

ED7700 -- Theories of Learning – Discussions

Online Journal:

Introduce yourself in the CourseRoom, and provide some background on how and why you became a Capella University learner in the School of Education. Respond to several other learners in an attempt to get to know one another.

B) Discuss the kinds of things online learners can do to create an effective online learning community. Comment on how you intend to contribute to our learning community.

Hello, My name is Richard Bloodworth. For the past several years I have been teaching English in in foreign countries (Seoul, South Korea; Tokyo and Chiba, Japan; Prague, Czech Republic; Istanbul, Turkey; Xi'an and Shanghai, China; and now Taipei, Taiwan). Prior to the English teaching I was employed in mostly arts related activities having studied art and architecture. I received my degree BFA from the University of Georgia in drawing and painting. I have lived mostly in Athens and Atlanta, GA in addition to the above mentioned cities and I have traveled around Europe and Asia.

I have taken three online courses, one with a lab, previous to this course (ED5004, ED5005, ED5006, and ED8111). I am interested in learning more in the field of education in order to be more effective in my career and decided to pursue the online approach since it seems to be the wave of the future and also it allows me to take the courses from anywhere in the world.

Concerning what learners can do to create an effective online learning experience, sharing is important: especially sharing knowledge, thoughts, encouragement and suggestions. Also, interaction is essential for an effective learning environment and experience so it is important to interact with the other learners and instructors. Completing and contributing to assignments and discussions are important as well as reading (which I will do when my books arrive which should be soon) the assigned texts. I hope to do all of the above mentioned tasks to contribute to this learning community and look forward to the course and reading everyone's thoughts and ideas.

U1 to Tina O'Block

Hello Tina,

Glad to see you are in this class after our course together, Research Methodology (ED5006). I'll be interested in hearing and reading about what new information you get about online instruction and the use of computers in the classroom.

Richard

The 2 books that helped me the most in learning website design were "K-12 Web Pages: Planning and Publishing Excellent School Web Sites" by Debra Kay Logan & Cynthia Lee Beuselinck and "Internet Literacy" by Fred T. Hofstetter. I did do some of the Dreamweaver tutorials as well and they were helpful. It is really not as complicated as it seems once you get

started. Just take it one step at a time. It is a continual learning process and I am still working on my sites (I think they will always be a work in progress). My Capella site is <http://www.lc.capellauniversity.edu/~to2245/> and my curriculum website is <http://oblockbooks.home.att.net> (soon to be www.oblockbooks.com). Sometimes you have to type in the curriculum website instead of clicking on it, not sure why. (from Tina O'Block).

UID2

Although I don't remember the exact first moment, I learned early on that if one touches fire or a hot stove one is likely to get burned (learning through experience or empiricism and behaviorism). Later on, I began to learn sounds and words by listening and repeating from others (social learning). I then began to learn other words and more complex concepts and abstract ideas (rationalism and cognitivism).

I think that children seem to learn best by doing, which are the principles espoused by Herbert Spencer, John Dewey, and John Dewey, among others. In the school where I have been teaching the term TPR (Total Physical Response) is used to express the belief that knowledge that is actively and physically experienced is more readily retained than knowledge that is more passively received. I think I too have learned more through physical, sensorial experiences than through only abstract contemplation. For instance, traveling (behaviorist and social learning) and experiencing a foreign culture can offer experiences that can enable one to learn about the culture, language, geography, history, etc. of a society to complement what can be read (cognitive learning) about it in books.

Concerning human learning, *how* we learn is through sensory perception and cognitive retention; *why* we learn, or the motive of all living organisms stripped to the barest essentials, is (the drive for) survival. Prehistoric humans began to gradually realize, that in order for all to survive, it became essential to pass along skills and information, or, in other words, to educate the members of a society and transmit information from generation to generation.

That is what I love about these classes. There is always someone with experiences from other countries. It always adds so much to the interaction and knowledge base. Vandy

I believe you and I were enrolled in ED8111 together last quarter. It is nice to be working with you again.. I find your opportunities to teach in other countries very fascinating. At times, it is challenging for me to effectively interact with and educate students within my American classroom. Seoul, South Korea and Istanbul, Turkey seems worlds apart from Athens Georgia. Again, fascinating!

Carla and Vandy,

We are all now connected in this world through computer and Internet technology with the press of a button and at the speed of light. In that way the world is all connected and we are not really all worlds apart (from each other or from Athens, Georgia), although there are the local cultural

differences everywhere. Besides, just last night I saw Michael Stipe (from REM based in Athens, GA) performing here on MTV so I don't necessarily feel worlds apart.

I look forward to reading everyone's thoughts throughout the course,

Richard

U2D2

Tina,

I read your posting with interest as I am thinking of developing a website myself. I have DreamWeaver but it is more complicated than I had expected. I plan on going through their tutorial but I thought I might ask if you have any suggestions for learning DreamWeaver or making a website. For instance, are there any books that you suggest I might get? Also, may I ask, if there is one, what is your website address?

Richard

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Hello Tatiana,

I am trying to find a dyad partner for ED7700. If you are interested perhaps we could form a dyad. Working at a camp for gifted children sounds like something I would like to do. I have worked in several camps in the past: one was a Y camp for several years, one was for children with muscular dystrophy, one was an art camp, one was a camp in Maine where I was a counselor but I was asked to draw portraits of all of the campers (too many -- 392! plus some of the staff). Your profile mentions that you are interested in politics. My action plan and my research methodology paper was about direct democracy (voting directly rather through representatives). I can email it as an attachment if you'd like.

Let me know what you think,

Richard

to : behrmat@yahoo.com>

Hello Mark,

I am trying to find a dyad partner for ED7700. If you are signed up for the course and if you are interested perhaps we could form a dyad. Does North Clayton mean Clayton, GA? I used to go to Athens Y camp for several years as a camper and counselor in Tallulah Falls, GA near Clayton in north Georgia, but maybe your school is in another Clayton. Your profile mentions that you have a degree in Political Science. My action plan and my research methodology paper was about direct democracy (voting directly rather through representatives). I can email it as an attachment if you'd like.

Let me know what you think,

Richard

to : mcrsa75@yahoo.com----

U2D1

Below are two differing views of the use of reinforcements in the classroom. Choose one and cite both the textbook and at least one other scholarly piece of literature as you post your defense of your chosen view in the CourseRoom.

View A: When students receive some type of extrinsic reward for academic achievement, they begin to think of learning as something that is done because it is required of them. In fact, learning should be something that students do to better themselves; that alone is the reward.

View B: Rewarding students for excelling academically is actually very "real world." Just as adults are paid to perform work functions, and paid more when they perform them well, so should students understand that performing academically will have associated rewards.

I believe View A is a world that exists only in the imagination, in fact to better one's self means to do so to succeed in some way or another: the idea of bettering one's self implies making one's self more valuable in some way either to society or to one's self. This does not necessarily mean material or financial rewards. Someone can enjoy the pure abstract contemplation of Plato's Theory of Forms or a Shakespearian sonnet or an algebraic equation for its own sake but even that offers some sort of reward even if that reward is only a pleasant emotion or a peaceful state of mind. So, even though it may appear superficial and does not really represent the internalization of knowledge or realization, we should not consider a reward for learning as something to be looked down on.

View B is the operant conditioning reality of society. Though some may feel it is too much like feeding fish to dolphins to train them to perform tricks, the offering of rewards to encourage learning or academic success can be an effective method to stimulate interest in learning and does correspond to the "real world" practice of paying people to perform jobs or services. Concerning View B, it should be first noted that rewards come in a variety of forms, such as a supportive smile, a hardy laugh, a thumbs up gesture, or a physical or metaphorical pat on the back for encouragement. It can also be in the form of points, stickers, stars, grades, play money or even real money or prizes. The reward can be immediate, which is more along the lines of operant conditioning, or it can be delayed which could encourage sustained, progressive, and continual growth and achievement in order to receive a reward at the "light at the end of the tunnel".

In the privately owned school language schools where I have taught, the children students receive as rewards play money currency which is spendable only in the school to buy school supplies such as book bags, pens, pencils, erasers, paint, etc. Some might find this somewhat mercenary but, although I have never seen the children actually spend this in-house currency, it seems to work as a positive reinforcer since the children enjoy the contest of seeing how many cards or

how much in-house currency they can accumulate just as adults do with real currency in the business world. These cards are given instantaneously, one at time, at the moment the achievement is done such as winning a game or having the highest test score, etc. This practice in fact follows the requirements for operant conditioning which are: " 1) the reinforcer must follow the response, 2) the reinforcer must follow immediately, 3) the reinforcer must be contingent on the response" (Ormrod, 2004, p. 53). Concerning immediate gratification, John Holt asks, "Why are older children much less able to stand the frustration of deferred success? I suspect it is because they are already, even in nursery school, in a very competitive, status-conscious situation, all struggling for the approval of the teacher, or each other." (Holt, 1983, p. 49).

Concerning a delayed reward to promote sustained behavior, another approach I have used to promote good classroom behavior is to give stickers for good citizenship so that the students receiving the most stickers at the end of the year can be awarded with certificates or prizes for good citizenship. If these practices motivate the learners to learn then I think there is no harm in this but this sort of practice and to this extent would not occur, and might not be allowed in some, in public schools though the students in public schools do get stars, awards, grades, and certificates for academic achievement and good behavior.

References:

Ormrod, Jeanne E. (2004). Human Learning. Upper Saddle River, NJ: Pearson Education, Inc.

Holt, John. (1983). How Children Learn. Cambridge, Massachusetts: Perseus Books.

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I like the way you list some of the many forms that intrinsic rewards can take, though I am not sure what is meant by real life models.

choice

feedback

interpersonal involvement

acknowledgment of feelings

celebrations rather than rewards

real life models

cooperative learning

U2D2

Provide examples of classical conditioning and operant conditioning in an instructional setting. Identify the components of each using the figures in the Ormrod text as models.

CLASSICAL CONDITIONING:

Classical conditioning involves a reflexive response shifting from one stimulus to another. The most well known example are the dogs of the Russian scientist Ivan Pavlov, the founder of classical conditioning research, whose salivation rate was observed when presented with food also began to salivate in expectation of being fed when noticing the laboratory assistants, or the dogs' feeders, only entering their room. The unlearned and inborn conditioning process involves first the unconditioned stimulus (food) and the unconditioned response (salivation) which is later introduced with conditioned stimulus (a bell ringing) that is reacted to with a conditioned response (salivation). Pavlov described areas of conditioning including acquisition (initial learning), extinction (unlearning or forgetting through disuse or no reward), spontaneous recovery (remembering or reactivating), stimulus generalization (reacting to a different but similar stimulus), stimulus discrimination (determining the difference between positive and negative stimuli). Classical conditioning helps explain emotions such as happiness, anger, excitement, and anxiety and the expectations that accompany them. For example the sight of a test might produce an emotion such as anxiety whereas a plate of food might elicit pleasant emotions of anticipation.

