.

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Defining The Problem As A Team

1. Discussion: *"How Do We Know That A Problem Exists?"*

- Ask the group if someone else has ever perceived a situation to be a problem, but you just didn't see it the same way?
- Ask the group if they ever had the above happen here at work in a meeting?
- Ask the group what happened in the meeting? Did the problem get resolved?
- Talk about the importance of "buy-in".

Instructor's note: *A problem cannot be solved if it isn't perceived as a problem by all of those involved in its solution. Therefore, we need what is called "buy-in" of the problem. This means that all involved in the solving of the problem agree that there is a problem. This is not agreeing on the solution.*

2. Brainstorming As A Tool For Buy-In

Review Guidelines For Brainstorming

Phase I: Generating Potential Solutions

- Any suggestion is "fair game"!
- The important thing is to be creative!
- Don't worry if something seems impractical or impossible. It might lead to something else that will work!
- Be sure to record everyone's suggestions where everyone can see them.
- Don't worry about duplications.
- Never say anything is "stupid." It may be the best solution in the long run.

Phase II: Selecting and Planning The Solutions

- Review all the suggestions and eliminate any duplications.
- Determine the pros and cons of remaining potential solutions:
- Determine means by which to measure success/failure of solutions.
- Initiate procedures for final selection and implementation.

Team Problem Solving cont.

2. Brainstorming cont.

Brainstorming Exercises

- One easy way to obtain buy-in is to have a brainstorming session in which the team thinks of symptoms that they see caused by this problem. These symptoms may come in the form of Hard Data or Soft Data. Ask the group what they would describe as Hard Data. (Hard Data = Data that is tangible or measurable. Soft Data = Data that is intangible and/or subjective.)

- Another way to obtain buy-in is through data collection. Delegating the task of data collection to team members brings with it the problem awareness or buy-in.

3. Buy-In and Problem Solving

Once the buy-in of the problem has occurred, problem solving may be initiated as a team.

Six Steps To Problem Solving

- Identifying and selecting the problems
- Analyzing the problems
- Generating potential solutions
- Selecting and planning the solutions
- Implementing the solution
- Evaluating the solution

These steps are all important to the success of the solution and the problem solving meeting.

Problem Solving:
The Trouble with Training Troubleshooters

In today's workplace, problem solving skills are becoming increasingly valuable as technology grows more and more complex. While sophisticated equipment is more reliable than earlier models, it also creates a training problem. The addition of computerized monitoring systems, the change in emphasis from mechanics to electronics and the overall increase in complexity make new forms of knowledge and skills necessary to maintain the new equipment.

Technical trouble shooting involves the detection, diagnosis and repair of faulty equipment or a faulty system. Whether you're talking about troubleshooting in electronics or in "forensic accounting" (finding problems in accounting systems), you need people who not only understand the system, but have good analytic skills and common sense. These people are not easy to find or train.

Many trainers view trouble shooting as an art that results from innate ability; they believe that good troubleshooters are born with an aptitude for troubleshooting. While some individuals have a knack for perfecting troubleshooting skills, current research suggests that these same skills can be taught -- with properly designed instruction.

The Training Problem

Current theory suggests that a key to expert performance in troubleshooting is in the organization of the expert's knowledge . Research also suggests that many of the traditional approaches to teaching troubleshooting are not effective:

- Many technical instruction programs focus on the theories underlying a system, whereas research show that experts do not rely solely on these quantitative aspects of the system. Rather, they will rely more on a conceptual understanding of the problem based in qualitative terms.

- A typical approach in technical instruction is to use schematic and wiring diagrams to describe the function and operation of a technical device. However, many trainees do not have a sufficient background in electronics to fully comprehend the abstract diagrams. The diagrams impede, rather than facilitate a conceptual understanding of the system because of the complex, abstract nature of the schematic and wiring diagrams.

Training Solutions

Scott Johnson, at the University of Illinois, who has done considerable research and training in this area, emphasizes that, for trouble shooting training to be effective:

1. **Students must be taught the function and operation of the specific technical system under study, and they must comprehend the relationships between the individual parts and the total system.** Through the development of this "system understanding", students will be better able to acquire understanding and generate appropriate hypotheses.

2. **Instruction must cover the technical evaluation procedures that are likely to be needed.** Students must know what procedures are available, when they should be used, how they are done, and what the results mean.

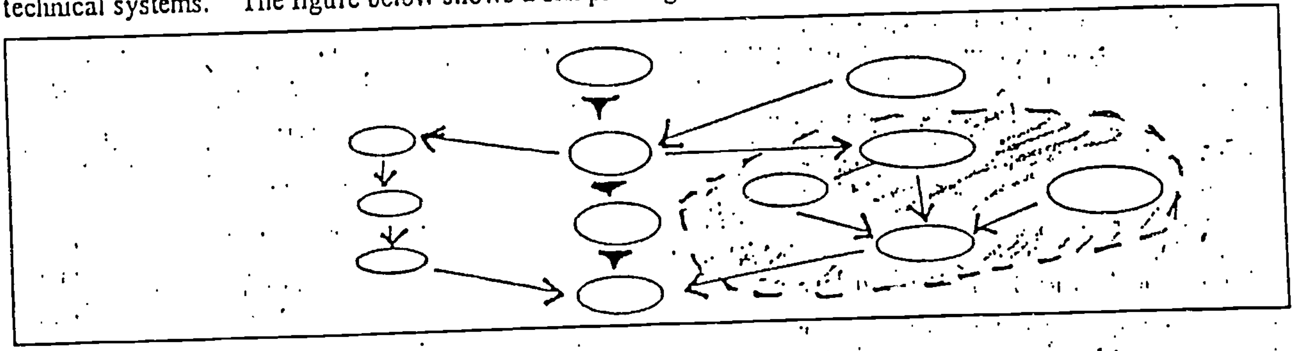
3. **Technical instruction must provide students with realistic learning experiences.** Students should be given systems that do not function properly and have them work through the troubleshooting process to identify the system fault. **Students should record initial symptoms, desired information, potential hypotheses, and useful technical evaluations.** By recording these important factors in the troubleshooting process,

Tools for Training Troubleshooting

Also for Cycle times/quality checks

1. Problem Space Concept

Before attempting to solve a problem in system, trainees are asked to draw a functional diagram of the system with areas shaded -- the "problem space" -- to indicate where the problem is likely to be based on the symptoms. By having trainees draw the problem space for numerous fault scenarios, trainers can quickly identify mistakes and omissions in trainees' understanding of problem symptoms and their relationships to technical systems. The figure below shows a sample diagram with the shaded problem space.



2. Two Person Debugging Game

In this exercise, trainees divide up into pairs with one acting as the observer and the other as the troubleshooter. The observer plans the problem to be solved by identifying all the symptoms, possible faults, possible tests and results from tests. (This preparation also makes the exercise a good "paper and pencil" simulation exercise).

As the troubleshooter tries to find the fault, the observer records the troubleshooting processes used, the information collected and the tests made. The observer provides specific information to the troubleshooter only if asked. When the troubleshooter finally locates the fault, the observer discusses the troubleshooting process used and identifies any poor or inefficient checks made. Through this process both the troubleshooter and the observer gain a greater understanding of the troubleshooting process and the system.

Advantages:

- It provides a realistic, simulated environment for a troubleshooting exercise;
- By knowing where the fault is, the observer clearly sees the troubleshooter's mistakes and gains insight into the troubleshooting process;
- The observer can record the troubleshooting process used by the troubleshooter for later review, which can lead to "reflective learning".
- It encourages teamwork, cooperation and communication; because the trainees will be actively involved in both the "bugging" and the troubleshooting, the trainer will be free to provide individual help to those needing assistance.

3. Prediction and Design Games

In the Prediction Game, trainees work under the trainer's guidance to predict what will happen to other components as a result of changes in a particular component. In the Design Game, the trainer challenges the trainees by describing the need for a new type of system. The trainees then use the components discussed in training to design a system that will meet the needs described by the trainer.

Both of these games offer wonderful learning opportunities. By working in a large group, each person can benefit from hearing the other trainees "think aloud" about the system and the changes. This "thinking aloud" process introduces people to other ways of looking at a system and its components, and encourages cooperative, rather than competitive problem solving. The games also reinforce the theory of operations taught in most courses but force trainees to think about the system at a much deeper level than they do in most

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Troubleshooting Styles - Which thinking style would most likely produce for which type

Scott Johnson and Jeff Flesher have offer a wonderful breakdown of troubleshooting styles. No single style is "right" for all occasions, but they each have advantages and disadvantages. Below is a sample:

Type	Characteristics	Advantages/Disadvantages
1. Gamblers	(depend on some element of chance to support their work)	
A. Wanderers	Rely completely on random chance to find the problem. Wander around the system by randomly selectin components in hopes of stumbling upon the fault.	Low probability of success. Have limited understanding of system and lack diagnostic skills.
B. Risk Takers	Like to experiment with components within a system.Reconfigure the system to provide new information that can help locate the faults.	Can be very dangerous to both equipment and personnel. Need to improve their odds of succes by seeking as much relevant information as possible before they "just try this to see what it does"
C. Swappers	Substitute a known good assembly or circuit board for an assumed bad part.	Risky in that good parts may get damaged in malfunctioning system. Leads to replacing major components to repair minor faults.
2. Testers	(rely on information from tests or their senses to locate faults)	
A. Sensors	Like to look, listen, touch and smell to isolate problems.	Needs experience. Can provide important information. Rarely works as sole method.
B. Tracers	Use a schematic diagram as a road map to search for the cause of the problem. Can work from good point towards fault or vice versa.	Need skill to read system map, navigate through system and recognize dead ends. Otherwise will miss important signals.
C. Splitters (half/split method)	Divide a system in half and check it for faults. If no fault exists at the midpoint, a new reference point is selected in the middle of the remaining circuitry.	More efficient form of tracing. Requires knowledge of system.
3. Thinkers	(use a logical approach that relies on their ability to process information).	
A. Readers	Use someone else's thought processes (e.g. manuals, fault isolation trees)	Good up to a certain point. then must use another style.
B. Analyzers	Use their system knowledge to eliminate portions of the system in a logical way before attempting to use test eequipment or other methods.	Good "think before you act" approach. Requires detailed knowlege of system. Used by most expert troubleshooters.

References:

Johnson, Scott D. (1988). " Cognitive Analysis of Expert and Novice Troubleshooting Performance". *Performance Improvement Quarterly*, Vol. 1, No. 3 pp. 38-54.

Johnson, Scott D. (1989). "A Description of Expert and Novice Performance Differences On Technical Troubleshooting Tasks". *Journal of Industrial Teacher Education*, Vol 26 no. 3. pp. 19-37.

Johnson, Scott D. (1991) "Training Technical Troubleshooters". *Technical and Skills Training*, Oct. 1991, pp. 9-16.

Johnson, Scott D. and Flesher, Jeff (1993). "Troubleshooting Styles and Training Methods". *Technical and Skills Training*. Nov/Dec 1993, pp. 15-19.

Subscriber Needs Survey

Name (optional) ______________

We want Trade Winds to meet your needs! Please take a couple of minutes to fill out this survey, tear off the sheet, and send it back in the attached envelope. Thank you so much!!

I. Current Trade Winds Features

1. Overall, what is your rating of *Trade Winds* so far?
   a) Very good _____ b) Good _____ c) Fair _____ d) Weak _____ 5) Terrible _____

2. Please rate the following features in terms of usefulness to you:

	1 Very Useful	2 Somewhat Useful	3 Not Useful
a) Why Didn't I Think of That? (front page)			
Comment:			
b) What's Working!! (Lessons/activities from other trainers/ instructors)			
Comment:			
c) Try This!! (Instructional ideas/ activities from other publications)			
Comment:			

II. Publication Schedule and Rates

1. The current monthly schedule of *Trade Winds* is:
   a) Too often _____ b) About right _____ c) Too seldom _____

2. If it came to a choice of having *Trade Winds* come out quarterly or not at all:
   _____ I would continue to subscribe to a fatter, quarterly *Trade Winds* at the same subscription price.
   _____ I would not continue to subscribe to a quarterly *Trade Winds* at the same subscription price.

3. If it came to a choice of having *Trade Winds* raise its rates by 50% or not continue:
   _____I would be willing to pay the increased rate.
   _____I would not be willing to pay the increased rate.

Subscriber Needs Survey cont.

III. Content Areas For *Trade Winds*

Please rate the following content areas in terms of usefulness to you:

	Warrants Regular Coverage	Warrants Occasional Coverage	Warrants No Coverage
1. Communication/Interpersonal Skills (listening skills, dealing with difficult people, speaking to convince others, etc.)			
2. Problem Solving (Tips/Strategies)			
3. Reading Skills (e.g., charts, manuals, comprehension strategies)			
4. Writing Skills (writing reports, memos, letters, basic skills)			
5. Math Skills (estimation, computation, understanding concepts, basic skills)			
6. Assessment Instruments/Strategies (commercial and instructor-developed)			
7. English As A Second Language (lessons, activities, materials)			
8. Review of instructional materials in print			
9. Review of computer software			
10. Games (instructional)			
11. Humor (cartoons, quotes, jokes, related to learning)			

IV. *Trade Winds* Layout

The current layout (graphic style) of *Trade Winds* is:
1) Inviting and readable _____ 2) Adequate _____ 3) Needs Improvement ______

Suggestions?

V. General Comments

BUILDING THOSE TEAM BUILDING BEHAVIORS

Team name__________________________

15 minutes

Read over the list of beneficial team behaviors and compare them to the list of rules of communication you drafted last class period. Discuss in your team the behaviors and potential problems, and draft a new rules of communication list for your group.

25 minutes

Read together or silently Point One of Deming's Fourteen Points. (The article is in the same packet as the beneficial team behaviors paper.)

In your group, answer these questions:

What is constancy of purpose? How, according to Deming, can companies achieve this?

From your reading, what is innovation, and continuous improvement of service?

What does constancy of purpose mean to your team?

How can your team have continuous improvement of product and service?

Since TQM involves everyone from workers to management, what supports will you need to keep constancy of purpose and continuous improvement happening in your team?

What behaviors and/or methods will your group need to change in order to have constancy of purpose and continuous improvement?

20 minutes

Bring out your Deming article from Monday that contains the Fourteen Points. Pick 4 or 5 points that you feel your team needs to adapt. Write a one sentence statement for each point that describes how your group will adapt these points into your every day work. (Have fun--this is a real challenge for your team!!!!!)

Appendix E

Jigsaw Material

(Refer to Lesson Plan for Directions)

BUDGET MENU

From the following menu of items taken from a monthly budget , choose which items you would spend your resources on. On the next page, give your justification for each item.

Options for Monthly Expenses

Trash pick up $37
Sanitation and water $50
Appliances and maintenance $90
VCR payments $20
TV payments $60
Gas $65
Electric $45
Phone $30
Cable $45
Insurance--Car $85
  Renters $100
  Homeowners $80
  Life $20
  Hospitalization $20
Car--owned and paid for
Food-Eating out $50
  Groceries $100 a week

Car payment $240
Glasses $200 annually
Eye Exams $50 annually
Vet bills $200 annual check up
Pet food and toys (Cat and Dog) $30
Clothing $50
Schooling(college) $166 (Support college aged child)
Schooling (Grade) $15 (Support grade school child-PTA)
Birthday $15
Make up $10
Pool and maintenance$100
Plants and Food $15
Anniversities $15

Credit card fees (Visa, American Express, Sears, Diner's Club, Discover, Penneys, Service Merchants, Master Card)--annual fee--$15
Minimum payments--$40

Entertainment--shows $10
  concerts $30
  dancing $10
  trips-vacations $1000 annually
  lottery $40
  CD's $40
  tapes $30
Doctor's visits $30 each
  --Medication (yearly) 2 people--$150
  1 person--$50
Child Support $70 a week
Baby Sitters 2 children $100 a week
  1 child $55 a week
House payments $425
Rent $350
Car repair and maintenance $45
Home repair $75

Cigarettes $80
Beer $20
Beauty Shop $25
Perms $45
Holidays $50
Emergency fund $40

List of Options and Justifications

Your total yearly gross income is $ 36,000.

Seven and a half percent of your gross is taken up in FICA and medicare insurance.

Your state and local tax takes up 2 1/2% of your gross income.

In your group, figure out your net monthly income and decide which optional deductions you would like to take out. (All deductions are in percentages of the gross income.)

Life insurance--1 %
401K program--2,3,or 4%
Union dues--3 %
Annuity--10%
Company retirement plan--3 1/2% with the company contributing matching funds
Health Insurance--3 1/2%

Coded Message

a	b	c	d	e	f	g	h	i	j	k	l	m
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n	o	p	q	r	s	t	u	v	w	x	y	z
■	❏	❐	❑	❒	▲	▼	◆	❖	◗	❘	❙	❚

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Appendix F

Skills

Preparing a Home Budget

You and your significant other are having some difficulties keeping your money matters straight. You've agreed on goals for your future in your two-income home, its just darned hard to find ways to save money like you would want to. Here are your monthly expenses:

Rent--$400 for a two bedroom apartment with one bath, newly remodeled
Car payments--$300 a month for a 2 year loan on a 1993 Chevy Cavalier bought in March of 1993--11% interest ($15,000--selling price)
Car maintenance --average $45--repairs and tune-ups on second car
--average $25--oil changes on either car
Phone--average $35 a month (basic package-$22 plus long distance)
TV--$40 payments, $40 down--bought in December of 1993 ($480--selling price)
Clothes--average $50 a month
Visa -- average $200 a month--includes gas expenses, entertainment, misc. (usually paid in full monthly; if not, there's 12.5% interest on the balance)
Food--$100 a month

Add any additional expenses you feel are not on this budget and determine the amount you need to put aside for each expense.

Your total monthly income is $1400.
Your goal is to have a savings account that is 22% of your total monthly income.

How do you read the newspaper? Junk Mail?

Cant read every thing word for word

Comprehend

Sorting

Storing

Skimming

Dictionaries

Telephone books

Searching for something in particular

Preview material

Scan table of contents, index, pictures, overview

Cluster

Mapping

Blueprint

Active Readers - who what where when why + how

Read ideas not words

Do a cluster on the board - "Circle"

They do a cluster on "Time" or "Clock"

Do a fast write on "Red" Just write anything Don't take time to ~~structure~~, gather thoughts, check spelling, backtrack etc

Do a cluster for your fastwrite

Make important ideas stand out

Personalize it.

Make it describe your thinking process

Put shapes around things, underline, add implied things that didnt get written.

Use pictures.

Get out blueprint.

Map your thinking of how you would remember/process info.

Map your thinking process when looking at blueprint.

Get into groups & label type of thinking - Mostly right or left?

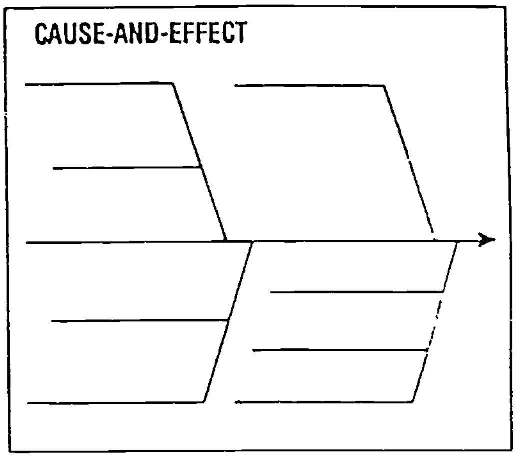
How does it help you remember + understand? Compare thinking processes

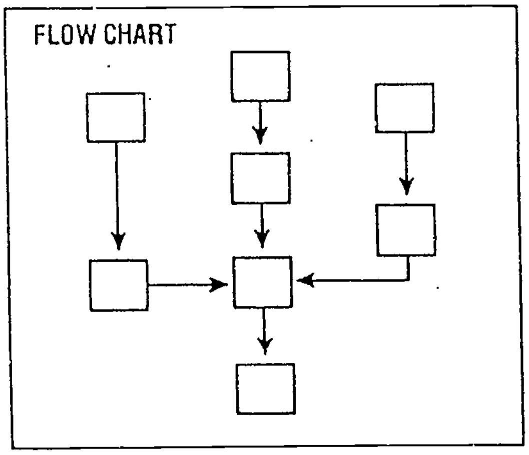
Shop paper - same way?

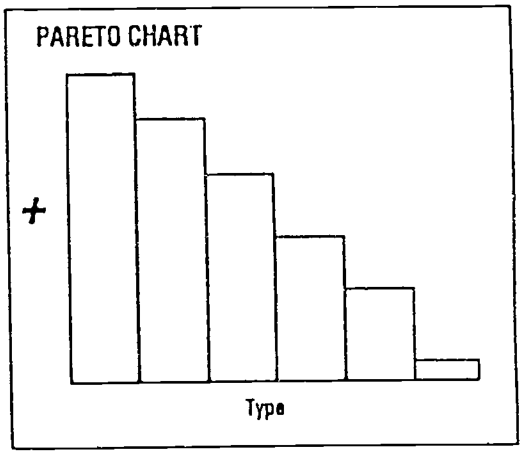
Then learning log / Job Skills Inventory?

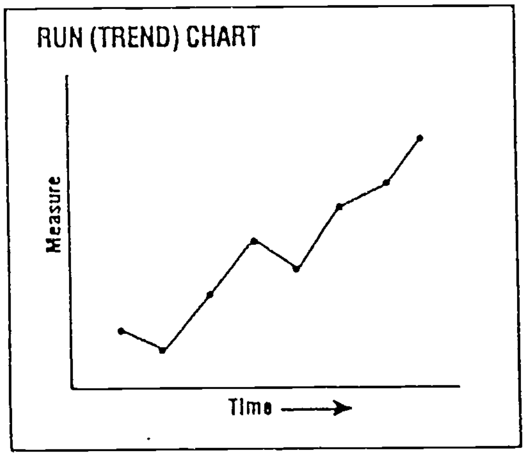
BEST COPY AVAILABLE

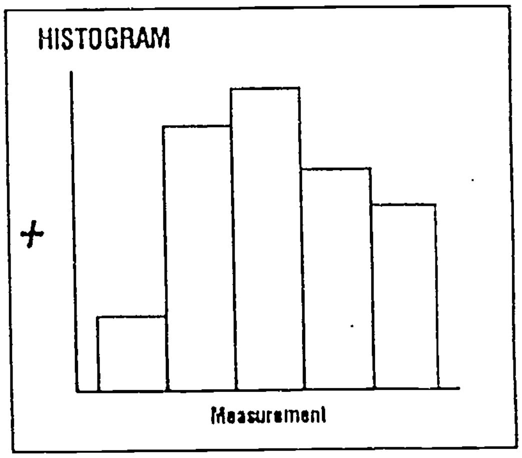
SEVEN HELPFUL CHARTS

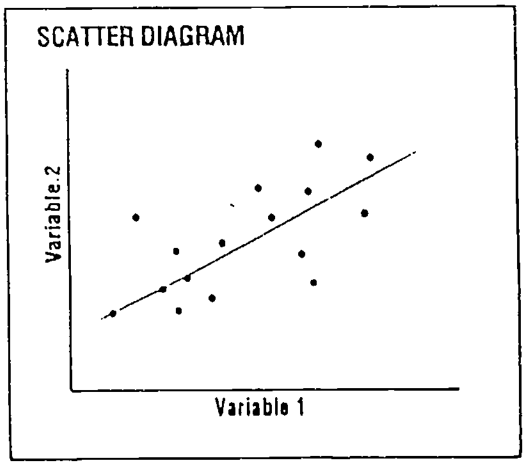

CAUSE-AND-EFFECT

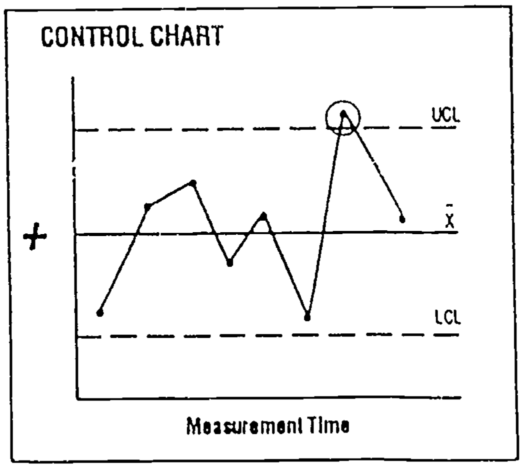

FLOW CHART


PARETO CHART


RUN (TREND) CHART

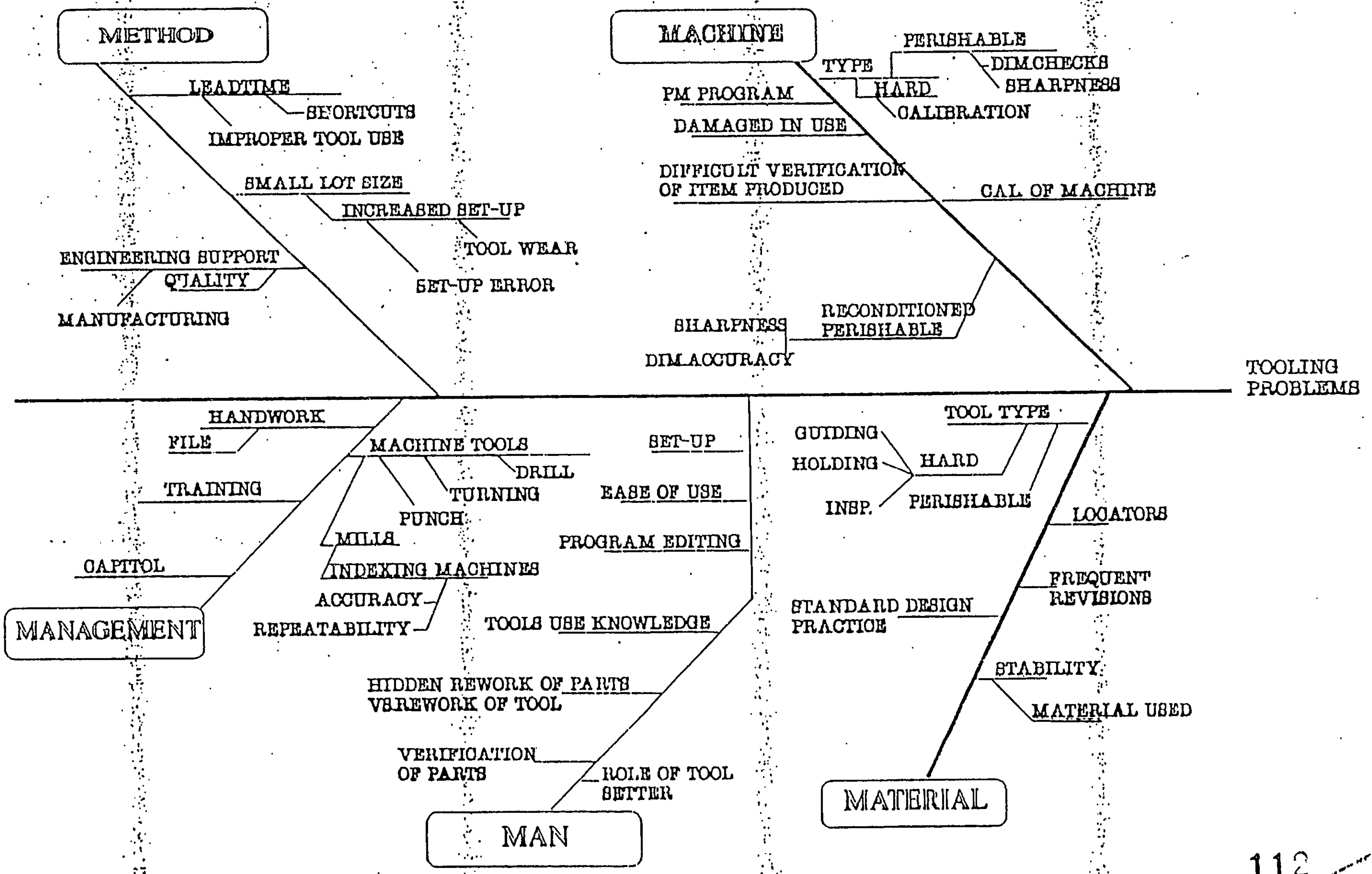

HISTOGRAM

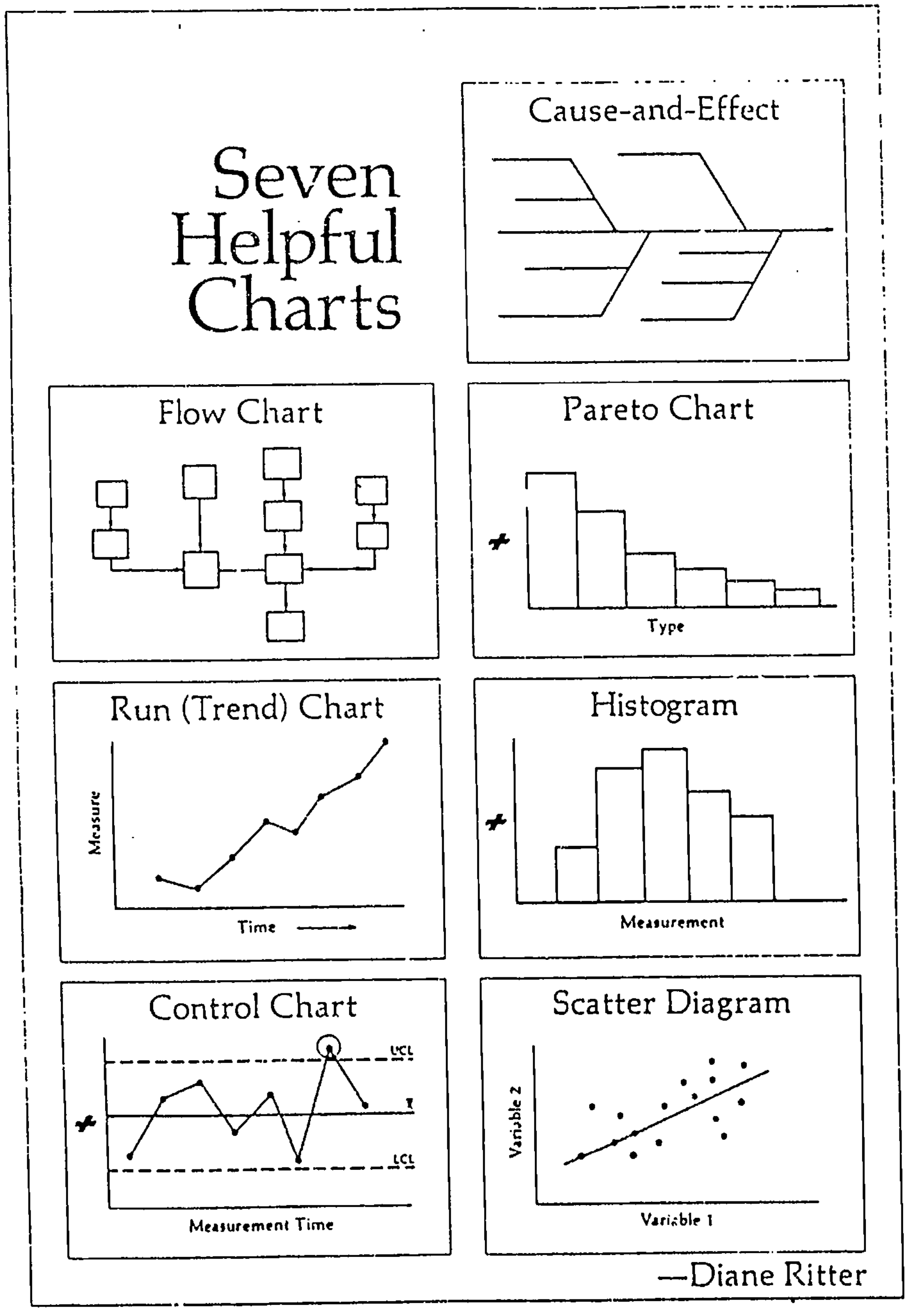

SCATTER DIAGRAM


CONTROL CHART

©Bob King, GOAL / QPC

TOOLING PROBLEMS
CAUSE AND EFFECT DIAGRAM


METHOD
LEADTIME
SHORTCUTS
IMPROPER TOOL USE
SMALL LOT SIZE
INCREASED SET-UP
TOOL WEAR
SET-UP ERROR
ENGINEERING SUPPORT
QUALITY
MANUFACTURING
MACHINE
TYPE
PERISHABLE
DIM CHECKS
SHARPNESS
HARD
CALIBRATION
PM PROGRAM
DAMAGED IN USE
DIFFICULT VERIFICATION OF ITEM PRODUCED
CAL OF MACHINE
RECONDITIONED
PERISHABLE
SHARPNESS
DIM ACCURACY
TOOLING PROBLEMS
MANAGEMENT
HANDWORK
FILE
MACHINE TOOLS
DRILL
TURNING
PUNCH
MILLS
INDEXING MACHINES
ACCURACY
REPEATABILITY
TRAINING
CAPITOL
MAN
SET-UP
EASE OF USE
PROGRAM EDITING
TOOLS USE KNOWLEDGE
HIDDEN REWORK OF PARTS VS REWORK OF TOOL
VERIFICATION OF PARTS
ROLE OF TOOL SETTER
MATERIAL
TOOL TYPE
GUIDING
HOLDING
INSP.
HARD
PERISHABLE
LOCATORS
FREQUENT REVISIONS
STANDARD DESIGN PRACTICE
STABILITY
MATERIAL USED



To demonstrate these tools simply, and to show how they can sometimes be used together, the theme of getting up and getting to work with which most of us are familiar has been used as an illustration. In addition, the Growth Opportunity Alliance of Greater Lawrence (GOAL) has been kind enough to provide actual examples drawn from various companies, which have been published in its pocket-size *Memory Jogger*.

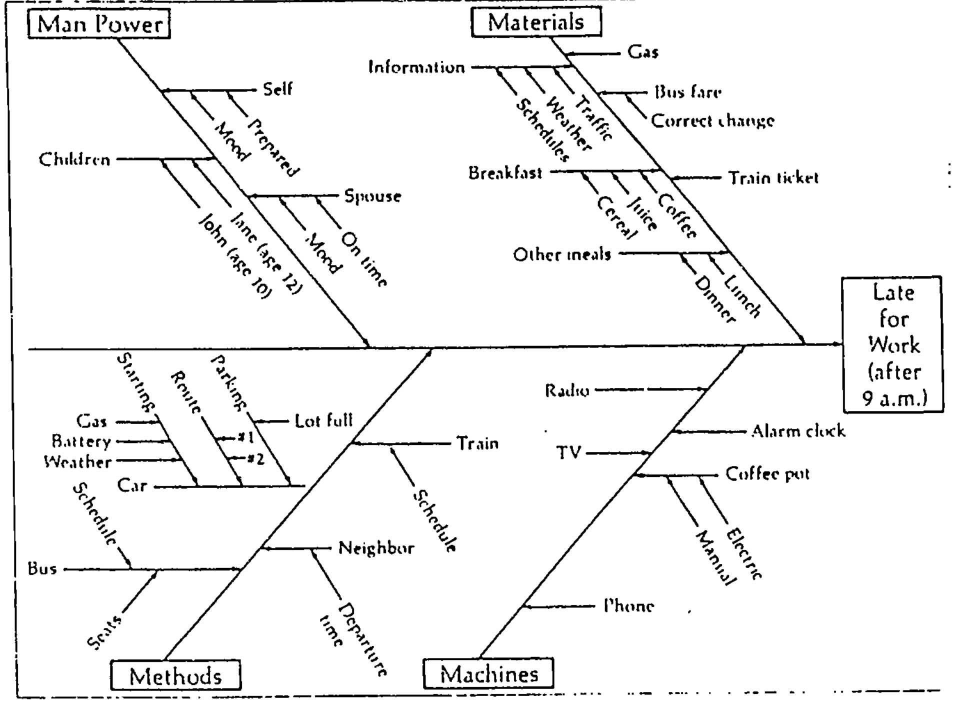
Cause-and-Effect Diagrams

Also known as the "fishbone" diagram because of its shape, or the Ishikawa diagram, after its originator, Kaoru Ishikawa, cause-and-effect diagrams are used in brainstorming sessions to examine factors that may influence a given situation. An "effect" is a desirable or undesirable situation, condition, or event produced by a system of "causes." In teaching this tool, the Japanese often use as the effect "a perfect plate of rice." Americans have used "bitter coffee." Minor causes are often grouped around four basic categories: materials, methods, manpower, and machines. Different groups may be used.

Let us suppose that you are late for work more often than you would like to be. Your morning routine begins with your alarm clock going off, and it ends when you arrive at your desk. Many things happen within that period of time. Your spouse and your two school-age children have their own schedules, which may conflict with yours. Sometimes the television offers something worth watching. Loading the dishwasher takes time. There are frequent telephone calls because people know it is a good time to catch you. You are not always able to drive to work. Your spouse may need the car, or it may be in the shop. You have a choice of riding with a neighbor, which requires advance notice, or you can take the train or a bus, which means buying a ticket or having the correct change. If you drive, parking can be a problem, and so can weather.

You invite your family to join you in a brainstorming session. All of you are surprised at how complicated a seemingly simple process is and at how many variables it has. Through discussion, everyone now becomes aware of the problem and hopefully takes an interest in helping out. Helpful suggestions include taking turns loading the dishwasher, scheduling car use, not turning on the television, getting a bigger kitchen clock, and so on.

Cause-and-Effect: "Late for Work"

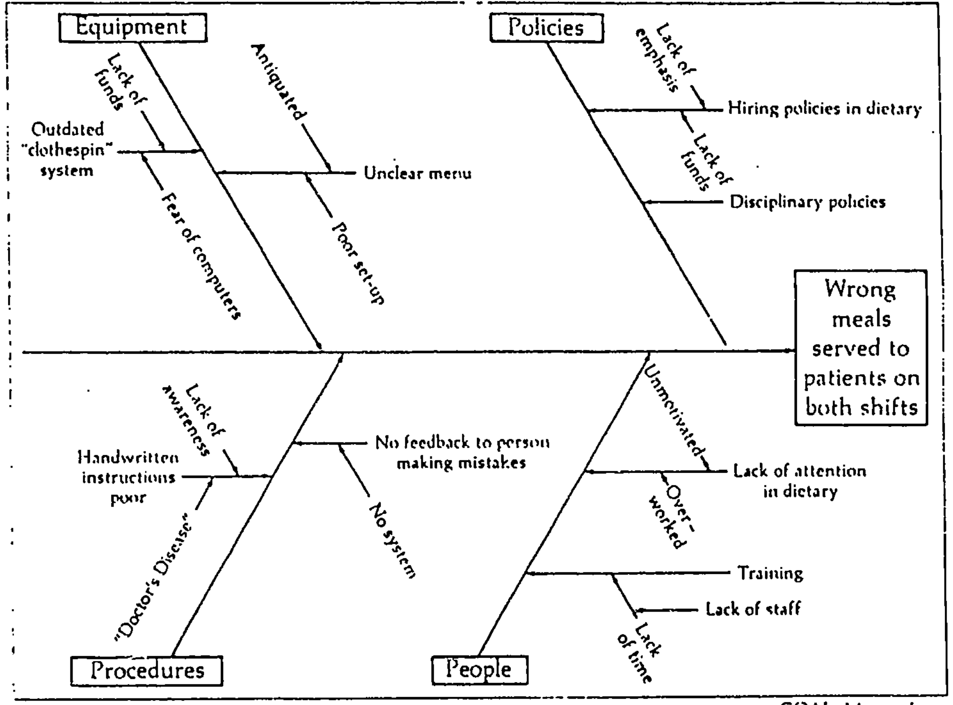

Man Power
Self
Prepared
Mood
Children
Spouse
Jane (age 12)
John (age 10)
Mood
On time
Materials
Information
Gas
Traffic
Weather
Schedules
Bus fare
Correct change
Breakfast
Train ticket
Cereal
Juice
Coffee
Other meals
Dinner
Lunch
Late for Work (after 9 a.m.)
Starting
Route
Parking
Gas
Battery
Weather
#1
#2
Lot full
Car
Train
Schedule
Bus
Schedule
Seats
Neighbor
Departure time
Methods
Radio
TV
Alarm clock
Coffee pot
Electric
Manual
Phone
Machines

Ishikawa, whose *Guide to Quality Control* was written for Japanese workers and is now the most widely read book on basic statistics for quality in the United States, outlines these benefits from cause-and-effect diagrams:

1. The creation process itself is educational. It gets a discussion going, and people learn from each other.
2. It helps a group focus on the issue at hand, reducing complaints and irrelevant discussion.
3. It results in an active search for the cause.
4. Data often must be collected.
5. It demonstrates the level of understanding. The more complex the diagram, the more sophisticated the workers are about the process.
6. It can be used for any problem.[3]

In an actual case, a hospital used a cause-and-effect diagram to examine the reasons why patients were receiving meals that were different from the orders they had placed. Afterward, the hospital staff targeted some of the causes for data collection.