The example of classical conditioning by Olson & Fazio in a study of college students in 2001 demonstrated that similar types of images associated with positive or negative ideas can evoke positive or negative opinions. A Pokemon cartoon character was shown to the participants with positive adjectives: "excellent", etc. and images: puppies, etc. as well as another similar Pokemon character with negative adjectives: "awful", etc. and images: cockroaches, etc. Then others were shown with neutral words and images. When asked to rate them the ones shown with unpleasant stimuli were rated negatively and the ones shown with pleasant stimuli were rated positively. (Omrod, 2004).

OPERANT CONDITIONING

Operant conditioning requires action on the part of the learner whereas classical conditioning does not. In classical conditioning the reward is the stimulus, in operant conditioning the reward is external to the stimulus. Operant conditioning involves increasing a behaviors with rewards or reinforcers or decreasing a behavior by using punishment techniques.

American psychologist Edward L. Thorndike, in the late 19th century, developed the puzzle box where a reward outside of the box could be obtained after the animal learned the method of opening the box conceived of the the law of effect which states:

"Responses to a situation that are followed by satisfactions are strengthened; responses that are followed by discomfort are weakened." (Omrod, 2004).

American psychologist B. F. Skinner, who created the term operant conditioning, developed the Skinner Box where the animal stays inside the box and by only pushing a lever or button receives food as a reinforcer for its behavior. He also claimed these reward and punishment procedures involved in operant conditioning could be used for humans in behavior modification, aversion therapy, educational procedures, language acquisition, business motivation, sports performance, psychological therapy, etc.

Operant conditioning, the study of which was originated by American psychologist B. F. Skinner, is the shaping of behavior with reinforcement and punishment. The main principles are reinforcement, punishment, shaping, extinction, discrimination, and generalization.

Reinforcement is strengthening behavior with a pleasant stimulus for positive reinforcement and with an unpleasant stimulus for negative reinforcement including escape and avoidance. A reinforcement schedule specifies the frequency and timing of reinforcers and Skinner identifies four main types: fixed-ratio (a reinforcer for each number of responses like a factory worker paid per product), variable-ratio (random number of responses to receive a reinforcer like throwing dice), fixed-interval (reinforcement is received after time elapses like a student watching the clock toward the end of the class period), and variable-interval (reinforcement after a certain amount of time like a teacher giving a pop quiz or prizes given at unscheduled times in the future).

Punishment is a way to weaken behavior so that it will not reoccur. Positive punishment involves reducing a behavior with an unpleasant stimulus if the behavior occurs such as aversion therapy or spanking and corporal punishment while negative punishment involves the removal of a pleasant stimulus such as allowing no TV watching or grounding teenagers.

Shaping is a reinforcement technique that is used to teach animals or people new behaviors that are not natural to them such as teaching an elephant to walk on its hind legs by rewarding them with food for that behavior.

Extinction is the elimination of a behavior through disuse or lack of continuing rewards or reinforcers. Under these circumstances the response rate is decreased and then eventually ceases.

Generalization and discrimination function in operant conditioning in ways similar to classical conditioning. In generalization, a learned behavior is performed appropriately in other, but similar situations.

Applications of Operant Conditioning can be applied in many areas. In schools and in the classroom teachers can reinforce behavior with rewards and privileges. The rewards can also be in the form of points, stickers, stars, grades, play money or even real money or prizes. "Skinner urged educators to focus on reinforcing student successes rather than on punishing student failures. In desperation, teachers often find themselves punishing misbehaviors, through such aversive consequences as displeasure, ridicule, and failing grades, rather than reinforcing appropriate responses; as Skinner puts it teachers 'induce students to learn by threatening them for not learning' (Skinner, 1968)." (Ormrod, 2004).

References:

- Ormrod, Jeanne E. (2004). *Human Learning*. Upper Saddle River, NJ: Pearson Education, Inc.
- Holt, John. (1983). *How Children Learn*. Cambridge, Massachusetts: Perseus Books.

U3 Action Assignment

In your dyad, discuss instructional strategies that can impact self-efficacy and self-regulation in a learner. Specify the age of the learner

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U3D1

Based on your discussion in Action Assignment 3.1, as a dyad, present and defend at least two teaching strategies that would increase your particular student's self-efficacy and promote his or her optimal self-regulation. Explain how these strategies might work from a behaviorist and/or social learning perspective.

Respond to at least one other dyad's post.

letter to Tatiana

Tatiana,

Here's the activity (U3A1) assignment:

In your dyad, discuss instructional strategies that can impact self-efficacy and self-regulation in a learner. Specify the age of the learner

Self-efficacy is when people are more likely to engage in certain behaviors when they are capable of executing those behaviors successfully (Omrod, 2004, p. 142).

I would say for self-efficacy: practice, repetition, modeling (from the teacher and from other students), praise and encouragement, operant conditioning (reward and punishment)

and for self-regulation: self discipline, a daily, weekly, and yearly, (maybe over several years, too) schedule, exercise, good daily health habits (eating, not smoking, etc.)

What do you think?

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Based on your discussion in Action Assignment 3.1, as a dyad, present and defend at least two teaching strategies that would increase your particular student's self-efficacy and promote his or her optimal self-regulation. Explain how these strategies might work from a behaviorist and/or social learning perspective.

Self-efficacy is the condition in which people are more likely to engage in certain behaviors when they believe they are capable of executing those behaviors successfully. (Omrod, 2004, p. 142). Self-efficacy involves choice of activities, goals, effort and persistence and learning and

achievement (Ormrod, 2004, p. 143).

We think that self-efficacy requires practice, repetition, modeling (from the teacher and from other students), praise and encouragement, positive operant conditioning (reward and punishment), and the development of self confidence.

Repetition plays a major role in self efficacy especially in young learners. We think that in older, more mature learners self-efficacy is impacted by the relevance of the subject matter. In older learners the lessons need to have meaning in the learner's life. Repetition counts for something but if the learner is not interested, or does not see the relevance or importance of subject matter then self-efficacy is negatively impacted.

We think that self-regulation requires self discipline and a daily, weekly, and yearly (maybe over several years, too) schedule, exercise, and good daily health habits (eating, not smoking, etc.).

As far as self-regulation we think that time management skills are a must. Students should also be taught how to prioritize their tasks. Schedules are very important. Tatiana once worked at a pre-school where the director felt that toddlers need little or no discipline so they were given free reign. The students, because they were given no guidelines, ran around all day and were extra cranky, unruly, and difficult to manage. Needless to say, she didn't work there for long! So that example illustrates the importance of schedules and discipline. We think that the use of exercise and that playing a team sport also helps students increase their self-regulation as well as their coordination skills and self confidence. Playing sports also teaches discipline and time management skills.

Reference:

Ormrod, Jeanne E. (2004). Human Learning. Upper Saddle River, NJ: Pearson Education, Inc.

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U3D2

This post is an individual (not a dyad) assignment: Respond to either A or B:

A. How has your learning been influenced by modeling? Describe a personal learning experience that involved modeling and analyze it from a behaviorist and/or social learning perspective.

In some of the language schools where I have taught the school provides workshops for the teacher to learn new teaching techniques and activities from the workshop's presenter, texts, and from other teachers or fellow workshop participants. Besides watching the presenter's presentations and demonstrations, the teachers engage in partner-based activities and then within small groups and then sometimes within a larger group. The partner based and small group (three or four people) based activities can be helpful for all subjects but especially for language, or English as a second language, classes since it allows the students more opportunities to speak the language that they are studying rather than waiting to be called on one at a time in a large classroom setting. Some of the activities are game type activities such as board games, bingo,

match game, fill in the blank games, spelling games, etc where the teachers practice and by watching each other and modeling each other's examples . Some are group activities where, for example, each of two teams tries to be the first to unscramble letters in words or words in sentences which are written on small pieces of paper. First these activities are modeled for the participants in the workshops by the presenter and then the participants re-enact the modeled activity. The same procedure is done for the students in a classroom where the activity is modeled for them usually by the teacher so that they understand what they are to do.

In the art classes I have taken, much of the learning of technique and skills is done through modeling. The student (myself, in this example) watches the teacher and then immitates the action to learn how to handle material or to draw or paint. For instance, in learning to paint portraits, the student studies various completed portraits that might have been done throughout history, then observes the teacher (live model) using certain materials and then watches as certain techniques are demonstrated such as how to draw a particular feature and the correct proportion of the parts of anatomy and mathematical formulas (such as comparisons of the distances of various features from one another, etc.). A similar technique involving listening (verbal instruction) is done while learning language: when the student listens to a word or phrase and then repeats it so this is also another type of modeling or learning by observing and then doing.

B. How has the learning of one of your students been influenced by modeling? Describe a student's learning experience that involved modeling and analyze it from a behaviorist and/or social learning perspective.

Use your text if you like and include at least one additional reference in support of your response.

Respond to at least one other learner's post.

Reference:

Ormrod, Jeanne E. (2004). Human Learning. Upper Saddle River, NJ: Pearson Education, Inc.

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U3D2 response to Tatiana

I think we all identified with the commercial use of modeling. The use of modeling is everywhere. The first thought most people have when they hear the word "model" is "fashion model". These people, sometimes celebrities, help set the fashion trends by modeling clothes and how to wear them and also help sell a lot of clothes. Models can also be examples (e.g. model students), physical explanations (e.g. atomic models) or prototypes (e.g. model cars). Concerning exemplary behavior, there are also role models who can be a parent, relative, mentor, teacher, sibling, celebrity, politician, scholar or anyone who sets a good or admirable example for people to follow. People often start their careers by patterning their behavior after their chosen successful role model(s) that they admire and want to emulate.

The advertising world uses role modeling quite a bit such as the white-mustached "Got Milk" advertisements which use celebrities as role models to get people to drink more milk. But one of the most explicit uses of role modeling in advertising is the advertising campaign that suggests that, in order to play great basketball and live a healthy life, one should drink Gatorade so that person can "Be Like Mike".

U3D1 comment to AlphaMuOmega

The self-efficacy, self belief, and self confidence of students is directly proportional to the conditions of their socio-cultural-economic surroundings so children from the ghettos generally would have proportionately much lower self-efficacy than children from more well to do backgrounds. You mentioned in your posting the often used phrase "success breeds success"; likewise, the reverse is true. The best and ideal solution, though easier said than done, would be to improve the socio-cultural-economic environment of the low self efficacy student(s).

U4 Titanium

Tatiana,

Here is part of the dyad activity for you to read. You can add what you would like and then send it as a reply and then I will post it.

Action Assignment 4.1:

In your dyad, discuss how the learning theories in Ormrod's chapter 8 apply to the way this course is structured and the way you are learning the material in this course.

As related to the structuring of this course, several applications of the learning theories of the Ormrod text are evident. In the chapter entitled, Antecedents and Assumptions of Cognitivism, several theoretical explanations of cognitive processes are offered. Verbal learning is used in this course in the learning and explanation of new terminology and concepts. Also in this course, learning theory and the educational process, the principles of **Gestalt** psychology and theory are utilized particularly in the organization and presentation of the course material. Used in the course presentation are the law of proximity (items and subjects close together are linked as groups), law of similarity (similar items are viewed as a unit), law of closure (the observer fills in the missing pieces to form a complete picture or concept), law of Pragnanz (terseness or preciseness involving memory traces), and problem solving using restructuring and insight. In short, human perception organizes concepts into comprehensible units or groups so that the whole can be "digested" gradually by consuming the groups or clusters of information.