Cause and Effect: "Wrong Hospital Meals"[4]


Equipment
Lack of funds
Outdated "clothespin" system
Fear of computers
Antiquated
Unclear menu
Poor set-up
Policies
Lack of emphasis
Hiring policies in dietary
Lack of funds
Disciplinary policies
Wrong meals served to patients on both shifts
Lack of awareness
Handwritten instructions poor
"Doctor's Disease"
No feedback to person making mistakes
No system
Procedures
Unmotivated
Lack of attention in dietary
Over-worked
Training
Lack of staff
Lack of time
People

—GOAL, *Memory Jogger*

Flow Charts

Often the first step a team looking for ways to improve a process takes is to draw a flow chart of that process. A process cannot be improved, the reasoning goes, unless everyone understands and agrees on what the process is. The flow chart is an extremely useful way of delineating what is going on. One way to begin is to determine how the process should work, then chart the way it does work. Doing this can immediately turn up redundancy, inefficiency, and misunderstanding.

Vernay Laboratories, Inc., an Ohio manufacturer of precision rubber products and a client of Dr. Deming, decided to streamline its billing procedures. Vernay asked three people in the department to flow chart the way it worked. The result was three different flow charts. No one really knew.

One management consultant reports that he always asks managers to flow chart the operation they oversee. It is astonishing, he says, how often they must ask for help from subordinates. They really do not know who is responsible for what under their administration.

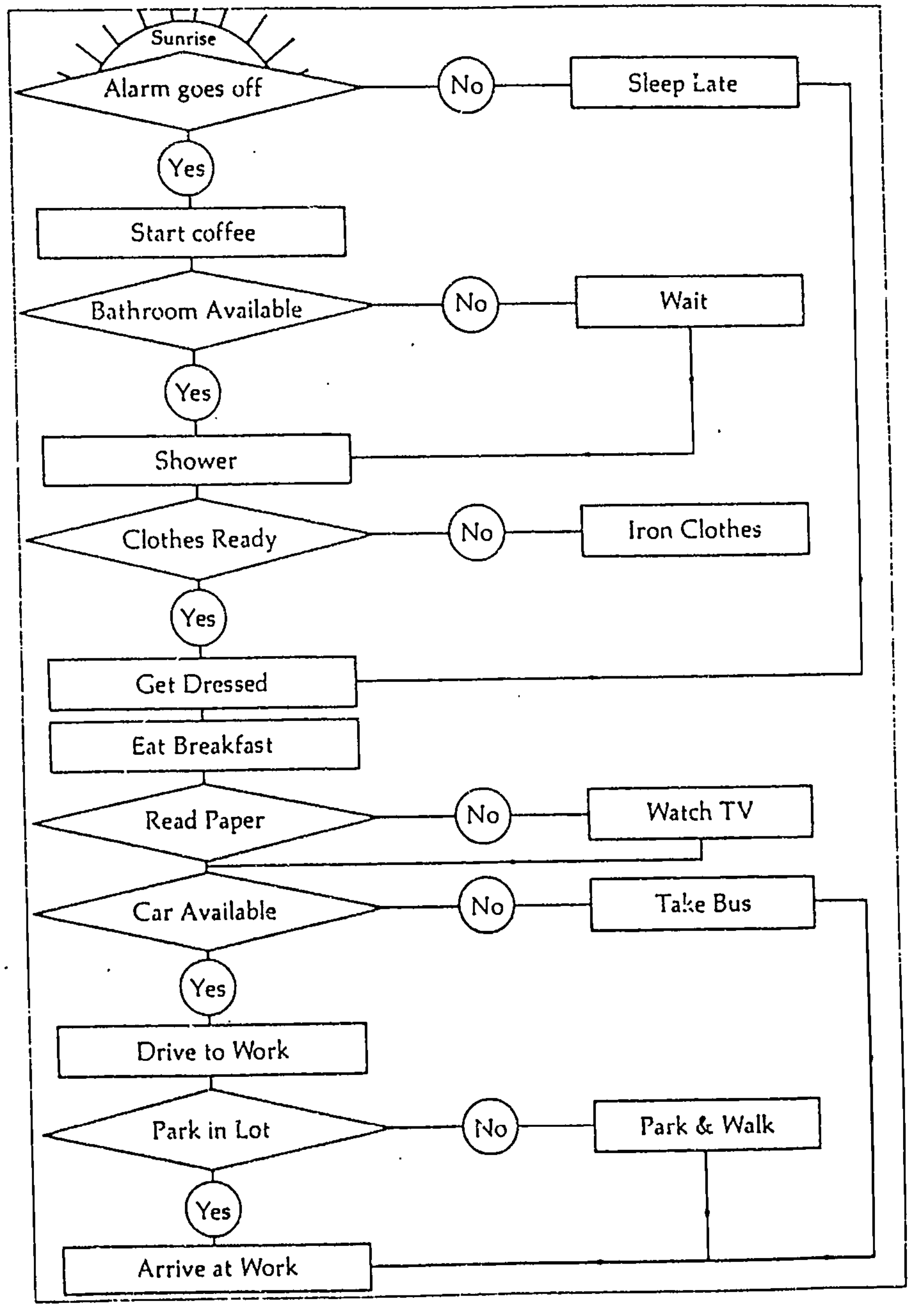
People in administrative or service operations where the flow of information is not always as visible as in a manufacturing process find flow charts particularly valuable.

A flow chart of your morning routine could begin with the alarm.

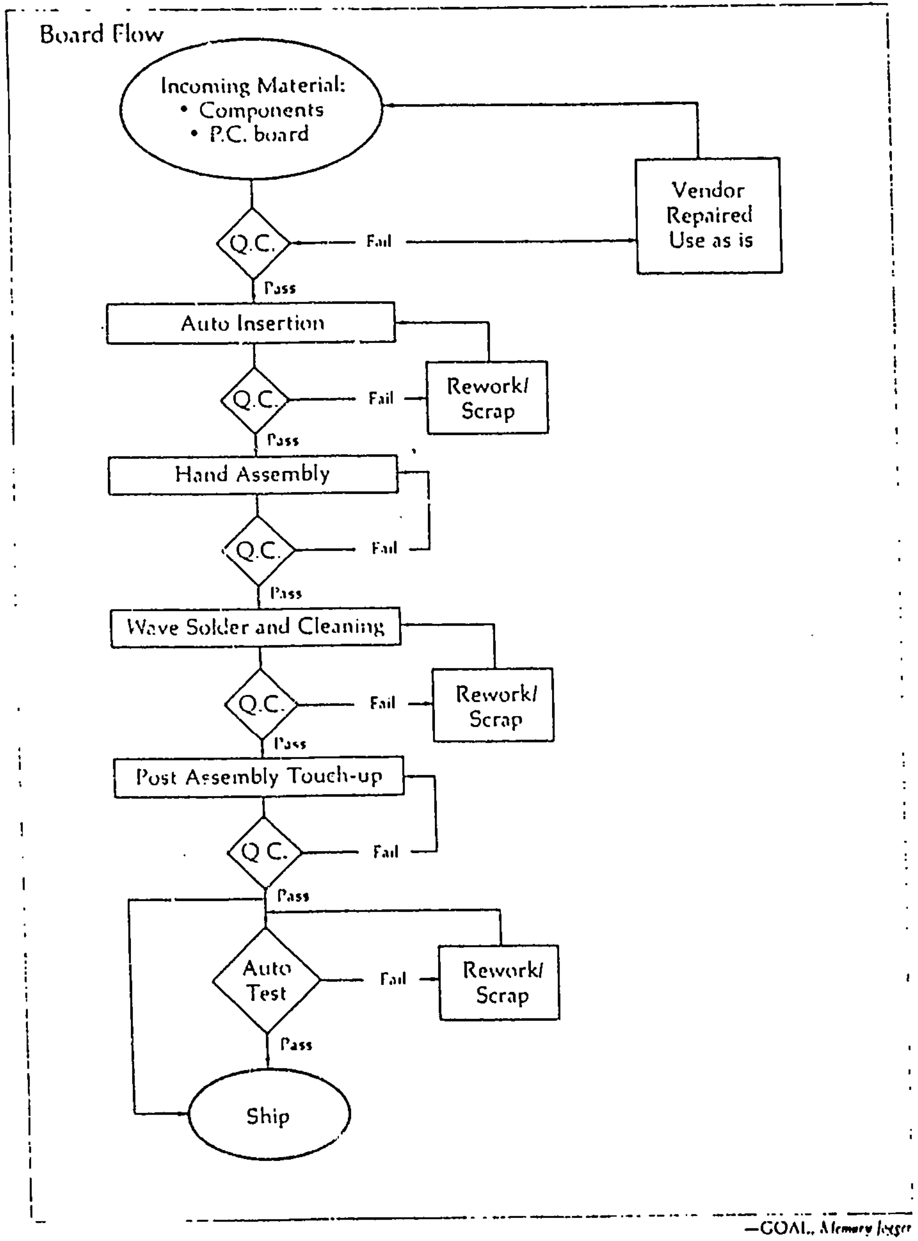
If you wanted to concentrate on eliminating the "no" loops, you might use two alarms, work out a bathroom schedule, prepare clothes in advance, get a second car, or rent a parking space on a monthly basis.

One manufacturer of printed circuit boards charted the process from the arrival of new materials to the shipping of finished products. It revealed three separate steps devoted to rework. If those could be eliminated, it would simplify the process and save money.

Flow Chart: "From Bed to Work"


Sunrise
Alarm goes off
No
Sleep Late
Yes
Start coffee
Bathroom Available
No
Wait
Yes
Shower
Clothes Ready
No
Iron Clothes
Yes
Get Dressed
Eat Breakfast
Read Paper
No
Watch TV
Car Available
No
Take Bus
Yes
Drive to Work
Park in Lot
No
Park & Walk
Yes
Arrive at Work

Flow Chart: "P.C. Board Flow"[5]


Board Flow
Incoming Material:
• Components
• P.C. board
Q.C.
Fail
Vendor
Repaired
Use as is
Pass
Auto Insertion
Q.C.
Fail
Rework/
Scrap
Pass
Hand Assembly
Q.C.
Fail
Pass
Wave Solder and Cleaning
Q.C.
Fail
Rework/
Scrap
Pass
Post Assembly Touch-up
Q.C.
Fail
Pass
Auto
Test
Fail
Rework/
Scrap
Pass
Ship

—GOAL, Memory Jogger

Pareto Charts

Pronounced *pah-ray-toe*, these are among the most commonly used graphic techniques. People will speak of "doing a pareto" or say, "Let's pareto it." This chart is used to determine priorities. The pareto is sometimes described as a way to sort out the "vital few" from the "trivial many."

Suppose, in our continuing example of a morning routine, you would like to leave the house at 8:15, arriving at work by 8:45, so as to have a fifteen-minute period in which to relax—or a cushion against being late—before work begins at 9 A.M. More often, you leave by 8:30 A.M. and barely make it. You decided to keep track of the things that interfere with your departure for sixty days. You are sure that waiting for the bathroom is a major cause. And you know that getting caught up in reading the paper is a delay. So is the pesky garage door, which occasionally sticks. Sometimes you can't resist hitting the snooze alarm.

In your research, you might use a checklist, a good way of collecting data.

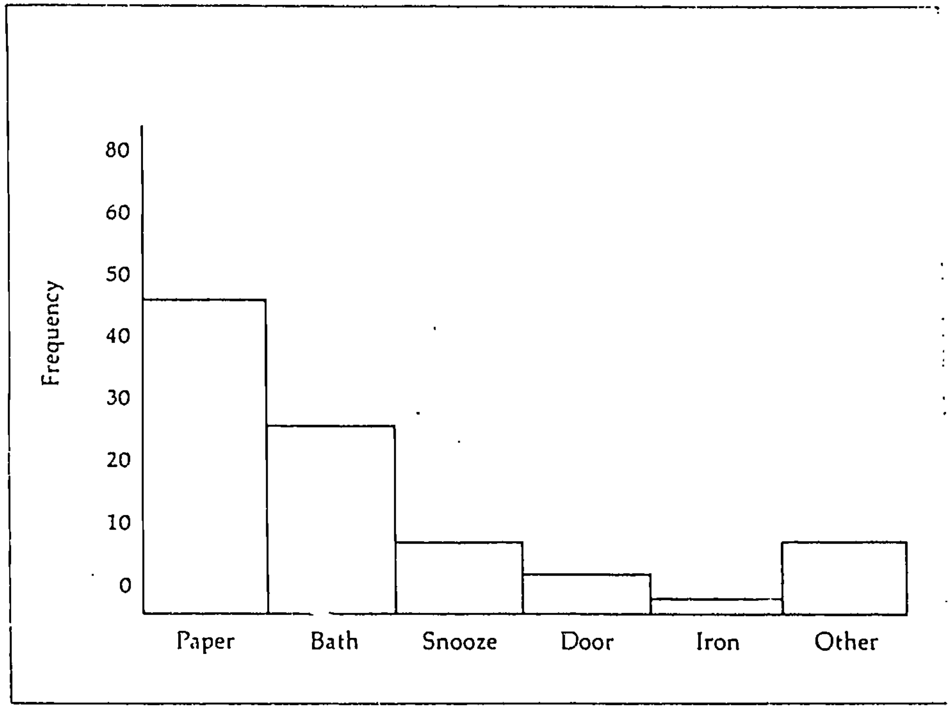
Here are some possible results:

Conditions That Might Cause Lateness
(*Some days have more than one occurrence*)

CAUSE	NUMBER OF TIMES
Reading paper (more than ten minutes)	45
Bathroom delay	20
Snooze alarm	8
Garage door	3
Having to iron	1
Other reasons	9

These incidents could be displayed on a pareto chart.

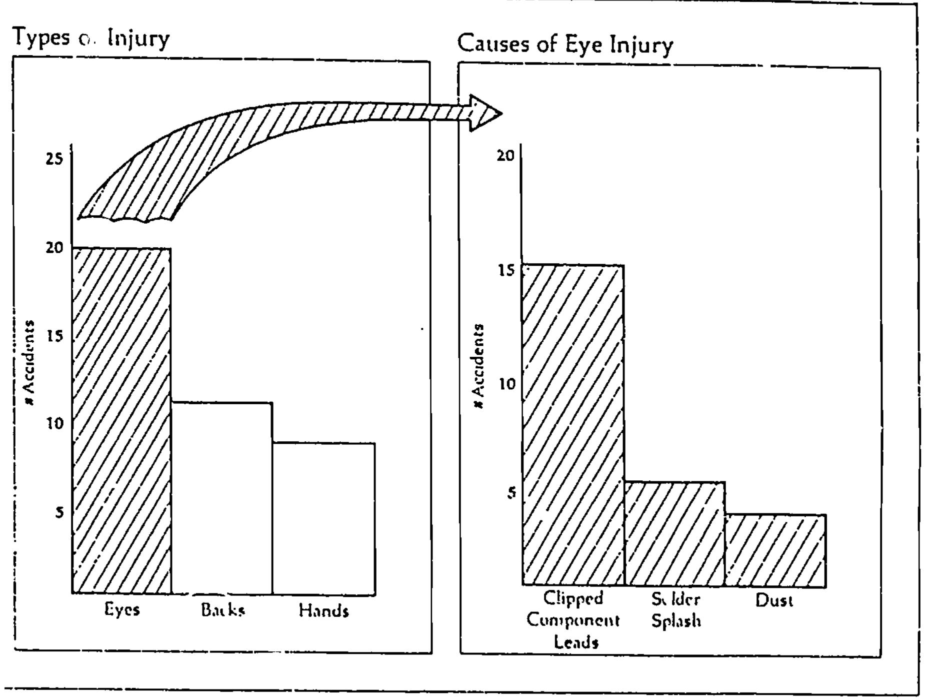
Pareto Chart: "Conditions That Might Cause Lateness"



As a result, you might make some changes. Switch to an afternoon paper. Get up earlier. Buy a clock without a snooze alarm.

At the printed circuit board plant, management organized a safety campaign at the employees' request. A team gathered data on accidents, then used a pareto to diagram the findings. Eye injuries were more common than any other. The team then researched causes and again made another pareto chart. The largest number of eye accidents occurred during the process of clipping the wire leads of components after they were soldered to the printed circuit board. In this fashion, pareto charts can be used to narrow down problems.

Pareto Chart: "Types of Injury"[6]



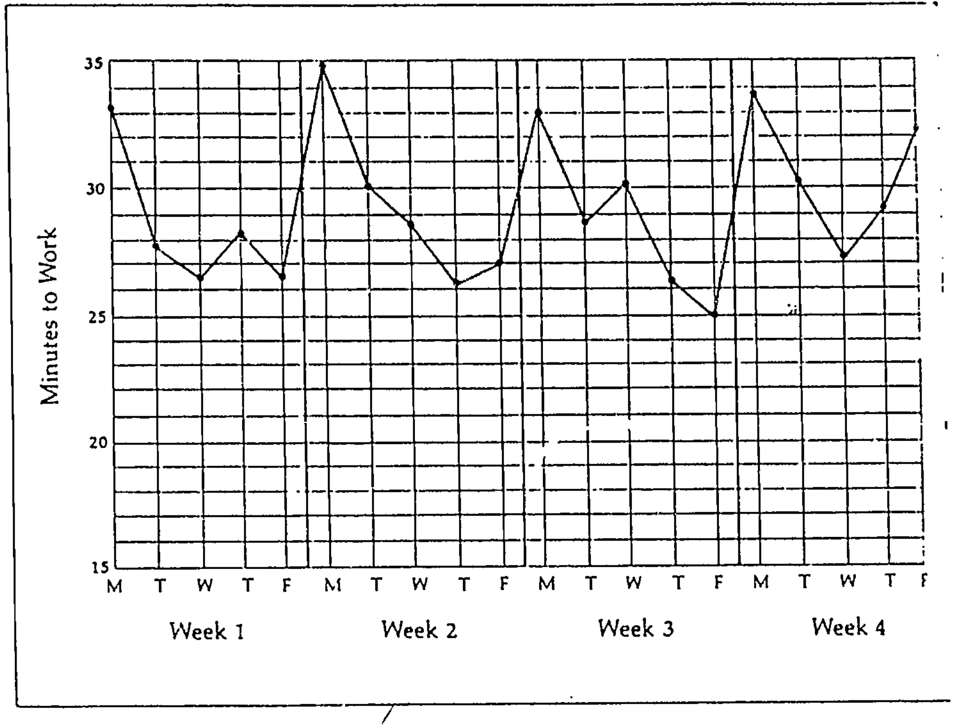
—GOAL, *Memory Jogger*

Run Charts

A run chart is perhaps the simplest of the statistical tools. Data are charted over a period of time to look for trends. Sales per month over a period of a year is a typical use.

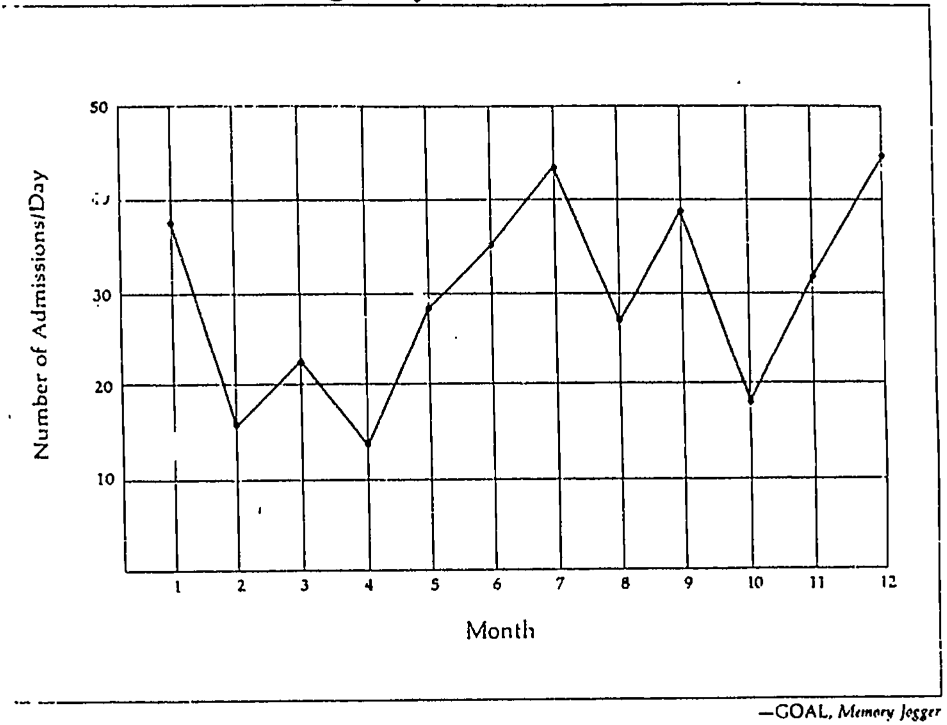
A run chart could be used to track the number of minutes it takes to get to work. You discover that it always takes longer on Monday, and accordingly you allow more time.

Run Chart: "Getting to Work on Time"



A hospital found that its emergency room was often either overstaffed or understaffed. It took the data it already had on emergency room cases and made a run chart. Admissions had been highest during January, July, September, and December. One might speculate that holidays and weather were a factor. The hospital decided it needed more information, investigating past years to see if the same pattern existed. It also used the run chart as a guide for conversations with the admissions staff.

Run Chart: "Emergency Room Admissions"[7]



—GOAL, *Memory Jogger*

Histograms

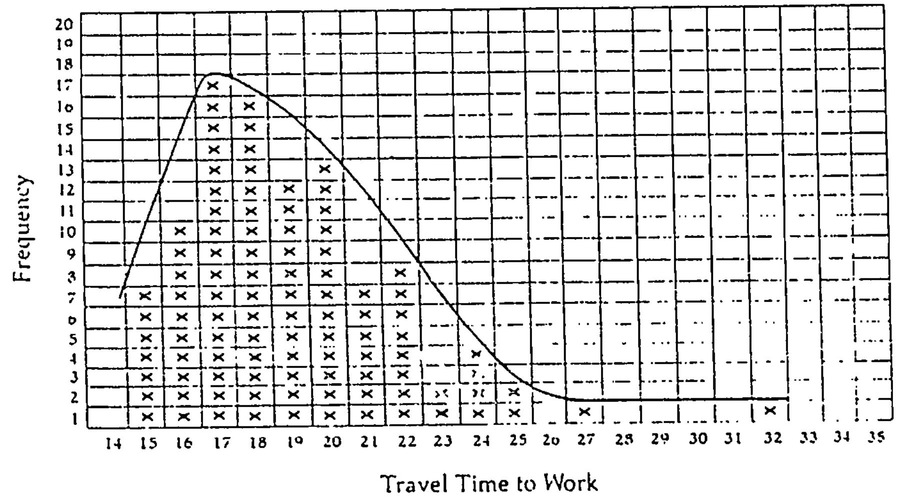
A histogram is used to measure how frequently something occurs. Suppose, for example, you are wondering just how much time you should allow for the drive to work. On good days you can make it in fifteen minutes. Every so often, you hit a traffic jam, and it takes forty-five minutes. What is "normal"? Clearly, not the average of the two. To find out, you might—if you're really committed to this project—collect data for, say, a hundred working days.

Hypothetical Commuting Times

15	16	20	15	18	17	20	18	17	19	23	20	21	21	16	15	17	21	17	17
18	16	22	25	17	16	19	19	18	17	25	18	16	17	17	16	15	22	20	17
16	15	18	17	17	16	19	18	19	20	24	27	17	19	22	16	18	21	20	24
18	22	22	18	17	18	19	17	21	24	18	15	19	20	23	22	19	18	17	21
32	22	18	20	21	19	20	24	16	17	18	20	22	20	20	19	18	15	19	20

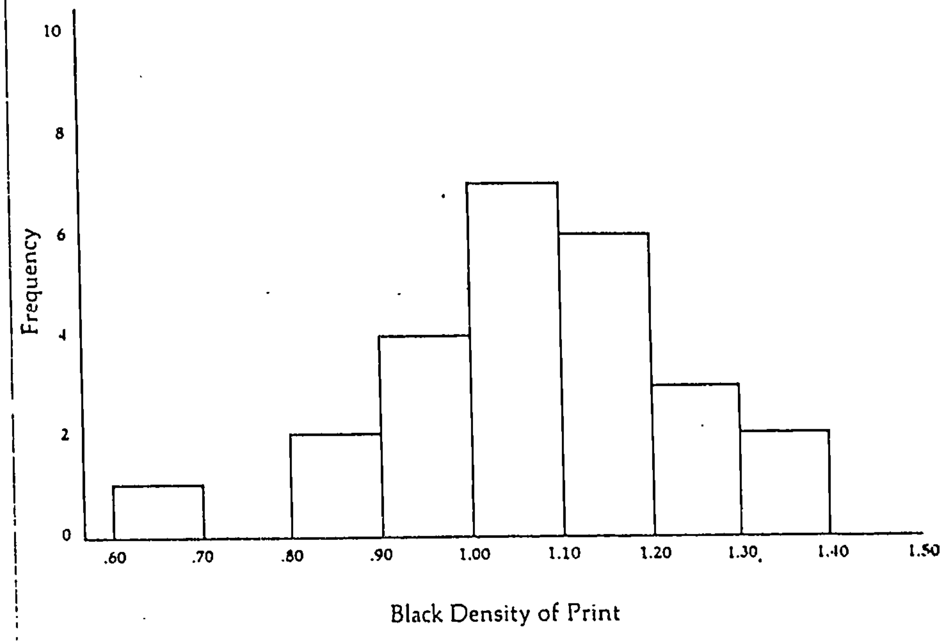
The data show that the longest trip was thirty-two minutes; the shortest, fifteen. All but two of the trips fell between fifteen and twenty-five minutes. On a histogram, there is a distinct curve.

Histogram: "How Long to Get to Work"



A print shop was receiving complaints about the quality of its finished product. Some customers thought the print wasn't dense enough. The shop measured the density over a period of time, then organized the results by frequency on a histogram to see where the bulk of the measurements fell.

Histogram: "Print Density"[8]



—GOAL, *Memory Jogger*

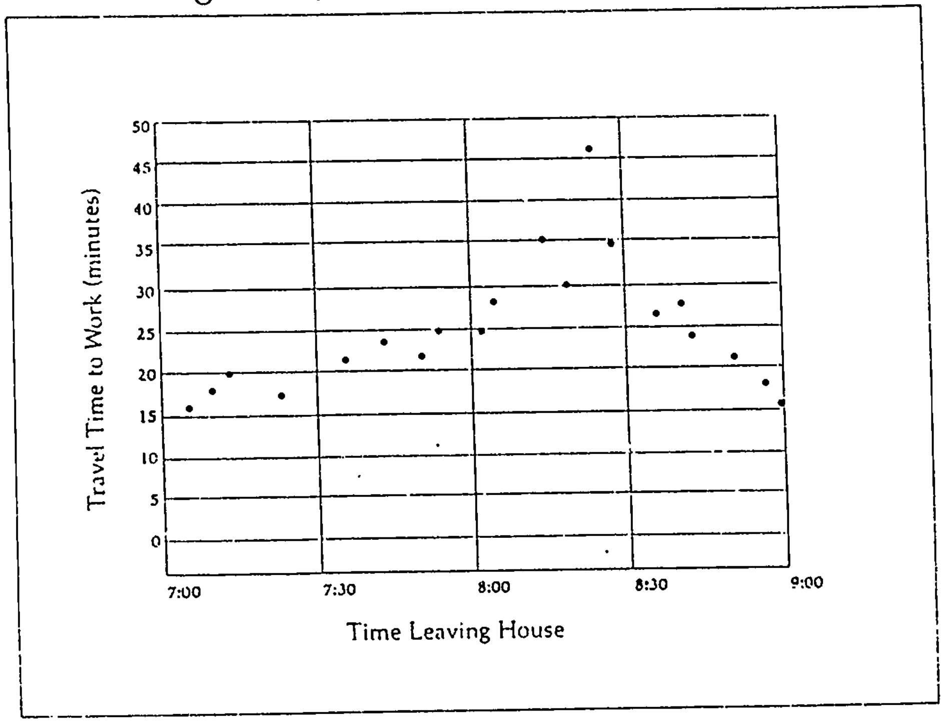
Scatter Diagrams

A scatter diagram is a method of charting the relationship between two variables.

Continuing our example, suppose your office has just instituted flextime. You may come to work anytime between 7:30 and 9:30 A.M. and leave eight and a half hours later. You would like to choose your hours to minimize drive time.

Over the next month, you leave the house at various times between 7 and 9 A.M. and record how long it takes you to get to work. On a scatter diagram, the two variables show a distinct relationship.

Scatter Diagram: "Drive Time"

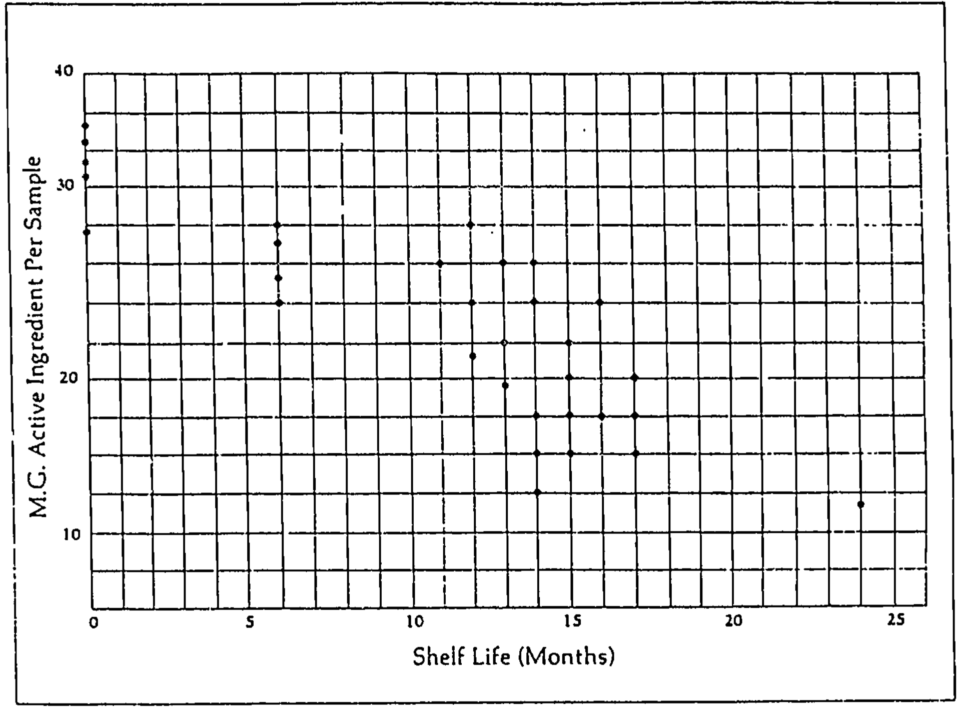


Leaving before 7:30 or after 8:30 greatly shortens the trip. You much prefer leaving later, and it eases competition for the bathroom. You tell your boss you will work from 9:30 A.M. to 6 P.M.

A manufacturer wanted to know whether there was a correlation between shelf life and the stability of his product. A scatter diagram showed that indeed there was.

In business, a scatter diagram might be used to chart the relationship between a worker's training and the number of defects, between moisture content and durability, between light levels and computer errors.

Scatter Diagram: "Active Ingredient Stability"[9]



—GOAL, *Memory Jogger*

Control Charts

Dr. Deming often talks about the need to use control charts to analyze processes. The purpose, he emphasizes, is "to stop people from chasing down causes." Properly understood, a control chart is a continuing guide to constant improvement. Control charts are easy to use and certainly not beyond the capabilities of most workers. But even experts, notes Dr. Deming, on occasion "find them extremely difficult to interpret."

Writes Dr. Deming on this subject, "The production worker requires only a knowledge of simple arithmetic to plot a chart. But he cannot by himself decide that he will use a chart on the job, and still less can he start a movement for use of charts.

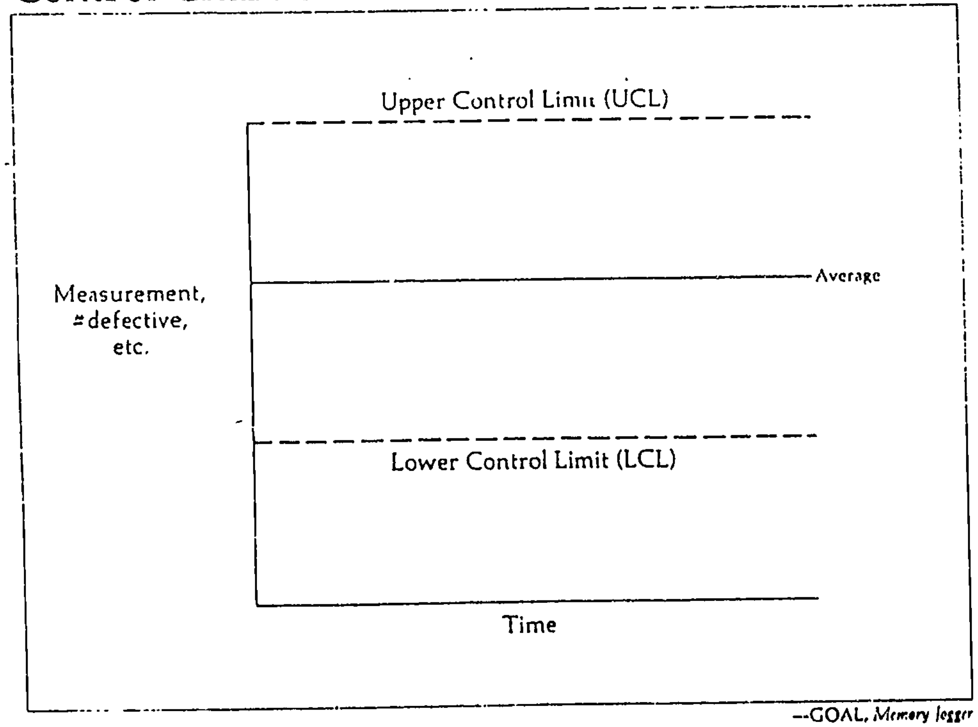
"It is the responsibility of management to teach the use of control charts on the job [ongoing] where they can be effective."

He sounds this cautionary note: "Proliferation of charts without purpose is to be avoided."[10]

The use of control charts generally goes by the name of Statistical Quality Control (SQC) or Statistical Process Control (SPC). Whole books have been devoted to the different kinds of control charts, knowing when and how to use them and how to interpret the results. Among useful texts are Ishikawa's *Guide to Quality Control* and *The Statistical Quality Control Handbook* published by AT&T.

A control chart is simply a run chart with statistically determined upper and lower limits drawn on either side of the process average. An example is shown below. These limits are not to be confused with specifications.

Control Chart Schematic[11]


Upper Control Limit (UCL)
Measurement, #defective, etc.
Average
Lower Control Limit (LCL)
Time

—GOAL, *Memory Jogger*

The upper and lower control limits are determined by allowing a process to run untouched and then analyzing the results using a mathematical formula. Every process has variation. The more finely tuned the process, the less deviation there is from the average.

There are two kinds of variation. The first is that which results from many small causes: minor variations in the worker's ability, the clarity of procedures, the capability of the machinery and equipment, and so forth. These are "common causes" and can often only be changed by management. The other form of variation is usually easier to eliminate. A machine malfunctions; an untrained worker is put on the job; defective material arrives from a vendor. Dr. Deming calls these "special causes." They show up on control charts as points outside the limits.

The formula for the control limits is designed to provide an economic balance between searching too often for special causes when there are none and not searching when a special cause may be found. A system can best be improved when special causes have been eliminated and it has been brought into statistical control. At that point, management can work effectively on the system, looking for ways to reduce variation.

Once a system is in control, control charts can be used for monitoring so as to immediately detect when something goes wrong—a "special cause." Line operators can record the data and take action—shutting down the line, if need be. A point need not be outside the limits to indicate action. Abrupt shifts or distinct trends within limits are also signals for investigation.

Control charts come in two broad varieties, to be used depending on the nature of the data. One is for data that can be measured: lengths, temperatures, volume, pressure, voltage. The other is for data that can be counted: defective components, typographical errors, mislabeled items.

Thinking about Writing and Communicating

Youv'e had some opportunities to think about your own thinking. Now let's delve into some of the thinking involved in writing and communicating. Keep in mind some of the thinking and environmental styles of taking in and communciating information as we do these exercises.

Article

Read the article in your group and discuss the following points----

1. Why was this article written?

2. What kind of thinking was involved in producing this article?

3. How would a writer have to visualize, put together information, gather information, anticipate what the reader need in order to produce this piece of writing÷

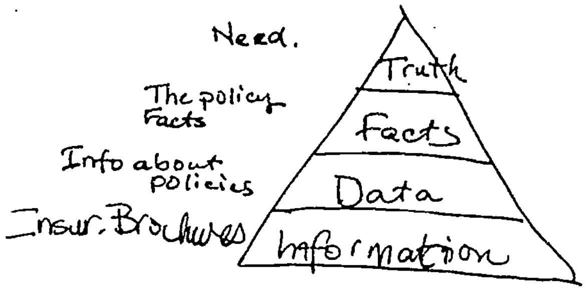
4. While you watched this situation happening, what questions would you need to ask yourself in order to write about it?

5. What would you need to talk with others about in order to write this article?

6. What would you need to consider in talking to others in order to write this article?

7. How would you approach these folks?

Round 1


Need.
Truth
The policy Facts
Facts
Info about policies
Data
Insur. Brochures
Information

What do you know

What can you guess

What did the writer assume or think you knew?

What is missing?

Round 2

Read article

What happened to cause someone to write the article - why would it be written

What thinking would go into ~~the~~ writing the article?

What would you have to think about, consider, visualize, anticipate

What would you have to ask yourself?

What would you need to talk to others about in order to write the article?

What would you consider in talking to others?

What and how would you ask people?

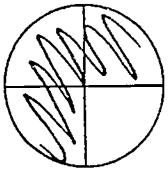
How would you approach them?

Proper Fractions

A proper fraction also stands for part of a whole. A proper fraction is written as one number above a second number.

- The top number is called the **numerator.** The numerator tells the number of parts you're describing.
- The bottom number is called the **denominator.** The denominator tells the number of equal parts the whole is divided into.

How much of the circle is shaded?



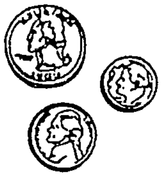
3 ← numerator
4 ← denominator

3 parts are shaded. The circle is divided into 4 equal parts.

What fraction of a dollar is shown below?

40 ← numerator
100 ← denominator

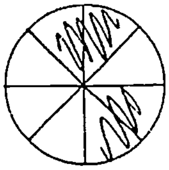
40 cents are shown. A dollar contains 100 cents.



Practice

On the line next to each figure, write a fraction to show how much of that figure is shaded.

X ← shaded parts
X ← total equal parts

1.

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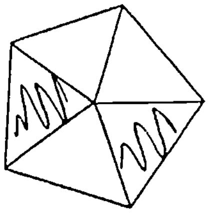
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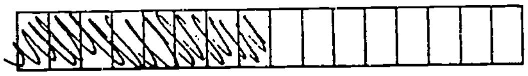
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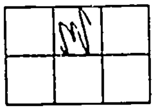
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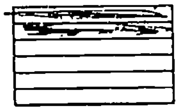
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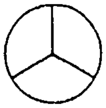
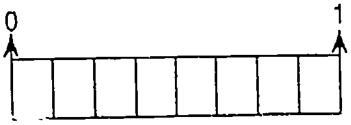
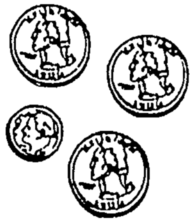
6. Shade $\frac{2}{3}$ of this circle:



7. Shade $\frac{7}{8}$ of the distance between 0 and 1:



8. What fraction of a dollar is shown at right?
(Remember: There are 100 cents in a dollar.)

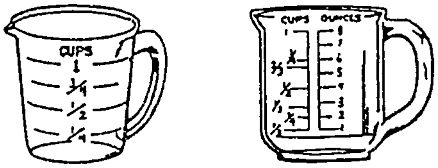


Writing Equivalent Fractions

The cups at right contain equal amounts of syrup.

- The cup on the left is divided into 4 equal measuring units.
- The cup on the right is divided into 8 equal measuring units.

$\frac{3}{4}$ and $\frac{6}{8}$ represent the same amount, and are called **equivalent fractions.**

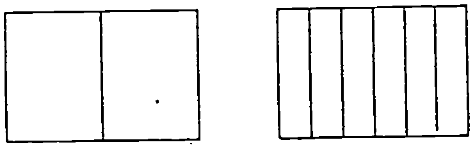


$\frac{3}{4}$ full = $\frac{6}{8}$ full

Practice

Write equivalent fractions for each pair of figures as indicated.

1. Fraction of each rectangle that's shaded

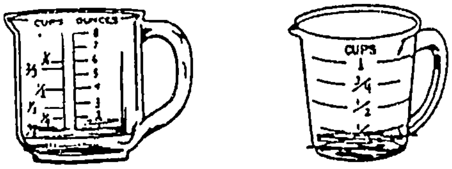


$\frac{1}{2} = \frac{}{6}$

2. Fraction of each pizza eaten

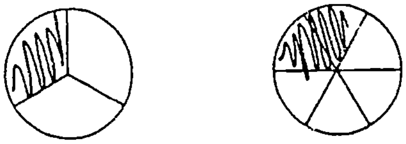
$\frac{}{} = \frac{}{8}$

3. Fraction of each cup filled with water



$\frac{}{} = \frac{}{}$

4. Fraction of each circle that's shaded

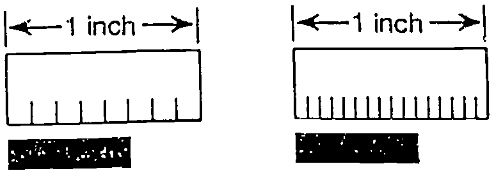


$\frac{}{} = \frac{}{}$

5. Fraction of each pizza remaining

$\frac{}{} = \frac{}{}$

6. Fraction of an inch that each bar measures



$\frac{}{} = \frac{}{}$

Simplifying Fractions

To **simplify (reduce)** a fraction is to rewrite it as an equivalent fraction with smaller numbers.

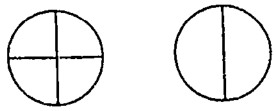
When a fraction is in its simplest form—smallest numbers possible—it is said to be **reduced to lowest terms.**

Examples: a) $\frac{2}{4} = \frac{1}{2}$

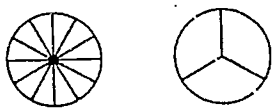
b) $\frac{8}{12} = \frac{2}{3}$

reduced to lowest terms

Equivalent Fractions



$\frac{2}{4}$ reduces to $\frac{1}{2}$.



$\frac{8}{12}$ reduces to $\frac{2}{3}$.

> To reduce a fraction to lowest terms, divide both numerator and denominator by the largest whole number that divides evenly into each.

Example 1: Reduce $\frac{6}{9}$ to lowest terms.

Divide both numerator (6) and denominator (9) by 3. $\frac{6 \div 3}{9 \div 3} = \frac{2}{3}$

Answer: $\frac{2}{3}$

> Sometimes you don't know the largest number you need to divide by. When this happens, you may need to divide twice or more. In Example 2 below, you could have saved a step by dividing by 4.

Example 2: Reduce $\frac{20}{32}$ to lowest terms.

Divide both 20 and 32 by 2. $\frac{20 \div 2}{32 \div 2} = \frac{10}{16}$ $\frac{10 \div 2}{16 \div 2} = \frac{5}{8}$

Divide again by 2.

Answer: $\frac{5}{8}$

▼ Practice

Reduce each fraction to lowest terms.

1. $\frac{4}{12} =$ $\frac{6}{8} =$ $\frac{4}{6} =$ $\frac{3}{9} =$ $\frac{12}{16} =$

2. $\frac{9}{15} =$ $\frac{14}{16} =$ $\frac{8}{32} =$ $\frac{10}{24} =$ $\frac{28}{64} =$

ON THE JOB

Using Equivalent Fractions for Sorting

Part of Ned's job at Value Hardware involves keeping supply bins organized. Ned must make sure that each bin holds the correct wood screws. The label on each bin gives the length of the screw size reduced to lowest terms.

Ned has 7 sizes of wood screws to place in the supply bins. Unfortunately, the manufacturing company gave the sizes only in 32nds of an inch.

By reducing each size to lowest terms, Ned determines where to place each size of wood screw.

Example: Ned first reduces Size A to lowest terms.

$$\frac{16}{32} = \frac{16 \div 2}{32 \div 2} = \frac{8}{16} \qquad \frac{8 \div 8}{16 \div 8} = \frac{1}{2} \text{ inch}$$

Then, Ned matches his answer with the labeled bins.

Answer: Size A goes in Bin #4 as shown below.
(Ned didn't see it, but he could have saved a step by first dividing by 16—$\frac{16 \div 16}{32 \div 16} = \frac{1}{2}$.)

▼ Practice

Write the size of the wood screw (A, B, and so on) on the line to the left of the correct bin. Size A has been done for you.

Wood Screws		Supply Bins
Size A: $\frac{16}{32}$ inch ($\frac{16}{32} = \frac{1}{2}$)	1. ______	BIN #1: $\frac{1}{8}$ inch
Size B: $\frac{12}{32}$ inch	2. ______	BIN #2: $\frac{1}{4}$ inch
Size C: $\frac{4}{32}$ inch	3. ______	BIN #3: $\frac{3}{8}$ inch
Size D: $\frac{28}{32}$ inch	4. __A__	BIN #4: $\frac{1}{2}$ inch
Size E: $\frac{24}{32}$ inch	5. ______	BIN #5: $\frac{5}{8}$ inch
Size F: $\frac{8}{32}$ inch	6. ______	BIN #6: $\frac{3}{4}$ inch
Size G: $\frac{20}{32}$ inch	7. ______	BIN #7: $\frac{7}{8}$ inch

Writing a Part as a Fraction of a Whole

Suppose you work in an arts and crafts shop where gold sequin twine sells for \$1.80 per foot. A customer comes in and would like to buy 8 inches of the twine. How can you figure out the cost?

You need to find out what fraction of a foot 8 inches equals.

Place the part $\longrightarrow$ $\frac{8}{12}$ (1 foot = 12 inches)
over the whole $\longrightarrow$
Reduce the fraction: $\frac{8}{12} = \frac{8 \div 4}{12 \div 4} = \frac{2}{3}$

- Eight inches is equal to $\frac{2}{3}$ of a foot. The twine would cost $\frac{2}{3}$ of \$1.80.

▼ Practice

A. Another customer buys the following items. As your first step in determining cost, write each length as a fraction of a foot or yard as indicated.

1 yard = 36 inches   1 foot = 12 inches

1. 9 inches of red felt = $\frac{9}{12}$ = ______________ foot
2. 6 inches of gold lamé = ______________ foot
3. 12 inches of silver braid = ______________ yard
4. 24 inches of vinyl backing = ______________ yard
5. 30 inches of corduroy = ______________ yard
6. 9 inches of striped ribbon = ______________ yard
7. 10 inches of sequin twine = ______________ foot

B. At the end of each week, you're supposed to write overtime minutes as a fraction of an hour. Do this for the overtime periods below. Be sure to reduce your answers to lowest terms.

1 hour = 60 minutes

Monday 15 minutes = __________ hour
Tuesday 20 minutes = __________ hour
Wednesday 45 minutes = __________ hour
Thursday 50 minutes = __________ hour
Friday 30 minutes = __________ hour

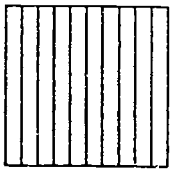
Writing Zero as a Place Holder

Although 0 has no value, it is used as a **place holder.**

- Placed between the decimal point and a digit, *zero changes the value of a decimal fraction.*

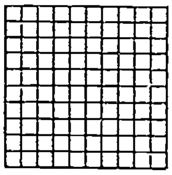
Example 1: .08 differs from .8 because of the 0 in the tenths place. The 0 *holds* the 8 in the hundredths place.

.8



is not the same as

.08



A zero that comes between the decimal point and the last nonzero digit is called a **necessary zero.** A necessary zero cannot be removed without changing the value of a number.

Examples of necessary zeros: .04 .506 .009

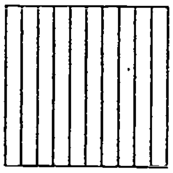
- Placed at the far right of a decimal fraction, a zero changes the way a fraction is read, *but does not change its value.*

Example 2: .80 and .8 differ in the way they are read and spoken aloud, yet they have the same value.

Read .80 as "eighty-hundredths."

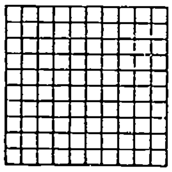
Read .8 as "eight-tenths."

.8



is the same as

.80



Because zeros at the far right do not change the value of a decimal fraction, these zeros are called **unnecessary zeros:**

Examples of unnecessary zeros: .20 .150 .800

▼ Practice

Underline each necessary zero. Cross out each unnecessary zero (.001, .1~~00~~).

1. .05 .106 .007 .30 .650 .800

2. .109 .048 .070 .050 .004 .097

When you multiply the following numbers on a calculator, the calculator does not display the right-hand zero. For each answer, circle the correct money value.

3. $.05 × 4 = .2 $.02 $.020 $.20 $2.00

4. $.25 × 2 = .5 $.50 $5.00 $.05 $.050

Writing Decimal Fractions

To write a decimal fraction, first identify the "th" word to decide **place value.**

- The place value gives the position of the right-hand digit of the decimal fraction.
- Write the number, and write 0s as place holders if needed.

Example: Write thirty-six thousandths as a decimal fraction.

The "th" word is thousandths.

Write 36 so that the 6 ends up in the thousandths place—the third place to the right of the decimal.

0 is written as a place holder.

.036

6 ends up in the thousandths place.

Answer: Thirty-six thousandths is written .036.

Practice

1. Bill took an order over the phone. The customer ordered pipe of various wall thicknesses. Write each quoted thickness on the Purchase Order at right.

"Type A, forty-eight thousandths of an inch."

"Type D, two-tenths of an inch."

"Type F, fifteen-thousandths of an inch."

"Type R, one hundred twenty-five thousandths of an inch."

"Type G, five-hundredths of an inch."

"Type M, four-tenths of an inch."

PURCHASE ORDER

ITEM TYPE	WALL THICKNESS	
Type A	.048	inch
Type D	______	inch
Type F	______	inch
Type R	______	inch
Type G	______	inch
Type M	______	inch

2. Reporting on a 100-meter race, the announcer told by how much each runner "just missed the world record." Write these times as decimal fractions on the form at right.

"Johnson, forty-seven thousandths of a second."

"Whiteside, three-tenths of a second."

"Morris, thirty-one hundredths of a second."

"Handly, one hundred nine thousandths of a second."

"George, seven-hundredths of a second."

Runner	Time off Record	
Johnson	______	sec.
Whiteside	______	sec.
Morris	______	sec.
Handly	______	sec.
George	______	sec.

Comparing Decimal Fractions

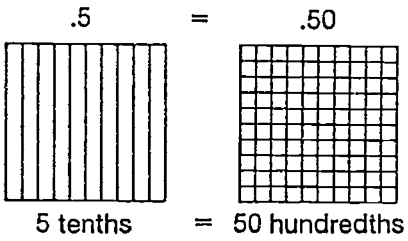
Decimal fractions are easy to compare when they have the same number of decimal places.

.75 is larger than .45 because 75 is larger than 45.

.013 is larger than .009 because 13 is larger than 9.

When decimals do not have the same number of places, add 0s until they do.

Remember, adding a 0 after the last digit of a decimal does not change its value.



Example: Which is larger, .06 or .039?

Step 1. Give .06 and .039 the same number of places.
Add 0 to .06: .06 = .060

Step 2. Compare .060 and .039.
.060 is larger than .039 because 60 is larger than 39.

Answer: .06 is larger than .039.

Place 0 at the end

.06 = .060

like this

not at the front.

.06 ≠ .006

not like this

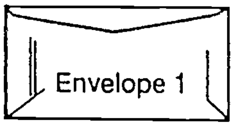
Practice

In each pair below, circle the larger decimal fraction.

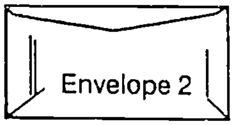
1. .9 or .7
2. .3 or .1
3. .5 or .8
4. .07 or .13
5. .50 or .05
6. .53 or .29
7. .125 or .087
8. .200 or .175
9. .450 or .625

10. As a jeweler, you sort gold wire threads by weight. Look at the weight given for each thread, and decide which envelope it belongs in. (First, add zeros so each decimal has three decimal places.)

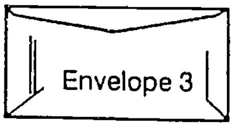
A. .35 oz. (.350) Envelope 2 (.350 is between .200 and .400)
B. .075 oz. Envelope ______
C. .48 oz. Envelope ______
D. .6 oz. Envelope ______
E. .102 oz. Envelope ______
F. .204 oz. Envelope ______



more than .400 ounces



between .200 and .400 ounces



less than .200 ounces

M&M's
Charting probability

This is a very easy and fun exercise in charting. With your eyes closed pick out one M&M from a jar and have a recorder write down on a tally sheet what color you choose. After you have chosen 30 or more, graph the number of M&M's picked of each color.

Now that you've charted the number of M&M's in each color category, find the ratio of yellow, red, brown, light brown,and green to the total number you charted. What percentage of each color is in a pack?

What conclusions can you draw from this activity?

How many do you suppose you need to get an accurate sampling?

What thinking skills were involved in this activity?

When do you use these particular thinking skills on the job?

How Do Graphs and Data Play a Part in *Your* Life?

"Data" simply refers to a collection of numbers. A graph is just a picture of those numbers that usually makes the numbers easier to understand. Answer the following questions to learn more about the data and graphs in your day-to-day life.

Think about where you usually see graphs and charts. Give two or three reasons why these formats might be used instead of just words.

____

____

____

____

____

Open a newspaper or magazine and find a graph or chart. What is the title of the graph or chart? ____________________

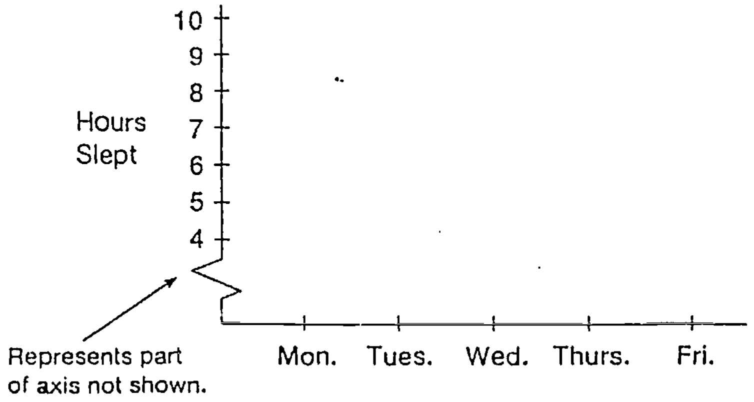
What values does the graph or chart show (time, years, percents, etc.)? ____________________

Why do you think the graph or chart is used there? __________

____

Take a few minutes and try constructing a graph of your own.

1. Plot a point above each day listed on the graph. Each point should show how many hours you slept each night last week.
2. Connect all the data points with a line.



Now take some time to think about the information you have graphed. Can you draw any interesting conclusions?

Skills You Will Learn

Data Analysis Skills

- interpolating
- extrapolating
- computing the mean
- determining the median
- computing a ratio

Reading Graphs

- reading tables
- reading a bar graph
- reading a line graph
- reading a circle graph

Life and Workplace Skills

- choosing clothes from a catalog
- bar graphs in business
- using a line graph at home
- thinking about a family budget
- drawing a bar graph

Thinking Skills

- using more than one data source
- drawing conclusions from data
- constructing graphs

Numerical Data

Data analysis is the study and use of **numerical data.**

- Numerical data is a group (often called a **set**) of numbers (called **data points**) that are related in some way.

Example 1: the set of numbers that stand for the ages of all the students in a math class

The table at right consists of a set of six data points.

Data Points

Men	Women
23 years	19 years
34 years	29 years
57 years	43 years

Data analysis is used in home life, schools, businesses, and government agencies. You use data analysis yourself when you count the change in your pocket to see how much you can spend for lunch.

Interpolation

Sometimes you want information not specifically given by data points. However, the number you want may fall *between* two given data points.

When this happens, you **interpolate.**

- To interpolate is to *estimate* the value of a data point that lies between two known data points.

Example 2: Referring to the table at right, determine the *approximate* temperature at 3:30 P.M. on Monday.

To estimate the 3:30 temperature, notice that 3:30 lies halfway between 3:00 and 4:00. Ask yourself, "What temperature lies halfway between 92° F and 88° F?"

The answer, 90° F, is your *best estimate* of the 3:30 temperature.

Answer: estimate—90° F.

Monday Afternoon Temperatures

1:00	2:00	3:00	4:00	5:00
93° F	95° F	92° F	88° F	84° F

Interpolation is used to estimate a data point that lies within the **range** of your given data points.

- The range consists of the beginning and ending values that make up your data.

In Example 2, the range is from 84°–95° Monday afternoon.

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ON THE JOB

Choosing Clothes from a Catalog

Elsie Busby is a salesclerk in the catalog department of Joan's Clothes for Women. Part of Elsie's job is to help customers choose clothes that fit comfortably.

To order the correct size, Elsie compares a woman's measurements with the listed catalog sizes shown below. However, experience has taught Elsie that women tend to have measurements that are not exactly those listed. For best fit, Elsie always recommends a size in which no single measurement is too small—even if one or more measurements are slightly large. Elsie knows that it is the tight-fitting clothes that get returned!

Women's Regular—fits 5'4" to 5'7"

	X-Small	Small		Medium		Large		X-Large
Sizes →	4	6	8	10	12	14	16	18
bust	32	33	34	35	36	38	40	42
waist	24	25	26	27	28	30	32	34
hips	35	36	37	38	39	41	43	45
sleeve	28	29	29	30	30	31	31	32

Women's Petite—fits 4'11" to 5'3"

	X-Small	Small		Medium		Large
Sizes →	4	6	8	10	12	14
bust	32	33	34	35	36	38
waist	24	25	26	27	28	30
hips	35	36	37	38	39	41
sleeve	26	27	28	28	29	29

▼ Practice

Use the tables above to help you answer the questions.

1. Jennie, who is 5'6" tall, wants to order a dress.
   a) Should she order petite or regular?__________
   b) Given Jennie's measurements at right, what size would Elsie recommend?__________
2. Sandi, who is 5'3$\frac{1}{2}$" tall, is also ordering a dress. What size would Elsie recommend? (Choose the size and whether Sandi should order petite or regular.)______________

Jennie	Sandi
Bust: 36	Bust: 36
Waist: 29 $\frac{1}{2}$	Waist: 27 $\frac{1}{2}$
Hips: 41	Hips: 38
Sleeve: 31	Sleeve: 29 $\frac{1}{2}$

The Language of Data Analysis

Three words that are often used in data analysis are *mean, median,* and *ratio.* We'll discuss the definition and use of each word on these next three pages.

Mean

Mean is another word for **average.** You may already know the two steps used to find the average of a set of numbers:

- First, compute the sum of the set.
- Second, divide this sum by the number of numbers in the set.

Example: Find the mean (average) of the following amounts: \$74.50, \$68.90, \$71.35, \$77.85

Step 1. Compute the sum of the set.

$$\begin{array}{r} \$74.50 \\ 68.90 \\ 71.35 \\ +\ 77.85 \\ \hline \$292.60 \end{array}$$

Step 2. Divide this sum by 4.

$$\begin{array}{r} \$\ 73.15 \\ 4\overline{)\$292.60} \\ -\ 28 \\ \hline 12 \\ -\ 12 \\ \hline 0\ 6 \\ -\ 4 \\ \hline 20 \\ -\ 20 \\ \hline \end{array}$$

numbers in the set

Answer: \$73.15

▼ Practice

A. You are working as a nurse's aide in a hospital. You've been asked to solve the following problems.

1. Find and record the average temperature of each patient during the 3-hour period listed on the chart below. Round your answers to the nearest tenth.
2. Estimate what Stacey's temperature was at 11:30 A.M.

   ____
3. Estimate what Bill's temperature will most likely be at 1:00 P.M. Assume his temperature continues to decrease at the same rate it has been decreasing. ________

Temperature Chart

Name	9:00 A.M.	10:00 A.M.	11:00 A.M.	12:00 Noon	Average (nearest .1° F)
Frank	101.6° F	102.8° F	103.4° F	102.0° F	________
Janessa	99.7° F	100.2° F	101.5° F	101.4° F	________
Stacey	102.9° F	103.1° F	102.4° F	100.6° F	________
Bill	104.4° F	103.2° F	102.0° F	100.8° F	________

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Median

The **median** of a set of numbers is the middle value.

- If a set contains an odd number of numbers, the median is the middle number.
- If a set contains an even number of numbers, the median is the average of the two middle numbers.

Example 1: Find the median of the following amounts:
$1.25, $1.10, $1.38, $1.19, $1.63

Step 1. Arrange the numbers in order, with the smallest number first.

Step 2. Since there is an odd number (5) of numbers, the median is the middle number.

$1.10
$1.19
$1.25 ← middle number = median
$1.38
$1.63

Answer: median = $1.25

Example 2: What is the median of the following weights:
12 lb., 9 lb., 11 lb., 8 lb.

Step 1. Arrange the numbers in order, with the smallest number first.

Step 2. Since there is an even number (4) of numbers, the median is the average of the two middle numbers.

8, 9, 11, 12

Median is the average of the two middle numbers.
9 + 11 = 20
20 ÷ 2 = 10 ← median

Answer: median = 10 lb.

Practice

B. You are working as a teacher's aide in a 7th-grade class. You've been asked to solve the following problems.

1. Find the median test score for the group of 4 or 5 students who took each test indicated below.
2. a) For comparison, compute the average score of the math test.

   b) Does this answer tell you why the teacher would rather know the median than the average?

Name	Math	Science	Social Studies	English
Lola	28	32	38	
Fran	30		41	37
Jess	29	31	40	38
Arnie	32	38	39	41
Louise	50	48	45	47
MEDIAN				

Ratio

A **ratio** is a comparison of two numbers. For example the ratio of *women to men* on the list at right is 4 to 3.

Class List	
Women	Men
Joyce	Alan
Mary	Ben
Alicia	Abe
Lucina	

A ratio can be written in symbols in two ways:

- With a colon, the ratio 4 to 3 is written 4:3.
- As a fraction, the ratio 4 to 3 is written $\frac{4}{3}$.

In words, a ratio is always read with the word *to*. The ratios 4:3 and $\frac{4}{3}$ are both read as "4 to 3."

When you write a ratio, write the numbers in the same order as asked for in the question.

- Although the ratio of women to men is 4 to 3, the ratio of *men to women* is 3 to 4 (3:4 or $\frac{3}{4}$).

▼ MATH TIP

A ratio is usually reduced to lowest terms. However, a ratio that is an improper fraction like $\frac{4}{3}$ is not changed to a mixed number.

Example: A new car gets 24 miles per gallon during city driving and 36 miles per gallon during highway driving. What is the ratio of highway mileage to city mileage?

Step 1. Write highway mileage as the numerator of the ratio fraction because it is mentioned first in the question.

$$\frac{36}{24} = \frac{\text{highway mileage}}{\text{city mileage}}$$

Step 2. Reduce the ratio fraction $\frac{36}{24}$.

$$\frac{36 \div 12}{24 \div 12} = \frac{3}{2}$$

Answer: 3:2 or $\frac{3}{2}$

▼ Practice

C. You are working at Friendly Shoe Store. Your supervisor asks you to solve the following problems.

1. Compute the profit made on each model of running shoe.
2. Compute the average profit of the 5 models listed.
3. Determine the median profit of the 5 models listed.
4. Determine the ratio of the selling price of model A to that of model B.
5. Determine the ratio of the profit of model B to that of model E.
6. Determine the ratio of the profit of the most profitable shoe to that of the least profitable shoe.

Running Shoes

Model	Selling Price (a)	Store's Cost (b)	Profit (a − b)
A	\$60.00	\$40.00	______
B	\$52.00	\$36.00	______
C	\$48.00	\$34.00	______
D	\$40.00	\$25.00	______
E	\$30.00	\$18.00	______

How Do Graphs and Data Play a Part in *Your* Life?

"Data" simply refers to a collection of numbers. A graph is just a picture of those numbers that usually makes the numbers easier to understand. Answer the following questions to learn more about the data and graphs in your day-to-day life.

Think about where you usually see graphs and charts. Give two or three reasons why these formats might be used instead of just words.

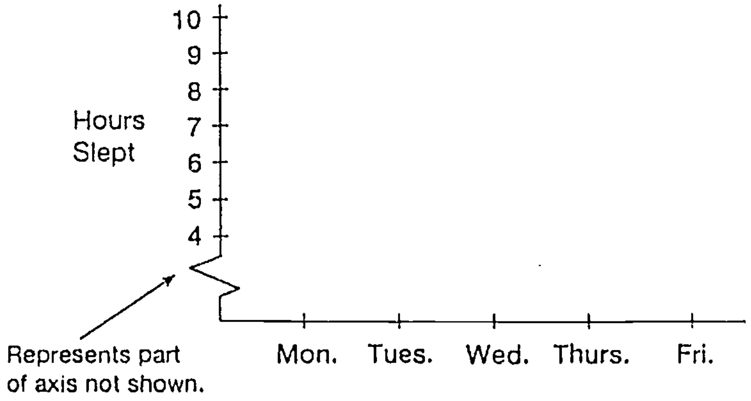
Open a newspaper or magazine and find a graph or chart. What is the title of the graph or chart?

What values does the graph or chart show (time, years, percents, etc.)?

Why do you think the graph or chart is used there?

Take a few minutes and try constructing a graph of your own.

1. Plot a point above each day listed on the graph. Each point should show how many hours you slept each night last week.
2. Connect all the data points with a line.



Now take some time to think about the information you have graphed. Can you draw any interesting conclusions?

Skills You Will Learn

Data Analysis Skills

- interpolating
- extrapolating
- computing the mean
- determining the median
- computing a ratio

Reading Graphs

- reading tables
- reading a bar graph
- reading a line graph
- reading a circle graph

Life and Workplace Skills

- choosing clothes from a catalog
- bar graphs in business
- using a line graph at home
- thinking about a family budget
- drawing a bar graph

Thinking Skills

- using more than one data source
- drawing conclusions from data
- constructing graphs

Numerical Data

Data analysis is the study and use of **numerical data.**

- Numerical data is a group (often called a **set**) of numbers (called **data points**) that are related in some way.

Example 1: the set of numbers that stand for the ages of all the students in a math class

The table at right consists of a set of six data points.

Data Points

Men	Women
23 years	19 years
34 years	29 years
57 years	43 years

Data analysis is used in home life, schools, businesses, and government agencies. You use data analysis yourself when you count the change in your pocket to see how much you can spend for lunch.

Interpolation

Sometimes you want information not specifically given by data points. However, the number you want may fall *between* two given data points.

When this happens, you **interpolate.**

- To interpolate is to *estimate* the value of a data point that lies between two known data points.

Example 2: Referring to the table at right, determine the *approximate* temperature at 3:30 P.M. on Monday.

Monday Afternoon Temperatures

1:00	2:00	3:00	4:00	5:00
93° F	95° F	92° F	88° F	84° F

To estimate the 3:30 temperature, notice that 3:30 lies halfway between 3:00 and 4:00. Ask yourself, "What temperature lies halfway between 92° F and 88° F?"

The answer, 90° F, is your *best estimate* of the 3:30 temperature.

Answer: estimate—90° F.

Interpolation is used to estimate a data point that lies within the **range** of your given data points.

- The range consists of the beginning and ending values that make up your data.

In Example 2, the range is from 84°–95° Monday afternoon.

Extrapolation

Sometimes you may want to know a number that falls *outside* the range of your given data points.

When this happens, you **extrapolate**.

- To extrapolate is to *estimate* the value of a data point that lies outside the range of your given data.

Example 3: Refer again to the table in Example 2. What is the approximate temperature at 6:00 P.M. on Monday?

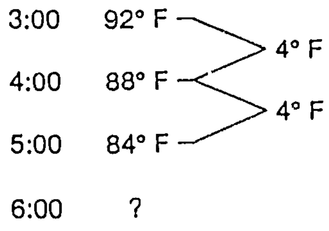
To estimate the 6:00 temperature, look at the temperature pattern during the time from 3:00–5:00. As shown at right, *the pattern is a decrease of 4° F each hour.*

Ask yourself, "If this pattern continues, what will be the temperature at 6:00 P.M.?" To find out, subtract 4° F from 84° F.

The answer, 80° F, is your *best estimate* of the 6:00 temperature.

Answer: estimate—80° F

Finding the Pattern



▼ Practice

Problems 1–4 refer to Table 1 at right.

1. What is the most desirable weight for a 5'8" man of average build? ________
2. Using interpolation, determine the most desirable weight for a 6'1" man of small build. ________
3. What is the height range for men for which data points are given? ____' ____" to ____' ____"
4. Using extrapolation, determine the most desirable weight for a 6'4" man of average build. ________

TABLE 1

Desirable Weight for Men
(pounds, without clothing)

Height	Small Build	Average Build	Large Build
5'4"	122	133	145
5'6"	130	142	155
5'8"	139	151	166
5'10"	147	159	174
6'	154	167	183
6'2"	162	175	192
6'4"	170		

Problems 5–8 refer to Table 2 at right.

5. What is the most desirable weight for a 5'6" woman of large build? ________
6. Using interpolation, determine the most desirable weight for a 5'1" woman of average build. ________
7. What is the height range for women for which data points are given? ____' ____" to ____' ____"
8. Using extrapolation, determine the most desirable weight for a 6'2" woman of large build. ________

TABLE 2

Desirable Weight for Women
(pounds, without clothing)

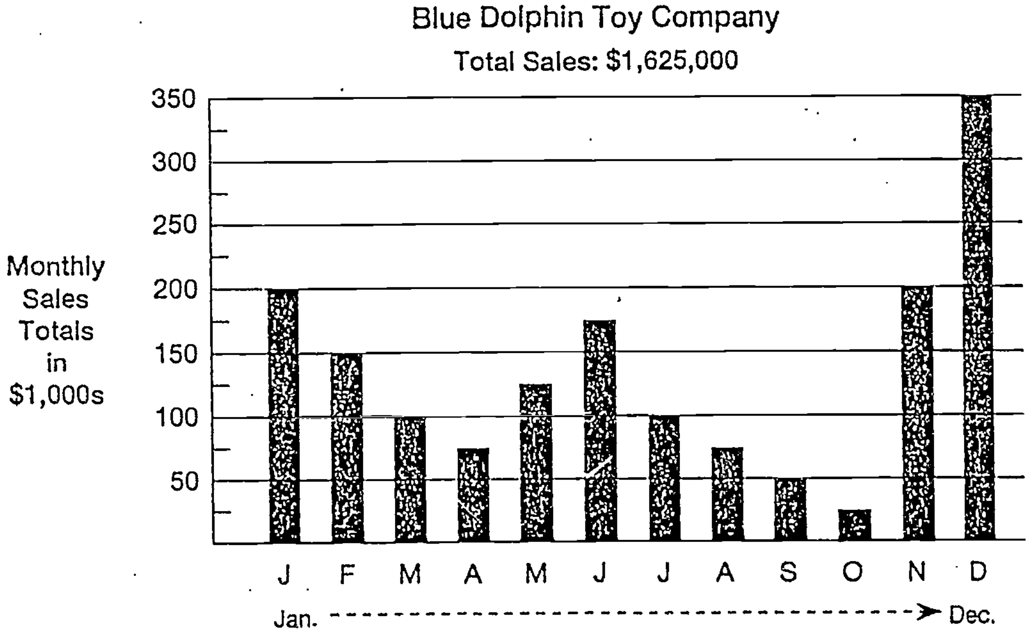
Height	Small Build	Average Build	Large Build
5'	100	109	118
5'2"	107	115	125
5'4"	113	122	132
5'6"	120	129	139
5'8"	126	136	146
5'10"	133	144	156
6'	141	152	166

ON THE JOB

Bar Graphs in Business

Imagine that you work in an office at Blue Dolphin Toy Company. At the end of each year, you take the monthly sales figures for the year and construct a bar graph. You then give the graph to your boss, who's very interested in the overall sales picture.

Here is the graph you constructed to show last year's sales.



Practice

Use the graph to help you answer the questions.

1. To the *nearest $1,000*, what is the *mean* monthly sales amount? ____________
   Hint: Mean monthly sales = total sales ÷ 12.
2. What are the monthly sales totals for the best and the worst months?
   Best month: ____________ **Worst month:** ____________
3. To the *nearest $1,000*, what is the *mean* monthly sales amount during the 3-month Christmas season of November, December, and January? ____________
4. What two months are the peak sales months for the two main sales seasons?
   Christmas Season: ____________ **Summer Season:** ____________
5. What is the *ratio* of December sales to June sales? ____________
6. What is the *median* monthly sales amount for the entire year? ____________

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DEFINING WORDS IN CONTEXT AND HAVING FUN DOING IT!

In the following sentences, define the words that are written in **boldface** using the clues surrounding that word.

1. The angry woman walked up to the customer service desk and **animadverted** her displeasure at the man behind the counter. She demanded a refund on a recently purchased coat.

2. After living in the South for years, Ann and John love taking trips up to such **boreal** regions like Canada, Alaska, and the Yukon for a change of pace.

3. The rumors around the office were so bad that the boss had to **convoke** a meeting with all the workers to clear the air.

4. The diamond Jerry bought Sandy had such a **effiugence** that she shown it under the light every opportunity she could.

Page 107: The codes, ciphers, cryptograms

L LATSST IN IESR OH ECAR A EKIL SIEMO HT ASU INEGA.

Answer: A GENIUS AT HOME IS LIKE A RACE HORSE IN ITS STALL.
This code is deciphered by simply reversing the order of letters in the entire sentence while keeping the original word spacing. What was your first insight into the solution? Was it EKIL, which is the only word in the code that has the same spacing as its reversal and which looks like LIKE spelled backward?

19–26–5–22 2–12–6 4–9–18–7–7–22–13
18–13 7–19–22 14–26–9–20–18–13–8 2–22–7?

The answer is: HAVE YOU WRITTEN IN THE MARGINS YET?

Here are some typical insights into solving this puzzle. You know that there are 26 letters in the alphabet, and you notice that no number above exceeds 26, so you're pretty sure that the letters they represent are in some kind of alphabetical order. But starting where? Your first guess is A = 1, B = 2, and so forth, but that doesn't seem to work out. Your next guess would probably be: A = 26, B = 25, C = 24, and so on down to Z = 1, and that's true. Another clue: Guessing at the common word "the." 2–12–6 is a three-letter word, but you can't get "the" out of it. But look: 7–19–22 is rich with meaning. If you assign "T = 7, H = 19, E = 22," then in 4–9–18–7–7–22–13, you immediately get: 4–9–18–TTE–13, which would make 13 a good bet to be N, D, or R; and the last word would immediately be 22–ET? So 22 narrows down to L, M, N, P, S, Y, G, or B, and possibly J or V. The question mark is also a good clue for the first word in the sentence, but you won't always be lucky enough to be handed punctuation in a cryptogram.

VS ABG, JUL ABG?

Answer: IF NOT, WHY NOT?
Here the question mark is of great help, narrowing down the choice of the first word in the code to 2-letter interroga-

15. Number Games

Numbers are good objects for inventive manipulation and combination—especially if you are not a numbers expert. For one thing, you can check whether you're right; with ideas, that's not so easy.

What is the lowest number that is a multiple of every number up to 10?
Ans: 2,520

How many ways are there of getting a sum of 12 by adding two or more numbers together?
Ans: 73

How many numbers can be divided into 462 without a remainder?
Ans: 16

Using only standard arithmetic signs, and using the number 17 four times, write an expression that equals 3.

Ans: $\frac{(17 + 17 + 17)}{3} = 17$

(how about an expression that equals 1? 2? 100?)

Of course, these little exercises should not be so hard that they require special mathematical training. Take a look at these examples—are there easy ways to get the answers? Invent other puzzles. Or just play with numbers. This little group

16
61

has a nice, square, sensible look to it—but take it apart, and the two numbers 16 and 61 have nothing in common except their digits . . . and 161 has nothing in common with either one of them. You can tease your imagination with numbers as well as with letters.

BRAIN BUILDER #134

UNDERSTAND BY EXPLAINING.

In order to comprehend something better, try explaining it to somebody else. Make certain it's something that you already understand well, but you'll find that formulating an explanation of the subject for someone else's comprehension will make you comprehend your subject even better. Skip no logical steps in your explanation. Once you are forced to put your comprehension to work, and in proper order, any gaps in it will be obvious, both to you and to your listener. In fact, his questions will be signpoints to increasing your understanding!

Exercise: You think you understand basic mathematics? Try explaining multiplication to a child.

Asking Questions Is a Powerful Tool

Now we come to one of the most important factors in the building of comprehension—the asking of questions. Believe it or not, this is in itself an art as well as a powerful tool used to increase your understanding and expand your intellect.