Some of the findings of Jean **Piaget**, who said that people are active processors of information, are used in this course. He said that knowledge can be described in terms of structures that

change with development (scheme, cognitive structures, operations) and that learning is a process of assimilation and accommodation. People are motivated to make sense of the world and he identified four stages of development: sensorimotor, pre-operational, concrete, and formal which are determined to some extent by the maturation of the individual.

Other concepts besides verbal learning that are explored are **serial learning** (sequential learning - and this is most definitely used in this course -- which involves **paired associative learning** such as foreign words with their English equivalents or words with their definitions, **primary effect** where the first items are learned quickly, and **recency effect** where the last or most recent items are learned quickly), **overlearning** (which sounds like "information overload" such as all of the overwhelming information in a large text book all at once or at a rapid pace the information of which can later be returned to and reviewed in order for assimilation to occur), **distributed practice** (pacing the distribution of information over a realistic period of time). Also, taken into consideration while presenting the course information, are the characteristics of the course material that would affect the speed with which the learners can absorb it.

Cognitivism states that some types of learning might be unique to humans, people learn best by becoming actively involved (which is a reason to take a university course, and also, concerning this course: participation in the Course Room dialogues, the dyad activities, reading the texts, writing the assignments, etc.), and when knowledge is organized into comprehensible units. Also taken into consideration in the design of this course is that learning is a process of relating new information to previously learned information.

Reference:

Ormrod, Jeanne E. (2004). Human Learning. Upper Saddle River, NJ: Pearson Education, Inc.

Action Assignment 4.2:

By Sunday of this week, submit the first draft of the behaviorism section of your final Course Project to your instructor for feedback. Begin work on the cognitivism section of your final Course Project. (2b, 8c, 10c.) (Due at the end of Unit 4.)

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U4D1

Post your dyad's conclusions from Action Assignment 4.1.

Respond to at least one other learner's post.

U4D1 Response

While teaching ESL, I know that the students learn much more and are much more interested in a class when music is introduced as a component of the lesson. It gives interest, rhythm, and melody to a class.

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U4D2 response

I agree that visual representation such as pictures and sketches are helpful in remembering and understanding. Also, the idea of a personal journal is particularly effective.

U4D2

his is an individual assignment: Describe your own metacognitive strategies. What additional strategies might enhance your learning? How might you help your learners develop similar strategies? Use your text if you like and include at least one additional reference in support of your response

There are many useful problem solving activities and metacognitive strategies mentioned in the text to help facilitate memorization. Some of the ones mentioned are combining algorithms, hill climbing, means-ends analysis, working backward, using visual imagery (this technique is used often), drawing analogies, representativeness, and availability. Both meaningless and meaningful problem solving or techniques can be used. Though they might be considered meaningless, mnemonic devices are used often such as the cited Roy G Biv. I learned the order of the planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto) by making up the sentence "My very early mother jumped swiftly under new planets" -- It doesn't make any sense but I remembered them that way.

Reference:

Ormrod, Jeanne E. (2004). Human Learning. Upper Saddle River, NJ: Pearson Education, Inc.

submit the first draft of the behaviorism section of your final Course Project to your instructor for feedback

U4A2 first draft of the Behaviorism section of course paper

Behaviorist Views of Learning

ED7700

Learning Theory and the Educational Process

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Dr. Colleen Nardone

Although my integrative project at the end of the Capella University series of courses for Professional Studies in Education involves the implementation and training for the continuing use of direct democracy (which means voting directly on legislative issues, as is done now in Switzerland, rather than through representatives) through the educational system -- and the uses of the concepts acquired in this course, Learning Theory and the Educational Process, will be applied in the future for that purpose -- I have chosen to explore the use of the principles of learning theory as they relate to the learning of English as a second language since these are the courses I am presently involved in teaching. When appropriate, I will give examples of techniques that I have used or can be used while teaching the subject (in this case, English as a second language) in my classes.

As the behaviorists have determined equipotentiality in relation to human and animal learning, experiments concerning learning processes done on animals often can be applied to human behavior and learning. In classical conditioning (which is involuntary and elicited by a stimulus and which occurs when two stimuli are paired), such as the well known example of Pavlov's salivating dogs, when neutral, conditioned, and unconditioned stimuli are presented to animals they respond with no, conditioned, or unconditioned responses respectively. According to the concept of equipotentiality, humans also respond in a similar way. So using these principles learned in experiments with animals and as applied to learning and education, students can be rewarded directly through signal learning which is the eliciting of a response such as is the result of the introduction of aversive or rewarding positive or negative stimuli. In the academic realm, other signal responses can include the positive desire for success. Classical conditioning includes the concept of extinction (reversion to an original condition after a positive or negative stimulus is eliminated), spontaneous recovery (a reappearance of a dormant response such as remembering forgotten words or concepts), stimulus generalization (generalizing to other situations applying language learning to real life situations or mathematical principles to solve actual problems presented by reality), stimulus discrimination (response to some stimuli but not to others when different effects are discovered such as learning what words and concepts are important and useful to learn), and higher-order conditioning (when a different stimulus with the same result is substituted for the original stimulus such as different rewards in different games are offered). Habit (routine and repetition such as following the same schedule everyday in the language classes or the same verbal or language patterns), contiguity theory (the proximity and logistics of the stimulus and response), inhibiting factors (punishment and fear of failure), and one-trial learning are also employed as aspects of classical conditioning.

Classical conditioning involves a reflexive response shifting from one stimulus to another. The most well known example are the experiments with the dogs of the Russian scientist Ivan Pavlov, the founder of classical conditioning research, whose salivation rate was observed when presented with food also began to salivate in expectation of being fed when noticing the

laboratory assistants, or the dogs' feeders, only entering their room. The unlearned and inborn conditioning process involves first the unconditioned stimulus (food) and the unconditioned response (salivation) which is later introduced with conditioned stimulus (a bell ringing) that is reacted to with a conditioned response (salivation). Pavlov described areas of conditioning including acquisition (initial learning), extinction (unlearning or forgetting through disuse or no reward), spontaneous recovery (remembering or reactivating), stimulus generalization (reacting to a different but similar stimulus), stimulus discrimination (determining the difference between positive and negative stimuli). Classical conditioning helps explain emotions such as happiness, anger, excitement, and anxiety and the expectations that accompany them. For example the sight of a test might produce an emotion such as anxiety whereas a plate of food might elicit pleasant emotions of anticipation.

Operant conditioning or connectionism (which is voluntary and initiated by the operant or organism) occurs when a response is followed by a reinforcing stimulus. Operant conditioning involves such concepts as shaping or successive approximations, chaining or sequential responses -- and these concepts are used often in language classes, primary and secondary (conditioned), reinforcers, reward (either through positive reinforcement which is the introduction of a pleasant stimulus such as giving the students the school in-house currency for good performance or through negative reinforcement which is the removal of an aversive stimulus such as allowing the students back in the room after they have been sent out), punishment (either through positive reinforcement which is the presentation of an aversive stimulus such as scolding and sending them out of the room or negative reinforcement which is the removal of a pleasant stimulus such as the removal of their in-house school currency). Factors affecting the effectiveness of reinforcement are timing (pacing, planning, scheduling of tasks), magnitude (intensity of the reinforcer and the level of difficulty of the presented concepts), appeal (attractiveness of the curriculum and its presentation with its attending elation or depression effect), and consistency (maintaining a certain level of expectations). Schedules of reinforcement include fixed ratio (scheduled, expected rewards), variable ratio (surprise rewards), fixed interval (e.g. giving time limits for games), variable interval (changing intervals over time to either speed up or slow down activities), and differential rates of high (when everyone knows the answers) and low (when none or few students know the answers) response. Stimulus control includes antecedent stimulus (to prepare the respondent for future stimuli), discriminative stimuli (responses are relative to given situations or appropriateness), stimulus generalization (adapting knowledge or language skills to new generalized situations), cueing (prompting), setting events (complex environmental settings designed to elicit particular responses such as the settings of educational institutions), behavioral momentum (changes in environmental stimuli which is necessary to keep a child's short attention span on track and this is done with a variety of techniques and activities in the school and classroom). All of these techniques help realize the educational objectives as formulated by B.S. Bloom through the taxonomy of knowledge, comprehension, application, analysis, synthesis, and evaluation.

Operant conditioning requires action on the part of the learner whereas classical conditioning does not. In classical conditioning the reward is the stimulus, in operant conditioning the reward

is external to the stimulus. Operant conditioning involves increasing a behaviors with rewards or reinforcers or decreasing a behavior by using punishment techniques.

American psychologist Edward L. Thorndike, in the late 19th century, developed the puzzle box where a reward outside of the box could be obtained after the animal learned the method of opening the box conceived of the the law of effect which states: "Responses to a situation that are followed by satisfactions are strengthened; responses that are followed by discomfort are weakened." (Omrod, 2004).

American psychologist B. F. Skinner, who created the term operant conditioning, developed the Skinner Box where the animal stays inside the box and by only pushing a lever or button receives food as a reinforcer for its behavior. He also claimed these reward and punishment procedures involved in operant conditioning could be used for humans in behavior modification, aversion therapy, educational procedures, language acquisition, business motivation, sports performance, psychological therapy, etc. Operant conditioning, the study of which was originated by Skinner, is the shaping of behavior with reinforcement and punishment. The main principles are reinforcement, punishment, shaping, extinction, discrimination, and generalization.

Reinforcement is strengthening behavior with a pleasant stimulus for positive reinforcement and with an unpleasant stimulus for negative reinforcement including escape and avoidance. A reinforcement schedule specifies the frequency and timing of reinforcers and Skinner identifies four main types: fixed-ratio (a reinforcer for each number of responses like a factory worker paid per product), variable-ratio (random number of responses to receive a reinforcer like throwing dice), fixed-interval (reinforcement is received after time elapses like a student watching the clock toward the end of the class period) , and variable-interval (reinforcement after a certain amount of time like a teacher giving a pop quiz or prizes given at unscheduled times in the future).

Punishment is a way to weaken behavior so that it will not reoccur. Positive punishment involves reducing a behavior with an unpleasant stimulus if the behavior occurs such as aversion therapy or spanking and corporal punishment while negative punishment involves the removal of a pleasant stimulus such as allowing no TV watching or grounding teenagers.

Shaping is a reinforcement technique that is used to teach animals or people new behaviors that are not natural to them such as teaching an elephant to walk on its hind legs by rewarding them with food for that behavior.

Extinction is the elimination of a behavior through disuse or lack of continuing rewards or reinforcers. Under these circumstances the response rate is decreased and then eventually ceases.

Generalization and discrimination function in operant conditioning in ways similar to classical conditioning. In generalization, a learned behavior is performed appropriately in other, but similar situations.