BRAIN BUILDER #136

QUESTION FOR INFORMATION.

Never ask questions in order to expose flaws in another's arguments. In our culture, asking questions is frequently perceived negatively, and for very good reasons. Questioning is often an effort to tear down, an effort that, by the way, usually proves fruitless. People simply won't allow their beliefs, correct or incorrect, to be torn apart by others. Why this should be so if the beliefs are incorrect is a matter apart. But understand that you will have little success in exposing others' mistaken beliefs by questioning them. Likewise, and much more importantly, others will have little success tearing yours apart; in this latter scenario, you are very much the loser. Before others question your longheld beliefs, question them yourself.

The only fruitful role of the questioner is a constructive one. Rather than tear down another's beliefs with your questions, therefore, learn to build your own on a foundation of logic and reason, through continual self-questioning.

Exercise: Listen to the questions at a presidential press conference to see which of them are asked for information and which are asked in order to convey a critical message to the listening audience or readership.

BRAIN BUILDER #130

USE A MULTISENSORY APPROACH TO LEARNING.

If you find a subject difficult, or if you want to learn it especially well, use a multisensory approach wherever possible, even if you have to invent it. Bring as many of your senses to bear on the problem as you can. Read the words—as in a book—at the same time that you *listen* to the words—as with an audio cassette—and "*watch*" the words—as with an instructor. The more of your senses you use, the easier it will be to both comprehend and remember. *Speaking* the words out loud provides an additional useful dimension, and, in the case of youngsters in particular, *touching* is also of great help; it is useful to adults as well as children. Reading the manual for your new word-processing program is nothing compared to putting your fingers on the keys and tapping out the commands—a literal "hands-on" approach.

Viewpoints

To help you be more flexible in your interpretations, practice considering situations from several alternative points of view. Imagine the following scenarios, and put yourself in other people's shoes.

☐ Your teenage son has just told you that he has a drug problem. Consider the situation from the viewpoint of the son. The parents. The boy's best friend. His teacher. His younger sister. His drug supplier.

☐ A single mother who shop lifts in order to make ends meet is caught trying to steal a diamond necklace. Consider the situation from the viewpoint of the mother. Of the police officer. Of the department store owner. Of the mother's grade-school son. What would the situation be like if she were caught stealing a loaf of bread? Pick-pocketing a wallet?

☐ A union goes on strike. Consider the situation from the viewpoint of the union leader. Of lower level management. Of the owner of the company. Of the workers who cross the picket line.

☐ You see a group of Hari Krishnas singing and dancing on your town's main street. How do feel about what you see? What would a junior member feel about it from the inside? How would the parent of one of the new members feel? What about the organizer?

☐ You see someone toss a candy-bar wrapper on a sidewalk. Consider the situation from the point of view of the litterer. of a street cleaner. (If people didn't litter. would the cleaner be out of a job?) Of a store owner. Of the candy-bar manufacturer.

☐ You see an elderly person struggling to get into a bus. Look at the situation from the point of view of the bus driver. Of the elderly person. Of a young person in a rush who is behind the elderly person.

#34: WHAT'S GOOD ABOUT IT?

Most people, when they experience a serious disappointment or setback, or a situation which might "normally" and habitually be treated as a disaster, lapse into a very noncreative state of mind that sometimes lasts for several weeks or even months. The stages a person goes through when confronted with a grave problem consist of, first, denial or distortion of the true nature of the problem; second, anger-resentment directed toward those who allegedly caused the problem, and, finally, depression, which usually paralyzes thinking processes for a shorter or longer period.

Sidney X. Shore has come up with a seemingly simple but very effective method of short-circuiting the incapacitating period that follows a difficult situation. It consists of writing out all the things that are *good* about the difficult problem. This is not espousing a pollyanna attitude, for the efficacy and validity of this method has been proven in numerous creativity seminars.

The Mental Movie

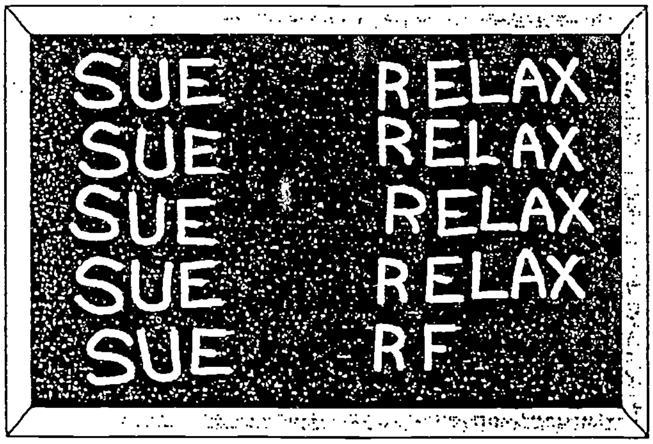
"We are what we imagine ourselves to be."
KURT VONNEGUT, JR., *novelist*

Virtually every moment, most of us experience a steady stream of pictures, sounds, and sensations passing through our mind. This stream of images creates a series of mental movies — thrillers, comedies, horror, love stories — that are complete with commercials, trailers, and advertisments. Because there is a strong link between mental pictures and feelings, negative images affect our moods and interfere with our attention. With deliberate visualization, however, it's possible to alter these images and thereby swing our feelings.

Here are some techniques to apply your visualization skills to life.

- GOAL VISUALIZATION: Form a mental picture of yourself doing or having something that you want to have or want to do. You could picture yourself walking in a new pair of shoes, or working at a new job, or eating dinner at your favorite restaurant. In this visualization. three things are important: first, include details by engaging all of your senses; second, imagine yourself *enjoying* the scenario you wish for youself; and third, picture the scene happening on a specific date. By encouraging you to focus on your objectives, this visualization helps you stir up your motivation. Start with small, easy-to-reach goals, and work up to larger, more encompassing goals.
- PERSONAL PERFORMANCE: If you are going to give a presentation — in a sales meeting, in a speech, or in an interview — picture a range of possible scenarios. Begin with an ideal outcome. Imagine you're performing in top shape with things happening exactly as you want them to. Then picture a mediocre outcome, with things happening close to the ideal, but not quite. Then visualize the worst possible outcome, with you stumbling over yourself. In the process of rehearsing these scenarios, you prepare yourself for mishaps and problems. Then, once you have worked through the possibilities, focus on the ideal images. Allow yourself to perform marvelously.

- RELAXATION AND STRESS MANAGEMENT: Take some time to recall pleasant memories. Relax your body as fully as possible, and let your memories float freely through your mind. Touch lightly on great heartfelt memories: green valleys, close friends, early childhood experiences, your old room, your first friend, walking to school in the sun, snow or rain, waking up refreshed and looking forward to the rest of the day.
- INNER MASSAGE: Visualize a blackboard. In the upper left hand corner, watch the letters of your name appear slowly, one at a time. Then, in the upper right hand corner of the blackboard, watch the letters of the word "relax" appear one at a time. Pause for a moment, and look at the words. Then, one line down, watch the word appear again, just as slowly.



- CALMING THE EMOTIONS: Swami Dyananda Sariswata, a Sanskrit teacher, has an interesting application for mental imagery. To help let go of the inner agitation associated with a troubling situation, focus on the positive. For example, if you are angry at your boss, visualize your boss doing something you like. Recall a time when she did something you approved of. Keep looking for the positive. Then, when you start feeling good about your boss, and thinking that she is not that bad, picture the situation that made you angry, *but in the light of the positive feeling.* Be willing to *accept* your boss as she is. Though you may not *approve* of all of her actions, don't feel compelled to change her or to mentally mar her. Apply this technique to domestic quarrels.

29. Names

Playing with names is fun. Here is one way: Change a name a little so that it reflects some characteristic trait of the bearer. The outcome should be funny to everyone (except the person involved, who may not have a sense of humor).

Do you know someone named Williams who is an accountant, or an automobile repairman, or an expensive doctor? By a simple switch. he becomes Billiams.

Is Frank Jones a tall. skinny fellow with long legs? How about Shank Bones?

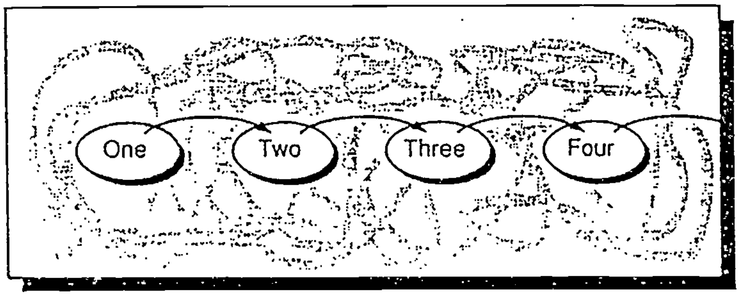
Make a game out of it. Write down ten names: co-workers, friends, celebrities, politicians. Now picture each of these people and think about them:

- What are their distinctive capabilities?
- What are their distinctive physical characteristics?
- What are their peculiarities of behavior, taste, and expression?

Now find your best angle of approach and do some experimenting. Of course, you want the new name to suggest the real name as strongly as possible. You may want to substitute letters, add letters. reverse syllables, or fit in a small extra word that denotes some salient trait.

Playing this game with friends can be a ball. but a little discretion is sometimes advisable. Aside from the fun, this is an instructive game: it teaches you to change and adapt that which is supposedly fixed, and to express observations by suggestion and allusion, rather than direct description.

How do you free yourself from the magnetic pull of everyday thoughts? One good way is to count. With each out breath, silently sound a number in your mind. Slowly count up from one to ten, then down from ten to one. In between the numbers, allow your regular thoughts to pass, but then return your attention to the numbers. Like the rhythm of breaking surf, the rhythm of your words has the power to soothe and relax, to keep you afloat above mental tides and currents.



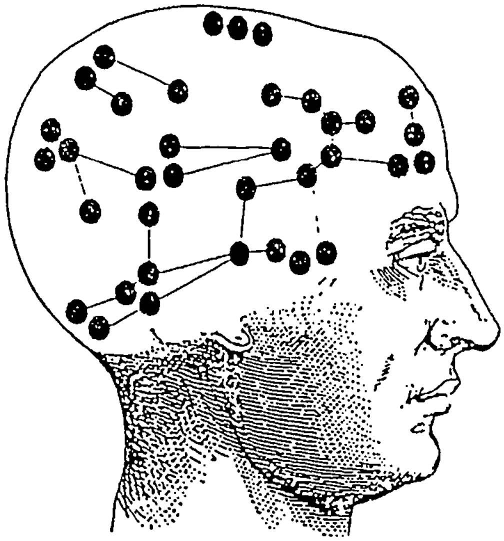
Another way to let go is to visualize your mind as a wide open blue sky, and individual thoughts as birds, first emerging from the distance, flying overhead, and then disappearing back into the distance. When a thought appears, you allow it to think itself through at its own rate. You don't try to rush it; you let it pass overhead.

When you watch your thoughts closely in this way, you'll realize that each has its own character. Some are fast, others are slow. Some refer to the future, some to the past. By learning to stay with your thoughts, without trying to manipulate, analyze or sort through them, you'll learn to experience directly their tones and patterns.

TIP Remember the words of Buddhist teacher Tarthang Tulku, "In your mind, what is happening is what you are doing."

Loosening Up Inside

Though the idea of mentally letting go is simple, the action is not so easy. If you're like most people, you'll find that after a few minutes, your thoughts become distracting. Your mind starts to plan, to anticipate, or to work out problems. You may become entranced with a stream of words and images. You may begin to observe how well you are relaxing. You may want to feel a certain way and begin to instruct yourself to reach some mental or emotional state. These urges, though subtle, prevent you from letting go fully.



Loosening up your mind does not mean stopping your thoughts. Trying to stop your thinking completely is about as hard as trying to stop your breathing, and maybe just about as useful. Loosening up your mind involves *letting go of the urge to follow* each and every thought that passes through your brain. You let them pass freely, one at a time, but you let go of the need to act on them.

Appendix G

Application

Relaxing Your Body

It's hard to be angry when you're smiling or to feel tense when you bow. These movements relax your muscles and uncouple anger from your body. When your body relaxes, your emotions follow suit. That's why smiling and bowing is such a pleasant custom in Japan. It's a beautiful form of body language that shows people you're relaxed and enjoying their company. When you're tensed up, you're sending the message, "I wish I weren't here." That's the type of body language the dentist gets all the time.

Relaxing your body sends a message to you as well as others. It tells you you're not in the grip of stress; you're in control, and you can determine how your body will respond. You can choose to use up less energy and feel less tense in responding to stress. You can even control your blood pressure by learning and regularly using relaxation techniques.

Is Relaxation Therapy for You?

The people who need relaxation therapy the most are, ironically, the very people who resist it the most—those who try to hold on to what control they feel they already have. Thinking that relaxation means loss of control is a mistake. Relaxation therapy does not mean making your mind blank; rather, it actually focuses your mind to rid your body of tension.

Ask yourself the following questions:

How many times a day do you use the words "should," "ought," and "must"? Do all your shirts have to be lined up just so in the closet? If you had to write a report and a friend said, "It's a beautiful day, let's go for a walk," would you allow yourself to go for a walk, or would you refuse to break your rule that "work comes first"? If you are inclined to be rigid in your behavior, you will probably benefit from relaxation therapy.

Relaxation Self-Assessment Test

To gauge your need for relaxation training, answer each of the following questions with one of these responses:

(a) Yes, frequently.
(b) Yes, sometimes.
(c) Occasionally.
(d) No, not very often.
(e) No, never.

Have you ever suffered from, or are you currently suffering from:

(1) *Insomnia* (the inability to fall asleep at night).
(2) *Breakthrough insomnia* (awakening in the middle of the night, with trouble getting back to sleep).
(3) *Headaches that begin at the back of your neck and work up over the scalp.*
(4) *Headaches that feel as if there is a throbbing pain on one side of your head.*
(5) *Upset stomach* (including constipation, cramps, diarrhea, feelings of nausea, or sharp pains).
(6) *Hypertension* (high blood pressure) or *angina* (chest pains from heart trouble).
(7) *Fatigue* without physical exertion.
(8) *Lack of concentration*, or the inability to focus on what you are doing.
(9) *Anxiety, tension, and feeling upset without apparent reason.*
(10) *Anxiety, tension, and feeling upset after you think you should have recovered* from an upsetting episode.
(11) *Feeling depressed* or sad.

Questions 1–6 measure physical expressions of your response to stress, including insomnia, headaches, upset stomachs, and the more serious conditions of high blood pressure and chest pain.

Questions 7–11 measure emotional responses to stress. If your body is chronically aroused but unable to go into action, you may become unable to concentrate, anxious without obvious reason, or depressed.

All of these questions touch on both physical and emotional responses to stress, and if you answered "frequently" or "sometimes" to several questions in either group, you are an excellent candidate for relaxation therapy.

elaxing to "Reminders"

Choose a "reminder stimulus"—a picture, a knickknack, any object in your daily environment that you enjoy seeing. You may choose more than one. My patients have chosen reminders like red stoplights, telephones, photographs, and stickers placed inconspicuously about the home and office.

Each time you see your reminder, sit down and get comfortable and take a deep abdominal breath. As you breathe in, your stomach should push out noticeably. Hold your breath. Then, exhale slowly, and as you exhale, imagine any tension you feel being blown out with the air from your lungs. As you breathe out, think gently to yourself, "I am relaxed. I am in control." Repeat the exercise. Then slowly stretch your arms and legs and go back to your normal activities. After you practice this exercise regularly for several weeks, you will find that relaxation becomes almost automatic every time you look at your reminder stimulus.

Relaxing on Breaks

This is a more intense form of relaxation. Take a five-minute relaxation break at least once a day to keep you in the relaxation habit. It will be most helpful if you take your relaxation break during the busiest part of your day.

Find a comfortable chair or sofa and make sure you will not be distracted. Make sure no bright lights or loud noises will bother you. Take a deep breath and hold it. Now exhale, and as you breathe out, think, "I am relaxed. I am peaceful." Gently push aside any intruding thoughts and focus clearly on the thought, "My muscles are relaxed and calm." Relax your jaw, then the rest of the muscles in your face. Keep your breathing slow and regular. Relax your shoulders and neck. If there is any tension in your chest or back, let yourself sink further and further into your chair or sofa. Relax your hands and arms. Then let your feet and legs relax. Take five minutes for this whole process. Then open your eyes, stretch, and resume your day, feeling invigorated and positive.

Recognizing Your Stress Cues

It is important to recognize when you are under stress and to try to reduce your stress at the first possible chance. Each person needs to identify his or her own stress cues. Some common cues are anxiety, anger, blushing, gritting your teeth, yelling, a feeling of frustration, or a physical sign such as shortness of breath, tightness in the chest or throat, clenched fists, or a feeling of fatigue. Any of these may be cues for you.

Make a list of things that happen to you when you are aroused by stress and pay particular attention to when they happen. Whenever you experience a stress cue, do one of two things:

If possible, immediately look at your reminder stimulus. Do some deep abdominal breathing. This will help you remind yourself that you are a relaxed and rational person.

If you cannot immediately do your breathing exercises, promise yourself that at the first opportunity you will take a relaxation break to practice abdominal breathing or muscle relaxation. This will clear the stress and tension from your dy. It is important not to allow the cumulative effects of eral stress episodes to wear you down.

Visualization

Now that you have learned to identify tension, you are ready for a technique called visualization, in which you focus your mind on relaxing images. This technique works best after you have learned to recognize the difference between tension and relaxation through abdominal breathing and PMR. In the beginning, try doing these first to clear your mind of preoccupation with thoughts and symptoms. Then you can focus on the relaxing scenes you create in your imagination.

You can do this in many ways. As one example, sit back in your easy chair again, put your feet up, and assume a comfortable position as you did to begin the PMR exercises. Close your eyes and focus on your breathing, slowly breathing in and out. Make sure that you're breathing abdominally. Now that you are sitting comfortably and are breathing deeply and rhythmically, become aware of your body and how it feels. Where do you feel tension and where do you feel relaxation? Do you feel limp and heavy? Is it hard to move? Allow your body to sink into the chair. Let the chair support you completely; just float on the chair.

Now you are ready to take a short trip in your imagination. Try to visualize a relaxing, pleasant scene. It can be as simple or elaborate as you like. Some people relax at the thought of lying on a beach on a warm summer day with the waves rolling in, breaking, and then receding; they like to picture the waves rolling in and out, in and out. Others like to picture themselves in a cool meadow with a brook flowing by. Still others find a mountain scene relaxing.

Find the scene that works for you and concentrate on it. Make this scene come alive in your mind and mentally transport yourself there. See the sights, smell the smells, feel the sensations. You may feel a warm sensation in your body and feel heavy, almost immobilized. Continue to visualize this scene for about 10 to 20 minutes. When you are through, slowly open your eyes, stretch, and yawn as you might in the morning when you wake up.

You will find that once you become proficient at this technique, you will be able to induce relaxation in a very short time and will feel relaxed and refreshed when you have completed the exercises.

Visualization is similar to self-hypnosis or meditation. In fact, it contains elements of both. Through your conscious will, you induce relaxation and control over your physical well-being.

Biofeedback

One of the first things learned in relaxation therapy is how to recognize your relaxation level through biofeedback—biological feedback you get from your body. Relaxation therapists have machines to measure skin temperature and electrical impulses in the muscles. There are also laboratory machines to measure signs of heart performance. However, you can get biofeedback in your office or living room simply by taking your pulse or your blood pressure.

The disappearance of the symptoms of stress is another form of biofeedback. If you notice that your headaches disappear, your stomach calms down, and you're able to sleep, you're reading your body's signals and using biofeedback. The same is true of noticing how and when your muscles relax.

Learning to read and change your body's signals through tension and relaxation of muscles is accomplished through practice. In the clinic, patients usually attend a dozen sessions over three months and do homework as well. The idea is to use these techniques over and over until you can summon them at will. This takes persistence, but it's not hard and it pays off measurably in your ability to manage daily tension.

Some basic relaxation techniques you can learn are abdominal breathing, progressive muscle relaxation, and visualization. The beauty of these exercises is that you can take them with you and use them anywhere at any time to cope with situational stress.

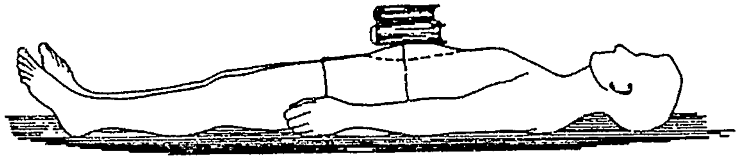
These techniques are not hard to learn. Even children, for example, can be taught at a very early age the difference between "fighting hands" (clenched fist and tightening of circulation) and "happy hands" (fingers spread and increased blood flow). For adults, one of the most popular parts of our stress seminars is abdominal breathing, a simple technique that you can put to use immediately.

Breathing—a Natural Therapy

There are three ways to breathe: raising the shoulders (shoulder breathing); expanding the rib cage (chest breathing); and expanding the chest cavity by moving the abdomen outward, pushing down the diaphragm muscle (abdominal breathing).

Chest breathing, the most common, tends to be rapid and shallow, especially under stress. Hyperventilation, an exaggerated form of rapid, shallow breathing, is a type of chest breathing associated with emotional upset and many physical symptoms, including heart palpitations, sweating, dizziness, anxiety, and fatigue. The slow, regular, and deep breaths characteristic of abdominal breathing, on the other hand, are associated with physical calm. There is a good deal of evidence that when people switch from chest to abdominal breathing, even temporarily, emotional and physical distress diminish significantly.

Properly trained singers, musicians who play wind instruments, and public speakers are usually abdominal breathers, but most people are chest breathers. What kind of breather are you? Ask a friend to watch you sometime when you're at



LEARNING ABDOMINAL BREATHING

rest and not aware of being observed, and have him or her note whether you're an abdominal breather or not. (If you are, your abdomen will push out as you inhale; as you exhale, it will pull in.) But regardless of how you breathe now or have breathed for most of your life, you can learn abdominal breathing by following these exercises.

Lie on your back and place a weight (two telephone books or the equivalent weight) over your navel, below the lower ribs. Relax. Now, simply breathe naturally and feel your stomach being pushed in when you breathe out and pushed up against the weight when you breathe in. At first, it is helpful to purposely exaggerate the inward and outward movements of your abdomen. When you know what abdominal breathing feels like, practice the exercise without the weight. Then, practice abdominal breathing while sitting, standing, and moving about.

The payoff will come the next time you feel stress gripping you and causing your body to tense up. Simply relax and take about twelve deep, slow abdominal breaths. You will feel some of your tension melt away.

Progressive Muscle Relaxation

The psychologists at the stress clinic use a cassette tape to guide patients through the steps of progressive muscle relaxation. The tape is reproduced below to give you an idea of what relaxation tapes are like and a chance to make one of your own, if you wish. (The tape works best if the voice is not yours—a friend's, perhaps—and is slow and soothing in tone.)

Progressive muscle relaxation, or PMR, means tensing and relaxing different groups of muscles in your body. This technique teaches you where your different muscles are and lets you know how they feel when you are tense and when you are relaxed. When you tense and relax a muscle, the relaxation is more profound than if you simply make a general, unfocused attempt to relax, at least in the beginning of your training.

Progressive Muscle Relaxation Exercise

Let's begin. First, find a comfortable spot in your home or office, preferably reclining or lying down. If you are sitting, find something to put your feet up on. Make sure the room is comfortable, that the lights are not bright, and the temperature is pleasant. Loosen your clothing if it is tight or uncomfortable. You may wish to remove your shoes also.

Now, close your eyes. Take a moment to examine the sensation. Can you hear my voice? Concentrate fully on my voice, and follow the instructions carefully.

Can you feel where you're touching the bed or chair? Are you comfortable? Doesn't it feel good? Yes. See yourself calm and peaceful and ready to relax.

Now, tense the muscles in your feet and legs by pulling your toes toward your head. Without moving your feet, tense your toes and pull them up as hard as you can. Hold it (five-second pause). Feel the spots where tension is present. Notice where any uncomfortable tenseness is present. Now, relax. Notice how good it feels to let all that tension go. Let your feet relax completely. Do you experience any unusual sensations in the muscles that you just tensed? Do they feel heavy? Do they feel warm or tingly? Does it feel hard to move your toes from their relaxed position? These are signs of profound relaxation. They are pleasant feelings which will continue as your muscles become more and more relaxed.

Now, push your toes away from your body. Push down as hard as you can. Again, notice where you feel tension. The tension is tight and painful. Really push down and hold that tension. Hold it (five-second pause). Notice where you are tense. Now relax completely. Let all of the tension run out of your feet, and let relaxation replace all the tightness. The feeling of relaxation is a good feeling, a quiet feeling. Enjoy this feeling now as your feet relax completely.

Now, move on to your legs. Tense your legs tightly. Notice where that tension is focused. Are your calves tight? Are your thighs tight and pulled together? Do your knees feel stiff and uncomfortable? Hold this tension (five-second pause). Feel where the tightness is. These large muscles are really tense and tight. Okay, let your legs relax. Let the tension drain away into the chair or bed, as your legs let go and relax deeply. Again, be aware of the accompanying feelings of relaxation. These are good feelings, peaceful feelings, quiet feelings in your legs and feet. It is so good to relax and let go.

Now, while keeping your legs and feet totally relaxed and quiet, tense your stomach and abdomen. Pull the muscles in your stomach taut. As you do this, you will feel yourself pushing down into the bed or chair. Push hard. Harder. Hold it (five-second pause). Feel the difference in the tightness of your stomach and the relaxation of your legs and feet. Now relax. Let wave after wave of gentle relaxation sweep over your stomach and abdomen. It feels good to let this area of your body relax and let go. Let your stomach melt and become relaxed and soft. It feels very good to relax your stomach.

Now, arch your back away from the sofa or chair. Pull yourself up tightly. Can you feel the tightness in your lower back? If not, pull up harder. Hold that tense, uncomfortable position. Remember to keep your legs and feet relaxed. Hold it (five-second pause). Let go and sink back into the chair or bed. Let your back collapse comfortably, and let all of the tension flow away. Let the bed or chair support you totally, as you surrender to gentle feelings of calm and relaxation in your back, your stomach, and your legs. These are good feelings. Again, notice the heaviness of your body as you become relaxed. Notice the feeling of immobility as the tension is drained out.

All right. While keeping your legs, feet, stomach, and back relaxed, I want you to tighten up your fists. Squeeze your hands into tight, tight fists. Tense your forearms and upper arms as well. Really squeeze your fists together tightly. Imagine you are pushing your fingers through the palms of your hands. Are your arms trembling? Notice the very uncomfortable feelings this causes. Hold it (five-second pause). Now let go. Open your hands and let your fingers dangle free. Let all of the stress pour out of your fingertips and let a warm, gentle, massaging relaxation sweep over your arms and hands. Let your arms relax totally, letting them collapse at your side. Can you feel the heaviness? If not, let your arms continue to relax. Let them join your legs, your feet, your stomach, and your back in being completely and profoundly relaxed. It feels so good to relax and let the tension disappear.

Now, shrug your shoulders. Pull your shoulders up as if you are trying to touch your ears with them. Pull tight! Feel the tension in your shoulder blades. Feel the tightness of the muscles on top of your shoulders and in your neck. Notice the discomfort, how it causes you pain. You may even feel pain in your back or in your head area. This is the side effect of tension. Okay, drop your shoulders and let them relax. Let them slide back down, relieving all the stress in the neck and shoulders. Let your shoulder blades snuggle back into the bed or chair comfortably. As before, the feelings of relaxation are much different from those of tension. Notice the difference. Notice how much better your body feels when it is relaxed rather than tense.

All right. Keep relaxing your arms, your body, and your legs. Let everything become loose and limp. Let the chair or bed do all the work in holding you up. While you are relaxing, tense up your facial muscles. Scrunch your face up. Really tighten up your forehead. Wrinkle it up! Also, clamp your jaw shut tight. Wrinkle up your eyes and nose. If you are not uncomfortable, you are not tensing enough. Redouble your efforts. Notice how unnatural and uncomfortable this feels. Notice the tightness beside your ears from clenching your jaws tight. Hold that tension (five-second pause). Okay, let go. Let your jaw drop slack. Let your eyelids gently smooth out. Let your forehead slide back into a relaxed and comfortable position. It feels terrific to let that tension subside, and to replace it with total relaxation. Check to see if your face is smooth and wrinkle-free. If not, stretch the skin slightly to make sure the relaxation can set in. Move your jaw slightly from side to side to clear any residual tension, and then let it hang loosely. Let your tongue lie passively in your mouth. It feels so good to relax completely.

You have now experienced tension and relaxation in the major muscles of your body. Now, while you are deeply relaxed, check your body to see if any tension or stress remains. Are your feet relaxed and heavy? If not, wiggle your toes gently, then let them relax. You might imagine a pair of invisible hands gently massaging your feet, to rid them of unwanted tension. Are your legs relaxed? Your stomach? Your back? Your arms? Your hands? Your neck and shoulders? Your jaw? Your eyes? Your forehead? If any of these areas are tense, gently tighten the area and then let it relax completely. Check your body now (30-second pause).

You have been examining the differences in tension and relaxation. Remember what it feels like when certain muscles are tense or tight. In this exercise, you consciously tightened each set of muscles in turn. However, during your actual working day, these muscles may tighten unconsciously, causing feelings of stress and/or fatigue. You should begin to become aware of when your muscles are tense, and attempt to relax them whenever possible. Remember, when you are relaxed, your body feels heavy—a safe, comfortable heaviness.

Now, for a few more minutes, enjoy your relaxation, and become aware of how good it feels. When you finish this exercise, open your eyes and stretch as you would when you wake up in the morning. You may feel a bit tired from tensing. If you do, simply sit and rest and relax for a few more minutes. Each time you practice this exercise, pay close attention to the accompanying feelings of tension and relaxation. By learning to spot tension easily and get rid of it, you can improve your health and sense of well-being. This will be a positive step toward a program of mental and physical wellness.

Discussion Questions on Point #14

1. What kind of thinking is demonstrated in the Shewhart Cycle?

2. What are the strengths and weaknesses of such a chart?

3. You are starting a company. Some folks (who have been avidly reading the works for such gurus as Deming and Juran) have come up with the great idea of using the Shewhart Cycle for planning improvements. In your group, discuss the wisdom or foolishness in doing this. Design an alternate way of monitoring quality.

Evaluation of Adapting a New Philosophy

Remember that Deming's ideas about producing quality is a philosophy--something that is not set in stone, but something to be adapted to the needs of a company. As you read the article in your group, decide which ideas from the article would be either helpful to adapt, or not so helpful.

Ideas that are helpful to adapt	Why	How we would adapt them

Ideas that are not helpful to adapt	Why	How we would avoid doing them

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A "Quality" Interview

Choose a partner to interview. Ask them the following questions, and record and discuss their responses.

1. In your opinion, what is your general definition of quality?

2. What does quality mean to you on your job?

3. What tools do you use that measure quality?

4. What exactly do these tools measure?

5. How do these tools affect you on the job, if at all?

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Full Text Provided by ERIC

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Chapter 9

Point Five: Improve Constantly and Forever the System of Production and Service

Improvement is not a one-time effort. Management is obligated to improve continually. Quality, Dr. Deming says, "must be built in at the design stage," and teamwork is essential to the process.[1] Once the plans are well underway, changes are costly and cause delays.

Everyone and every department in the company must subscribe to constant improvement. It cannot be limited merely to manufacturing or the service delivery systems. Purchasing, transportation, engineering, maintenance, sales, personnel, training, and accounting all have a role to play.

Dr. Deming emphasizes that management must lead the way. Only management can initiate improvement in quality and productivity. Production workers on their own can achieve very little.

Removal of an irritant, or solving a particular problem, is not improvement of a process. It is simply "putting out a fire."

He tells the story of attendance at an awards ceremony. The highest award went to a man who had discovered that the labels were not on bottles of a vaccine that were ready to be shipped. Identification was still possible. A few minutes later, that would not have been the case. The man saved the company $250,000.

The second award went to a man who discovered contamination in a shipment before it went out. The shipment was of course condemned.

Those awards, Dr. Deming says, were for putting out fires, not for improvement of quality nor of the system.

Statistical thinking is critical to improvement of a system. Only by use of properly interpreted data can intelligent decisions be made. But to depend only on the use of statistics is a sure way to go out of business. A company must follow all of the Fourteen Points.

By the same token, meeting specifications does not result in constant improvement. It ensures the status quo.

"Zero defects" is the same misguided notion. As a goal, it makes no sense. There must be a method. Likewise, with "meeting the competition." "You think the Japanese are going to stand still while somebody catches up?" Dr. Deming queries.[2]

It is more appropriate, Dr. Deming suggests, to consider such questions as whether your firm is doing better than a year ago, or two years ago; whether marketing is more effective, whether customer satisfaction has increased, and whether the pride and performance of employees has improved. A company that subscribes to Point Five can answer yes to those questions.

Dr. Deming says:

"Putting out fires is not improvement. Finding a point out of control, finding the special cause and removing it, is only putting the process back to where it was in the first place. It is not improvement of the process. [Dr. Deming attributes this conclusion to Dr. Joseph M. Juran, many years ago.]

"You are in a hotel. You hear someone yell fire. He runs for the fire extinguisher and pulls the alarm to call the fire department. We all get out. Extinguishing the fire does not improve the hotel.

"That is not improvement of quality. That is putting out fires."[3]

The above information gives some clues as to how our brains may be processing information. Those people who are predominant "right-sided" may show language and processing preferences for the left hemisphere abilities while the opposite is true of the predominantly "left-sided" profile. A mixed profile may indicate an ability to move between the hemispheres more easily, and hopefully, in a controlled manner.Cross lateral, or a mixed profile, people often show improved physical and mental abilities from regular exercising with cross lateral movements and with their eyes closed.

This information provides another method for learning to observe ourselves, appreciate who we are, and then set goals for improvement.

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PERSONAL LEARNING PROFILE

	LEFT	RIGHT
Eye	-----	-----
Ear lobe	-----	-----
Shoulder	-----	-----
Smile	-----	-----
Foot	-----	-----
Handedness	-----	-----
Writing	-----	-----

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POSSIBLE BRAIN HEMISPHERIC DIFFERENCES

LEFT	RIGHT
•aware of detail	•looks at whole
•learns in sequence/order	•learns all at once (simultaneous)
•splits the world into parts with proper names	•connects the world by relationships & related wholes
•logical in sequential/cause & effect thinking	•sees resemblances/ analogic thinking
•responds to "factual" info	•responds to feeling states
•linear thinking	•may think in images
•grammatically strings words together	•sees words as images or sentences as a single unit
•notices differences; distinction important	•open-ended ideas; organizes in clusters
•knows what, who, when, where	•knows why, how
•uses few words to communicate lots of meaning	•uses many words to "paint" oral pictures
•responds well to schedules	•responds to "natural" time well; may awake without alarm
•objective	•intuitive; does not know how one knows
•eyes tend to tract L - R	•eyes tend to tract R - L
•listens to auditory detail/phonics	•listens to auditory patterns of rhythm and ups and downs (modulations)

Flow Charts

Often the first step a team looking for ways to improve a process takes is to draw a flow chart of that process. A process cannot be improved, the reasoning goes, unless everyone understands and agrees on what the process is. The flow chart is an extremely useful way of delineating what is going on. One way to begin is to determine how the process should work, then chart the way it does work. Doing this can immediately turn up redundancy, inefficiency, and misunderstanding.

Vernay Laboratories, Inc., an Ohio manufacturer of precision rubber products and a client of Dr. Deming, decided to streamline its billing procedures. Vernay asked three people in the department to flow chart the way it worked. The result was three different flow charts. No one really knew.

One management consultant reports that he always asks managers to flow chart the operation they oversee. It is astonishing, he says, how often they must ask for help from subordinates. They really do not know who is responsible for what under their administration.

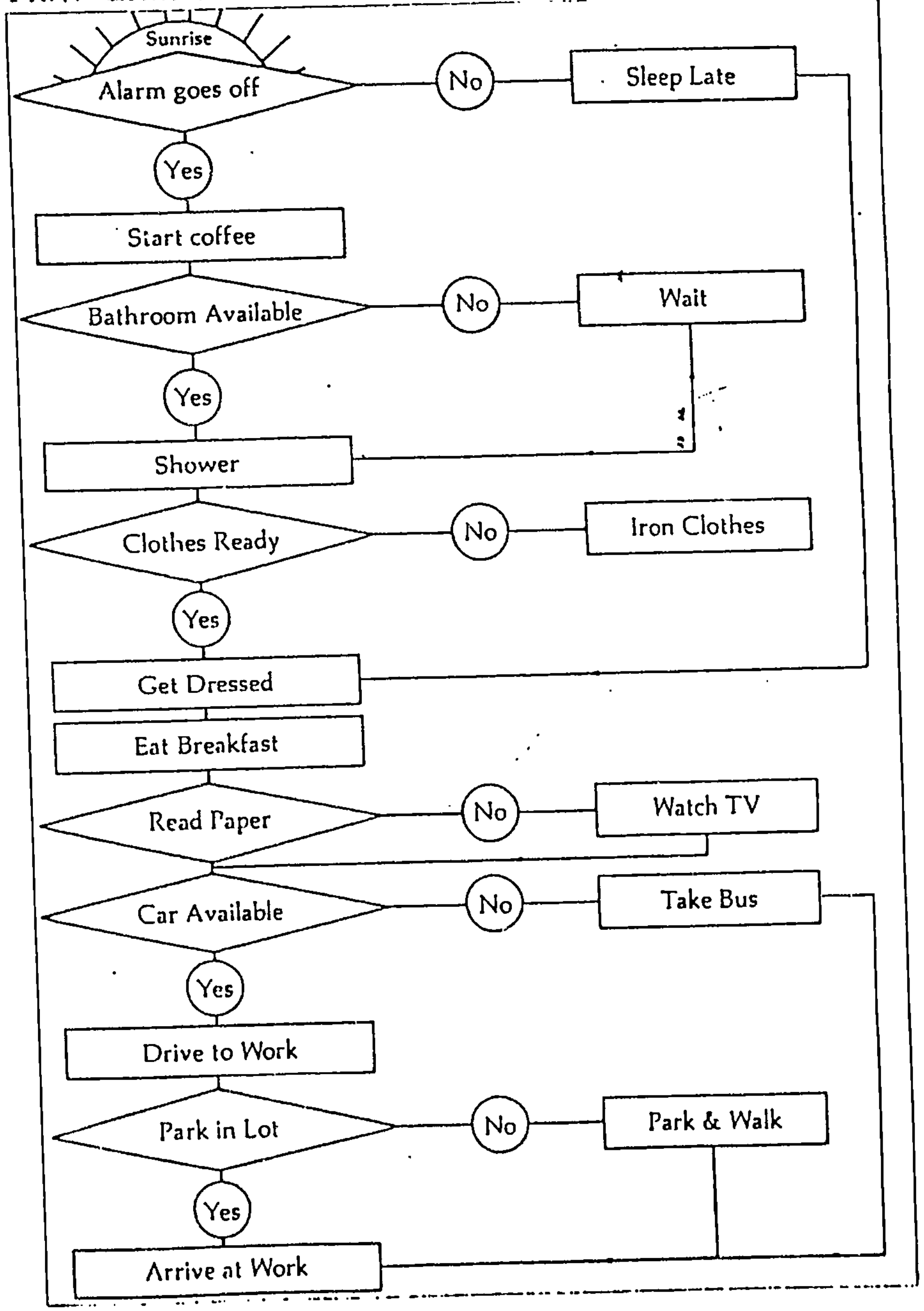
People in administrative or service operations where the flow of information is not always as visible as in a manufacturing process find flow charts particularly valuable.