Applications of Operant Conditioning can be applied in many areas. In schools and in the classroom teachers can reinforce behavior with rewards and privileges. The rewards can also be

in the form of points, stickers, stars, grades, play money or even real money or prizes. "Skinner urged educators to focus on reinforcing student successes rather than on punishing student failures. In desperation, teachers often find themselves punishing misbehaviors, through such aversive consequences as displeasure, ridicule, and failing grades, rather than reinforcing appropriate responses; as Skinner puts it teachers 'induce students to learn by threatening them for not learning' (Skinner, 1968)." (Omrod, 2004).

Though some may feel it is too much like feeding fish to dolphins to train them to perform tricks, the offering of rewards to encourage learning or academic success can be an effective method to stimulate interest in learning and does correspond to the "real world" practice of paying people to perform jobs or services. The point should be made that rewards come in a variety of forms, such as a supportive smile, a hearty laugh, a thumbs up gesture, or a physical or metaphorical pat on the back for encouragement. It can also be in the form of points, stickers, stars, grades, play money or even real money or prizes. The reward can be immediate, which is more along the lines of operant conditioning, or it can be delayed which could encourage sustained, progressive, and continual growth and achievement in order to receive a reward at the "light at the end of the tunnel".

In the privately owned school language schools where I have taught, the children students receive as rewards play money currency which is spendable only in the school to buy school supplies such as book bags, pens, pencils, erasers, paint, etc. Some might find this somewhat mercenary but, although I have never seen the children actually spend this in-house currency, it seems to work as a positive reinforcer since the children enjoy the contest of seeing how many cards or how much in-house currency they can accumulate just as adults do with real currency in the business world. These cards are given instantaneously, one at time, at the moment the achievement is done such as winning a game or having the highest test score, etc. This practice in fact follows the requirements for operant conditioning which are: " 1) the reinforcer must follow the response, 2) the reinforcer must follow immediately, 3) the reinforcer must be contingent on the response" (Omrod, 2004, p. 53).

Concerning a delayed reward to promote sustained behavior, another approach used that can be used to promote good classroom behavior is to give stickers for good citizenship so that the students receiving the most stickers at the end of the year can be awarded with certificates or prizes for good citizenship. If these practices motivate the learners to learn then I think there is no harm in this but this sort of practice and to this extent would not occur, and might not be allowed in some, in public schools though the students in public schools do get stars, awards, grades, and certificates for academic achievement and good behavior.

Other concepts important to the practices of behaviorism are the development of self-efficacy and self-regulation.

Self-efficacy is the condition in which people are more likely to engage in certain behaviors when they believe they are capable of executing those behaviors successfully. (Omrod, 2004, p. 142). Self-efficacy involves choice of activities, goals, effort and persistence and learning and achievement (Omrod, 2004, p. 143). Self-efficacy requires practice, repetition, modeling (from

the teacher and from other students), praise and encouragement, positive operant conditioning (reward and punishment), and the development of self confidence. Repetition plays a major role in self efficacy especially in young learners. In older, more mature learners self-efficacy is impacted by the relevance of the subject matter. In older learners the lessons need to have meaning in the learner's life. Repetition counts for something but if the learner is not interested, or does not see the relevance or importance of subject matter then self-efficacy is negatively impacted.

Self-regulation requires self discipline and a daily, weekly, and yearly (perhaps over several years, too) schedule, exercise, and good daily health habits (eating, not smoking, etc.). As far as self-regulation we think that time management skills are a must. Students should also be taught how to prioritize their tasks and for this reason schedules are very important. . The use of exercise and that playing a team sport also helps students increase their self-regulation as well as their coordination skills and self confidence. Playing sports also teaches discipline and time management skills.

Another form of behaviorist activity involves modeling or replicating behavior that is to be emulated. In some of the language schools where I have taught the schools provide workshops for the teachers to learn new teaching techniques and activities from the workshop's presenter, texts, and from other teachers or fellow workshop participants. Besides watching the presenter's presentations and demonstrations, the teachers engage in partner-based activities and then within small groups and then sometimes within a larger group. The partner based and small group (three or four people) based activities can be helpful for all subjects but especially for language, or English as a second language, classes since it allows the students more opportunities to speak the language that they are studying rather than waiting to be called on one at a time in a large classroom setting. Some of the activities are game type activities such as board games, bingo, match game, fill in the blank games, spelling games, etc where the teachers practice and by watching each other and modeling each other's examples . Some are group activities where, for example, each of two teams tries to be the first to unscramble letters in words or words in sentences which are written on small pieces of paper. First these activities are modeled for the participants in the workshops by the presenter and then the participants re-enact the modeled activity. The same procedure is done for the students in a classroom where the activity is modeled for them usually by the teacher so that they understand what they are to do.

In art classes, much of the learning of technique and skills is done through modeling. The student watches the teacher and then imitates the action to learn how to handle material or to draw or paint. For instance, in learning to paint portraits, the student studies various completed portraits that might have been done throughout history, then observes the teacher (live model) using certain materials and then watches as certain techniques are demonstrated such as how to draw a particular feature and the correct proportion of the parts of anatomy and mathematical formulas (such as comparisons of the distances of various features from one another, etc.). A similar technique involving listening (verbal instruction) is done while learning language: when the student listens to a word or phrase and then repeats it so this is also another type of modeling or learning by observing and then doing.

References:

Ormrod, Jeanne E. (2004). Human Learning. Upper Saddle River, NJ: Pearson Education, Inc.

Holt, John. (1983). How Children Learn. Cambridge, Massachusetts: Perseus Books.

U5D1

a) What has been your most significant learning experience in this course to date?

This course is similar in some ways to the psychology courses I have taken but here the emphasis is on the physiology and behaviors associated with learning. Most of the information presented in the text came from psychological research ranging from the physical and chemical activities of the brain to observed behavior such as in classical and operant conditioning. I think the information about conditioning and cognitive theory have been the most significant concepts presented in the course thus far.

b) How would you evaluate your course experience overall?

I think overall that I have learned about the above mentioned concepts and I think that the text reading, dyad activities, and reading what the others involved in the course have to say has made for a useful learning experience.

--

U5D1 response to Dina

I think that is admirable that you value everyone's backgrounds and individual contributions to society since I believe there is strength in diversity. Society needs specialists skilled in all areas (medical doctors, mechanics, scientists, etc.) and that requires diversity. Also that is one of the basic principles of a democratic society.

As we are studying the learning processes, I would think that the learning processes or techniques for the autistic children would vary from the techniques used on more normal children. I imagine there are many theories as to the causes of autism but one I have heard is that it can be caused by an inner ear problem to where the child constantly or often hears a maddening sound or ringing inside of his ear. Also, it was said that some of the ones with that condition were equipped with special hearing aid devices to alleviate the problem. Have you ever of that?

U5D2

a) How actively have you been engaged in the CourseRoom thus far?

I think I have been as active as my schedule allows by reading the texts, doing the assignments, and responding to the others involved in the course.

b) What plans do you have for the rest of the course to assure continued engagement with the course content and other learners?

I plan to continued the above-mentioned interactivity and hope that I can offer my (hopefully, useful) insights as well as continue to learn from the insights and information presented in the course texts and from the others involved in the course.

--

U5D2 Response to Rycharde

I think it is difficult for everyone to get all the assignments in before the end of the week but it helps that the assignments are posted the weekend before the end of the following week which essentially gives everyone about 10 days to get all of the assignments in.

By the way, I am curious about the spelling of your name. It seems to be a French spelling but usually in French the spelling is Richard. Is it from some language other than French or English? Just wondering.

U5D3

a) What could the instructor do to help you be more successful in this course?

Perhaps we could be presented with some more Internet sources or websites that could give us more information related to the course.

b) What questions do you have at this point?

Is there a suggested length (combined number of pages of all four sections) for the Course Project that we are to write?

--

U5D3 comment to Jennifer

It is always best to find an effective medium between structure and freedom. It is good to have a structure and plan but also the freedom to react to changes and incorporate creative input. Concerning what you said about wanting structure, and perhaps security, and not too much

freedom (which could be a sort of chaos) brought to my mind a lyric in a Joni Mitchell song: "the kind of crazy you get from too much choice".

U6 Action Activity

By Sunday of this week, February 15, submit the first draft of the cognitivism section of your final course project to your instructor for feedback. Begin work on the memory and motivation section of your Course Project. (Due at the end of Unit 8.)

U6D1 response to Kathy

The reason that remembering faces is simple and remembering names is as difficult as it is, I think, is because a person has only one face whereas a person can have any name. So the association of a face is definite but the assignment of a name is arbitrary.

One way of remembering is to use name tags. Some schools and institutions use this for security purposes but the teacher learning the student's names could use them for the purpose of identifying the student and learning his name. Another way is to have name plates or tags on the students desk.

Name games can be played too. One is to have name tags of imaginary or famous people placed on the participant's back with the person not knowing what name is on his/her back. He has to guess who the person's name is on his back by asking questions to the others in the class who are mingling about. There is also the game Face/Off, based on the John Travolta/Nicholas Cage movie about exchanged identities. In that game the participants mingle around the room. The first meeting, each introduces him/herself, as him/herself, then to the next person the participant introduces him/herself as the person he/she had just previously met. The each of the participants go around the room each time introducing him/herself as the person they last spoke with. That is a way for everyone to become introduced to everyone else. It becomes really strange when the meeting goes full circle and you hear someone introducing themselves as you.

And then there is the Name Song (Sally, sally bo bally; banana fannah foe fally; me my moe mally --- Sal-ly). However, there are some names with which that song should not be sung.

But I think after time (a few weeks) the names are learned just by referring to the roll. After I learn the students' names well, it's hard to imagine them with any other name (even though a rose by any other name would smell as sweet).

U6D1

Focus on a classroom memory problem you have experienced personally or with a student. How would you interpret this problem from a behaviorist point of view? From a cognitivist point of view? Using the learning theories we have studied, how might you address the problem? Use your text if you like and include at least one additional reference in support of your response.

Learning English, or any language, as a second or additional language requires quite a bit of memorization and memory retention ability. Sometimes there are discipline problems associated with such classes with children and sometimes these problems may be a result of personal or family problems or even learning disabilities. But usually the problems arise from motivational problems stemming from the fact that some of the students just do not want to study and learn a language other than their native language. Often there are feelings of frustration in not being able to remember the extensive vocabulary requirements, grammatical rules, and the pronunciation idiosyncracies of English. It is important to instill in these students the importance of learning English (even though Mandarin Chinese is the most spoken native language in the world with over 1.3 billion speakers which is 3 times more than native English speakers) if they are to communicate internationally or if they are to ever live, travel, work or study in an English speaking country. Even if the students never leave Taiwan, which is unlikely nowadays, they would need to learn English for travel, or communication with people outside of -- or visitors to -- (in this particular case) Taiwan and international business -- and there is a lot of that here with importing and exporting.

From a behaviorist point of view, I think it is important, as suggested by the naturalism of Rousseau and later incorporated into the educational philosophies of pragmatism and progressivism, to let children be children since childhood is bestowed only once in each individual's life. However, if the children only play all of the time and do not study then much useful information is not conveyed and therefore not learned. One approach is to have some educational games, such as spelling games, word games, board games and so on, to get the children to enjoy learning while at the same time challenge each other in a sporting and interesting way. To stress the importance of student effort, I try to get each class to watch the animated Disney version of Pinocchio, in English with English subtitles for them to read along with, which contains the moral lesson that all play and no work can create an unproductive adult. In the movie, Pinocchio is tempted twice to veer from his goal of converting from a puppet to a real human boy which requires him to perform certain admirable traits one of which is to attend school. The first time he is lured away to be taken on as a performer in a puppeteer's show and after he is rescued from that ordeal he is lured again but this time to go to an island where the boys only play all of the time with no restrictions. But unbeknownst to them, the playing boys eventually turn into donkeys and are sold to donkey farms by the owner of the island -- though Pinocchio was able to escape from that situation also. The students watching this all get the point that if the students only play, goof off, or play hooky then they could become illiterate and low producing adults. So this helps them understand the reasons for their educational efforts.

To increase language retention from a cognitivist point of view, which involves the physical and chemical processes of brain functions and methods of retaining and recalling information through memory, it is necessary to use rote memorization, repetition, checking for understanding, and

creative application of learned material. Sometimes I think we learn by accident (many discoveries are made that way such as the Curies's discovery of Radium). In the school where I am teaching now, I thought that we were to finish one class two weeks before we did which had the result of my spending one day, rather than two, on each language lesson. Rather than spending two days on a lesson and then going on never to return to that particular lesson (which I think places some of the information in the short term memory), now the second day is two weeks later. This actually, I think has the effect of reinforcing the lesson so that it becomes a review and more of the information is retained in the long term memory that way which is advantageous for a language class.

References:

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U6D2 Social science for direct democracy and for language acquisition for teaching English as a second language.

What can the classroom teacher do to improve transfer? To answer this question, select an academic concept (e.g. a math concept, a social science concept, etc.) and describe possible instructional strategies that might promote transfer.

Transfer involves how learning in one situation affects another (if the transfer has a facilitating effect then it is a positive transfer but if it has a debilitating effect then it is a negative transfer) and problem solving is using the transferred skills and knowledge to solve a problem.

Vertical transfer is a sequential, additive process based on previous knowledge on which the new information is based such as in learning language, one begins with the alphabet then moves up to words then sentences and conversation or in learning mathematics one starts with numbers then proceeds to arithmetic then geometry then algebra, etc. . Lateral transfer involves transfer between two similar, but not interdependent, informational sources such as learning two languages at the same time. Near transfer is the transfer of problems or situations that have similar but different variable characteristics and that are solved by the same solutional formula. Far transfer, which is less frequent than near transfer, involves problems with very different variable characteristics but that are solved by the same solutional formulas.

Specific transfer involves overlapping or parallel learning and transfer tasks. An example of this in the foreign language field would be the naming of the parts of speech (noun, verb, adjective, etc.) which would transfer and apply to English, French, Chinese, etc. General transfer, which is less frequent than specific transfer, such as study habits for one subject could transfer to another,

e.g. from mathematics to language. Formal discipline involves having a regimen, structure, or curriculum for a course of study and this is also used in learning English as a second language.

Situated learning concerns learning within a context and relative to a particular situation. This is used often in language acquisition such as in the total immersion techniques for learning a new language. For example, to learn a foreign language, it is probably best to learn it within the country where it is spoken and used so that one is constantly surrounded by the use of the language skills that the learner is acquiring. The most difficult subjects to learn would be those that contain inert knowledge or knowledge that would not much be used outside of the classroom. An example of this could be learning to speak Latin although the learning to read and write Latin could transfer to learning other languages. Some people mistakenly think that learning algebra is inert knowledge though in actuality such knowledge is useful in many practical situations.

Factors that affect transfer include:

1. Meaningful, understood, and relevant data transfer more readily than data obtained through rote memorization.
2. Thoroughly learned information transfers more readily than superficial knowledge.
3. The more similar a situation is to the original learned skill the more likely transfer will occur.
4. Principles and concepts are more easily transferred than specific, concrete facts.
5. Practice increases the extent to which transferred skills can be applied to new situations ("practice makes perfect").
6. Increase in the time lapse between the original learned skill and its application decreases the extent of the transfer.

Each of the above listed concepts applies to the learning of a new language or indeed of any new knowledge.

Reference:

Ormrod, Jeanne E. (2004). Human Learning. Upper Saddle River, NJ: Pearson Education, Inc.

7700 U6 first draft Cognitivism

Cognitivism involves how we acquire knowledge and concepts through the perceptions of our senses.

Below is an interesting example of how we cognitively perceive words:

According to a research at an English university, it doesn't matter in what order the letters in a word are, the only important thing is that first and last letter is at the right place. The rest can be a total mess and you can still read it without problem. This is because we do not read every letter by itself but the word as a whole. (Ross, 2003).

Following are several theoretical explanations of cognitive processes. Verbal learning is used in the language courses in the learning and explanation of new terminology and concepts. Also in the language courses that I teach, the principles of **Gestalt** psychology and theory are utilized particularly in the organization and presentation of the course material. Used in the course presentation are the law of proximity (items and subjects close together are linked as groups), law of similarity (similar items are viewed as a unit), law of closure (the observer fills in the missing pieces to form a complete picture or concept), law of Pragnanz (terseness or preciseness involving memory traces), and problem solving using restructuring and insight since human perception organizes concepts into comprehensible units or groups so that the whole can be "digested" gradually by consuming the groups or clusters of information.

Some of the findings of Jean **Piaget**, who said that people are active processors of information, are also used in the English as a second language course. Piaget said that knowledge can be described in terms of structures that change with development (scheme, cognitive structures, operations) and that learning is a process of assimilation and accommodation. People are motivated to make sense of the world and he identified four stages of development: sensorimotor, pre-operational, concrete, and formal which are determined to some extent by the maturation of the individual.

Lev Vygotsky's developmental theory involves the following principles:

1. Internalization
2. In the first few years of life thought and language become increasing interdependent
3. Adults transfer their culture to children
4. Children learn from people more advanced than themselves
5. Challenging tasks promote maximum cognitive growth

Other concepts besides verbal learning are **serial learning** (sequential learning -- and this is most definitely used in the English language courses where new knowledge is built upon the foundations of previously learned knowledge -- which involves **paired associative learning** such as foreign words with their English equivalents or words with their definitions, **primary effect**

where the first items are learned quickly, and **recency effect** where the last or most recent items are learned quickly), **overlearning** (which brings to mind the idea of "information overload", such as all of the overwhelming information in a large text book or in a course such as the language courses, which is presented at a rapid pace, the information of which can later be returned to and reviewed in order for assimilation to occur), **distributed practice** (pacing the distribution of information over a realistic period of time). Also, taken into consideration while presenting the language course information, are the characteristics of the course material, such as the difficulty or simplicity of the presented information, that would affect the speed with which the learners can absorb it.

Cognitivism states that some types of learning might be unique to humans and that people learn best by becoming actively involved (such as our school's practice of TPR or Total Physical Response) and when knowledge is organized into comprehensible units. Also taken into consideration in the design of the language courses is that learning is a process of relating new information to previously learned information.

Another principle involved in the cognitive process is the transfer of learned material.

Vertical transfer is a sequential, additive process based on previous knowledge on which the new information is based such as in learning language, one begins with the alphabet then moves up to words then sentences and conversation or in learning mathematics one starts with numbers then proceeds to arithmetic then geometry then algebra, etc. . Lateral transfer involves transfer between two similar, but not interdependent, informational sources such as learning two languages at the same time. Near transfer is the transfer of problems or situations that have similar but different variable characteristics and that are solved by the same solution formula. Far transfer, which is less frequent than near transfer, involves problems with very different variable characteristics but that are solved by the same solution formulas.

Specific transfer involves overlapping or parallel learning and transfer tasks. An example of this in the foreign language field would be the naming of the parts of speech (noun, verb, adjective, etc.) which would transfer and apply to English, French, Chinese, etc. General transfer, which is less frequent than specific transfer, such as study habits for one subject could transfer to another, e.g. from mathematics to language. Formal discipline involves having a regimen, structure, or curriculum for a course of study and this is also used in learning English as a second language.

Situated learning concerns learning within a context and relative to a particular situation. This is used often in language acquisition such as in the total immersion techniques for learning a new language. For example, to learn a foreign language, it is probably best to learn it within the country where it is spoken and used so that one is constantly surrounded by the use of the language skills that the learner is acquiring. The most difficult subjects to learn would be those that contain inert knowledge or knowledge that would not much be used outside of the classroom. An example of this could be learning to speak Latin although the learning to read and write Latin could transfer to learning other languages. Some people mistakenly think that learning algebra is inert knowledge though in actuality such knowledge is useful in many practical situations.

Factors that affect transfer include and that apply to the learning of a new language:

1. Meaningful, understood, and relevant data transfer more readily than data obtained through rote memorization.
2. Thoroughly learned information transfers more readily than superficial knowledge.
3. The more similar a situation is to the original learned skill the more likely transfer will occur.
4. Principles and concepts are more easily transferred than specific, concrete facts.
5. Practice increases the extent to which transferred skills can be applied to new situations ("practice makes perfect").
6. Increase in the time lapse between the original learned skill and its application decreases the extent of the transfer.

"Modern cognitive psychologists believe that learning involves complex mental processes, including memory, attention, language, concept formation, and problem solving. They study how people process information and form mental representations of people, objects, and events." (Mazur, 2002). Cognitive learning theory involves the processes of obtaining, remembering, and applying knowledge. Cognitive learning is concerned with mental processes, and, unlike behaviorist learning, does not require learning to be done from a model and also does not require previous direct experience. Learning is manifested by a change in knowledge which also causes a change in behavior even though the learning itself is not directly noticeable. Latent learning is an internal process that changes the mental processes but is not indicated through changes in behavior. In 1930 American psychologist Edward C. Tolman, who considered himself to be a field theorist, demonstrated latent learning by showing that rats can make cognitive maps of a maze which they could use if it became necessary for them. Insight is solving through revelation a problem not solved before by the person with the problem. Inventions are examples of solutions through insight. Kohler demonstrated how a chimpanzee can use insight or ingenuity to solve problems in order to obtain food.

Types of knowledge according to cognitive learning theory are:

General: Generally useful information .

Domain Specific: Information specific to one situation

Declarative: Words, facts, etc.

Procedural: Knowledge used in performing tasks.

Conditional: Appropriate use of declarative and procedural knowledge.

Metacognition: Knowledge about one's own thinking. .

Constructivist Perspective The learner as an active participant

Exogenous Constructivism: People make models of the external world within their minds .

Endogenous Constructivism: knowledge is derived from previous knowledge and not empirically derived by the observer.

Dialectical Constructivism: knowledge developed through the interaction of internal, cognitive and external (environmental) factors.

Radical Constructivism: subjectivity or personal relativism of perceptions.

Perception: The interpretation of sensory information based on past experiences. (Woolford, 1997).

The main areas of cognitive learning are memorizing, understanding, and applying and are listed below with examples of how they are used within the context of teaching English as a second language

Memorization.