A flow chart of your morning routine could begin with the alarm.

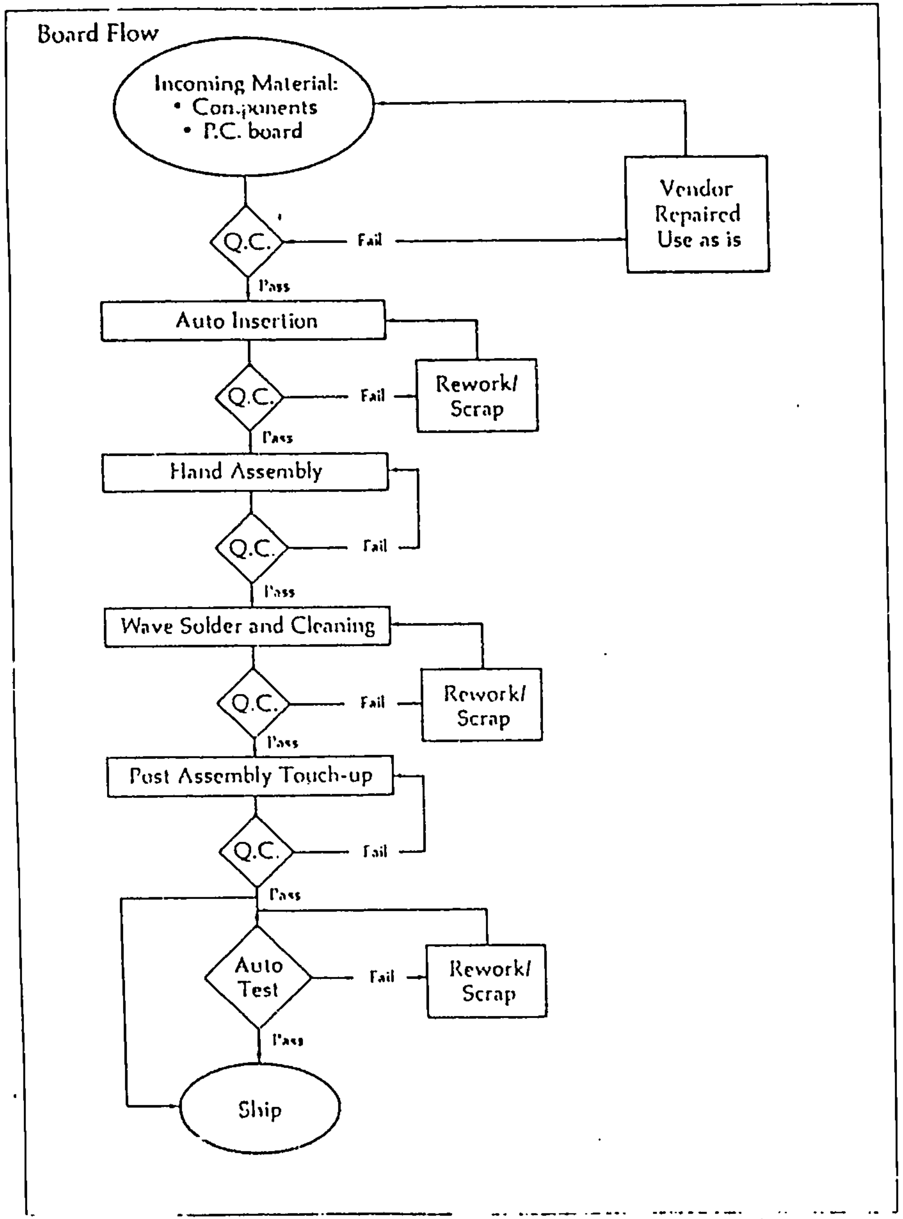
If you wanted to concentrate on eliminating the "no" loops, you might use two alarms, work out a bathroom schedule, prepare clothes in advance, get a second car, or rent a parking space on a monthly basis.

One manufacturer of printed circuit boards charted the process from the arrival of new materials to the shipping of finished products. It revealed three separate steps devoted to rework. If those could be eliminated, it would simplify the process and save money.

Flow Chart: "From Bed to Work"


Sunrise
Alarm goes off
No
Sleep Late
Yes
Start coffee
Bathroom Available
No
Wait
Yes
Shower
Clothes Ready
No
Iron Clothes
Yes
Get Dressed
Eat Breakfast
Read Paper
No
Watch TV
Car Available
No
Take Bus
Yes
Drive to Work
Park in Lot
No
Park & Walk
Yes
Arrive at Work

Flow Chart: "P.C. Board Flow"[5]


Board Flow
Incoming Material:
• Components
• P.C. board
Vendor Repaired Use as is
Q.C.
Fail
Pass
Auto Insertion
Q.C.
Fail
Rework/ Scrap
Pass
Hand Assembly
Q.C.
Fail
Pass
Wave Solder and Cleaning
Q.C.
Fail
Rework/ Scrap
Pass
Post Assembly Touch-up
Q.C.
Fail
Pass
Auto Test
Fail
Rework/ Scrap
Pass
Ship

—GOAL, Memory Jogger

Pareto Charts

Pronounced *pah-ray-toe*, these are among the most commonly used graphic techniques. People will speak of "doing a pareto" or say, "Let's pareto it." This chart is used to determine priorities. The pareto is sometimes described as a way to sort out the "vital few" from the "trivial many."

Suppose, in our continuing example of a morning routine, you would like to leave the house at 8:15, arriving at work by 8:45, so as to have a fifteen-minute period in which to relax—or a cushion against being late—before work begins at 9 A.M. More often, you leave by 8:30 A.M. and barely make it. You decided to keep track of the things that interfere with your departure for sixty days. You are sure that waiting for the bathroom is a major cause. And you know that getting caught up in reading the paper is a delay. So is the pesky garage door, which occasionally sticks. Sometimes you can't resist hitting the snooze alarm.

In your research, you might use a checklist, a good way of collecting data.

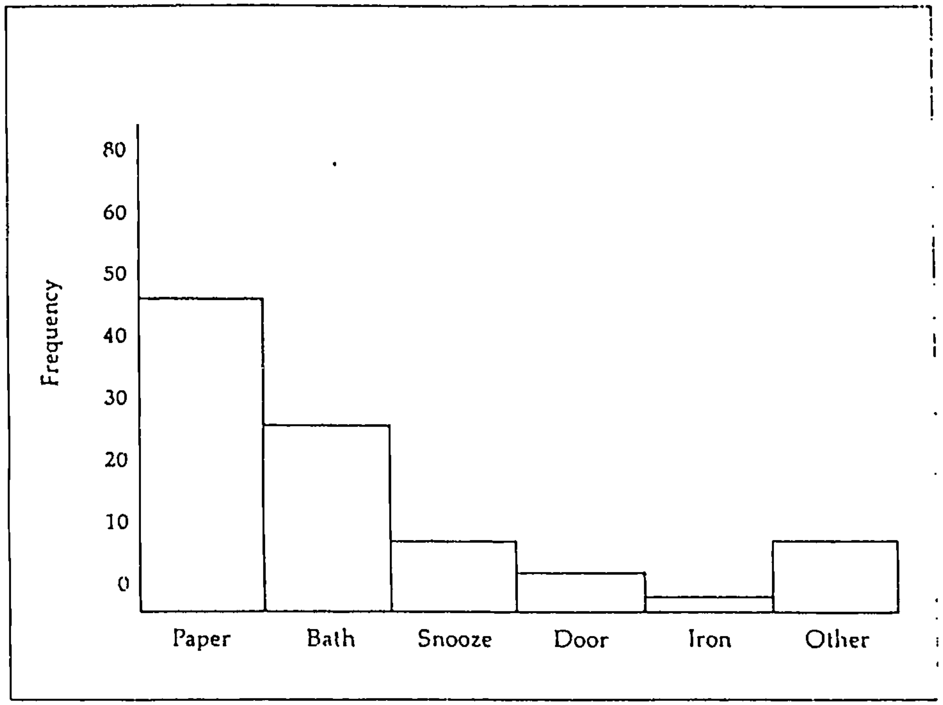
Here are some possible results:

Conditions That Might Cause Lateness
(Some days have more than one occurrence)

CAUSE	NUMBER OF TIMES
Reading paper (more than ten minutes)	45
Bathroom delay	20
Snooze alarm	8
Garage door	3
Having to iron	1
Other reasons	9

These incidents could be displayed on a pareto chart.

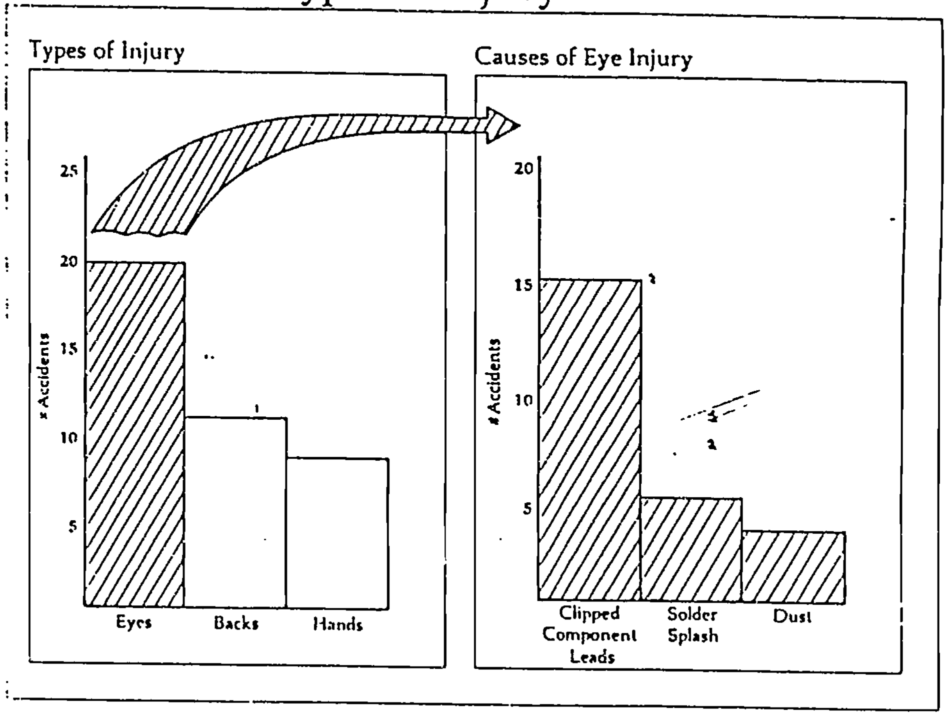
Pareto Chart: "Conditions That Might Cause Lateness"



As a result, you might make some changes. Switch to an afternoon paper. Get up earlier. Buy a clock without a snooze alarm.

At the printed circuit board plant, management organized a safety campaign at the employees' request. A team gathered data on accidents, then used a pareto to diagram the findings. Eye injuries were more common than any other. The team then researched causes and again made another pareto chart. The largest number of eye accidents occurred during the process of clipping the wire leads of components after they were soldered to the printed circuit board. In this fashion, pareto charts can be used to narrow down problems.

Pareto Chart: "Types of Injury"[6]



—GOAL, *Memory Jogger*

Chapter 6

Point Two: Adopt the New Philosophy

Quality must become the new religion. Japan has introduced a new economic age of reliability and smooth operation. There are new standards. We can no longer afford to live with mistakes, defects, poor workmanship, bad materials, handling damage, fearful and uninformed workers, poor training or none at all, executive job-hopping, and inattentive and sullen service. Defects are not free.

"The cost of living depends inversely on the goods and services that a given amount of money will buy," Dr. Deming points out. "Reliable service reduces costs. Delays and mistakes raise costs."[1]

Dr. Deming illustrates this point by telling of a beer manufacturer who boasted that he had no problem with cans because his suppliers replaced those that were defective. It never occurred to him that he was paying for the defective cans, because their cost was included in the wholesale price.

By the same token American consumers accept that when there is an industrial accident—the nuclear shutdown at Three M Island, for example—they will end up footing the bill. They even joke about it. Who has not said, "You know who will end up paying for this."

Thus, consumers of goods and services end up paying for delays and mistakes, which reduces their standard of living.

Businesses seldom learn of their customers' dissatisfaction. Customers, Dr. Deming says, do not complain. They merely

switch. How much better it would be to have customers that would boast about products and bring in new business.

Everyone can come up with a personal list of horrors of things gone wrong, and complaints unheeded.

In the post–World War II period, American-manufactured items, produced under economies of scale, dominated the market. There was no competition until Japan began to make inroads in the late 1950s.

In those days an actor named Ronald Reagan popularized a slogan for General Electric: "Progress is our most important product." That was back in the days when GE's version of progress was a never-ending selection of affordable household appliances fueled by cheap, seemingly unlimited electricity. Everybody believed in progress, which was thought to mean a constantly improving standard of living. Today, General Electric has pleaded guilty to fraud on federal contracts.

Dr. Deming suggests that we must believe in quality as we once believed in progress.

Dr. Deming says:

"Point two really means in my mind a transformation of management. Structures have been put in place in management that will have to be dismantled. They have not been suitable for two decades. They never were right, but in an expanding market you couldn't lose. The weaknesses showed up when competition came in. We will have to undergo total demolition of American style of management, which unfortunately has spread to just about the whole western world. In fact, one problem is that American companies have forced it on to their Canadian subsidiaries and subsidiaries in other countries, thus injecting disease the world over. This is a pity.

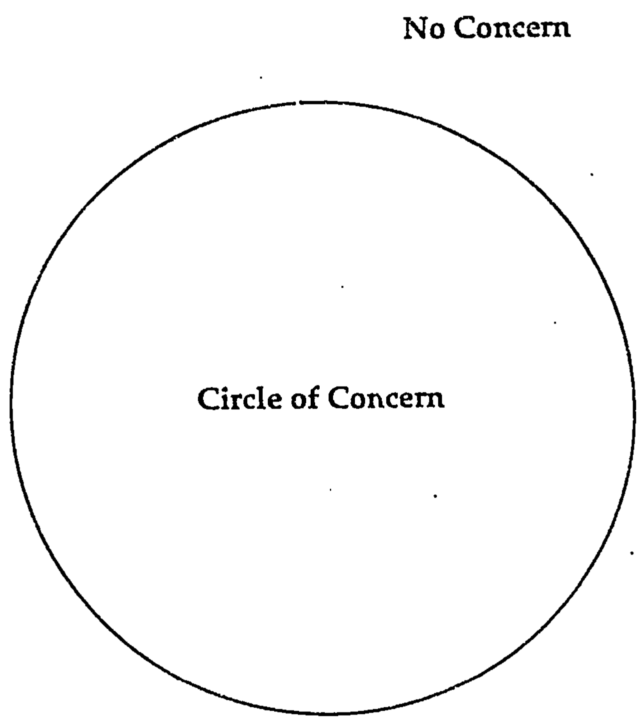
"Competition introduced a squeeze. Management offered all kinds of excuses. There was every kind of thing in this world, except the awful truth that Americans were beaten. Where they have been beaten is in the management. It has been focusing on results."[2]

"But how do you love when you don't love?"

"My friend, love is a verb. Love—the feeling—is a fruit of love, the verb. So love her. Serve her. Sacrifice. Listen to her. Empathize. Appreciate. Affirm her. Are you willing to do that?"

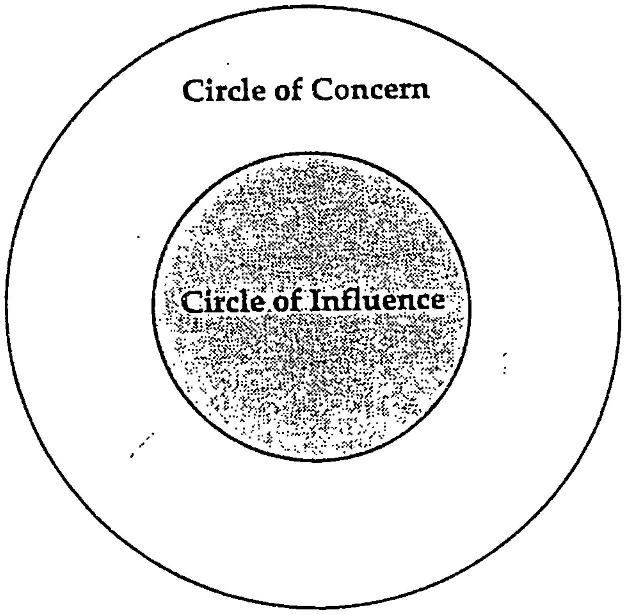
In the great literature of all progressive societies, love is a verb. Reactive people make it a feeling. They're driven by feelings. Hollywood has generally scripted us to believe that we are not responsible, that we are a product of our feelings. But the Hollywood script does not describe the reality. If our feelings control our actions, it is because we have abdicated our responsibility and empowered them to do so.

Proactive people make love a verb. Love is something you do: the sacrifices you make, the giving of self, like a mother bringing a newborn into the world. If you want to study love, study those who sacrifice for others, even for people who offend or do not love in return. If you are a parent, look at the love you have for the children you sacrificed for. Love is a value that is actualized through loving actions. Proactive people subordinate feelings to values. Love, the feeling, can be recaptured.



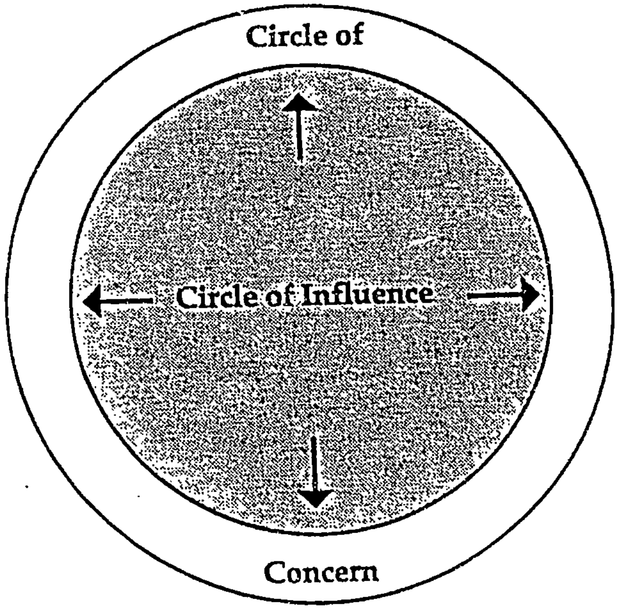
CIRCLE OF CONCERN/CIRCLE OF INFLUENCE

Another excellent way to become more self-aware regarding our own degree of proactivity is to look at where we focus our time and energy. We each have a wide range of concerns—our health, our children, problems at work, the national debt, nuclear war. We could separate those from things in which we have no particular mental or emotional involvement by creating a "Circle of Concern."



As we look at those things within our Circle of Concern, it becomes apparent that there are some things over which we have no real control and others that we can do something about. We could identify those concerns in the latter group by circumscribing them within a smaller Circle of Influence.

By determining which of these two circles is the focus of most of our time and energy, we can discover much about the degree of our proactivity.

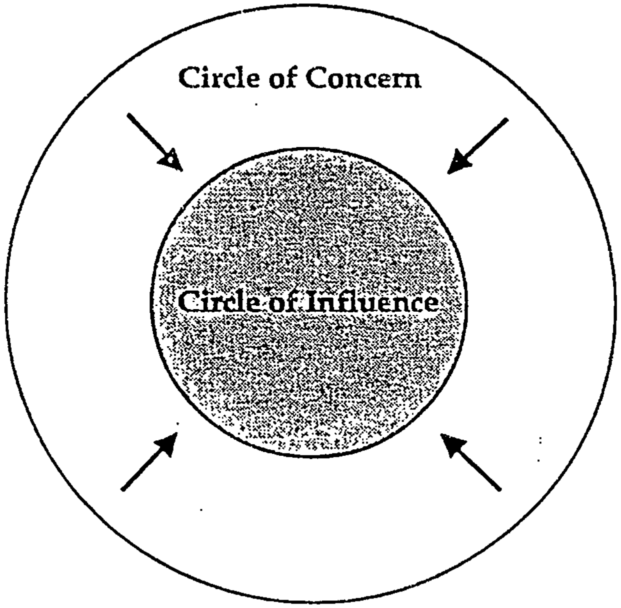


PROACTIVE FOCUS

(Positive energy enlarges the Circle of Influence)

Proactive people focus their efforts in the Circle of Influence. They work on the things they can do something about. The nature of their energy is positive, enlarging and magnifying, causing their Circle of Influence to increase.

Reactive people, on the other hand, focus their efforts in the Circle of Concern. They focus on the weakness of other people, the problems in the environment, and circumstances over which they have no control. Their focus results in blaming and accusing attitudes, reactive language, and increased feelings of victimization. The negative energy generated by that focus, combined with neglect in areas they could do something about, causes their Circle of Influence to shrink.



REACTIVE FOCUS

(Negative energy reduces the Circle of Influence)

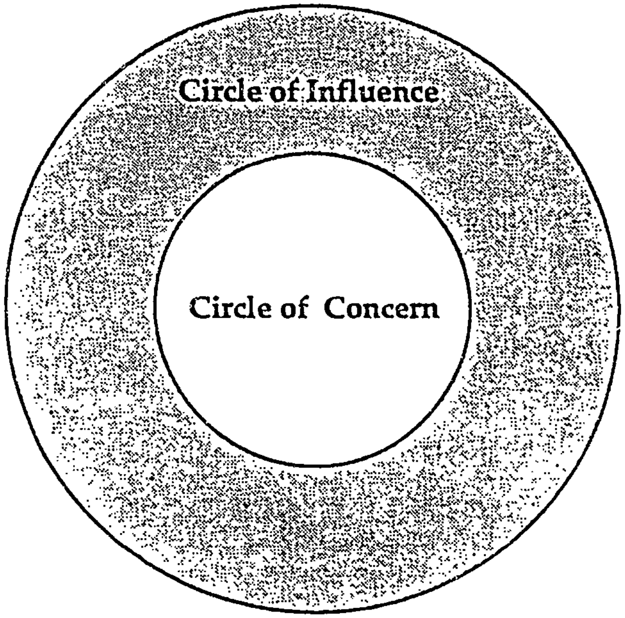
As long as we are working in our Circle of Concern, we empower the things within it to control us. We aren't taking the proactive initiative necessary to effect positive change.

Earlier, I shared with you the story of my son who was having serious problems in school. Sandra and I were deeply concerned about his apparent weaknesses and about the way other people were treating him.

But those things were in our Circle of Concern. As long as we focused our efforts on those things, we accomplished nothing, except to increase our own feelings of inadequacy and helplessness and to reinforce our son's dependence.

It was only when we went to work in our Circle of Influence, when we focused on our own paradigms, that we began to create a positive energy that changed ourselves and eventually influenced our son as well. By working on ourselves instead of worrying about conditions, we were able to influence the conditions.

Because of position, wealth, role, or relationships, there are some circumstances in which a person's Circle of Influence is larger than his or her Circle of Concern.



This situation reflects a self-inflicted emotional myopia—another reactive selfish life-style focused in the Circle of Concern.

Though they may have to prioritize the use of their influence, proactive people have a Circle of Concern that is at least as big as their Circle of Influence, accepting the responsibility to use their influence effectively.

Direct, Indirect, and No Control

The problems we face fall in one of three areas: direct control (problems involving our own behavior); indirect control (problems involving other people's behavior); or no control (problems we can do nothing about, such as our past or situational realities). The proactive approach puts the first step in the solution of all three kinds of problems within our present Circle of Influence.

Direct control problems are solved by working on our habits. They are obviously within our Circle of Influence. These are the "Private Victories" of Habits 1, 2, and 3.

Indirect control problems are solved by changing our methods of influence. These are the "Public Victories" of Habits 4, 5, and 6. I have personally identified over 30 separate methods of human influence—as separate as empathy is from confrontation, as separate as example is from persuasion. Most people have only three or four of these methods in their repertoire, starting usually with reasoning, and, if that doesn't work, moving to flight or fight. How liberating it is to accept the idea that I can learn new methods of human influence instead of constantly trying to use old ineffective methods to "shape up" someone else!

No control problems involve taking the responsibility to change the line on the bottom on our face—to smile, to genuinely and peacefully accept these problems and learn to live with them, even though we don't like them. In this way, we do not empower these problems to control us. We share in the spirit embodied in the Alcoholics Anonymous prayer, "Lord, give me the courage to change the things which can and ought to be changed, the serenity to accept the things which cannot be changed, and the wisdom to know the difference."

Whether a problem is direct, indirect, or no control, we have in our hands the first step to the solution. Changing our habits, changing our methods of influence and changing the way we see our no control problems are all within our Circle of Influence.

EXPANDING THE CIRCLE OF INFLUENCE

It is inspiring to realize that in choosing our response to circumstance, we powerfully affect our circumstance. When we change one part of the chemical formula, we change the nature of the results.

I worked with one organization for several years that was headed by a very dynamic person. He could read trends. He was creative, talented, capable, and brilliant—and everyone knew it. But he had a very dictatorial style of management. He tended to treat people like "gofers," as if they didn't have any judgment. His manner of speaking to those who worked in the organization was, "Go for this . . . go for that . . . now do this . . . now do that—I'll make the decisions."

The net effect was that he alienated almost the entire executive team surrounding him. They would gather in the corridors and complain to each other about him. Their discussion was all very sophisticated, very articulate, as if they were trying to help the situation. But they did it endlessly, absolving themselves of responsibility in the name of the president's weaknesses.

"You can't imagine what's happened this time," someone would say. "The other day he went into my department. I had everything all laid out. But he came in and gave totally different signals. Everything I'd done for months was shot, just like that. I don't know how I'm supposed to keep working for him. How long will it be until he retires?"

"He's only fifty-nine," someone else would respond. "Do you think you can survive for six more years?"

"I don't know. He's the kind of person they probably won't retire anyway."

But one of the executives was proactive. He was driven by values, not feelings. He took the initiative—he anticipated, he empathized, he read the situation. He was not blind to the president's weaknesses; but instead of criticizing them, he would compensate for them. Where the president was weak in his style, he'd try to buffer his own people and make such weaknesses irrelevant. And he'd work with the president's strengths—his vision, talent, creativity.

This man focused on his Circle of Influence. He was treated like a gofer, also. But he would do more than what was expected. He anticipated the president's need. He read with empathy the president's underlying concern, so when he presented information, he also gave his analysis and his recommendations based on that analysis.

As I sat one day with the president in an advisory capacity, he said, "Stephen, I just can't believe what this man has done. He's not only given me the information I requested, but he's provided additional information that's exactly what we needed. He even gave me his analysis of it in terms of my deepest concerns, and a list of his recommendations.

"The recommendations are consistent with the analysis, and the analysis is consistent with the data. He's remarkable! What a relief not to have to worry about this part of the business."

At the next meeting, it was "go for this" and "go for that" to all the executives . . . but one. To this man, it was "What's your opinion?" His Circle of Influence had grown.

[redacted] Thi[redacted]sed [redacted] a s[redacted]the [redacted]niza[redacted] The[redacted]tive[redacted]ds i[redacted] the executive corridors began shooting their vindictive ammunition at this proactive man.

It's the nature of reactive people to absolve themselves of responsibility. It's so much safer to say, "I am not responsible." If I say "I am responsible," I might have to say, "I am irresponsible." It would be very hard for me to say that I have the power to choose my response and that the response I have chosen has resulted in my involvement in a negative, collusive environment, especially if for years I have absolved myself of responsibility for results in the name of someone else's weaknesses.

So these executives focused on finding more information, more ammunition, more evidence as to why they weren't responsible.

But this man was proactive toward them, too. Little by little, his Circle of Influence toward them grew also. It continued to expand to the extent that eventually no one made any significant moves in the organization without that man's involvement and approval, including the president. But the president did not feel threatened because this man's strength complemented his strength and compensated for his weaknesses. So he had the strength of two people, a complementary team.

This man's success was not dependent on his circumstances. Many others were in the same situation. It was his chosen response to those circumstances, his focus on his Circle of Influence, that made the difference.

There are some people who interpret "proactive" to mean pushy, aggressive, or insensitive; but that isn't the case at all. Proactive people aren't pushy. They're smart, they're value driven, they read reality, and they know what's needed.

Look at Gandhi. While his accusers were in the legislative chambers criticizing him because he wouldn't join in their Circle of Concern Rhetoric condemning the British Empire for their subjugation of the Indian people, Gandhi was out in the rice paddies, quietly, slowly, imperceptibly expanding his Circle of Influence with the field laborers. A ground swell of support, of trust, of confidence followed him through the countryside. Though he held no office or political position, through compassion, courage, fasting, and moral persuasion he eventually brought England to its knees, breaking political domination of three hundred million people with the power of his greatly expanded Circle of Influence.

[redacted] THE "HAVE'S" AND THE "BE'S"

One way to determine which circle our concern is in is to distinguish between the *have's* and the *be's*. The Circle of Concern is filled with the *have's*:

"I'll be happy *when I have* my house paid off."
"*If only I had* a boss who wasn't such a dictator. . . ."
"*If only I had* a more patient husband. . . ."
"*If I had* more obedient kids. . . ."
"*If I had* my degree. . . ."
"*If I could just have* more time to myself. . . ."

The Circle of Influence is filled with the *be's*—I can *be* more patient, *be* wise, *be* loving. It's the character focus.

Anytime we think the problem is "out there," that thought is the problem. We empower what's out there to control us. The change paradigm is "outside-in"—what's out there has to change before we can change.

The proactive approach is to change from the inside-out: to *be* different, and by being different, to effect positive change in what's out there—I can *be* more resourceful, I can *be* more diligent, I can *be* more creative, I can *be* more cooperative.

One of my favorite stories is one in the Old Testament, part of the fundamental fabric of the Judeo-Christian tradition. It's the story of Joseph, who was sold into slavery in Egypt by his brothers at the age of seventeen. Can you imagine how easy it would have been for him to languish in self-pity as a servant of Potiphar, to focus on the weaknesses of his brothers and his captors and on all he didn't have? But Joseph was proactive. He worked on *be*. And within a short period of time, he was running Potiphar's household. He was in charge of all that Potiphar had because the trust was so high.

Then the day came when Joseph was caught in a difficult situation and refused to compromise his integrity. As a result, he was unjustly imprisoned for thirteen years. But again he was proactive. He worked on the inner circle, on *being* instead of *having*, and soon he was running the prison and eventually the entire nation of Egypt, second only to the Pharaoh.

I know this idea is a dramatic paradigm shift for many people. It is so much easier to blame other people, conditioning, or conditions for our own stagnant situation. But we are responsible—"response-able"—to control our lives and to powerfully influence our circumstances by working on *be*, on what we are.

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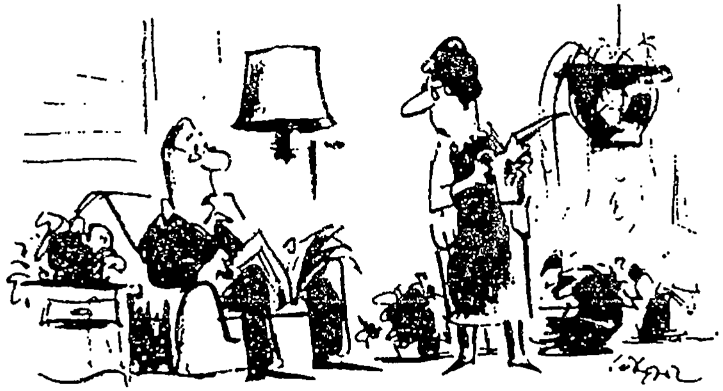


"It's finally happening, Helen. The hemispheres of my brain are drifting apart."

Drawing by Lorenz;
© 1980 The New Yorker Magazine, Inc.

experience a thrust to an opposite brain-style because of changing responsibilities and opportunities and because of the body's innate need for balance (homeostasis).

3. Whichever your dominance or preference, you still use both sides of your brain and shift them, depending upon the skills needed and your particular brain organization.
4. Lateralization is the degree to which brain functions are performed in the task-appropriate hemisphere (balancing the checkbook in the left and recalling a loved one's face in the right). Highly lateralized individuals move more completely into the task-appropriate hemisphere (the usual case with males), while less lateralized persons (the usual case with females) will perform a task in both hemispheres.

In the next chapter, you'll discover which, if either, brain-style you prefer and how this preference affects your behavior.

2

Knowing Yourself —Right or Left

What lies behind us and what lies before us are small matters compared to what lies within us.

—Ralph Waldo Emerson

The ideas behind split-brain research will be of much greater value when you can translate them into personal terms. Without further ado, you are invited to take the following test to determine your hemispheric dominance.

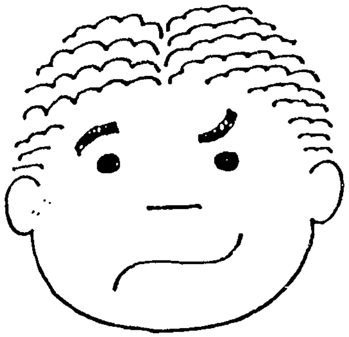
Please do not analyze the questions. Answer them quickly, checking the answer that first feels right to you. When there are multiple choices, select the one that most closely represents your attitude or behavior.

Brain Preference Indicator Test

1. In a problem-solving situation, do you:
   a. ___ take a walk and mull solutions over, then discuss them?
   b. ___ think about, write down all alternatives, arrange them according to priorities, and then pick the best?
   c. ___ recall past experiences that were successful and implement them?
   d. ___ wait to see if the situation will right itself?

2. Daydreaming is:
   a. ___ a waste of time
   b. ___ amusing and relaxing
   c. ___ a real help in problem-solving and creative thinking
   d. ___ a viable tool for planning my future

3. Glance quickly at this picture.



Was the face smiling?
a. yes ___ b. no ___

4. Concerning hunches:
   a. ___ I frequently have strong ones and follow them
   b. ___ I have strong hunches but don't consciously follow them
   c. ___ I occasionally have hunches but don't place much faith in them
   d. ___ I would not rely on hunches to help me make important decisions

5. In thinking about the activities of your day, which is most typical of your "style"?
   a. ___ I make a list of all the things I need to do, people to see
   b. ___ I picture the places I will go, people I'll see, things I'll do
   c. ___ I just let it happen
   d. ___ I plan the day's schedule, blocking out appropriate times for each item or activity

6. Do you usually have a place for everything, a system for doing things, and an ability to organize information and materials?
   a. ___ yes b. ___ no

7. Do you like to move your furniture, change the decor of your home or office frequently?
   a. ___ yes b. ___ no

8. Please check which of these activities you enjoy:
   ___ swimming
   ___ tennis
   ___ golf
   ___ camping/hiking
   ___ skiing
   ___ fishing
   ___ singing
   ___ gardening
   ___ playing instrument
   ___ home improvements
   ___ sewing
   ___ reading
   ___ arts/crafts
   ___ cooking
   ___ photography
   ___ doing nothing
   ___ travel
   ___ bicycling
   ___ collecting
   ___ writing
   ___ chess
   ___ bridge
   ___ roulette
   ___ charades
   ___ dancing
   ___ walking
   ___ running
   ___ hugging
   ___ kissing
   ___ touching
   ___ chatting
   ___ debating

9. Do you learn athletics and dancing better by:
   a. ___ imitating, getting the feel of the music or game?
   b. ___ learning the sequence and repeating the steps mentally?

10. In sports or performing in public do you often perform better than your training and natural abilities warrant?
    a. ___ yes b. ___ no

11. Do you express yourself well verbally?
    a. ___ yes b. ___ no

12. Are you goal-oriented?
    a. ___ yes b. ___ no

13. When you want to remember directions, a name, or a news item, do you:
    a. ___ visualize the information?
    b. ___ write notes?

c. ____ verbalize it (repeat it to yourself or out loud)?
d. ____ associate it with previous information?

14. Do you remember faces easily?
a. ____ yes   b. ____ no

15. In the use of language, do you:
a. ____ make up words?
b. ____ devise rhymes and incorporate metaphors?
c. ____ choose exact, precise terms?

16. In a communication situation, are you more comfortable being the:
a. ____ listener?   b. ____ talker?

17. When you are asked to speak extemporaneously at a meeting, do you:
a. ____ make a quick outline?
b. ____ just start talking?
c. ____ shift the focus to someone else or say as little as possible?
d. ____ speak slowly and carefully?

18. In an argument, do you tend to:
a. ____ talk until your point is made?
b. ____ find an authority to support your point?
c. ____ just become withdrawn?
d. ____ push chair or table, pound table, talk louder—yell?

19. Can you tell fairly accurately how much time has passed without looking at your watch?
a. ____ yes   b. ____ no

20. Do you prefer social situations that are:
a. ____ planned in advance?
b. ____ spontaneous?

21. In preparing yourself for a new or difficult task, do you:
a. ____ visualize yourself accomplishing it effectively?
b. ____ recall past successes in similar situations?
c. ____ prepare extensive data regarding the task?

22. Do you prefer working alone or in a group?
a. ____ alone   b. ____ group

23. When it comes to "bending the rules" or altering company policy, do you feel:

a. ____ rules and policy are to be followed?
b. ____ progress comes through challenging the structure?
c. ____ rules are made to be broken?

24. In school, did you prefer:
a. ____ algebra?   b. ____ geometry?

25. Which of these handwriting positions most closely resembles yours?
a. ____ regular right-hand position
b. ____ hooked right-hand position (fingers pointing toward your chest)
c. ____ regular left-hand position
d. ____ hooked left-hand position (fingers pointing toward your chest)

26. In notetaking, do you print:
a. ____ never?   b. ____ frequently?

27. Do you use gestures to
a. ____ emphasize a point?
b. ____ express your feelings?

28. Do you instinctively *feel* an issue is right or correct, or do you *decide* on the basis of information?
a. ____ feel   b. ____ decide

29. I enjoy taking risks.
a. ____ yes   b. ____ no

30. After attending a musical:
a. ____ I can hum many parts of the score.
b. ____ I can recall many of the lyrics

31. Please hold a pencil perpendicularly to the ground at arm's length, centered in your line of vision and lined up with a frame, board, or door. Holding that position, close your left eye. Did your pencil appear to move?
a. ____ yes

Close your right eye. Did your pencil appear to move?
b. ____ yes

32. Sit in a relaxed position and clasp your hands comfortably in your lap.

Which thumb is on top?
a. ____ left   b. ____ right   c. ____ parallel

ERIC Full Text Provided by ERIC

33. Check as many of these items as you feel are true about you:
    - ___ I can extract meaning from contracts, instruction manuals, and legal documents
    - ___ I can understand schematics and diagrams
    - ___ I strongly visualize the characters, setting, and plot of reading material
    - ___ I prefer that friends phone in advance of their visits
    - ___ I dislike chatting on the phone
    - ___ I find it satisfying to plan and arrange the details of a trip
    - ___ I postpone making telephone calls
    - ___ I can easily find words in a dictionary, names in a phone book
    - ___ I love puns
    - ___ I take lots of notes at meetings and lectures
    - ___ I freeze when I need to operate mechanical things under stress
    - ___ Ideas frequently come to me out of nowhere

34. I have:
    a. ___ frequent mood changes
    b. ___ almost no mood changes

35. I am:
    a. ___ not very conscious of body language. I prefer to listen to what people say
    b. ___ good at interpreting body language
    c. ___ good at understanding what people say and also the body language they use

36. How many boxes did you check for Chapter 1? ___

Here's the scoring key to the self-test. List the numbers of each answer you checked.