This is used in the memorization of spelling words, vocabulary words, pronunciation, definitions of words and grammatical rules.

Understanding.

When doing any activity or exercise it is important to check for understanding before a task begins. It is best not to ask "Do you understand?" because they might say "yes" but in fact do not understand. It is best to not repeat the target question or concept when asking a question which checks for understanding. In all of the activities the point is to get the students to understand since without understanding there is no communication. One of their vocabulary words recently was "communicate" and the text book define it for the children: "to read, write, or draw for someone" and I added "so that they can understand you" because without the element of understanding no communication occurs.

Application.

This is one of the most important areas of cognitive learning because it is necessary to apply one's knowledge in order to make it worthwhile for having obtained it in the first place. Going on field trips, having students engage in participatory activities, reading out loud, repeating after the teacher, role playing, and having conversations and discussions in English are all ways that the learners can begin to apply their knowledge. The general reason for them to study English in the first place is so that they can communicate with English speakers so that they can someday travel, live, work or study in an English speaking country or in their own country they can communicate internationally for travel, work, business, or social purposes. With this knowledge, their horizons will be greatly expanded and the possibilities

for new opportunities can increase exponentially.

References for Cognitive Learning

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B Motivation

Learning is usually most efficient and rapid when the learner is motivated and attentive. Behavioral studies with both animals and people have shown that one effective way to maintain the learner's motivation is to deliver strong and immediate reinforcers for correct responses. However, other research has indicated that very high levels of motivation are not ideal. Psychologists believe an intermediate level of motivation is best for many learning tasks. If a person's level of motivation is too low, he or she may give up quickly. At the other extreme, a very high level of motivation may cause such stress and distraction that the learner cannot focus on the task. See Motivation.

MOTIVATION

Motivation, cause of an organism's behavior, or the reason that an organism carries out some activity. In a human being, motivation involves both conscious and unconscious drives. Psychological theories must account for a "primary" level of motivation to satisfy basic needs, such as those for food, oxygen, and water, and for a "secondary" level of motivation to fulfill

social needs such as companionship and achievement. The primary needs must be satisfied before an organism can attend to secondary drives.

The American psychologist Abraham Maslow devised a six-level hierarchy of motives that, according to his theory, determine human behavior. Maslow ranks human needs as follows: (1) physiological; (2) security and safety; (3) love and feelings of belonging; (4) competence, prestige, and esteem; (5) self-fulfillment; and (6) curiosity and the need to understand. No single theory of motivation has been universally accepted, but a direction is evident. Formerly, many psychologists stressed the reduction of stimulation to its lowest possible level. An organism was thought to pursue that behavior most likely to bring about this desired state of no stimulation. Many human physiological systems do in fact operate in this manner. Recent cognitive theories of motivation, however, portray humans seeking to optimize rather than minimize stimulation and are thus better able to account for exploratory behavior, the need for variety, aesthetic reactions, and curiosity. (Mazur, 2002).

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U7D1

What are the roles and responsibilities of the teacher in motivating students to learn?

The teacher functions as a facilitator and mediator between the student and the body of knowledge to be learned and should provide the sort of knowledge, expertise, and training necessary for the students' intellectual and cultural growth. The teacher can only make the students aware of the immediate and future extrinsic rewards.

Focus on the process of intrinsic learning and its influence on motivation. Do you think a teacher can increase a student's intrinsic motivation? Use your text if you like and at least one additional reference.

Motivation can be primary such as the need for food and clothing or secondary such as the need for companionship and success (and perhaps fashionable clothing). American psychologist Abraham Maslow developed a hierarchy of needs that motivates human behavior. The needs in order of importance from most to least are: (1) physiological such as the need for food (2) security and safety such as the need for income and protection (3) love and belonging (4) self-efficacy including competence, prestige, and self-esteem (5) self-satisfaction and self-fulfillment (6) curiosity, inquisitiveness, and the desire to understand. (Mazur, 2002).

I think intrinsic motivation, by definition of the word, is internal to the student so therefore it can not be increased by the teacher through a series of immediate rewards and punishments or the promise of future rewards and punishments of success, communication skills, technical skills, career advancement, and material possessions or of the lack of the previously mentioned rewards. For these reasons the teacher can only offer extrinsic motivation since intrinsic motivation comes from within the student.

References:

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Ormrod, Jeanne E. (2004). Human Learning. Upper Saddle River, NJ: Pearson Education, Inc

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U7D1 Comment to Laura

Human are social beings and you have pointed out the importance of the sense of belonging, as mentioned in Maslow's hierarchy of needs, as a factor for motivation. So much of what we do is to please others which is extrinsic motivation, as well as ourselves (through self actualization) which is intrinsic motivation, in order to belong to the security of a group.

Richard

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U7D2

Would you describe your motivation to be a graduate student as intrinsic or extrinsic? Has this always been the case in your educational experiences, or was there a time when you were motivated differently? Relate your answer to the theories we have been discussing in this course.

I think my motivation as a graduate student is a combination of intrinsic and extrinsic factors and my educational motivation has been throughout my life. An infant or very young child is motivated intrinsically out of curiosity and survival drives. Later, the motivation becomes more extrinsic as the child attempts to please its parents and others. I think as a person matures, in addition to the rewards that are intrinsic and for personal satisfaction, the rewards are external to the internalized knowledge and become increasingly more extrinsic in nature. These externalized rewards can include success, communication skills, technical skills, career advancement, and material possessions or of the lack of the previously mentioned rewards and are in line with the concepts of B.F. Skinner as described in his theories of operant conditioning.

Reference:

Ormrod, Jeanne E. (2004). Human Learning. Upper Saddle River, NJ: Pearson Education, Inc.

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U7D2 comment to Jennifer

I think when we as learners read or study, for our own enjoyment or edification, subjects on our own that we are not required to take then we are involved in more intrinsically motivated behavior. The contents of this course and other online courses through Capella, or other courses at universities, could conceivably be studied by the learners themselves at their own structure and

pace and that type of motivation could perhaps be considered intrinsic depending upon the ultimate intent of the learners. But the fact that we are all enrolled in courses for credit and usually working toward a degree, to me, implies that we are extrinsically motivated in taking these courses.

Richard

--

U7D2 Reply to Nancy

Nancy, I don't doubt that you are intrinsically motivated to learn, as am I, in taking these courses at Capella. I just meant that there seems to be other motivations and rewards other than only intrinsic ones. Sometimes definitions of words overlap so that we in fact might actually agree in essence with each other on this issue. Words have many different connotations and shades of meaning so our thoughts about intrinsic and extrinsic motivation in educational matters are probably similar in essence. From what I gather, you consider your experience with the Capella course(s) as that of a participant in a focus group and I think that is admirable in itself. Thank you for your thoughts on the matter,

Richard

LETTER TO COLLEEN NARDONE IN MEXICO:

Hello to Colleen in Mexico,

Can you open WordPerfect (or PageMaker or Adobe Acrobat Reader) in your home computer? If you can not open any of these as attachments then I can send the final paper within the body of an emailed letter to you.

(By the way, I am not sure how you like to be addressed. Do you prefer Professor Colleen or Nardone, or Dr. Colleen or Nardone, or Colleen? I can call you by any title you like.)

I visited Mexico with a person who is from Mexico and in whose house I stayed while in Atlanta at the beginning of 2003. We went to Mexico City and Guadalajara. In Mexico City I saw, among other sights, the Archaeological Museum and took a nearby excursion to the pyramids of Teotihuacan. Where in Mexico are you?

Enjoy Mexico,

Richard Bloodworth

U8 Action Assignment

By Sunday February 29, submit the first draft of the memory and motivation section of your Course Project to your instructor for feedback.

U8 Action Assignment

first draft Memory and Motivation

ED7700

Learning Theory and the Educational Process

Winter 2004

Richard Bloodworth

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Dr. Colleen Nardone

from Meriam Webster Dictionary (2003):

Memory: **1 a** : the power or process of reproducing or recalling what has been learned and retained especially through associative mechanisms **b** : the store of things learned and retained from an organism's activity or experience as evidenced by modification of structure or behavior or by recall and recognition; synonyms: remembrance, recollection, reminiscence.

Motivation: **1 a** : the act or process of motivating **b** : the condition of being motivated
2 : a motivating force, stimulus, or influence: incentive

Learning and memory involve storage, encoding (modified information, changed, and simplified) and retrieval.

In 1890 William James identified the three components of memory as after image, primary memory, and secondary memory. Using a similar concept, W. Watkinson and R. Shiffrin (1968) identified the dual-store model which consists of sensory memory (unlimited capacity, visual and auditory form of storage of a very brief duration), short term (working) memory or STM which is affected by intensity, novelty, incongruity, emotion, and personal significance), and long term memory or LTM. long term memory storage processes involve selection, rehearsal, meaningful learning, internal organization, elaboration and embellishment, visual imagery, and procedural

knowledge. Factors affecting working memory are working memory, prior knowledge, prior misconceptions, expectations, verbalization, enactment, and repetition and review. Long term memory can be encoded with symbols (numbers, words, etc.), appearance, meanings, and actions and is organized with hierarchies (the entire network of information within a category), propositional network (the chain of thought within a network), and parallel distributed processing (numerous informational nodes being processed simultaneously). Concepts, schemas (a connected set of ideas), scripts (how events typically transpire), and conceptual change are involved in the processes of long term memory. Long term memory involves retrieval using associative cues, construction, and forgetting. Forgetting can be caused by decay, oblitative subsumption (information replaced by new information), interference (one set of information interfering with recalling another set), failure to retrieve, repression (repressing painful memories), nonstorage, and construction error ("remembering" unencountered information).

Increase of wait time by three seconds (Mohatt and Erickson, 1981; Rowe, 1974, 1987; Tharp, 1989; Tobin, 1987) can increase student participation, better quality of student response, better classroom performance, different kinds of questions, flexibility in instruction, and changes in expectations (Omrod, 2004). I have noticed this while teaching the ESL classes that, that the students like the excitement of playing word games, etc., it is helpful to their learning process if I briefly pause while waiting for answers rather than expecting rapid-fire interaction.

Learning also involves metacognition, self-regulated learning, and study strategies which can include meaningful learning and elaboration, organization, note taking, identifying important information, summarizing, comprehension monitoring, and mnemonics.

Some examples of mnemonics are the well known Roy G. Biv for remembering the colors in the rainbow or attaching definitions according to the sounds in the word or other associations. For example, "stalactites" hold "tight" to the ceiling and "stalagmites" "might" make it to the ceiling. Or "meteoroid" sounds like "asteroid" or something from outer space, "meteor" can make one think of a meteor shower through the Earth's atmosphere, and "meteorite" sounds like an earthly rock like bauxite or graphite. "Lava" is the most visible and obvious and is therefore the most often used word whereas "magma", as is expected since it is underground and out of sight, is the least used word.

Also in the ESL classes I have been teaching many visual learning devices, including flash cards, have been used. Pictures, role play, and drawing all give a visual dimension to the learning of a language. For example, to a very young child first learning the word "look", the two Os in the word can be made into eyes. Also, realia is effective where real objects are used to teach principles to be learned such as dissecting a frog for biology class or using a real clock to teach the students how to tell time.

The social nature of learning involves student interaction with adults and peers and includes apprenticeships, class discussions, reciprocal teaching (gradually turns the teaching role over to students), cooperative learning, peer tutoring, community of learners, and technology-based solutions (computers, online courses, audio-visual equipment, etc.). Apprenticeship includes modeling, coaching, scaffolding (support system), articulation, reflection, increasing complexity

and diversity of tasks, and exploration. Norm Chomsky in the 1950s developed the ideas of shaping, reinforcement, generalization, discrimination, and observational learning for children and adults learning language

Factors that influence learning ability are motivation, prior experience, intelligence, and learning and developmental disorders. Memory and learning are interrelated and the processes of each are similar. Although the English language uses a single word for memory, there are many different kinds. Usually the three main types listed are sensory memory, short-term or working memory, and long-term memory. .

Encoding is the process of perceiving information and bringing it into the memory system. Recoding is also called chunking, because separate bits of information can be grouped into meaningful units, or chunks. For example, unscrambling individual nonsensical letters into one meaningful word can make those collection of letters remembered and this technique can be used in my ESL language classes. One recoding method that people often use to remember information to rehearse the informatio, or to repeat it mentally. Also useful is elaborative processing, which involves thinking about information in a meaningful way and associating it with existing information in long-term memory.

Explicit memory refers to the conscious recollection of facts. Recognition tests require students to examine a list of items and find the ones they have seen before, or to decide if they have seen an item before, or identify the correct choice. Multiple-choice and true-false exams are kinds of recognition tests and these are used often while teaching my ESL classes.

In some cases, recall can be even more effective than recognition in teaching ESL there is quite a bit of eliciting to get the students to recall an answer. In a class of fifteen students usually the collective consciousness of the class usually brings up a correct answer especially if they have been told the answer previously within the course lessons.

Implicit memory refers to using stored information without trying to retrieve it. Psychologists use the term priming to describe the relatively automatic change in performance resulting from prior exposure to information. Priming occurs even when people do not consciously remember being exposed to the information.

A retrieval cue is any stimulus that helps us recall information in long-term memory and this technique is used often to get the ESL students to recall words by eliciting responses from the students by supplying clues and prompts. Distinctiveness is another principle that determines the effectiveness of retrieval cues. Overt cues such as sights and sounds can induce remembering such as, for the ESL students, recorded music. One listening exercise is to get the students to listen to songs and give them paper with the songs lyrics but with some of the lyrics blank so that they have to fill in the blanks with the word as sung in the song that they are listening to.

There is also mood-dependent memory such as *deja vu* and *jamais vu* (someone sees something they have seen before but they think they have not). There is also the tip-of-the-tongue state and flashbulb memory (a clear memory of a traumatic or important event).

Another way our cognitive system introduces error is by means of inference. Forgetting is defined as the loss of information over time. The decay theory of forgetting is the oldest idea about forgetting that says that forgetting caused by decay. But reminiscing of long ago memories seems to contradict this theory. Some scientists say that forgetting occurs because of interference from other information or activities over time. The two types of interference are proactive interference, where prior learning interferes with the ability to recall newer information, and retroactive interference, where new information interferes with the ability to recall earlier information or experiences. Repression, which refers to forgetting an unpleasant event, is another cause of forgetting. The idea of repression was introduced by Sigmund Freud

Concerning the physiological processes of learning, remembering involves the chemical connections within the brain and alterations in the neural pathways. Long term memories are thought to be stored in the hippocampus and the prefrontal cortex links the long-term memories to the senses so that one can respond to events as they happen. The cerebellum processes the skill memories so that movements are coordinated.

Learning is usually most efficient and rapid when the learner is motivated and attentive.

Motivation can be intrinsic (internal rewards) or extrinsic (external rewards). Motivation involving the basic human needs includes drive theory (survival drive, etc.), arousal (attentiveness), Maslow's hierarchy of needs (physiological, safety, belonging, esteem, and self-actualization), competence and self-worth, and relatedness (feeling of social connectedness). Individuals have different needs for affiliation, approval, and achievement. Also, related to motivation is affect which includes the emotions of pleasure, anxiety, excitement, pride, depression, anger, guilt, etc. (Omrod, 2004).

Cognitive factors in motivation include intrinsic motivation such as self-efficacy, self-determination, and response from others as well as establishing goals towards which the student progresses. Motivational attributions include contingencies (conditional possibilities), self-efficacy, learning strategies, metacognition (people's recognition and regulation of their own learning processes), self-regulated learning, self-worth, self-handicapping, relatedness, expectancies, values, and affect. (Omrod, 2004).

Motivation is the cause of an organism's behavior. In a human being, motivation involves both conscious and unconscious drives. Psychological theories must account for a "primary" level of motivation to satisfy basic needs, such as those for food, oxygen, and water, and for a "secondary" level of motivation to fulfill social needs such as companionship and achievement. The primary needs must be satisfied before an organism can attend to the secondary drives.

Motivation can be primary such as the need for food and clothing or secondary such as the need for companionship and success (and perhaps fashionable clothing). The American psychologist Abraham Maslow devised a hierarchy of needs that, according to his theory, explain human behavior. Maslow states that the needs are: (1) physiological; (2) safety; (3) love and belonging; (4) esteem; (5) self-fulfillment and curiosity and (6) self-actualization. Some theories say that an organism is thought to desire a state of no stimulation which brings to mind the Buddhist concept

of nirvana. Though recent cognitive theories of motivation, however, say humans want to optimize, rather than minimize, stimulation and this better explains their exploratory nature and the need for variety, art, travel, and curiosity. (Mazur, 2002).

The teacher functions as a facilitator and mediator between the student and the body of knowledge to be learned and should provide the sort of knowledge, expertise, and training necessary for the students' intellectual and cultural growth. The teacher can only make the students aware of the immediate and future extrinsic rewards. Concerning intrinsic and extrinsic learning, I think when we as learners read or study, for our own enjoyment or edification, subjects on our own that we are not required to take then we are involved in more intrinsically motivated behavior. The contents of online courses or other university courses could conceivably be studied by the learners themselves at their own structure and pace and that type of motivation could perhaps be considered intrinsic depending upon the ultimate intent of the learners. Enrolling in a course for credit and usually working toward a degree implies that the enrolled student is extrinsically motivated in taking the courses.

Intrinsic motivation, by definition of the word, is internal to the student so therefore it can not be increased by the teacher through a series of immediate rewards and punishments or the promise of future rewards and punishments of success, communication skills, technical skills, career advancement, and material possessions or of the lack of the previously mentioned rewards. For these reasons the teacher can only offer extrinsic motivation since intrinsic motivation comes from within the student. In my ESL classes the extrinsic rewards include the in-house school currency given to them for positive achievements and scaffolding and support from the teachers, staff, and peers.

A student's motivation as a graduate student is a combination of intrinsic and extrinsic factors and my educational motivation has been throughout my life. An infant or very young child is motivated intrinsically out of curiosity and survival drives. Later, the motivation becomes more extrinsic as the child attempts to please its parents and others. I think as a person matures, in addition to the rewards that are intrinsic and for personal satisfaction, the rewards are external to the internalized knowledge and become increasingly more extrinsic in nature. As a motivational technique, in the ESL classes I have been teaching, in-house school currency is given as a reward for good performance -- or they are taken away as punishment. Another motivational technique is posting the Student of the Week's name in the front of the classroom every week on a poster created for that purpose. These externalized rewards can include success, communication skills, technical skills, career advancement, and material possessions or of the lack of the previously mentioned rewards and are in line with the concepts of B.F. Skinner as described in his theories of operant conditioning. Also, students can be motivated to learn by taking elective courses that are of use and interest to them.

During each ESL classes, at some point, I always ask the students: Why do you study English? The answers vary. Some even say that they are forced to or have to. But others give more positive answers. I tell them that, if they are to live, study, travel, or work abroad, they will need to learn English since it is the international business. Other reasons are: to enjoy cultural products such as music with lyrics, movies, books, magazines, and the Internet. Even if they never leave their

country they at some point will need to communicate internationally for international trade or social communication and they might also need to communicate with foreign visitors to their country who most probably will speak English. Most of them are motivated since they are interested in a university education in the future and they realize that it is essential for them to learn English. All of these reasons provide motivation to study and learn English.

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Mazur, J. (2002). Encarta Encyclopedia 2002. Seattle: Microsoft Inc.

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Roediger, Henry. (2002). Encarta Encyclopedia. Seattle: Microsoft Corporation.

Woolford, A.E. (1997). Educational Psychology. New York: Pearson Allyn & Bacon.

U8D1

Should teachers tailor assessments according to the individual cognitive needs of students? If yes, please provide some examples of both when and how this should be done. If no, please explain why. In the educational system, there needs to be a standard curriculum and a general method of study but there can be variations and departures from the general guidelines. Based on the ideas of multiple intelligences and multiple interests, talents, and abilities as well as multiple personality types and cultural backgrounds, it is necessary to have a multitude of approaches for many students. Also, students with special abilities or disabilities would need to have variations in approaches to accommodate the level of their abilities. However, accommodating with different teaching styles should not mean that the higher level students should be prevented from progressing in order to accommodate the lower level students and likewise the lower level students should not be expected to perform beyond their abilities or capacities. It is important to create an environment where all students perform and learn to the highest of their ability in order for all of the students to achieve their highest potential abilities.

Richard

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U8D1 comment to Tatiana

Tatiana, I think you have captured the goal of education with the statement: "Metacognition in turn inspires higher order thinking skills, which will allow students to transfer their knowledge to the world beyond the classroom". Richard

--

U8D2 Comment to Laura

Laura, As you indicated there is so much going on when learning and communication occur which consist of activities that let the child "build their developmental skills in the areas of expressive and receptive communication, cognitive, fine and gross motor, social, self help and sensory and self regulation". All learning and cognition is a complicated series of interrelated activities.

Richard

U8D2

Think about an area of instruction you're involved in right now (either as a teacher or learner) and very briefly describe how you might make that instruction multidisciplinary in nature. * (See description below.) How are cognitive learning principles being demonstrated in your example? Think about memory and transfer, constructivism, and other cognitive theories and principles that might apply.

Respond to at least one other learner's post.

*"The integrative or multidisciplinary curricular approach...to education seeks to help students learn and appreciate the relevancy of how school subjects are tied together and how each subject builds on the other."

- Wicklein, R., Schell, J. (2003) Case Studies of Multidisciplinary Approaches to Integrating Mathematics, Science and Technology Education. Retrieved November 26 2003, from Digital Library and Archives.

I think in the ESL classes I make the instruction multidisciplinary (as well as multimedia) because I use several subjects (history, mathematics, English, literature, science, geography, art, etc.) while conveying the information and skills necessary for language learning. The language knowledge is transferred to English usage for reading, writing, speaking, and listening and for conversational use. Today I had the students draw and make kites so that we learned terms in science concerning wind, motion, force, etc. and they also got to express themselves creatively.