1. a. 7
   b. 1
   c. 3
   d. 9

2. a. 1
   b. 5
   c. 7
   d. 9

3. a. 3
   b. 7

4. a. 9
   b. 7
   c. 3
   d. 1

5. a. 1
   b. 7
   c. 9
   d. 3

6. a. 1
   b. 9

7. a. 9
   b. 1

8.

swimming	9	travel	5
tennis	4	bicycling	8
golf	4	collecting	1
camping/hiking	7	writing	2
skiing	7	chess	2
fishing	8	bridge	2
singing	3	roulette	7
gardening	5	charades	5
playing instrument	4	dancing	7
home improvements	3	walking	8
sewing	3	running	8
reading	3	hugging	9
arts/crafts	5	kissing	9
cooking	5	touching	9
photography	3	chatting	4
doing nothing	9	debating	2

9. a. 9
   b. 1

10. a. 9
    b. 1

11. a. 1
    b. 7

12. a. 1
    b. 9

13. a. 9
    b. 1
    c. 3
    d. 5

14. a. 7
    b. 1

15. a. 9
    b. 5
    c. 1

16. a. 6
    b. 3

17. a. 1
    b. 6
    c. 9
    d. 4

18. a. 3
    b. 1
    c. 7
    d. 9

19. a. 1
    b. 9

20. a. 1
    b. 9

21. a. 9
    b. 5
    c. 1

22. a. 3
    b. 7

23. a. 1
    b. 5
    c. 9

24. a. algebra 1
    b. geometry 9

25. a. 1
    b. 7
    c. 9
    d. 3

26. a. 1
    b. 9

27. a. 2
    b. 8

28. a. 9
    b. 1

29. a. 7
    b. 3

30. a. 9
    b. 1

31. a. 8
    b. 2

32. a. 1
    b. 9
    c. 5

33. 1 contracts
    7 schematics
    9 visualize
    2 advance
    3 chatting
    1 plan trip
    7 postpone
    1 find words
    3 puns
    1 notes
    3 freeze
    9 nowhere

34. a. 9
    b. 1

35. a. 1
    b. 7
    c. 5

36. Score as follows:
    9 a. if you read 0 to 1 boxes all the way through
    5 b. if you read 2 to 5 boxes all the way through
    1 c. if you read 6 to 8 boxes all the way through

Now add the number of points you scored and divide the total by the number of answers you checked. (This latter number will vary

PRINCIPLES OF CREATIVE COOPERATION

I take as my guide the hope of a saint:
in crucial things, unity—
in important things, diversity—
in all things, generosity.

INAUGURAL ADDRESS OF PRESIDENT
GEORGE BUSH

WHEN SIR WINSTON CHURCHILL WAS CALLED to head up the war effort for Great Britain, he remarked that all his life had prepared him for this hour. In a similar sense, the exercise of all of the other habits prepares us for the habit of synergy.

When properly understood, synergy is the highest activity in all life—the true test and manifestation of all of the other habits put together.

The highest forms of synergy focus the four unique human endowments, the motive of Win/Win, and the skills of empathic communication on the toughest challenges we face in life. What results is almost miraculous. We create new alternatives—something that wasn't there before.

Synergy is the essence of principle-centered leadership. It is the essence of principle-centered parenting. It catalyzes, unifies, and unleashes the greatest powers within people. All the habits we have covered prepare us to create the miracle of synergy.

What is synergy? Simply defined, it means that the whole is greater than the sum of its parts. It means that the relationship which the parts have to each other is a part in and of itself. It is not only a part, but the most catalytic, the most empowering, the most unifying, and the most exciting part.

The creative process is also the most terrifying part because you don't know exactly what's going to happen or where it is going to lead. You don't know what new dangers and challenges you'll find. It takes an enormous amount of internal security to begin with the spirit of adventure, the spirit of discovery, the spirit of creativity. Without doubt, you have to leave the comfort zone of base camp and confront an entirely new and unknown wilderness. You become a trailblazer, a pathfinder. You open new possibilities, new territories, new continents, so that others can follow.

Synergy is everywhere in nature. If you plant two plants close together, the roots comingle and improve the quality of the soil so that both plants will grow better than if they were separated. If you put two pieces of wood together, they will hold much more than the total of the weight held by each separately. The whole is greater than the sum of its parts. One plus one equals three or more.

The challenge is to apply the principles of creative cooperation, which we learn from nature, in our social interactions. Family life provides many opportunities to observe synergy and to practice it.

The very way that a man and a woman bring a child into the world is synergistic. The essence of synergy is to value differences—to respect them, to build on strengths, to compensate for weaknesses.

We obviously value the physical differences between men and women, husbands and wives. But what about the social, mental, and emotional differences? Could these differences not also be sources of creating new, exciting forms of life—creating an environment that is truly fulfilling for each person, that nurtures the self-esteem and self-worth of each, that creates opportunities for each to mature into independence and then gradually into interdependence? Could synergy not create a new script for the next generation—one that is more geared to service and contribution, and is less protective, less adversarial, less selfish; one that is more open, more trusting, more giving, and is less defensive, protective, and political; one that is more loving, more caring, and is less possessive and judgmental?

SYNERGISTIC COMMUNICATION

When you communicate synergistically, you are simply opening your mind and heart and expressions to new possibilities, new alternatives, new options. It may seem as if you are casting aside Habit 2 (to begin with the end in mind); but, in fact, you're doing the opposite—you're fulfilling it. You're not sure when you engage in synergistic communication how things will work out or what the end will look like, but you do have an inward sense of excitement and security and adventure, believing that it will be significantly better than it was before. And that is the end that you have in mind.

You begin with the belief that parties involved will gain more insight, and that the excitement of that mutual learning and insight will create a momentum toward more and more insights, learnings, and growth.

Many people have not really experienced even a moderate degree of synergy in their family life or in other interactions. They've been trained and scripted into defensive and protective communications or into believing that life or other people can't be trusted. As a result, they are never really open to Habit 6 and to these principles.

This represents one of the great tragedies and wastes in life, because so much potential remains untapped—completely undeveloped and unused. Ineffective people live day after day with unused potential. They experience synergy only in small, peripheral ways in their lives.

They may have memories of some unusual creative experiences, perhaps in athletics, where they were involved in a real team spirit for a period of time. Or perhaps they were in an emergency situation where people cooperated to an unusually high degree and submerged ego and pride in an effort to save someone's life or to produce a solution to a crisis.

To many, such events may seem unusual, almost out of character with life, even miraculous. But this is not so. These things can be produced regularly, consistently, almost daily in people's lives. But it requires enormous personal security and openness and a spirit of adventure.

Most all creative endeavors are somewhat unpredictable. They often seem ambiguous, hit-or-miss, trial and error. And unless people have a high tolerance for ambiguity and get their security from integrity to principles and inner values they find it unnerving and unpleasant to be involved in highly creative enterprises. Their need for structure, certainty, and predictability is too high.

SYNERGY IN THE CLASSROOM

As a teacher, I have come to believe that many truly great classes teeter on the very edge of chaos. Synergy tests whether teachers and students are really open to the principle of the whole being greater than the sum of its parts.

There are times when neither the teacher nor the student knows for sure what's going to happen. In the beginning, there's a safe environment that enables people to be really open and to learn and to listen to each other's ideas. Then comes brainstorming, where the spirit of evaluation is subordinated to the spirit of creativity, imagining, and intellectual networking. Then an absolutely unusual phenomenon begins to take place. The entire class is transformed with the excitement of a new thrust, a new idea, a new direction that's hard to define, yet it's almost palpable to the people involved.

Synergy is almost as if a group collectively agrees to subordinate old scripts and to write a new one.

I'll never forget a university class I taught in leadership philosophy and style. We were about three weeks into a semester when, in the middle of a presentation, one person started to relate some very powerful personal experiences which were both emotional and insightful. A spirit of humility and reverence fell upon the class—reverence toward this individual and appreciation for his courage.

This spirit became fertile soil for a synergistic and creative endeavor. Others began to pick up on it, sharing some of their experiences and insights and even some of their self-doubts. The spirit of trust and safety prompted many to become extremely open. Rather than present what they prepared, they fed on each other's insights and ideas and started to create a whole new scenario as to what that class could mean.

I was deeply involved in the process. In fact, I was almost mesmerized by it because it seemed so magical and creative. And I found myself gradually loosening up my commitment to the structure of the class and sensing entirely new possibilities. It wasn't just a flight of fancy; there was a sense of maturity and stability and substance which transcended by far the old structure and plan.

We abandoned the old syllabus, the purchased textbooks and all the presentation plans, and we set up new purposes and projects and assignments. We became so excited about what was happening that in about three more weeks, we all sensed an overwhelming desire to share what was happening with others.

We decided to write a book containing our learnings and insights on the subject of our study—principles of leadership. Assignments were changed, new projects undertaken, new teams formed. People worked much harder than they ever would have in the original class structure, and for an entirely different set of reasons.

Out of this experience emerged an extremely unique, cohesive, and synergistic culture that did not end with the semester. For years, alumni meetings were held among members of that class. Even today, many years later, when we see each other, we talk about it and often attempt to describe what happened and why.

One of the interesting things to me was how little time had transpired before there was sufficient trust to create such synergy. I think it was largely because the people were relatively mature. They were in the final semester of their senior year, and I think they wanted more than just another good classroom experience. They were hungry for something new and exciting, something that they could create that was truly meaningful. It was "an idea whose time had come" for them.

In addition, the chemistry was right. I felt that experiencing synergy was more powerful than talking about it, that producing something new was more meaningful than simply reading something old.

I've also experienced, as I believe most people have, times that were almost synergistic, times that hung on the edge of chaos and for some reason descended into it. Sadly, people who are burned by such experiences often begin their next new experience with that failure in mind. They defend themselves against it and cut themselves off from synergy.

It's like administrators who set up new rules and regulations based on the abuses of a few people inside an organization, thus limiting the freedom and creative possibilities for many—or business partners who imagine the worst scenarios possible and write them up in legal language, killing the whole spirit of creativity, enterprise, and synergistic possibility.

As I think back on many consulting and executive education experiences, I can say that the highlights were almost always synergistic. There was usually an early moment that required considerable courage, perhaps in becoming extremely authentic, in confronting some inside truth about the individual or the organization or the family which really needed to be said, but took a combination of considerable courage and genuine love to say it. Then others became more authentic, open, and honest, and the synergistic communication process began. It usually became more and more creative, and ended up in insights and plans that no one had anticipated initially.

As Carl Rogers taught, "That which is most personal is most general" The more authentic you become, the more genuine in your expression, particularly regarding personal experiences and even self-doubts, the more people can relate to your expression and the safer it makes them feel to express themselves. That expression in turn feeds back on the other person's spirit, and genuine creative empathy takes place, producing new insights and learnings and a sense of excitement and adventure that keeps the process going.

People then begin to interact with each other almost in half sentences, sometimes incoherent, but they get each other's meanings very rapidly. Then whole new worlds of insights, new perspectives, new paradigms that insure options, new alternatives are opened up and thought about. Though occasionally these new ideas are left up in the air, they usually come to some kind of closure that is practical and useful.

SYNERGY IN BUSINESS

I enjoyed one particularly meaningful synergistic experience as I worked with my associates to create the corporate mission statement for our business. Almost all members of the company went high up into the mountains where, surrounded by the magnificence of nature, we began with a first draft of what some of us considered to be an excellent mission statement.

At first the communication was respectful, careful and predictable. But as we began to talk about the various alternatives, possibilities and opportunities ahead, people became very open and authentic and simply started to think out loud. The mission statement agenda gave way to a collective free association, a spontaneous piggybacking of ideas. People were genuinely empathic as well as courageous, and we moved from mutual respect and understanding to creative synergistic communication.

Everyone could sense it. It was exciting. As it matured, we returned to the task of putting the evolved collective vision into words, each of which contains specific and committed-to meaning for each participant.

The resulting corporate mission statement reads:

> Our mission is to empower people and organizations to significantly increase their performance capability in order to achieve worthwhile purposes through understanding and living principle-centered leadership.

The synergistic process that led to the creation of our mission statement engraved it in the hearts and minds of everyone there, and it has served us well as a frame of reference of what we are about, as well as what we are not about.

Another high level synergy experience took place when I accepted an invitation to serve as the resource and discussion catalyst at the annual planning meeting of a large insurance company. Several months ahead, I met with the committee responsible to prepare for and stage the two-day meeting which was to involve all the top executives. They informed me that the traditional pattern was to identify four or five major issues through questionnaires and interviews, and to have alternative proposals presented by the executives. Past meetings had been generally respectful exchanges, occasionally deteriorating into defensive Win/Lose ego battles. They were usually predictable, uncreative, and boring.

As I talked with the committee members about the power of synergy, they could sense its potential. With considerable trepidation, they agreed to change the pattern. They requested various executives to prepare anonymous "white papers" on each of the high priority issues, and then asked all the executives to immerse themselves in these papers ahead of time in order to understand the issues and the differing points of view. They were to come to the meeting prepared to listen rather than to present, prepared to create and synergize rather than to defend and protect.

We spent the first half-day in the meeting teaching the principles and practicing the skills of Habits 4, 5 and 6. The rest of the time was spent in creative synergy.

The release of creative energy was incredible. Excitement replaced boredom. People became very open to each other's influence and generated new insights and options. By the end of the meeting an entirely new understanding of the nature of the central company challenge evolved. The white paper proposals became obsolete. Differences were valued and transcended. A new common vision began to form.

Once people have experienced real synergy, they are never quite the same again. They know the possibility of having other such mind-expanding adventures in the future.

Often attempts are made to recreate a particular synergistic experience, but this seldom can be done. However, the essential purpose behind creative work *can* be recaptured. Like the Far Eastern philosophy, "We seek not to imitate the masters, rather we seek what they sought," we seek not to imitate past creative synergistic experiences, rather we seek new ones around new and different and sometimes higher purposes.

SYNERGY AND COMMUNICATION

Synergy is exciting. Creativity is exciting. It's phenomenal what openness and communication can produce. The possibilities of truly significant gain, of significant improvement are so real that it's worth the risk such openness entails.

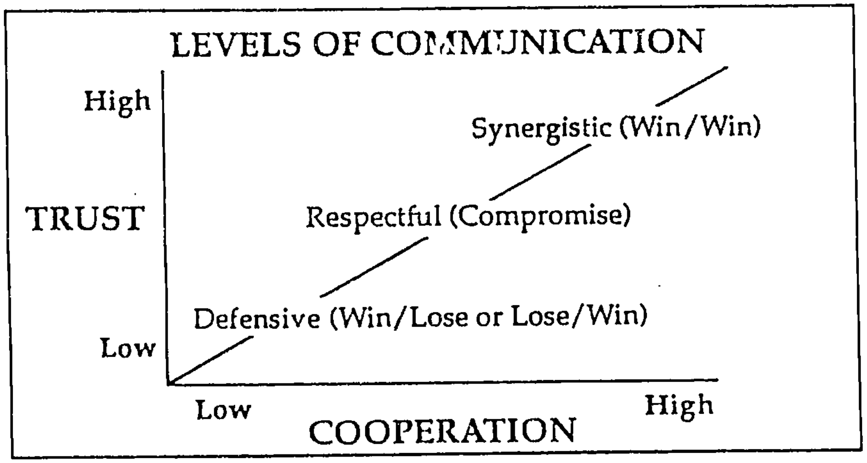
After World War II, the United States commissioned David Lilienthal to head the new Atomic Energy Commission. Lilienthal brought together a group of people who were highly influential—celebrities in their own right—disciples, as it were, of their own frames of reference.

This very diverse group of individuals had an extremely heavy agenda, and they were impatient to get at it. In addition, the press was pushing them.

But Lilienthal took several weeks to create a high Emotional Bank Account. He had these people get to know each other—their interests, their hopes, their goals, their concerns, their backgrounds, their frames of reference, their paradigms. He facilitated the kind of human interaction that creates a great bonding between people, and he was heavily criticized for taking the time to do it because it wasn't "efficient."

But the net result was that this group became closely knit together, very open with each other, very creative, and synergistic. The respect among the members of the commission was so high that if there was disagreement, instead of opposition and defense, there was a genuine effort to understand. The attitude was "If a person of your intelligence and competence and commitment disagrees with me, then there must be something to your disagreement that I don't understand, and I need to understand it. You have a perspective, a frame of reference I need to look at." Nonprotective interaction developed, and an unusual culture was born.

The following diagram illustrates how closely trust is related to different levels of communication.



The lowest level of communication coming out of low-trust situations would be characterized by defensiveness, protectiveness, and often legalistic language, which covers all the bases and spells out qualifiers and the escape clauses in the event things go sour. Such communication produces only Win/Lose or Lose/Lose. It isn't effective—there's no P/PC balance—and it creates further reasons to defend and protect.

The middle position is respectful communication. This is the level where fairly mature people interact. They have respect for each other, but they want to avoid the possibility of ugly confrontations, so they communicate politely but not empathically. They might understand each other intellectually, but they really don't deeply look at the paradigms and assumptions underlying their own positions and become open to new possibilities.

Respectful communication works in independent situations and even in interdependent situations, but the creative possibilities are not opened up. In interdependent situations compromise is the position usually taken. Compromise means that 1 + 1 = 1½. Both give and take. The communication isn't defensive or protective or angry or manipulative; it is honest and genuine and respectful. But it isn't creative or synergistic. It produces a low form of Win/Win.

Synergy means that 1 + 1 may equal 8, 16, or even 1,600. The synergistic position of high trust produces solutions better than any originally proposed, and all parties know it. Furthermore, they genuinely enjoy the creative enterprise. A miniculture is formed to satisfy in and of itself. Even if it is short lived, the P/PC balance is there.

There are some circumstances in which synergy may not be achievable and No Deal isn't viable. But even in these circumstances, the spirit of sincere trying will usually result in a more effective compromise.

FISHING FOR THE THIRD ALTERNATIVE

To get a better idea of how our level of communication affects our interdependent effectiveness, envision the following scenario:

It's vacation time, and a husband wants to take his family out to the lake country to enjoy camping and fishing. This is important to him; he's been planning it all year. He's made reservations at a cottage on the lake and arranged to rent a boat, and his sons are really excited about going.

His wife, however, wants to use the vacation time to visit her ailing mother some 250 miles away. She doesn't have the opportunity to see her very often, and this is important to her.

Their differences could be the cause of a major negative experience.

"The plans are set. The boys are excited. We should go on the fishing trip," he says.

"But we don't know how much longer my mother will be around, and I want to be by her," she replies. "This is our only opportunity to have enough time to do that."

"All year long we've looked forward to this one-week vacation. The boys would be miserable sitting around grandmother's house for a week. They'd drive everybody crazy. Besides, your mother's not that sick. And she has your sister less than a mile away to take care of her."

"She's my mother, too. I want to be with her."

"You could phone her every night. And we're planning to spend time with her at the Christmas family reunion. Remember?"

"That's not for five more months. We don't even know if she'll still be here by then. Besides, she needs me, and she wants me."

"She's being well taken care of. Besides, the boys and I need you, too."

"My mother is more important than fishing."

"Your husband and sons are more important than your mother."

As they disagree, back and forth, they finally may come up with some kind of compromise. They may decide to split up—he takes the boys fishing at the lake while she visits her mother. And they both feel guilty and unhappy. The boys sense it, and it affects their enjoyment of the vacation.

The husband may give in to his wife, but he does it grudgingly. And consciously or unconsciously, he produces evidence to fulfill his prophecy of how miserable the week will be for everyone.

The wife may give in to her husband, but she's withdrawn and overreactive to any new developments in her mother's health situation. If her mother were to become seriously ill and die, the husband could never forgive himself, and she couldn't forgive him either.

Whatever compromise they finally agree on, it could be rehearsed over the years as evidence of insensitivity, neglect, or a bad priority decision on either part. It could be a source of contention for years and could even polarize the family. Many marriages that once were beautiful and soft and spontaneous and loving have deteriorated to the level of a hostility through a series of incidents just like this.

The husband and wife see the situation differently. And that difference can polarize them, separate them, create wedges in the relationship. Or it can bring them closer together on a higher level. If they have cultivated the habits of effective interdependence, they

approach their differences from an entirely different paradigm. Their communication is on a higher level.

Because they have a high Emotional Bank Account, they have trust and open communication in their marriage. Because they think Win/Win, they believe in a third alternative, a solution that is mutually beneficial and is better than what either of them originally proposed. Because they listen empathically and seek first to understand, they create within themselves and between them a comprehensive picture of the values and the concerns that need to be taken into account in making a decision.

And the combination of those ingredients—the high Emotional Bank Account, thinking Win/Win, and seeking first to understand—creates the ideal environment for synergy.

Buddhism calls this "the middle way." *Middle* in this sense does not mean compromise; it means higher, like the apex of the triangle.

In searching for the "middle" or higher way, this husband and wife realize that their love, their relationship, is part of their synergy.

As they communicate, the husband really, deeply feels his wife's desire, her need to be with her mother. He understands how she wants to relieve her sister, who has had the primary responsibility for their mother's care. He understands that they really don't know how long she will be with them, and that she certainly is more important than fishing.

And the wife deeply understands her husband's desire to have the family together and to provide a great experience for the boys. She realizes the investment that has been made in lessons and equipment to prepare for this fishing vacation, and she feels the importance of creating good memories with them.

So they pool those desires. And they're not on opposite sides of the problem. They're together on one side, looking at the problem, understanding the needs, and working to create a third alternative that will meet them.

"Maybe we could arrange another time within the month for you to visit with your mother," he suggests. "I could take over the home responsibilities for the weekend and arrange for some help at the first of the week so that you could go. I know it's important to you to have that time.

"Or maybe we could locate a place to camp and fish that would be close to your mother. The area wouldn't be as nice, but we could still be outdoors and meet other needs as well. And the boys wouldn't be climbing the walls. We could even plan some recreational activities with the cousins, aunts, and uncles, which would be an added benefit."

They synergize. They communicate back and forth until they come up with a solution they both feel good about. It's better than the solutions either of them originally proposed. It's better than compromise. It's a synergistic solution that builds P and PC.

Instead of a transaction, it's a transformation. They get what they both really want and build their relationship in the process.

NEGATIVE SYNERGY

Seeking the third alternative is a major paradigm shift from the dichotomous, either/or mentality. But look at the difference in results!

How much negative energy is typically expended when people try to solve problems or make decisions in an interdependent reality? How much time is spent in confessing other people's sins, politicking, rivalry, interpersonal conflict, protecting one's backside, masterminding, and second guessing? It's like trying to drive down the road with one foot on the gas and the other foot on the brake!

And instead of getting a foot off the brake, most people give it more gas. They try to apply more pressure, more eloquence, more logical information to strengthen their position.

The problem is that highly dependent people are trying to succeed in an interdependent reality. They're either dependent on borrowing strength from position power and they go for Win/Lose, or they're dependent on being popular with others and they go for Lose/Win. They may talk Win/Win technique, but they don't really want to listen; they want to manipulate. And synergy can't thrive in that environment.

Insecure people think that all reality should be amenable to their paradigms. They have a high need to clone others, to mold them over into their own thinking. They don't realize that the very strength of the relationship is in having another point of view. Sameness is not oneness; uniformity is not unity. Unity, or oneness, is complementariness, not sameness. Sameness is uncreative . . . and boring. The essence of synergy is to value the differences.

I've come to believe that the key to interpersonal synergy is intrapersonal synergy, that is synergy within ourselves. The heart

of intrapersonal synergy is embodied in the principles in the first three habits, which give the internal security sufficient to handle the risks of being open and vulnerable. By internalizing those principles, we develop the abundance mentality of Win/Win and the authenticity of Habit 5.

One of the very practical results of being principle-centered is that it makes us whole—truly integrated. People who are scripted deeply in logical, verbal, left-brain thinking will discover how totally inadequate that thinking is in solving problems which require a great deal of creativity. They become aware and begin to open up a new script inside their right brain. It's not that the right brain wasn't there; it just lay dormant. The muscles had not been developed, or perhaps they had atrophied after early childhood because of the heavy left-brain emphasis of formal education or social scripting.

When a person has access to both the intuitive, creative, and visual right brain, and the analytical, logical, verbal left brain, then the whole brain is working. In other words, there is psychic synergy taking place in our own head. And this tool is best suited to the reality of what life is, because life is not just logical—it is also emotional.

One day I was presenting a seminar which I titled, "Manage from the Left, Lead from the Right" to a company in Orlando, Florida. During the break, the president of the company came up to me and said, "Stephen, this is intriguing. But I have been thinking about this material more in terms of its application to my marriage than to my business. My wife and I have a real communication problem. I wonder if you would have lunch with the two of us and just kind of watch how we talk to each other?"

"Let's do it," I replied.

As we sat down together, we exchanged a few pleasantries. Then this man turned to his wife and said, "Now, honey, I've invited Stephen to have lunch with us to see if he could help us in our communication with each other. I know you feel I should be a more sensitive, considerate husband. Could you give me something specific you think I ought to do?" His dominant left brain wanted facts, figures, specifics, parts.

"Well, as I've told you before, it's nothing specific. It's more of a general sense I have about priorities." Her dominant right brain was dealing with sensing and with the gestalt, the whole, the relationship between the parts.

"What do you mean, 'a general feeling about priorities'? What is

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it you want me to do? Give me something specific I can get a handle on."

"Well, it's just a feeling." Her right brain was dealing in images, intuitive feelings. "I just don't think our marriage is as important to you as you tell me it is."

"Well, what can I do to make it more important? Give me something concrete and specific to go on."

"It's hard to put into words."

At that point, he just rolled his eyes and looked at me as if to say, "Stephen, could you endure this kind of dumbness in your marriage?"

"It's just a feeling," she said, "a very strong feeling."

"Honey," he said to her, "that's your problem. And that's the problem with your mother. In fact, it's the problem with every woman I know."

Then he began to interrogate her as though it were some kind of legal deposition.

"Do you live where you want to live?"

"That's not it," she sighed. "That's not it at all."

"I know," he replied with a forced patience. "But since you won't tell me exactly what it is, I figure the best way to find out what it is is to find out what it is not. Do you live where you want to live?"

"I guess."

"Honey, Stephen's here for just a few minutes to try to help us. Just give a quick 'yes' or 'no' answer. Do you live where you want to live?"

"Yes."

"Okay. That's settled. Do you have the things you want to have?"

"Yes."

"All right. Do you do the things you want to do?"

This went on for a little while, and I could see I wasn't helping at all. So I intervened and said, "Is this kind of how it goes in your relationship?"

"Every day, Stephen," he replied.

"It's the story of our marriage," she sighed.

I looked at the two of them and the thought crossed my mind that they were two half-brained people living together. "Do you have any children?" I asked.

"Yes, two."

"Really?" I asked incredulously. "How did you do it?"

"What do you mean how did we do it?"

"You were synergistic!" I said. "One plus one usually equals two. But you made one plus one equal four. Now that's synergy. The whole is greater than the sum of the parts. So how did you do it?"

"You know how we did it," he replied.

"You must have valued the differences!" I exclaimed.

VALUING THE DIFFERENCES

Valuing the differences is the essence of synergy—the mental, the emotional, the psychological differences between people. And the key to valuing those differences is to realize that all people see the world, not as it is, but as they are.

If I think I see the world as it is, why would I want to value the differences? Why would I even want to bother with someone who's "off track"? My paradigm is that I am objective; I see the world as it is. Everyone else is buried by the minutia, but I see the larger picture. That's why they call me a supervisor—I have super vision.

If that's my paradigm, then I will never be effectively interdependent, or even effectively independent, for that matter. I will be limited by the paradigms of my own conditioning.

The person who is truly effective has the humility and reverence to recognize his own perceptual limitations and to appreciate the rich resources available through interaction with the hearts and minds of other human beings. That person values the differences because those differences add to his knowledge, to his understanding of reality. When we're left to our own experiences, we constantly suffer from a shortage of data.

Is it logical that two people can disagree and that both can be right? It's not logical: it's *psychological.* And it's very real. You see the young lady; I see the old woman. We're both looking at the same picture, and both of us are right. We see the same black lines, the same white spaces. But we interpret them differently because we've been conditioned to interpret them differently.

And unless we value the differences in our perceptions, unless we value each other and give credence to the possibility that we're both right, that life is not always a dichotomous either/or, that there are almost always third alternatives, we will never be able to transcend the limits of that conditioning.

All I may see is the old woman. But I realize that you see something else. And I value you. I value your perception. I want to understand.

So when I become aware of the difference in our perceptions, I say, "Good! You see it differently! Help me see what you see."

If two people have the same opinion, one is unnecessary. It's not going to do me any good at all to communicate with someone else who sees only the old woman also. I don't want to talk, to communicate, with someone who agrees with me; I want to communicate with you because you see it differently. I value that difference.

By doing that, I not only increase my own awareness; I also affirm you. I give you psychological air. I take my foot off the brake and release the negative energy you may have invested in defending a particular position. I create an environment for synergy.

The importance of valuing the difference is captured in an often quoted fable called "The Animal School," written by educator Dr. R. H. Reeves:

> Once upon a time, the animals decided they must do something heroic to meet the problems of a "New World," so they organized a school. They adopted an activity curriculum consisting of running, climbing, swimming and flying. To make it easier to administer, all animals took all the subjects.
>
> The duck was excellent in swimming, better in fact than his instructor, and made excellent grades in flying, but he was very poor in running. Since he was low in running he had to stay after school and also drop swimming to practice running. This was kept up until his web feet were badly worn and he was only average in swimming. But average was acceptable in school, so nobody worried about that except the duck.
>
> The rabbit started at the top of the class in running, but had a nervous breakdown because of so much makeup in swimming.
>
> The squirrel was excellent in climbing until he developed frustrations in the flying class where his teacher made him start from the ground up instead of from the tree-top down. He also developed charley horses from over-exertion and he got a C in climbing and a D in running.
>
> The eagle was a problem child and had to be disciplined severely. In climbing class he beat all the others to the top of the tree, but insisted on using his own way of getting there.
>
> At the end of the year, an abnormal eel that could swim exceedingly well and also could run, climb and fly a little had the highest average and was valedictorian.

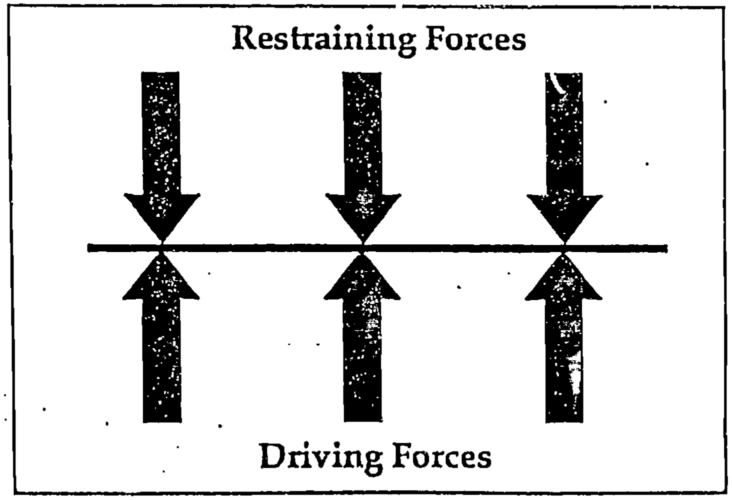
> The prairie dogs stayed out of school and fought the tax levy because the administration would not add digging and burrowing to the curriculum. They apprenticed their children to the badger and later joined the groundhogs and gophers to start a successful private school.

FORCE FIELD ANALYSIS

In an interdependent situation, synergy is particularly powerful in dealing with negative forces that work against growth and change.

Sociologist Kurt Lewin developed a "Force Field Analysis" model in which he described any current level of performance or being as a state of equilibrium between the driving forces that encourage upward movement and the restraining forces that discourage it.

Driving forces generally are positive, reasonable, logical, conscious, and economic. In juxtaposition, restraining forces are often negative, emotional, illogical, unconscious, and social/psychological. Both sets of forces are very real and must be taken into account in dealing with change.



In a family, for example, you have a certain "climate" in the home—a certain level of positive or negative interaction, of feeling safe or unsafe in expressing feelings or talking about concerns, of respect or disrespect in communication among family members.

You may really want to change that level. You may want to create a climate that is more positive, more respectful, more open and trusting. Your logical reasons for doing that are the driving forces that act to raise the level.

But increasing those driving forces is not enough. Your efforts are opposed by restraining forces—by the competitive spirit between children in the family, by the different scripting of home life you and your spouse have brought to the relationship, by habits that have developed in the family, by work or other demands on your time and energies.

Increasing the driving forces may bring results—for a while. But as long as the restraining forces are there, it becomes increasingly harder. It's like pushing against a spring: the harder you push, the harder it is to push until the force of the spring suddenly thrusts the level back down.

The resulting up and down, yo-yo effect causes you to feel, after several attempts, that people are "just the way they are" and that "it's too difficult to change."

But when you introduce synergy, you use the motive of Habit 4, the skill of Habit 5, and the interaction of Habit 6 to work directly on the restraining forces. You create an atmosphere in which it is safe to talk about these forces. You unfreeze them, loosen them up, and create new insights that actually transform those restraining forces into driving ones. You involve people in the problem, immerse them in it, so that they soak it in and feel it is their problem and they tend to become an important part of the solution.

As a result, new goals, shared goals, are created, and the whole enterprise moves upward, often in ways that no one could have anticipated. And the excitement contained within that movement creates a new culture. The people involved in it are enmeshed in each other's humanity and empowered by new, fresh thinking, by new creative alternatives and opportunities.

I've been involved several times in negotiations between people who were angry at each other and hired lawyers to defend their positions. And all that did was to exacerbate the problem because the interpersonal communication deteriorated as it went through the legal process. But the trust level was so low that the parties felt they had no other alternative than to take the issues to court.

"Would you be interested in going for a Win/Win solution that both parties feel really good about?" I would ask.

The response was usually affirmative, but most people didn't really think it was possible.

"If I can get the other party to agree, would you be willing to start the process of really communicating with each other?"

Again, the answer was usually "yes."

The results in almost every case have been astounding. Problems that had been legally and psychologically wrangled about for months have been settled in a matter of a few hours or days. Most of the solutions weren't the courthouse compromise solutions, either; they were synergistic, better than the solutions proposed independently by either party. And, in most cases, the relationships continued even though it had appeared in the beginning that the trust level was so low and the rupture in the relationship so large as to be almost irreparable.

At one of our development programs, an executive reported a situation where a manufacturer was being sued by a longtime industrial customer for lack of performance. Both parties felt totally justified in the rightness of their position and perceived each other as unethical and completely untrustworthy.

As they began to practice Habit 5, two things became clear. First, early communication problems resulted in a misunderstanding which was later exacerbated by accusations and counteraccusations. Second, both were initially acting in good faith and didn't like the cost and hassle of a legal fight, but saw no other way out.

Once these two things became clear, the spirit of Habits 4, 5, and 6 took over, the problem was rapidly resolved, and the relationship continues to prosper.

In another circumstance, I received an early morning phone call from a land developer desperately searching for help. The bank wanted to foreclose because he was not complying with the principal and interest payment schedule, and he was suing the bank to avoid the foreclosure. He needed additional funding to finish and market the land so that he could repay the bank, but the bank refused to provide additional funds until scheduled payments were met. It was a chicken and egg problem with undercapitalization.

In the meantime, the project was languishing. The streets were beginning to look like weed fields, and the owners of the few homes that had been built were up in arms as they saw their property values drop. The city was also upset over the "prime land" project falling behind schedule and becoming an eyesore. Tens of thousands of dollars in legal costs had already been spent by the bank and the developer and the case wasn't scheduled to come to court for several months.

In desperation, this developer reluctantly agreed to try the principles of Habits 4, 5, and 6. He arranged a meeting with even more reluctant bank officials.

The meeting started at 8 A.M. in one of the bank conference rooms. The tension and mistrust were palpable. The attorney for the bank had committed the bank officials to say nothing. They were only to listen and he alone would speak. He wanted nothing to happen that would compromise the bank's position in court.

For the first hour and a half, I taught Habits 4, 5, and 6. At 9:30 I went to the blackboard and wrote down the bank's concerns based on our prior understanding. Initially the bank officials said nothing, but the more we communicated Win/Win intentions and sought first to understand, the more they opened up to explain and clarify.

As they began to feel understood, the whole atmosphere changed and a sense of momentum, of excitement over the prospect of peacefully settling the problem was clearly evident. Over the attorney's objections the bank officials opened up even more, even about personal concerns. "When we walk out of here the first thing the bank president will say is, 'Did we get our money?' What are we going to say?"

By 11:00, the bank officers were still convinced of their rightness, but they felt understood and were no longer defensive and officious. At that point, they were sufficiently open to listen to the developer's concerns, which we wrote down on the other side of the blackboard. This resulted in deeper mutual understanding and a collective awareness of how poor early communication had resulted in misunderstanding and unrealistic expectations, and how continuous communication in a Win/Win spirit could have prevented the subsequent major problems from developing.

The shared sense of both chronic and acute pain combined with a sense of genuine progress kept everyone communicating. By noon, when the meeting was scheduled to end, the people were positive, creative, and synergistic and wanted to keep talking.

The very first recommendation made by the developer was seen as a beginning Win/Win approach by all. It was synergized on and improved, and at 12:45 P.M. the developer and the two bank officers left with a plan to present together to the Home Owners Association and the city. Despite subsequent complicating developments, the legal fight was aborted and the building project continued to a successful conclusion.

I am not suggesting that people should not use legal processes. Some situations absolutely require it. But I see it as a court of last, not first, resort. If it is used too early, even in a preventive sense, sometimes fear and the legal paradigm create subsequent thought and action processes that are not synergistic.

ALL NATURE IS SYNERGISTIC

Ecology is a word which basically describes the synergism in nature—everything is related to everything else. It's in the relationship that creative powers are maximized, just as the real power in these Seven Habits is in their relationship to each other, not just in the individual habits themselves.

The relationship of the parts is also the power in creating a synergistic culture inside a family or an organization. The more genuine the involvement, the more sincere and sustained the participation in analyzing and solving problems, the greater the release of everyone's creativity, and of their commitment to what they create. This, I'm convinced, is the essence of the power in the Japanese approach to business, which has changed the world marketplace.

Synergy works; it's a correct principle. It is the crowning achievement of all the previous habits. It is effectiveness in an interdependent reality—it is teamwork, team building, the development of unity and creativity with other human beings.

Although you cannot control the paradigms of others in an interdependent interaction or the synergistic process itself, a great deal of synergy is within your Circle of Influence.

Your own internal synergy is completely within the circle. You can respect both sides of your own nature—the analytical side and the creative side. You can value the difference between them and use that difference to catalyze creativity.

You can be synergistic within yourself even in the midst of a very adversarial environment. You don't have to take insults personally. You can sidestep negative energy; you can look for the good in others and utilize that good, as different as it may be, to improve your point of view and to enlarge your perspective.

You can exercise the courage in interdependent situations to be open, to express your ideas, your feelings, and your experiences in a way that will encourage other people to be open also.

You can value the difference in other people. When someone disagrees with you, you can say, "Good! You see it differently." You don't have to agree with them; you can simply affirm them. And you can seek to understand.

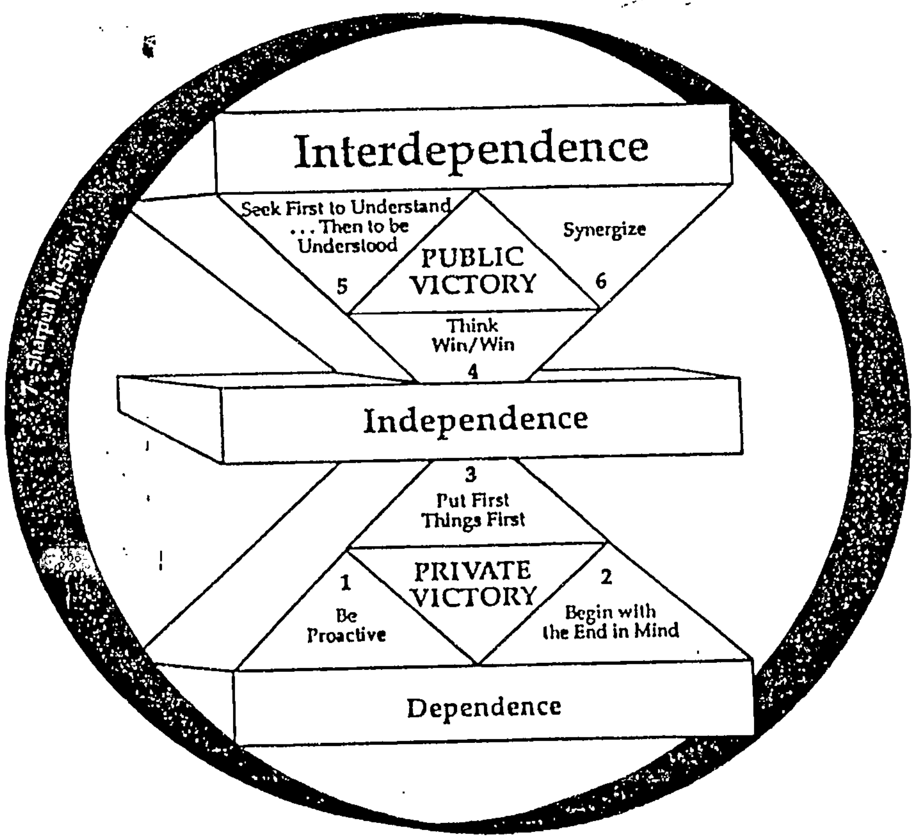
When you see only two alternatives—yours and the "wrong" one—you can look for a synergistic third alternative. There's almost always a third alternative, and if you work with a Win/Win philosophy and really seek to understand, you usually can find a solution that will be better for everyone concerned.

APPLICATION SUGGESTIONS:

1. Think about a person who typically sees things differently than you do. Consider ways in which those differences might be used as stepping-stones to third alternative solutions. Perhaps you could seek out his or her views on a current project or problem, valuing the different views you are likely to hear.
2. Make a list of people who irritate you. Do they represent different views that could lead to synergy if you had greater intrinsic security and valued the difference?
3. Identify a situation in which you desire greater teamwork and synergy. What conditions would need to exist to support synergy? What can you do to create those conditions?
4. The next time you have a disagreement or confrontation with someone, attempt to understand the concerns underlying that person's position. Address those concerns in a creative and mutually beneficial way.

Part Four

RENEWAL

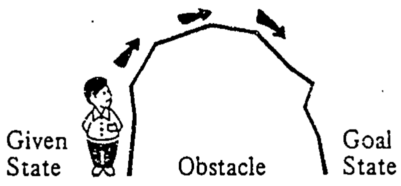

Interdependence
Seek First to Understand ... Then to be Understood
5
PUBLIC VICTORY
Synergize
6
Think Win/Win
4
Independence
3
Put First Things First
PRIVATE VICTORY
1
Be Proactive
2
Begin with the End in Mind
Dependence
7 Sharpen the Saw

For a situation to be a problem, it must be judged in relationship to an individual and a time. If a person is not interested in finding the prime numbers between 211 and 257, the situation is not a problem **for him**. Secondly, the individual must not know immediately how to proceed. The situation must be new to him, presenting some difficulty or obstacle which he must overcome.

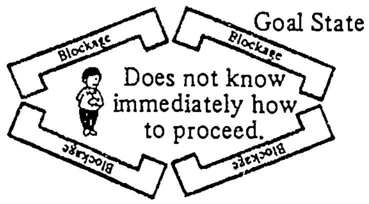
If he has encountered this kind of situation before, then it may not present a problem to him now. But it was a problem when he first confronted it. Therefore, a problem for one person now may not be a problem for that person tomorrow. And it may not be a problem today for someone else. He either knows how to overcome the problem situation or does not care about the solution.

The distinction involving blockage is an important one because many persons confuse a problem with an exercise or a task. For example, if I ask you to find 387 x 469 you are confronted with an exercise. You know immediately how to proceed. You have faced similar tasks before.

We may desire a given goal state, and it may require time and effort to achieve. But unless one is presented with the perplexing difficulty of not knowing immediately how to proceed, he is not confronting a problem by our definition.



EXERCISE OR TASK



PROBLEM

Problem Solving

In problem solving, you must therefore expect to be challenged by situations you have not met previously, to be unsure about how to start, to be unaware of how much time or effort will be required for solution. Consequently, your attitude plays an important role. You must desire the solution goal to subject yourself to this kind of dilemma. You must have confidence that the obstacles are within your capability to overcome. You must believe that your thinking and problem solving skills are adequate to begin an attack upon the problem.

AFFECTIVE CONSIDERATIONS TO PROBLEM SOLVING

- You must desire the solution
- You must feel that it is within your ability
- You must believe that you can begin an attack on the problem.

Of these three considerations, the first two are easier to achieve. For the third to occur, you must have: (a) experience in solving problems; and (b) an understanding (explicit or intuitive) of general steps or procedures that are usually productive in solving problems. We call these general procedures, *strategies*.

PROBLEM SOLVING STRATEGIES

Look for a pattern
Construct a table
Account for all possibilities (systematically)

Act it out
Make a model
Guess and check
Work backwards

Make a drawing, figure, or graph
Select appropriate notation
Restate the problem (in your own words)
Identify wanted, given, and needed information
Write an open sentence

Identify a subgoal
Solve a simpler (or similar) problem
Change your point of view
Check for hidden assumptions

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Traits Good Problem Solvers Usually Possess

- good estimation and analysis skills
- ability to perceive likenesses and differences
- reflective and creative thinking
- ability to visualize relationships
- strong understanding of concepts and terms
- ability to disregard irrelevant data
- capability to switch methods easily, but not impulsively
- ability to generalize on the basis of few examples
- ability to interpret quantitative data
- strong self-esteem
- low test anxiety

A common factor which many researchers cite as making an important contribution to problem solving development is the frequent opportunity to solve good quality problems which can be solved by children in a variety of ways.

Psychological Points and Teaching Implications

A number of eminent psychologists and expert problem solvers have studied and spoken on conditions affecting the development of problem solving ability. This section attempts to summarize some of the key points suggested by these authorities and to discuss implications for classroom instruction.

Jean Piaget and William Brownell

According to Piaget, problem solving growth is influenced by two sets of factors: (a) highly personal and narrowly individualistic perceptions associated with early childhood, and (b) social factors imposed on children which cause them to gradually substitute objective reality for subjective schemas, replacing illogical, personal mental processes with impersonal logical and rational thinking. Children are perceived as gradually passing from an egocentric to a socially aware thinking structure.

Prior to age seven or eight, reasoning is a mental experiment characterized by discontinuity, logical inconsistency, absolutism, juxtaposition, and syncretism. Until this age, Piaget's findings indicate that children find it difficult to solve problems wholly on a verbal basis and need to rely upon concrete materials which they can manipulate and associate with ideas in the problem. Not until the age of 11 or 12 does Piaget find children to be skillful in verbal problem solving and capable of adult kinds of reasoning.

Brownell, while supporting Piaget's description of how children develop power in problem solving, expands upon and modifies some of Piaget's findings. Brownell asserts that children at any age, not necessarily those older than seven or eight, are capable of solving problems suited to their experience, understanding, and behavior equipment. However, their processes may be largely nonverbal. In emphasizing the importance of problems being within the capabilities of children, Brownell cautions teachers against expecting too much of young children at verbal levels. "It is futile, perhaps dangerous, to ask children to solve problems which are beyond their powers or to solve problems by exclusively verbal processes before they can do so." [Brownell. 1942, p. 430]

Alluding to Piaget's levels of child development, Brownell emphasizes that these age levels are tentative and that children do not move from level to level in an all-or-none way. Children at any age may possess characteristics linked with several levels of thinking as they work with different kinds of problems. Moreover, Brownell questions the changes that occur in children's thinking structures as being the sole product of age differences. He suggests that increases in general experience and language facility may be just as important and that older children have merely had more opportunity for this development.

Turning to means to improve problem solving ability, Brownell criticizes a number of educational practices. He faults the step analysis techniques (1) "What is asked? What am I to find?" (2) "What is given? What do I know?" (3) "What process or processes should I use?" (4) "What is the probable answer?" He states that such an analysis does not necessarily characterize expert thinking by adults, and furthermore, that no research supports its being characteristic of good thinking by children. He further questions reliance on this technique to the possible exclusion of other essentials in problem solving such as facts, meanings, and understandings.

Total quality control is striving for quality in all aspects of an organization. It is not a program that can be bought and implemented. It is a philosophy, an approach to managing an organization.

TOTAL QUALITY CONTROL involves the TOTAL organization in sharing a commitment to provide QUALITY products and services by CONTROLling the processes of an organization. Several components are essential for any organization striving toward total quality control.

Notes:

Process Analysis: When employees treat each other as 'customers', quality products and service follow. Each worker should be aware of who his/her 'customer' is. This awareness leads to communication about the process flow and the quality of the product being forwarded down the line.

Notes:

Employee Empowerment: The total organization must be involved, the workers as well as management. Decisions should not just be mandated by the "powers that be"; instead, there should be involvement by all those that are affected. Quality circles, small group improvement activities, and team processes are examples of employee involvement. Fresh ideas come out of such groups because employees feel they are a part of the organization. This empowerment provides not only a sense of belonging and involvement, but also a sense of worth.

Notes:

Customer Commitment: Knowing what the customer wants is critical to an organization. Without customers, there is no business. An organization should continually be sensing its customers to provide the best possible product and/or service.

Notes:

Education/Training: In order to offer quality products and services, an organization must continuously improve. This continuous improvement comes about only through on-going education and training. The organization that does not consider continuous improvement as one of the critical

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THE CHANGE CHART

THE CRISIS STAGE
(STAGE I)

THE HARD WORK STAGE
(STAGE II)

THE TOUGH DECISION STAGE
(STAGE III)

THE UNEXPECTED PAIN STAGE
(STAGE IV)

THE JOY AND INTEGRATION STAGE
(STAGE V)

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THE CRISIS STAGE (STAGE 1)

The Crisis Stage forces change on you whether you want it or not, and whether or not you are prepared for it. Most of the time you aren't prepared for the event, and experience a substantial loss of control. The dramatic loss of control can create feelings of anxiety, fear, confusion and an array of self-critical complaints.

Crises come in many forms: divorce, unemployment, dealing with stepchildren, affairs, problems with a difficult boss, an unwanted pregnancy, illness, litigation, heavy debts, the kids growing up and leaving home for college, a second marriage, death of a spouse, a heart attack, the stress of relocating, war, etc.

Many crises are externally focused and developmental in nature (e.g. getting married, becoming a first-time parent, blending two families), yet all crises involve a sudden shift in how you see the world. As your external life is changed, you are called upon to change your internal belief systems in healthy ways to keep up (and the reverse).

Unfortunately, crises also can serve to reinforce old negative beliefs about yourself. In fact, bad outcomes often serve as "proof" of your failures and shortcomings which reinforce low self-esteem. Crisis events can be used as incontrovertible proof that you shouldn't try to change.

You can avoid many crises by continuing to grow and change during calm periods when you don't really need to. The more positive your attitude becomes, the more your external life is rearranged to match the template of your positive beliefs.

Heavy crises can make you feel like you are losing your mind. You aren't! The CRISIS STAGE is put under control quickly with brief psychotherapy.

Of course, many crises signal that work toward change has been neglected for too long.

SUMMARY OF THE CRISIS STAGE OF CHANGE

THE QUESTION:	"WHAT IS GOING ON HERE?"
ENERGY FOCUS:	FEAR OF BEING OVERWHELM BY FORCES BEYOND YOUR CONTROL.
GROWTH FOCUS:	OBSERVATION OF THE QUAL OF YOUR LIFE.
MENTAL NEEDS:	ANALYZING ALTERNATIVES.
EMOTIONAL NEEDS:	FOR CONTACT WITH SUPPORTIVE PEOPLE.
SKILLS:	TO THINK CLEARLY ABOUT HIGHLY CHARGED EMOTIO EVENTS.

The primary effect of a crisis is to get your attention your attention is riveted on a problem, your goal should b anything productive to resolve the problem.

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THE HARD WORK STAGE (STAGE II)

The hard work stage makes you roll up your sleeves and get down to doing the dirty work. You don't mind the extensive effort, however, as you are kept busy with interesting and challenging projects. You also gain from acquiring the discipline necessary to learn new skills.

High self-esteemers expect to work hard throughout their lifetimes. They don't like to go around with a chip on their shoulders, saying "Hey, that's me! Take it or leave it!" Nor do they say, "I'm not going to speak to you if you don't give me what I want. You owe me!" To them, hard work is enjoyable.

Goal setting means you break free from unhelpful dependencies, and of relationships that might be encouraging you to stay the same. Some of the very people who complained that you weren't growing enough will do their best to frustrate your further growth. Going back to your goals is a guaranteed way to remove nagging negative feelings.

Changing makes you value yourself and lay claim to your inner strengths instead of disowning them.

Most people aren't afraid of working hard. Still, you may balk at spending money or taking valuable time to learn the information you need. "I've got to be realistic not selfish," says it all. You may feel selfish about allocating limited resources to your own growth, even when your family backs you one hundred percent.

Change-experts keep their radar turned on high to pick up answers that seem to come out of nowhere. Their attitude: "Who or what might I bump into today to help me change?" Experts are walking human sponges who seek to soak up new advice, opportunities and trends.

Education can come from many available sources: libraries, old friends, taking community education classes, radio programs, reading the best works in a field or networking with experts; these are just a few of the ways to tap into the abundance of learning resources.

Do you get uptight just thinking about anger? Have you been trained to think of anger as a "bad" feeling? Healthy anger motivates hard work when nothing else works.

Anger Is a Helpful Emotion Not an Obnoxious Behavior: All right. Don't worry about getting stuck in angry energy. Anger can be your best friend when it is used wisely. Anger is caring energy meant to expand and protect your self-esteem.

Stuffing Anger Results in Depression or Self-Criticism: If you can't fantasize the destruction of your tormentor, are you being too rigid and taking angry energy out on your self or body instead? Quite likely. How caring and kind is that?

Since anger is a friend I want you to be able to:

- Gain, not lose, from situations that are frustrating.
- Think clearly about your anger.
- Feel intense anger without doing or saying something stupid you will regret.
- Be confident communicating your anger assertively in your important relationships.

Let's summarize what we've covered regarding the second stage of growth, Stage II: The Hard Work Stage.

SUMMARY OF THE HARD WORK STAGE OF CHANGE

THE QUESTION:	"WHAT HAVE I BEEN MISSING?"
ENERGY FOCUS:	TAKING CONTROL OF YOUR FUTURE HAPPINESS.
GROWTH FOCUS:	PREPARING FOR SIGNIFICANT CHANGE.
MENTAL NEEDS:	LEARNING QUICKLY FROM FAILURES.
EMOTIONAL NEEDS:	FOR CONTACT WITH CHALLENGING PEOPLE.
SKILLS:	TO LISTEN CAREFULLY TO GOOD ADVICE.

The hard work stage may take many months. Time flies as you are absorbed in learning new skills without being certain whether or not your efforts are going to pay off.

Skills are the tools to get what you want. The primary goal of hard work is to acquire the necessary tools to achieve your goals and thereby receive a richer variety of positive strokes.

THE TOUGH DECISION STAGE (STAGE III)

The Tough Decision Stage invites you to carefully weigh the pros and cons of difficult choices and make the choice that best suits your self-esteem and developmental needs.

Realistically, you stand to make both good and bad choices. However, you may have some trouble telling the difference between the two. Or you may procrastinate until a decision is forced on you. Sitting on the fence post doesn't work in this stage. You are forced to move forward and make new decisions or revert back to tired old habits.

Strangely, the best decision for you may be the one that makes you the most uncomfortable! Comfortable decisions are not always best for your self-esteem. In fact, just the reverse may be so. Uncomfortable decisions are often good for you.

Self-esteeming decisions require you to "grow down" and reach deep inside to grow beyond your current limitations. A good decision makes you take positive action in spite of your fears. Fear of the unknown, fear of failure, fear of commitment, fear of disapproval, fear of success and many other fears must be confronted.

Good decisions are based on your desires and goals and may or may not feel right. They require that you respect your life purpose. Good decisions demand practical and concrete results be returned for your efforts. Independent decisions make you grow and change instead of repeating your problems over and over again.

Is it any wonder then that good decisions are anxiety arousing? After all, as a result of the decision you are venturing into the unknown and trying out behaviors that you have never tried before. No one can predict what will happen! This is why good decisions take a great deal of guts.

Don't let the discomfort of the new stop you from taking action. Don't expect to feel comfortable the first few times you try a new behavior. Instead, bravely set your goal to experiment with the new and learn quickly from your mistakes.

SUMMARY OF THE TOUGH DECISION STAGE OF CHANGE

THE QUESTION:	"HOW CAN I HAVE WHAT MAKES ME FEEL GOOD?"
ENERGY FOCUS:	HOLDING ON, LETTING GO.
GROWTH FOCUS:	DECIDING FOR HAPPINESS.
MENTAL NEEDS:	TO MAKE GOOD CHOICES.
EMOTIONAL NEEDS:	TO BENEFIT FROM CONTROVERSY AND CONFLICT.
SKILLS:	TAKING POSITIVE ACTIONS IN SPITE OF FEAR.

The decision to go on and grow or to withdraw from the struggle and settle for the status quo is usually contemplated for

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THE UNEXPECTED PAIN STAGE (STAGE IV)

The unexpected pain stage is marked by fears of success that torpedo your self-esteem.

Be prepared for a depth charge! Surprising upsurges of panic, pain, disappointment, and disillusionment are a customary part of this stage since you are required to further refine and strengthen your identity.

Ambivalence reigns over your self-esteem. You will feel more successful and frustrated at the same time. You will experience trust and skepticism. You will become convinced that your changes are sinking into a dark abyss.

Since this post-decision stage is a mixed emotional bag (even though on the whole you feel much better), the unexpected pain entailed in this phase can make you back off from integrating your changes and making them final.

Realizing that this stage is a normal phase of changing should give you hope. Promise me you won't be shocked when you hit this stage – keep on going forward with your changes! Keep close track of your goals to be successful.

Each individual must painstakingly chisel out his or her personal definition of the word "success." Success may mean enjoying life, emotional self-control, understanding the opposite sex, starting a business or heightening sexuality to name a few.

The goal at this stage is to challenge yourself to choose success in spite of unexpected disappointments and difficulties.

SUMMARY OF THE UNEXPECTED PAIN STAGE

THE QUESTION:	"CAN I KEEP BEING SUCCESSFUL?"
ENERGY FOCUS:	AMBIVALENCE: HAPPY BUT DISAPPOINTED.
GROWTH FOCUS:	LIVING A GENUINE LIFE.
MENTAL NEEDS:	COMMITTING TOTALLY TO THE POSITIVE CHANGE.
EMOTIONAL NEEDS:	KIND CONFRONTATION OF FEARS OF SUCCESS.
SKILLS:	PRACTICE MASTERING NEGATIVE EMOTIONS.

The unexpected pain stage is where panic sets in and you wonder if you've committed yourself to the right course. Barricades are erected that block your success, and your hopes for success begin fading.

The purpose of this stage is to help you better sort out who you are, and how and why you are unique. Inner success fears that have up to now imposed a life sentence of undue compromise upon you are unmasked and conquered.

THE JOY AND INTEGRATION STAGE (STAGE V)

When your life is running along relatively smoothly, and you know exactly why it's going so well, you have probably arrived at the stage of Joy and Integration. From here on, you will be a different person.

Reviewing the route you took to arrive, you probably noticed that everything didn't go exactly according to plan. What you used to consider worthless now seems valuable, and what you used to think was quite grand doesn't seem to matter much.

Most important to you now are positive relationships with real people. You have learned to make warm attachments matter. You like being around people who like you for having the courage to be who you are.

Feeling happy isn't any big deal at this stage. Oh sure, you enjoy feelings of well-being, but you are not obsessed with having to feel any particular feeling in preference to any other "bad" feeling. You accept painful feelings as instructive, instead of something to be eliminated. You recognize that your growth-edge is sharpened when you feel alive inside.

Deep satisfaction occurs only when you live out your aspirations, live by your own values and choose to be who you really are. You realize that when you feel good about yourself, you feel more empathetic and tolerant of others. You don't settle for second best to put your self-esteem to the test.

You no longer demand that life be perfect or idyllic. You strive to learn as much as you can about the difficult game of life. You know the challenges of changing when you are stared down by the ugly face of fear.

Thankfulness: you stop a moment to gaze at a beautiful landscape, smile as a lovely woman or handsome man walks by, and you laugh broadly at the antics of a small child. Tear rivulets mark your face – you are alive!

Your relationships become more meaningful and simple. Most times they nourish, nurture and help you grow when you are holding yourself back. You surround yourself with people and possessions that reflect your identity. During unpredictable crises or periods of conflict you feel more in control.

SUMMARY OF THE JOY AND INTEGRATION STAGE

THE QUESTION:	"HOW MIGHT I SUCCEED EVEN MORE?"
ENERGY FOCUS:	RELAXED CONFIDENCE AND SELF-CONTROL.
GROWTH FOCUS:	HIGH SELF-ESTEEM.
MENTAL NEEDS:	ENJOYING GOOD HABITS.
EMOTIONAL NEEDS:	PEACEFUL EXCITEMENT IN RELATIONSHIPS.
SKILLS:	BEING THANKFUL FOR GOOD THINGS.

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Use Self-Control: Sharing complaints tries to give you a greater feeling of mastery over difficult situations that seem beyond your meager coping resources and control.

Change More Than You Complain: Complaining can make you feel more in charge of your destiny. So can changing.

2. RESTORE A SENSE OF COMPETENCE IN YOURSELF.

To Be Successful: Be good at what you do and use positive strokes to be a fast learner.

Value Self-Competence: You need to feel you are lovable and capable and can weather any relational or occupational setback with a little help from your friends.

Change More Than You Complain: Complaining can address grievances and increase hopefulness. So can changing.

3. REDUCE YOUR FEELINGS OF LONELINESS AND ALIENATION.

To Be Successful: Demand that you live an exciting life and contribute something to this world instead of being bored.

Encourage a Sense of Belonging: You need to feel you are not alone or rejected. Find ways to fit in and refuse to be bored or suffer in silence.

Change More Than You Complain: Complaining can reassure you that you are not drowning all alone in the ocean of life. So can changing.

4. ALLOW YOURSELF TO RECONNECT WITH IMPORTANT SOURCES OF LOVE.

To Be Successful: Stay attached, but when you detach due to resentment, try to reconnect as soon as you can.

Let Go of Resentments to Stay Attached: You need to resolve resentments, not dump your frustrations. Healthy complaining should be the first step in resolving tough problems.

Change More Than You Complain: Complaining can renew a sense of teamwork, family togetherness and intimacy. So can changing.

5. SAFELY RELEASE YOUR PENT-UP FRUSTRATIONS AND ANGER.

To Be Successful: To get out anger, physical activity and hard work is by far a better way than complaining.

Release Emotions Appropriately: Accumulated anger festers and tears down your self-esteem. Don't let anger come out in cutting remarks, a closed attitude or procrastination.

Change More Than You Complain: Complaining can erase the slate clean of festering resentments. So can changing.

6. IDENTIFY TOUGH CONFLICTS YOU NEED TO RESOLVE.

To Be Successful: Relationships without problems aren't real relationships. Don't let idealism rob you of real love.

Develop Insight: Harping about problems is meant to put needed pressure to bear on finding solutions to the problems. Listen carefully to complaints, and then brainstorm solutions to them.

Change More Than You Complain: Complaining can challenge you to be at your best. So can changing.

7. UNLOAD HURT FROM YOUR SELF-ESTEEM.

To Be Successful: Stay sensitive and vulnerable when you are hurt and don't wall yourself off from others. Expect a caring response.

Trade Hurt for Peace of Mind: There is usually a deep hurt that is hard to handle at the root of complaining. Crying is necessary to release hurt and should not be outlawed.

Change More Than You Complain: Complaining can open you up to emotional closeness and stronger attachment. So can changing.

Learn to change what gripes you the most.

Complaining about your work woes or love fiascoes is a culturally permissible avenue to get rid of anger, receive badly needed strokes and to try to improve your sagging self-esteem.

8. **Squelching the strengths that make you most lovable.**
9. **Engaging in a false sense of intimacy.**

Chronic complainers must face many negative consequences.

Negative change-attitudes will make you stay in situations that are bad for you, and inevitably make you give up hope and stop growing and changing. And what outlet will remain for you to reduce your frustrations?

Why, complaining, of course. You will complain to protest the unfairness of forfeiting your needs to the insanity of desperately needing to receive approval and avoid anger. Stand up for your right to enjoy your life even when you are feeling bad.

Learn to love your anger for a change.

To begin to conquer the bad habit of complaining, let's take stock of the benefits complaining tries to bring to your self-esteem.

POSITIVE ASPECTS OF COMPLAINING

Complaining has many positive intentions.

The primary positive intent of complaining is to obtain badly needed strokes and to restore lost human contact. When positive strokes aren't available though, which is frequently the case, the negative strokes of complaining come into play.

Be honest. Are you a habitual praiser or complainer? You must learn to value praising and receiving praise above complaining. After all, the secret to conquering the fear of success is to be able to openly and genuinely accept compliments.

Here is a summary of the benefits complainers hope will accrue to them. Your complaining seeks to:

1. INCREASE YOUR SENSE OF SELF-CONTROL.

To Be Successful: Know who and what you can and cannot control to feel more in charge.

BEST COPY AVAILABLE

The truth: You don't have sufficient experience or haven't been taught effective change strategies that are guaranteed to work across a wide variety of situations. In fact, you have been taught to resist both comfortable and uncomfortable changes alike. Change heralds both happiness and unexpected pain.

Accepting what you want from life isn't as easy as you might presume. My job is to teach you the necessary skills to become a change-expert, should you want to. I am going to give you an array of tips that can be used again and again throughout the many transitions of your life.

CHANGING NEGATIVE ATTITUDES

Changing old ways of thinking isn't easy, but it is necessary for building your self-esteem. "Bad" attitudes are lies told about your good character that interfere with the bigger challenge of self-acceptance.

Giving up before you begin, or quitting soon after you start, results from the rigid belief system that you are a static human being who can't transform into a different person. You are capable of change until the day you take your last breath. But why should you wait that long?

The two words most responsible for the maintenance of rigid attitudes are "I CAN'T." For example, "I can't change" is a belief that makes you feel like a victim, and dooms your efforts to achieve change.

Sticking to goals occurs when you determinedly declare: "I CAN TOO DO IT!" Replacing victim beliefs with this type of coping statement encourages new behaviors during the trying times of breaking difficult mental and physical habits.

Do you ever feel like giving up on tough new change projects? Do you ever succumb to the temptation of being self-critical? If so, find out which of these coping statements CAN help you out the most:

1. I CAN CHANGE TODAY.

To Achieve Self-Control: Keeping an open attitude to change forces you to make the best use of your time by living in the present. Go ahead and change despite your current age, life situation or length of time you have been practicing the negative attitude.

Work Daily On Your Self-Esteem: Experts believe it's never too late to change.

2. I CAN BE DIFFERENT.

To Achieve Self-Control: Interrupting bad mental habits means you cast off easy methods of anxiety-reduction, and throw away your security blankets. Change requires the courage to live in harmony with disruptive emotions.

Work Daily On Your Self-Esteem: Experts know that negative thinking is not a helpful way to deal with anger.

3. I CAN SEE MYSELF ACHIEVING THE GOAL.

To Achieve Self-Control: Use the power of imagination to visualize yourself moving toward your goal. Developing a positive attitude requires you to be alert to the hidden costs of staying the same.

Work Daily On Your Self-Esteem: Experts visualize a bright future of accomplishment in advance of the reality.

4. I CAN GET OVER ANY HURT.

To Achieve Self-Control: Risking success and real intimacy can bring out unresolved grief issues locked away deep in your mind. Take time to heal forgotten wounds, and assimilate the best traits of the lost person into your personality.

Work Daily On Your Self-Esteem: Experts do not let negative attitudes be an indirect expression of unresolved grief.

5. I CAN COPE WITH THE STRESS OF THE UNKNOWN.

To Achieve Self-Control: Switching from a bad situation to a good one turns on all of your body's senses, creative energies and self-actualization drives in unpredictable and profound ways.

Work Daily On Your Self-Esteem: Experts attempt to redefine anxiety as "the excitement of being fully alive."

6. I CAN HAVE WHAT I DESIRE.

To Achieve Self-Control: Peace of mind, grudge-free living and self-pride come from the hard work of having your dreams come true. High self-esteemers struggle with accepting the best of life's rewards.

Work Daily On Your Self-Esteem: Experts deal honestly with self-defeating guilt feelings.

7. I CAN FINISH WHAT I START.

To Achieve Self-Control: Procrastination applies to the reluctance to begin a change project, the ambivalence of continuing it or the resistance to follow-through on hard won wins.

Work Daily On Your Self-Esteem: Experts finish strong by taking lots of little steps in the right direction.

8. I CAN ASK FOR HELP WHEN I'M OVERWHELMED.

To Achieve Self-Control: Low self-esteem states happen every day to high self-esteemers. People who undergo dramatic change often feel like scared and vulnerable children again.

Work Daily On Your Self-Esteem: Experts know when hope is low; asking for help must take a high priority.

9. I CAN LEARN FROM MY MISTAKES.

To Achieve Self-Control: It is crucial for those of us who have been abused, or who have abused our own bodies, minds or relationships to forgive ourselves. Choose to learn something new from old failures to avoid repeating them.

Work Daily On Your Self-Esteem: Experts do not accept failure as the final decree.

10. I CAN LET MY BEST TRAITS COME OUT.

To Achieve Self-Control: Negative attitudes keep great talents hidden from view, and feelings of being bad and worthless running strong. Challenge yourself to be on friendly terms with your secret strengths, and use them as allies to master difficult tasks.

Work Daily On Your Self-Esteem: Experts keep stroking their strengths to succeed.

No, changing a negative attitude is not easy. But you can still get your changes right despite previous attempts that might have failed.

YOU CAN TOO CHOOSE new changes right now! And watch closely how your self-acceptance grows as you master negative emotions.

Permissions are another forceful way to fight frustrations. No, high self-esteem won't make your frustrations magically disappear, and it requires much more than just thinking positive messages. But they can give you hope when hope is hard to come by.

APPENDIX H

INDIVIDUAL

Your Personal Stress Management Program: A Workbook

Personal stressors

In the space below, make a list of the things that bother you in your *personal* life. Upon completing the list indicate which stressors can be eliminated or at least minimized and which ones are unlikely to be changeable.

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________

Organizational stressors

In the space below make a list of the things that bother you in your organization. Upon completing the list, indicate which stressors could be eliminated or at least minimized and which ones are unlikely to be changeable.

1. ______________________________
2 ______________________________
3 ______________________________
4 ______________________________
5 ______________________________

Three ways to raise productivity in your organization*

First Get the people in your organizational unit to identify what can be done about the stressors in the organization (see your earlier list) that hinder productivity because of the stress impact they have on everyone Some movement in a positive direction is possible for some of these stressors if a problem-solving approach is taken Don't spend time on the stressors that can't be changed, once you're sure they can't be

1 Organizational stressor ______________________________
Solution ______________________________
____

2 Organizational stressor ______________________________
Solution ______________________________
____

3 Organizational stressor ______________________________
Solution ______________________________
____

---

*Adapted from Jere E Yates, *Your Own Worst Enemy* (Santa Monica California Stephen Bosustow Productions 1978) p 12 A film on stress with the same title is distributed by Stephen Bosustow Productions

4. Organizational stressor: ______________________________
Solution: ______________________________
____

5. Organizational stressor: ______________________________
Solution: ______________________________
____

Second: Explore ways in which you may be pushing yourself and others beyond the stress threshold and thus lowering productivity.

1. Cause of stress overload: ______________________________
Solution: ______________________________
____

2. Cause of stress overload: ______________________________
Solution: ______________________________
____

3 Cause of stress overload: ______________________________
Solution: ______________________________
____

4. Cause of stress overload: ______________________________
Solution ______________________________
____

5 Cause of stress overload ______________________________
Solution ______________________________
____

Third: Explore ways in which you may be hindering productivity because you are not putting *enough* stress on yourself or on others. You may need to motivate people by raising performance expectations.

WHO (INCLUDING YOURSELF) AND WHAT NEEDS MORE STRESS?

1. ______________________________

____

2 ______________________________

____

3. ______________________________

____

4. ______________________________

____

(3)

Coping self-statements

Make up coping self-statements to calm you in the following situations. Three or four sentences for each category should be sufficient.

Preparing for a stressful situation ______________

____

____

Handling a stressful situation ______________

____

____

Coping with the feeling of being overwhelmed ______________

____

____

Reinforcing self-statements ______________

____

____

Stress reduction through systematic desensitization

Choose a stressful scene that you want to de-stress through systematic desensitization. Briefly describe this scene in space 10, then describe the events immediately leading up to it, in terms of increasing levels of stress, starting with the least stressful scene and proceeding step by step up the hierarchy until you get to the most stressful scene. (See Chapter 5.)

STRESS HIERARCHY

	Scene number	Scene description	Fear thermometer rating
Least stressful scene	0		(0°)
	1		(10°)
	2		(20°)
	3		(30°)
	4		(40°)
	5		(50°)
	6		(60°)
	7		(70°)
	8		(80°)
Most stressful scene	9		(90°)
	10		(100°)

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Clarifying your values: an exercise

1. According to your checkbook, what five things do you really value?

____

____

____

____

____

2 What would you do if you had one year to live and were guaranteed success in whatever you attempted?

____

____

____

3. What do you regard as your three greatest personal achievements?

____

____

____

4 What do you consider your own greatest personal failure?

____

____

____

5. What three words or qualities would you like to have closely identified with your name, now and after your death?

____

____

____

A physical fitness test

These exercises will give you some indication of your overall state of fitness. If you're under a doctor's care, don't attempt them without your doctor's consent. Stop if you feel overstressed. Do this exercise and then answer the questions with a "yes" or "no."

____1. When you pinch your waist, while standing, is the skin fold an inch or less?

____2. Can you hold a deep breath for 45 seconds?

____3. Is the difference between your chest full of air and your chest not full of air at least 3½ inches if you're a man and 2½ inches if you're a woman?

____4. Can you do 10 situps?

____5. Can you do 5 pushups without undue strain?

____6. Can you step up and down 20 times on a strong chair which is about 15 inches from the floor?

____7 While sitting on the floor with legs apart and hands clasped behind your head, can you lean forward and touch each elbow to the opposite knee without undue effort?

____8. Can you do 10 deep knee bends? (Omit this one if you have cartilage problems).

____9. After running in place for 3 minutes, lifting your feet up at least 4 inches off the floor, is your pulse under 120 beats a minute?

A "no" answer to any of these questions suggests that you are not as physically fit as you should be. If you struggled to complete some of the exercises, you may not be in overall good shape, either.

Source Adapted from Jack Tresidder (ed), *Feel Younger, Live Longer*, (Chicago Rand McNally, 1977), pp 112-113

Writing your own prescription*

After assessing your own ability to handle stress in your life, be your own doctor and write yourself a prescription indicating specifically what you are going to do to manage stress more effectively.

1. ______________________________
____
____

2. ______________________________
____
____

3. ______________________________
____
____

4. ______________________________
____
____

5. ______________________________
____
____

Signed ______________________

---

*Adapted from Jere E. Yates, *Your Own Worst Enemy* (Santa Monica, California: Stephen Bosustow Productions, 1978), p. 13

ERIC Full Text Provided by ERIC

Cognitive strategies

One of the main factors in determining your reaction to stressors is the cognitive process of perception. How you perceive or think about a particular stressor is all important. Therefore managing your thoughts is an effective means of reducing or equalizing stress. To say that stress is all in your mind is too simplistic: Stress is not just in the mind, but your mental efforts can help you minimize stress. The following discussion will focus on some of these cognitive strategies.

First, don't revert to simplistic thinking; rather, make your thinking as complex as possible. With excessive stress, strong feelings of arousal—even agitation—usually appear. As you become more upset, your thoughts tend to revert to a more primitive, simplistic state. "Tunnel vision" sets in; and you become oblivious to your environment. More sophisticated and complex ways of coping with a situation give way to primitive simplification. Instead of reverting to simplistic thinking, you need to keep your mind alert to other ways of interpreting what's happening to you.

(7)

Second, recognize that the stress will not last forever. When you're under tremendous stress, it's not uncommon to begin to think that it will never end. But if you have had enough experience, it will be helpful to recall that the acute stress of a certain time will diminish in magnitude and eventually vanish. You can also try to imagine what it will be like when the stressful situation is over. This method of thinking in the future perfect tense ("I shall have solved that problem") will help convince you that your current difficulties will end and may help you focus on ways of solving the problem so that you will be able to arrive at that point.

Third, keep your head in the midst of unsettling stressors. W. Timothy Gallwey uses the term "freak-out" to describe an upset mind.[8] Even though it may well describe a tennis player's reaction to a poor shot, it applies equally well to other situations in life when your mind is so upset (stressed) that you can't think clearly about what action to take. Action based on freaked-out thinking isn't usually very appropriate or effective. For example, when you're under a lot of pressure and are not feeling well, you get a time sheet back from your payroll department indicating an extremely minor error. As you investigate the reason for it, you have to deal on the phone with a clerk in the payroll department who has an insulting, disrespectful manner. Being freaked out, you march over to see her and insult her and criticize her poorly written note. You end up complying with her request, but also trying to match her insult for insult. This whole incident would get you no where and would damage future relations with your payroll people.

Typically, the reasons for freak-outs can be classified into three categories: dislike of a present situation (as above), regret about past events, and fear or uncertainty about the future. Let's look at what may happen when regret about a past event upsets your mind. You hire a secretary who quickly makes a disaster area of your office. You fire her, but as you do, you think to yourself, "I must be a terrible interviewer and judge of people." Before long, you are really down on yourself as you analyze the situation: "She was terrible. I should have spotted her weaknesses in the interview. I am an atrocious judge of people. And because being a good judge of people is such an important quality in an effective manager, I must be a lousy manager." You are probably way off base in your analysis, because that's what frequently happens when you freak out. In this case you're letting one mistake represent far too much, and you're failing to see the positive side: you did fire her when you realized your mistake. For after all, the ability to rectify mistakes is also a characteristic that effective managers possess. Yet it's the nature of freaked-out thinking that you don't see the whole picture clearly in perspective.

Now let's see what may happen when you are fearful or uncertain about the future. To illustrate future "freak out," let's carry the above example further. Now you're about to interview prospective applicants to replace the secretary. As you are about to begin an interview, the following thoughts run through your mind: "What if I blow it again by making another poor choice? What will my boss and my own staff think? I just can't afford to make a mistake this time. I'll never hear the end of it." It should be rather evident that this kind of thinking is certainly not going to help you in your selection process. The answer is to see that the problem is more in your mind than in the external situation—it's your reaction that counts. By keeping your head and remaining calm you'll be able to find the resources for dealing with the situation successfully.

Figure 7. The social readjustment rating scale.

Life Event	Mean Value
1. Death of Spouse	100
2. Divorce	73
3. Marital separation	65
4. Jail term	63
5. Death of close family member	63
6. Personal injury or illness	53
7. Marriage	50
8. Fired at work	47
9. Marital reconciliation	45
10. Retirement	45
11. Change in health of family member	44
12. Pregnancy	40
13. Sex difficulties	39
14. Gain of new family member	39
15. Business readjustment	39
16. Change in financial state	38
17. Death of close friend	37
18. Change to different line of work	36
19. Change in number of arguments with spouse	35
20. Mortgage over $10,000	31
21. Foreclosure of mortgage or loan	30
22. Change in responsibilities at work	29
23. Son or daughter leaving home	29
24. Trouble with in-laws	29
25. Outstanding personal achievement	28
26. Wife begin or stop work	26
27. Begin or end school	26
28. Change in living conditions	25
29. Revision of personal habits	24
30. Trouble with boss	23
31. Change in work hours or conditions	20
32. Change in residence	20
33. Change in schools	20
34. Change in recreation	19
35. Change in church activities	19
36. Change in social activities	18
37. Mortgage or loan less than $10,000	17
38. Change in sleeping habits	16
39. Change in number of family get-togethers	15
40. Change in eating habits	15
41. Vacation	13
42. Christmas	12
43. Minor violations of the law	11

Reprinted with permission from *Psychosomatic Research*, Volume 11, Thomas H. Holmes and R.H. Rahe, "The Social Readjustment Rating Scale." Copyright© 1967, Pergamon Press, Ltd.

≥ 150 points over the past year = higher health risks

Crucial to the process of desensitization is your ability to construct a "stress hierarchy," consisting of a series of scenes that progressively lead up to your highest point of stress. For example, you decide to go over the head of your boss to the CEO of your company to demand that he fire your boss because of gross incompetence. To say the least, such a situation could be very risky for you, because he just may fire you if you're not convincing enough. In constructing your "stress hierarchy," the actual moment with your CEO when you reveal your bold idea would constitute the moment of highest stress. Let's say that on a stress thermometer (if there were such a gadget) this moment would register 100 degrees. Once you know what the 100 degree situation would be, reconstruct the events leading up to it according to their degrees on the stress thermometer. It might appear as follows:

Least stressful scene	0. Sitting quietly in my office (0°)
	1. Making the appointment with my CEO (10°)
	2. Waking up the morning of my appointment (20°)
	3. Going to work the morning of my appointment (30°)
	4. Planning my exact words (40°)
	5. Walking over to the CEO's office (50°)
	6. Sitting in the CEO's outer office (60°)
	7. Being told I can enter the office (70°)
	8. Walking into the CEO's office (80°)
	9. Small talk with the CEO (90°)
Most stressful scene	10. Telling the CEO my idea (100°)

When you begin systematic desensitization, you should be as relaxed as possible (the next chapter deals with relaxation techniques). Imagine the least stressful scene in your hierarchy for 15 seconds and then relax as you cease your imagining. Relax by imagining yourself in a setting that is very comfortable for you, such as the beach. Then imagine the next scene for 15 seconds as you remain relaxed. Repeat this process all the way up your stress hierarchy, being careful to monitor the tension in your body. If you find that you're getting tense while imagining a certain scene, stop and retreat to that comfortable picture in your mind. You may have to go back and work at staying relaxed while thinking of a less stressful scene. Go further up the hierarchy only when you know you are capable of staying relaxed. The ultimate aim would be to remain calm while imagining the most stressful scene.

At that point the stress will have been counterconditioned and replaced by feelings of relaxation, and you will discover that there is a transfer effect: Desensitizing yourself to a stressful situation carries over and will enable you to remain calmer and under less stress when you really do face the actual experience itself. (Consult the appropriate section of the workbook to create your own "stress hierarchy.")

APPENDIX I

BRAIN

POSSIBLE BRAIN HEMISPHERIC DIFFERENCES

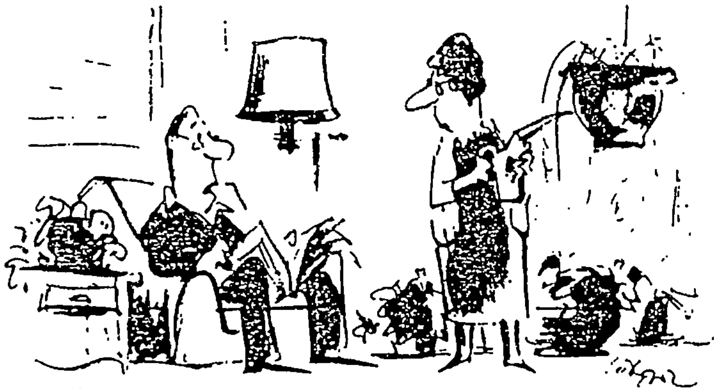
LEFT	RIGHT
•aware of detail	•looks at whole
•learns in sequence/order	•learns all at once (simultaneous)
•splits the world into parts with proper names	•connects the world by relationships & related wholes
•logical in sequential/cause & effect thinking	•sees resemblances/ analogic thinking
•responds to "factual" info	•responds to feeling states
•linear thinking	•may think in images
•grammatically strings words together	•sees words as images or sentences as a single unit
•notices differences; distinction important	•open-ended ideas; organizes in clusters
•knows what, who, when, where	•knows why, how
•uses few words to communicate lots of meaning	•uses many words to "paint" oral pictures
•responds well to schedules	•responds to "natural" time well; may awake without alarm
•objective	•intuitive; does not know how one knows
•eyes tend to tract L - R	•eyes tend to tract R - L
•listens to auditory detail/phonics	•listens to auditory patterns of rhythm and ups and downs (modulations)

PERSONAL LEARNING PROFILE

	LEFT	RIGHT
Eye		✓
Ear lobe		✓
Shoulder	✓	
Smile		
Foot		✓
Handedness		✓
Writing		✓
Dominant Eye		✓

The above information gives some clues as to how our brains may be processing information. Those people who are predominant "right-sided" may show language and processing preferences for the left hemisphere abilities while the opposite is true of the predominantly "left-sided" profile. A mixed profile may indicate an ability to move between the hemispheres more easily, and hopefully, in a controlled manner.Cross lateral, or a mixed profile, people often show improved physical and mental abilities from regular exercising with cross lateral movements and with their eyes closed.

This information provides another method for learning to observe ourselves, appreciate who we are, and then set goals for improvement.



"It's finally happening, Helen. The hemispheres of my brain are drifting apart."

Drawing by Lorenz;
© 1980 The New Yorker Magazine, Inc.

experience a thrust to an opposite brain-style because of changing responsibilities and opportunities and because of the body's innate need for balance (homeostasis).

3. Whichever your dominance or preference, you still use both sides of your brain and shift them, depending upon the skills needed and your particular brain organization.
4. Lateralization is the degree to which brain functions are performed in the task-appropriate hemisphere (balancing the checkbook in the left and recalling a loved one's face in the right). Highly lateralized individuals move more completely into the task-appropriate hemisphere (the usual case with males), while less lateralized persons (the usual case with females) will perform a task in both hemispheres.

In the next chapter, you'll discover which, if either, brain-style you prefer and how this preference affects your behavior.

2

Knowing Yourself —Right or Left

> What lies behind us and what lies before us are small matters compared to what lies within us.
>
> —Ralph Waldo Emerson

The ideas behind split-brain research will be of much greater value when you can translate them into personal terms. Without further ado, you are invited to take the following test to determine your hemispheric dominance.

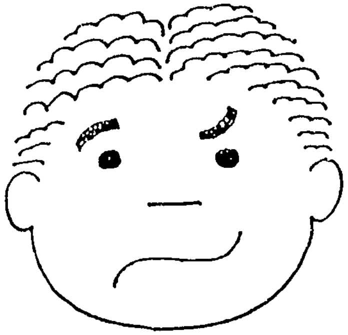
Please do not analyze the questions. Answer them quickly, checking the answer that first feels right to you. When there are multiple choices, select the one that most closely represents your attitude or behavior.

Brain Preference Indicator Test

1. In a problem-solving situation, do you:
    a. ___ take a walk and mull solutions over, then discuss them?
    b. ___ think about, write down all alternatives, arrange them according to priorities, and then pick the best?
    c. ___ recall past experiences that were successful and implement them?
    d. ___ wait to see if the situation will right itself?

2. Daydreaming is:
   a. ___ a waste of time
   b. ___ amusing and relaxing
   c. ___ a real help in problem-solving and creative thinking
   d. ___ a viable tool for planning my future

3. Glance quickly at this picture.



Was the face smiling?
a. yes ___ b. no ___

4. Concerning hunches:
   a. ___ I frequently have strong ones and follow them
   b. ___ I have strong hunches but don't consciously follow them
   c. ___ I occasionally have hunches but don't place much faith in them
   d. ___ I would not rely on hunches to help me make important decisions

5. In thinking about the activities of your day, which is most typical of your "style"?
   a. ___ I make a list of all the things I need to do, people to see
   b. ___ I picture the places I will go, people I'll see, things I'll do
   c. ___ I just let it happen
   d. ___ I plan the day's schedule, blocking out appropriate times for each item or activity

6. Do you usually have a place for everything, a system for doing things, and an ability to organize information and materials?
   a. ___ yes b. ___ no

7. Do you like to move your furniture, change the decor of your home or office frequently?
   a. ___ yes b. ___ no

8. Please check which of these activities you enjoy:
   ___ swimming
   ___ tennis
   ___ golf
   ___ camping/hiking
   ___ skiing
   ___ fishing
   ___ singing
   ___ gardening
   ___ playing instrument
   ___ home improvements
   ___ sewing
   ___ reading
   ___ arts/crafts
   ___ cooking
   ___ photography
   ___ doing nothing
   ___ travel
   ___ bicycling
   ___ collecting
   ___ writing
   ___ chess
   ___ bridge
   ___ roulette
   ___ charades
   ___ dancing
   ___ walking
   ___ running
   ___ hugging
   ___ kissing
   ___ touching
   ___ chatting
   ___ debating

9. Do you learn athletics and dancing better by:
   a. ___ imitating, getting the feel of the music or game?
   b. ___ learning the sequence and repeating the steps mentally?

10. In sports or performing in public do you often perform better than your training and natural abilities warrant?
    a. ___ yes b. ___ no

11. Do you express yourself well verbally?
    a. ___ yes b. ___ no

12. Are you goal-oriented?
    a. ___ yes b. ___ no

13. When you want to remember directions, a name, or a news item, do you:
    a. ___ visualize the information?
    b. ___ write notes?

c. ____ verbalize it (repeat it to yourself or out loud)?
d. ____ associate it with previous information?

14. Do you remember faces easily?
a. ____ yes b. ____ no

15. In the use of language, do you:
a. ____ make up words?
b. ____ devise rhymes and incorporate metaphors?
c. ____ choose exact, precise terms?

16. In a communication situation, are you more comfortable being the:
a. ____ listener? b. ____ talker?

17. When you are asked to speak extemporaneously at a meeting, do you:
a. ____ make a quick outline?
b. ____ just start talking?
c. ____ shift the focus to someone else or say as little as possible?
d. ____ speak slowly and carefully?

18. In an argument, do you tend to:
a. ____ talk until your point is made?
b. ____ find an authority to support your point?
c. ____ just become withdrawn?
d. ____ push chair or table, pound table, talk louder—yell?

19. Can you tell fairly accurately how much time has passed without looking at your watch?
a. ____ yes b. ____ no

20. Do you prefer social situations that are:
a. ____ planned in advance?
b. ____ spontaneous?

21. In preparing yourself for a new or difficult task, do you:
a. ____ visualize yourself accomplishing it effectively?
b. ____ recall past successes in similar situations?
c. ____ prepare extensive data regarding the task?

22. Do you prefer working alone or in a group?
a. ____ alone b. ____ group

23. When it comes to "bending the rules" or altering company policy, do you feel:

a. ____ rules and policy are to be followed?
b. ____ progress comes through challenging the structure?
c. ____ rules are made to be broken?

24. In school, did you prefer:
a. ____ algebra? b. ____ geometry?

25. Which of these handwriting positions most closely resembles yours?
a. ____ regular right-hand position
b. ____ hooked right-hand position (fingers pointing toward your chest)
c. ____ regular left-hand position
d. ____ hooked left-hand position (fingers pointing toward your chest)

26. In notetaking, do you print:
a. ____ never? b. ____ frequently?

27. Do you use gestures to
a. ____ emphasize a point?
b. ____ express your feelings?

28. Do you instinctively *feel* an issue is right or correct, or do you *decide* on the basis of information?
a. ____ feel b. ____ decide

29. I enjoy taking risks.
a. ____ yes b. ____ no

30. After attending a musical:
a. ____ I can hum many parts of the score.
b. ____ I can recall many of the lyrics

31. Please hold a pencil perpendicularly to the ground at arm's length, centered in your line of vision and lined up with a frame, board, or door. Holding that position, close your left eye. Did your pencil appear to move?
a. ____ yes

Close your right eye. Did your pencil appear to move?
b. ____ yes

32. Sit in a relaxed position and clasp your hands comfortably in your lap.

Which thumb is on top?
a. ____ left b. ____ right c. ____ parallel

33. Check as many of these items as you feel are true about you:
- ___ I can extract meaning from contracts, instruction manuals, and legal documents
- ___ I can understand schematics and diagrams
- ___ I strongly visualize the characters, setting, and plot of reading material
- ___ I prefer that friends phone in advance of their visits
- ___ I dislike chatting on the phone
- ___ I find it satisfying to plan and arrange the details of a trip
- ___ I postpone making telephone calls
- ___ I can easily find words in a dictionary, names in a phone book
- ___ I love puns
- ___ I take lots of notes at meetings and lectures
- ___ I freeze when I need to operate mechanical things under stress
- ___ Ideas frequently come to me out of nowhere

34. I have:
a. ___ frequent mood changes
b. ___ almost no mood changes

35. I am:
a. ___ not very conscious of body language. I prefer to listen to what people say
b. ___ good at interpreting body language
c. ___ good at understanding what people say and also the body language they use

36. How many boxes did you check for Chapter 1? ___

Here's the scoring key to the self-test. List the numbers of each answer you checked.

1. a. 7
   b. 1
   c. 3
   d. 9

2. a. 1
   b. 5
   c. 7
   d. 9

(7)

3. a. 3
   b. 7

4. a. 9
   b. 7
   c. 3
   d. 1

5. a. 1
   b. 7
   c. 9
   d. 3

6. a. 1
   b. 9

7. a. 9
   b. 1

8.

swimming	9	travel	5
tennis	4	bicycling	8
golf	4	collecting	1
camping/hiking	7	writing	2
skiing	7	chess	2
fishing	8	bridge	2
singing	3	roulette	7
gardening	5	charades	5
playing instrument	4	dancing	7
home improvements	3	walking	8
sewing	3	running	8
reading	3	hugging	9
arts/crafts	5	kissing	9
cooking	5	touching	9
photography	3	chatting	4
doing nothing	9	debating	2

9. a. 9
   b. 1

10. a. 9
    b. 1

11. a. 1
    b. 7

12. a. 1
    b. 9

13. a. 9
b. 1
c. 3
d. 5

14. a. 7
b. 1

15. a. 9
b. 5
c. 1

16. a. 6
b. 3

17. a. 1
b. 6
c. 9
d. 4

18. a. 3
b. 1
c. 7
d. 9

19. a. 1
b. 9

20. a. 1
b. 9

21. a. 9
b. 5
c. 1

22. a. 3
b. 7

23. a. 1
b. 5
c. 9

24. a. algebra 1
b. geometry 9

25. a. 1
b. 7
c. 9
d. 3

26. a. 1
b. 9

27. a. 2
b. 8

28. a. 9
b. 1

29. a. 7
b. 3

30. a. 9
b. 1

31. a. 8
b. 2

32. a. 1
b. 9
c. 5

33. 1 contracts
7 schematics
9 visualize
2 advance
3 chatting
1 plan trip
7 postpone
1 find words
3 puns
1 notes
3 freeze
9 nowhere

34. a. 9
b. 1

35. a. 1
b. 7
c. 5

36. Score as follows:
9 a. if you read 0 to 1 boxes all the way through
5 b. if you read 2 to 5 boxes all the way through
1 c. if you read 6 to 8 boxes all the way through

Now add the number of points you scored and divide the total by the number of answers you checked. (This latter number will vary

Brain Dominance

The hypothesis of a study at the Biofeedback Institute of Denver was that researchers could predict a subject's brain dominance by choice of occupation. For example, it was assumed that lawyers, mathematicians and accountants would be left dominants because these occupations require logical, sequential skills. Musicians, athletes and artists were expected to be right dominants, since these occupations require visuospatial, artistic talents. Therefore, subjects were limited to those occupations.

The EEG or electroencephalogram test involved attaching electrodes to the left and right sides of the head, on three locations for each side. These measured the electrical emissions from the brain's two sides, while mental tasks were assigned by the tester. When output varies between hemispheres it can be determined which hemisphere is in dominance and the degree of that dominance. Half the tasks were right-brained (listening to music, visualizing) and half were left-brained (counting out loud backward, defending a point of view). More than four hundred persons were tested in this manner.

Individuals in occupations involving highly structured procedures (accountants, chemists) were clearly left dominants, while those in work with less structure (athletes, painters) were right dominants. Furthermore, within specific occupations distinctions were noted; lawyers who practiced corporate and contract law were more left-brained than those who were in domestic and criminal law. Classical musicians were left dominants (most likely because of the discipline of their studies), while rock musicians were right dominants.[8]

among testors, since questions 8 and 33 have a large number of parts.) For example: if your points totaled 300 in 40 answers, your Brain Preference Indicator (BPI) would be 7.5.

Find your number on this continuum:

Left ______________________________ Right
1 3 5 7 9

The questions in this self-test cover the most salient differences between dominant rights and lefts. The questions have been posed to individuals who also underwent an EEG dominance test at the Biofeedback Institute of Denver. (See **Brain Dominance.**) In its final form, the self-test has been given to more than five hundred people in the Wonder seminars. The results of the self-test and the lab test correlated.

Your Brain Preference Indicator (BPI) indicates a general thought style that results in a consistent pattern of behavior in all areas of your life. Recognizing and understanding the components of this pattern allow you to develop alternative approaches where needed. To help you interpret your BPI, an analysis of each question or related questions follows.

Questions 1 and 5

The left-dominant person is more apt to solve a problem by following an organized approach: defining the problem, researching and recording possible solutions, eliminating impossible solutions, assigning priorities to the most viable, and then implementing the plan. The extreme dominant right will wait to see what happens. The other two answers describe moderate degrees. Moderate rights will get a feel for what will work and need frequent support from others. The moderate left will check the record and repeat strategies that were previously successful.

Questions 2 and 4

These are attitudinal questions. Extreme and moderate rights typically place their trust in daydreaming and hunches, while lefts find such things as intuition entertaining at most.

Question 3

Dominant lefts are usually "right-eyed" and first look at the left side of the paper. Therefore they see the downturned side of the mouth in the test picture.

◆ ◆ ◆ ◆

methods closely and clarify how you might follow a grouper or a stringer strategy.

◆ ◆ ◆ ◆

Groupers. You prefer to take a broad view of any subject under study You like to search out general principles rather than meticulous details and to relate one topic to as many other areas of knowledge as possible. You are quick to find relationships and to draw parallels among different areas of study.

Because of this learning style, groupers learn most easily and effectively in unstructured situations and do less well if knowledge is presented according to some rigid plan. Because you are able to bring together a wide range of information, you are likely to prove more successful than stringers when an eclectic approach is used.

Very little current teaching is presented in this way. Lesson plans, textbooks, and training schemes, whether in the factory, university, or classroom, are usually designed in a systematic, step-by-step manner that favors stringers. This approach works to the disadvantage of groupers, who prefer to come to grips with overall principles before getting down to the finer details of a topic.

Jump right into the subject you want to study. Go to the library and skim through several books and magazines that look interesting. Feel free to explore several aspects or topics simultaneously. Don't worry about not being systematic, of not mastering the fundamentals first in order to have a solid foundation. You're not building a house; you're creating a rich configuration of facts and concepts that your mind will delight in connecting.

As a grouper, you should keep an eye open for *big ideas, basic concepts,* and *organizing principles.* But as you do this, keep a separate list of the detailed parts of the subject that you will want to master later. This is a necessary aspect of learning, although you can keep it on the back burner when you're starting out. As long as you have your list, you're not likely to get anxious about having too many principles but not enough practical techniques.

Stringers. A systematic, methodical approach best suits you, because you learn most successfully by mastering specific details before moving to more general concepts.

Your best approach is to establish a series of clearly defined goals that allow knowledge to be accumulated gradually. Only facts directly related to the topic under study should be considered, while less relevant information, no matter how interesting, can temporarily be ignored. Stringers tend to achieve good grades in college, because the highly structured nature of most academic work favors their particular style of learning.

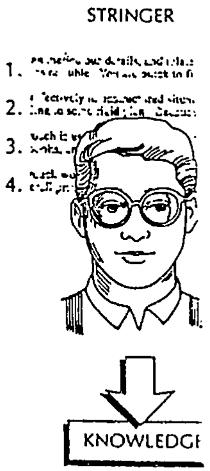
Devote the initial portion of your time to developing a firmly structured plan with which you feel comfortable. Don't worry about taking all the time you need with this: you will more than make up for it once you get started, because you will have the confidence of a detailed road map for your study.

Consult the tables of contents of several good books in your field of study, so that you can define the scope and priorities in that field. Having acquired a rough map of the entire terrain, select those topics you want to master and arrange them in a sensible order.

As a stringer, you should learn about each subtopic fully before proceeding to the next. You will thrive on a feeling of mastery of each segment and on the cumulative sense of building solidly on the subject as a whole.

What should you do if a learning situation prevents you from using your preferred style? You may be a grouper who prefers to start with the big picture but are in a language course in which you're required to master vocabulary, word by word by word. Or suppose you're a stringer looking for a clear and methodical introduction to art, but your course takes lots of field trips to museums to view and discuss various paintings from many time periods. There are four things you can do.

First, check out whether an alternative arrangement can be made for learning what you want to learn. From our experience in school and college we are all conditioned to accept too readily that the class, course, or program we're in is not something we can control. But as an adult who's in the market for learning, you are much freer to pick and choose. Moreover



might consider taking a basic accounting course from a local business college. But her first step is planning her campaign.

Joe learns differently. When he wants to master a new style of cooking, for example, he steers clear of courses and plans. Instead he goes to restaurants, talks to the waiters or cooks, and tastes a variety of dishes. Then he picks up a cookbook and, after a few experiments, gains a sense of what tastes go together and how much preparation is needed. That's when he starts improvising his own recipes.

The following exercise, developed by David Lewis and James Greene of the Mind Potential Study Group in London, will reveal a basic aspect of your personal learning style. You will find out whether you prefer to tackle new topics from the bottom up, laying a solid foundation first, or from the top down, gaining an overall perspective before filling in the details. Then you will learn how to use this knowledge to design your approach to any learning task.

◆ ◆ ◆ ◆

Are You a Grouper or a Stringer?

Check the phrase in each pair that corresponds more closely to your preferred approach to learning. There are no right or wrongs ways to complete these statements; they're designed simply to distinguish your preferences

When studying one unfamiliar subject, you
- ____ (a) prefer to gather information from diverse topic areas.
- ____ (b) prefer to focus on one topic.

You would rather
- ____ (a) know a little about a great many subjects.
- ____ (b) become an expert on just one subject.

When studying from a textbook, you
- ____ (a) skip ahead and read chapters of special interest out of sequence.
- ____ (b) work systematically from one chapter to the next, not moving on until you have understood earlier material.

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When asking people for information about some subject of interest, you
- ____ (a) tend to ask broad questions that call for rather general answers.
- ____ (b) tend to ask narrow questions that demand specific answers.

When browsing in a library or bookstore, you
- ____ (a) roam around looking at books on many different subjects.
- ____ (b) stay more or less in one place, looking at books on just a couple of subjects.

You are best at remembering
- ____ (a) general principles.
- ____ (b) specific facts.

When performing some tasks, you
- ____ (a) like to have background information not strictly related to the work.
- ____ (b) prefer to concentrate only on strictly relevant information.

You think that educators should
- ____ (a) give students exposure to a wide range of subjects in college.
- ____ (b) ensure that students mainly acquire in-depth knowledge related to their specialties.

When on vacation, you would rather
- ____ (a) spend a short amount of time in several places.
- ____ (b) stay in one place the whole time and get to know it well.

When learning something, you would rather
- ____ (a) follow general guidelines.
- ____ (b) work with a detailed plan of action.

Do you agree that, in addition to specialized knowledge, a person should know some math, art, physics, literature, psychology, politics, languages, biology, history, and medicine? (If you think people should study four or more of these subjects, score an "a" on this question.)

Now total all the a and b answers.

If you scored six or more a's on the test, you are a *grouper;* if you scored six or more b's, you are a *stringer*. If your a's and b's were close to equal, you find both approaches congenial and can choose the one that better fits the subject at hand.

The higher your total of either a's or b's, the more specialized your learning style is. The descriptions below should illustrate your learning

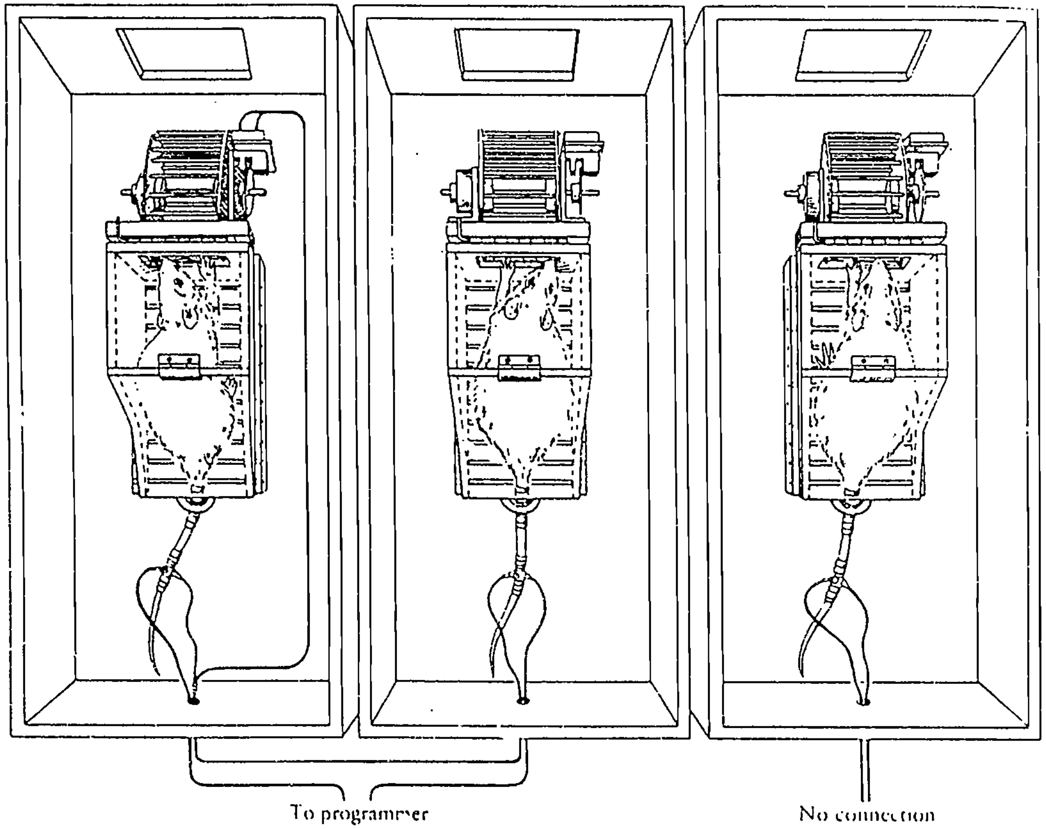

Figure 7.9
In this experimental setup, the control rat received no shocks. The other two rats got identical shocks, but one heard a warning tone 10 seconds before each shock. The ability to predict shock resulted in fewer stomach ulcers than did random shock (Weiss, 1980).

heard a beeping tone 10 seconds before the shock, while the other heard beeps, but random ones with no predictive meaning. The rat that heard the warning beep, and so could predict the arrival of the shocks, showed very little ulceration. The shocked rat who had no way to predict the arrival of the shocks developed rather severe ulcers.

With the original experiment complete, Weiss then arranged the setup so that one of the rats could avoid the shock for itself and its partner by jumping onto a platform during the warning signal (or, if it had been a bit slow, it could terminate the shock for them both by jumping onto the platform after it began). The rats that were able to cope with shock by avoiding it or escaping from it showed much less ulceration than their helpless partners, even though both groups had received identical amounts of shock.

Even for rats, then, the predictability of events in their environment, feedback from that environment about the outcome of their actions, and the consequent sense of being able to cope help prevent stress and its effects.

Studies using human subjects (Champion, 1950; Geer et al., 1970) indicate that some of these principles govern our behavior too. When volunteer subjects are given inescapable shocks, those who have been told by the experimenters that they can stop (not prevent) the shock by clenching a fist or pressing a button show less emotional arousal (measured by amount of skin moisture) than subjects who know they have no control. The shocks were brief, so the subjects who pressed the button believed that their actions were responsible for ending the shock. Because they got feedback in the form of termination of the shock, they felt that they had a means of coping with the situation.

What happens to a lone animal given a series of shocks that it has no power to escape? Martin Seligman (1975) gave a series of shocks to two group of dogs. One control group of dogs was permitted to learn how to escape; they could jump a hurdle into the other side of the box in which they were placed, where no shocks were delivered. The other group was first given a series of inescapable shocks, then given the opportunity to learn the escape mechanism. They could not. They did not even try. Seligman calls this phenomenon "learned helplessness."

Jay Weiss's research may have shed some light on Seligman's findings. When Weiss sacrificed a number of rats used in his experiment and studied their brains, he found that the helpless rats, even though they had received fewer shocks, had decreased levels of norepinephrine in their brains. Weiss believes that the helplessness of Seligman's dogs—their inability to learn an escape mechanism when it was finally made available to them—resulted from a temporary depletion of norepinephrine in their brains. The "executive rats," those that had been able to jump on the platform and avoid or escape the shock, had normal brain levels of norepinephrine.

(11)

Stress and Anxiety

"Stress" is a word currently used—and often incorrectly—in many popular magazines and books. Thousands of self-help books promise to teach their readers how to avoid or manage it. But stress, according to Hans Selye, a foremost researcher in this area, is "the nonspecific response of the body to any demand." You *want* your brain and body to respond in ways that help you meet the demands made by disease or by events such as a final exam, an at-bat in the ninth inning of a tie ballgame, or an important job interview. Stress, in other words, is not always bad; it is an important part of everyone's life. Challenges and changes, which often engender stress, provide the opportunities for adaptation to new life circumstances.

Stress itself, then, is not harmful. In fact, one study found that young mice exposed from time to time to mild stresses—handling, or weak electric shocks—became better able to handle stressful events than their unstressed littermates (Levine, 1960). As adults, they were also stronger and larger—and their adrenal glands were larger.

What is potentially harmful to animals, including human beings, is a prolonged period of stress or a combination of stressful events—called "stressors"—that make it very difficult, or impossible, to adapt to the demands of the situation.

Selye's General Adaptation Syndrome

Selye (1956) proposed three phases in an animal's stress reaction, which he called the "general adaptation syndrome": (1) alarm, (2) resistance, and (3) exhaustion.

In the alarm reaction, the sympathetic nervous system is aroused, just as described on p. 215. The hypothalamus sends a chemical signal to the pituitary, causing it to increase its release of adrenocorticotropic hormone (ACTH). ACTH, in turn, travels in the bloodstream to the adrenal glands and causes them to secrete hormones, corticosteroids, which prepare organs all over the body to engage in action and to deal with potential injury. Sympathetic nerves and the adrenal medulla secrete norepinephrine into the bloodstream. Increased levels of norepinephrine, of ACTH, or of corticosteroids are the signs that researchers use to measure stress arousal.

In the resistance stage, the body mobilizes its resources to overcome the stress-producing event. In most diseases and injuries, antibodies rush to the affected site. In psychological stress, the sympathetic system prepares one for fight or flight.

Everybody goes through the alarm and resistance stages many, many times during his or her life. When resistance is successful, the body returns to normal. But if a stressor continues, the body may reach a stage of exhaustion. In the mice Selye originally studied, for example, exposure to extreme cold first caused the adrenal glands to discharge all their microscopic fat granules, which contain the corticosteroids (alarm). The glands then became laden with an unusually large number of fat droplets containing more corticosteroids (resistance). Finally, all those droplets were discharged, and the mice could produce no more. They died (exhaustion). In psychological terms, exhaustion equals breakdown; sometimes the breakdown takes the form of mental illness, sometimes of psychosomatic disease.

Stress, Disease, and the Feeling of Control

In a song from the musical *Guys and Dolls*, Adelaide, sneezing and coughing, laments her lover's many delays in marrying her. Just from waiting around for a plain little band of gold, a person, she says, "can develop a cold." Many psychological and physiological studies have corroborated this connection between emotion and disease.

In one large-scale study, 5000 patients spoke about the events in their lives that preceded their physical illnesses. The researchers found that dramatic life changes had preceded illness in a large number of cases. The patients reported events in their lives like death of a spouse, divorce, marriage, change of residence, being fired from a job, or retirement that occurred within two years before they became ill. In a subsequent study of a group of physicians, researchers quantified such life changes by point ratings and, on the basis of the subjects' recent histories, predicted those at high risk for illness. Of those rated at high risk, 49 percent reported having contracted some sort of illness during the eight months of the study; only 9 percent of those judged as low-risk reported being ill. The psychologists concluded that the struggle of coping with life crises, especially when a person's coping techniques are faulty, can lower resistance to disease (Holmes & Masuda, 1972). Although unsubstantiated by physiological evidence, this conclusion fits Selye's description of the stages of resistance and exhaustion.

Many scientists believe that stomach ulceration, for example, is caused by psychological factors. Ulcers can be induced not only in people but also in rats and monkeys. A series of studies with rats as subjects, conducted by Jay Weiss, demonstrated such a psychological dimension to the effects of environmental stress. These rats were put in an experimental apparatus that controlled all movement (see Figure 7.9). All shocks were of the same intensity. One control rat received no shocks; the other two rats received simultaneous electric shocks to their tails. One of the shocked rats consistently y seem far-fetched to generalize from atory situations involving electric shock situations that generate stress in ordinary human lives. But a recent study by Jay R. Kaplan and his colleagues with monkeys omes a bit closer. In this study, which howed that social stress can contribute to atherosclerosis, or hardening of the arteries, all the monkeys had been fed from birth with a "prudent" diet, one low in saturated fats, ontaining almost no cholesterol. Over a vo-year period, some of the monkeys were ubjected to a number of stressful conditions arising from the usual social organization of monkey life. For instance, individual monkeys were repeatedly taken from their own social group and put into a new one, where they had no rank in the dominance hierarchy and had to fight for position. Groups of the male monkeys were also visited for two-week periods by one female in heat, and so ere subjected to the stress of fighting for her favors. The stressed monkeys ended up having significantly more numerous and more severe arterial lesions (the signs of atherosclerosis) than the monkeys whose social e was stable.

Is it too far-fetched to draw an analogy between the stresses of these monkeys' social lives and the stresses encountered by, say, a middle-management executive or a single working mother? The executive receives directives from her superiors that she must carry out, yet she probably had no control over the decision-making that produced them. Most of the time she is acutely aware of being in competition with others for promotion—and of those below her competing for her job. Most of her social life involves other employees of the corporation, so work tensions carry over into her private life. Add to this the frustration of rush-hour commuter traffic and the necessity for travel, with attendant jet lag, and you have a formula for stress.

The single working mother's life often requires her to balance at least three conflict-i[redacted]ims[redacted]requ[redacted]ents[redacted]er jo[redacted]the psychological and [illegible] dren, and her desires for personal fulfillment. How serious does a child's cold have to be for the mother to stay home from work? What does she do when she has to work late on the same evening that her son has a Little League game? In a way, she loses the feeling of control whatever she decides. Something important always remains undone.

Prolonged stress of this kind produces the psychological state that we commonly call anxiety. In a modern, complex culture, many people experience it. Our limbic system, our "animal brain," does its job in producing emotional arousal, and our cortex monitors and modulates that arousal. It is a fine balance. But if we feel that things have slipped out of our control, if stressors seem to pile up endlessly, the fine balance may be disturbed. Anxiety may represent tensions between limbic and cortical impulses.

One widespread means that people use to allay anxiety is to take tranquilizers. The one most often used is Valium, a benzodiazepine thought to work by promoting the effectiveness of the neurotransmitter GABA (gamma-amino butyric acid), whose primary function is to inhibit the firing of neurons (Costa & Guidotti, 1979; McGeer & McGeer, 1981). GABA has its own receptors, and Valium receptors are very close to them; when the drug is present, it actually aids in GABA's binding to its own receptors. The more GABA bound to a neuron, the less likely it is to fire. (The discovery of opiate binding sites led to the discovery of endorphins, so the finding of tranquilizer binding sites has led to a search for the body's own tranquilizers. The first related factor identified is an 18–amino acid peptide that acts like a "reverse" Valium, producing anxiety. If valid, this finding would suggest that Valium works by opposing the effects of the still unidentified natural factor, a bit like the way that naloxone blocks the opioid peptide responses.)

The limbic system contains many neurons that GABA acts upon. It seems likely, then, that tranquilizers do their job by inhibiting the flow of messages through the limbic sys ten[redacted]rebv[redacted]pen[redacted]mot[redacted]

One psychopharmacological study produced findings in rats that seem relevant to human anxiety. Rats were trained to run a maze for food rewards. One group was rewarded every time they correctly negotiated the maze; another group found the food reward only some of the time. Then, for both groups, all reward ceased. The rats that had been rewarded each time they ran the maze soon stopped searching. In the language of classical conditioning, the behavior was extinguished. But the rats that had found the food reward only occasionally—that is, who had received only partial reinforcement—took much longer to stop their searching. The uncertainty of reward during training was thought to create an anxiety state, which was revealed by their persistent running of the maze long after the reward had been withdrawn and long after the other group of rats had given up the search.

The researcher (Gray, 1977), using implanted electrodes, had noted that in the "anxious" rats, a certain level of electrical activity occurred in the hippocampus. When these rats were given barbiturates, alcohol, or tranquilizers, the frequency of electrical activity in the hippocampus decreased, and the animals stopped their fruitless, anxious searches for the reward, their anxiety apparently reduced. Such findings suggest why so many people elect to use alcohol and tranquilizing drugs despite their potential dangers, since these substances temporarily reduce anxiety levels and modulate the stresses of living in a complex modern society.

After all this discussion of the brain's lows, one might be tempted to ask why human beings have evolved in a way that makes them subject to such emotional storms. Why have we inherited this capacity to feel so awful? Perhaps fish are better off. The poet T. S. Eliot once said as much: "I should have been a pair of ragged claws, scuttling across the floors of silent seas." Luckily, we have also inherited the capacity for feeling wonderful—for experiencing emotions like joy, tenderness, affection, exultation. There appear to be some logical [redacted]

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