Some more thoughts concerning multidisciplinary learning:

All universities are composites of many departments of academic disciplines. When someone takes on a degree program at a university they are involved in multidisciplinary studies by the nature of the curriculum and coursework that they are required to take. The students might take courses in language, mathematics, literature, the sciences (biology, astronomy, etc.), political science, history, literature, philosophy, in addition to their major area of study. The interdisciplinary (or multidisciplinary) studies programs involve situations where the students, with the assistance of academic advisors, constructs his own curriculum of study with more of his chosen electives to concentrate on a more specialized or uniquely tailored area of studies. For instance, if someone wants to be a medical illustrator, he should take medical and biology courses

in addition to art and illustration courses. Likewise, if someone wants to be a scientific illustrator concentrating on space travel, the universe, or astronomy then he should take science and astronomy courses in addition to art and illustration courses. Learning these skills would involve memory since there are many techniques and facts to learn. The information learned could be transferred so that the scientific knowledge as well as the principles of art, drawing, painting, illustration would transfer to the field of scientific illustration. This process would involve the principles of constructivism since all of the knowledge would be cumulative because all of the new learned knowledge would build upon the previously learned knowledge.

Some concepts involving cognition are verbal learning, serial learning (sequential learning which involves paired associative learning , primary effect where the first items are learned quickly, and recency effect where the last or most recent items are learned quickly, overlearning , distributed practice (dispensing of information over a period of time).

Cognitive learning theory is a general approach that views learning as an active mental process of acquiring, remembering, and using knowledge.

The types of memory are: sensory (perception of the information), working (short term), and long term.

The types of knowledge are: general (widely applicable), domain specific (specific to one area), declarative (words, facts, etc.), procedural (used in performing tasks), and conditional (appropriate use of declarative and procedural knowledge).

Metacognition, which is knowledge about our own thinking involves rote memorization tools, part learning (breaking material into short lists), distributed learning (good for long term memory) ,massed learning (cramming), mnemonics (which are techniques for learning including the loci method, acronyms, and key words), Gestalt theory, as well as the constructivist perspective which emphasizes the active role of the learner in building understanding and making sense of information.

Richard

References:

Mazur, J. (2002). Encarta Encyclopedia 2002. Seattle: Microsoft Inc.

Ormrod, Jeanne E. (2004). Human Learning. Upper Saddle River, NJ: Pearson Education, Inc

Woolford, A.E. (1997). Educational Psychology. New York: Pearson Allyn & Bacon.

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what was posted:

U8D2

Think about an area of instruction you're involved in right now (either as a teacher or learner) and very briefly describe how you might make that instruction multidisciplinary in nature. * (See description below.) How are cognitive learning principles being demonstrated in your example? Think about memory and transfer, constructivism, and other cognitive theories and principles that might apply.

In the ESL classes I have been teaching, the instruction is multidisciplinary (as well as multimedia) because I use several subjects (history, mathematics, English, literature, science, geography, art, etc.) while conveying the information and skills necessary for language learning. The language knowledge is transferred to English usage for reading, writing, speaking, and listening and for conversational use. Today I had the students draw and make kites so that we learned terms in science concerning wind, motion, force, etc. and they also got to express themselves creatively.

Some more thoughts concerning multidisciplinary learning:

All universities are composites of many departments of academic disciplines. When someone takes on a degree program at a university they are involved in multidisciplinary studies by the nature of the curriculum and coursework that they are required to take. The students might take courses in language, mathematics, literature, the sciences (biology, astronomy, etc.), political science, history, literature, philosophy, in addition to their major area of study. The interdisciplinary (or multidisciplinary) studies programs involve situations where the students, with the assistance of academic advisors, constructs his own curriculum of study with more of his chosen electives to concentrate on a more specialized or uniquely tailored area of studies. For instance, if someone wants to be a medical illustrator, he should take medical and biology courses in addition to art and illustration courses. Likewise, if someone wants to be a scientific illustrator concentrating on space travel, the universe, or astronomy then he should take science and astronomy courses in addition to art and illustration courses. Learning these skills would involve memory since there are many techniques and facts to learn. The information learned could be transferred so that the scientific knowledge as well as the principles of art, drawing, painting, illustration would transfer to the field of scientific illustration. This process would involve the principles of constructivism since all of the knowledge would be cumulative because all of the new learned knowledge would build upon the previously learned knowledge.

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Metacognition, which is knowledge about our own thinking involves rote memorization tools, part learning (breaking material into short lists), distributed learning (good for long term memory), massed learning (cramming), mnemonics (which are techniques for learning including the loci method, acronyms, and key words), Gestalt theory, as well as the constructivist perspective which emphasizes the active role of the learner in building understanding and making sense of information.

Richard

References:

Mazur, J. (2002). Encarta Encyclopedia 2002. Seattle: Microsoft Inc.

Ormrod, Jeanne E. (2004). Human Learning. Upper Saddle River, NJ: Pearson Education, Inc

Woolford, A.E. (1997). Educational Psychology. New York: Pearson Allyn & Bacon.

U9D1 from schedule

Discussion 9.1:

Select an example of instructional technology in an educational setting. Using the learning theories we have studied in this course, explain how your example promotes learning. Use your text if you like and include at least one additional reference in support of your response.

Respond to at least one other learner's post.

U9D1

Select an example of instructional technology in an educational setting. Using the learning theories we have studied in this course, explain how your example promotes learning. Use your text if you like and include at least one additional reference in support of your response.

In the area of technology, a great deal has changed because technology is a rapidly accelerating phenomenon. Now almost everyone is connected by transportation and communication technology and people and schools are connected by computer and Internet technology so that all of civilization's collected knowledge is accessible at the touch of a button and at the speed of light. The Internet and the World Wide Web forms a world communication system, a world library and information system, an information storage and an information retrieval and dispensing system, commercial uses for a worldwide marketplace for buying and selling, and online courses, among

others. Much of the use of the Internet is behind the scenes but its social impact is profound and it is one of the instruments that is helping to create a new world culture. Technology through many inventions, including the Internet, is making the world smaller by bringing the world together as a result of the instantaneous worldwide flow of information and knowledge and this has made an immense impact on everyone's life.

From Smith and Smythe's article, "Globalization, Citizenship, and Technology": "To understand how globalization might empower citizens we must recognize that the information revolution made globalization possible. As Kobrin notes, 'the emerging global world economy is electronic, integrated through information systems and technology rather than organizational hierarchies.' (Kobrin 1998) We are witnessing what has been described as a third industrial revolution 'characterized by the intensive application of information and communications technology, flexible production systems and organizational structures, market segmentation and globalization.' (Cerny 1995)". In the same article, Rowland describes the Internet as essentially anarchic. He refers to a "vision of an alternative libertarian society based on cooperation as opposed to competition." (Rowland 1997) "The Net," says Rowland, "is public space that is shared by millions of citizens but lacks a government."

The Internet has had a profound impact on everyone and even on the educational process. For example, these online courses, which can be taken from anywhere in the world, would not be possible without it. Not many people know who the inventor of the World Wide Web is (the original concept and technology of the Internet came from the U.S. military with the idea of making a communication system that could survive a nuclear war) but the Web's inventor is Tim Berners-Lee who stated that "the vision that I have for the Web is about anything being potentially connected to anything." This has the potential of even further blurring the boundaries between nations and ideologies and is in fact causing this to occur currently.

In "Transnationalism, Localization, and Fast Foods in East Asia" by James L. Watson in "McDonaldization, the Reader" by George Ritzer mentions that some aficionados especially those connected with "Wired" magazine assert that "Internet enthusiasts have already begun to create a global culture that will negate -- or at least undermine -- the traditional state." and: "Web visionaries also predict that ideologies based on class, religion, and ethnicity will recede as the global system becomes a reality. Underlying globalist theories is the idea that people the world over will share a common culture." (Ritzer, 2002). This has already begun to happen.

For educational institutions to have all knowledge-base sources such as libraries and online books, magazines, and websites is a truly revolutionary development. Students of all levels are connected to everyone in the world with another Internet computer and all have access to the same informational sources. Encyclopedias and information sources with verbal, visual, and audio information give a new dimension to the educational enterprise and just surfing the net is an operant conditioning reward in itself and creates a sort of intrinsic motivation to learn. Concerning the cognitive techniques of learning that the Internet offers, with all of the sensual mental stimulation provided by the Internet, the information can be referred to in the same way that books are read except without the paper and the actual books themselves. The Internet user can connect up to a world library of sources from anywhere in the world he happens to be at the time.

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U9D1 comment to Rycharde

Technology is helping all segments of society and it is good to hear that there are many technologies available for the visually impaired. I am curious and am wondering if there is any software now that converts verbal, written text into audio output. If such products don't already exist, I imagine that they will sometime in the future.

Richard

U9D1 response to Colleen

Do you see any applications that are specific to your teaching? If so, can you relate them to one of our theories?

I have researched information and printed out information and handouts for classes that were obtained from the Internet. Also, I have had the students look up information too. For the children students I have introduced them to the Yahoo Kids page which has all sorts of information, games, news, etc. of interest to the young learners. On that site there are educational links with animated movies demonstrating many scientific principles, episodes of history, etc. On the Internet, there are online language courses too and online dictionaries for the language learners and also there are encyclopedias for information in all academic subjects. As far as theories that we have studied are concerned, I would relate the use of these sources as cognitive in effect. As far as operant conditioning is involved (concerning intrinsic or extrinsic motivation for the use the Internet for educational purposes), if the information being obtained is a required school project then perhaps the motivation is extrinsic but if someone searches and reads the Internet for their own enjoyment then that could be considered intrinsic motivation.

Also concerning the Internet, one application specific to my teaching is that most of my teaching jobs were found in listings on the Internet. Besides the Internet's use in helping me find the teaching positions, taking these online courses would not have been possible without Internet technology (and I think these courses are helpful for my teaching).

Richard

U10 Action Assignment from schedule

Action Assignment 10.1:

Post your draft and respond to other learners' posted drafts privately via e-mail or in the CourseRoom. Your instructor will also provide comments. Be sure to copy your instructor if you use e-mail.

**Behaviorist and Cognitive Views of Learning
and Memory and Motivation**

ED7700

Learning Theory and the Educational Process

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Dr. Colleen Nardone

Introduction:

This paper discusses some behaviorist and cognitive views of learning and the concepts of memory and motivation as related to human learning. The concepts are discussed theoretically in general and then specific examples are given as to the implementation of the theories in especially in the field of language learning and in particular to the field of English as a foreign language, a field in which I have been involved teaching for the past several years.

Behaviorist Views of Learning:

from the Meriam Webster Dictionary (2003):

behaviorism: a school of psychology that takes the objective evidence of behavior (as measured responses to stimuli) as the only concern of its research and the only basis of its theory without reference to conscious experience

As the behaviorists have demonstrated equipotentiality in relation to human and animal

learning, experiments concerning learning processes done on animals often can be applied to human behavior and learning. In classical conditioning (which is involuntary and elicited by a stimulus and which occurs when two stimuli are paired), such as the well known example of Pavlov's salivating dogs, when neutral, conditioned, and unconditioned stimuli are presented to animals they respond with no, conditioned, or unconditioned responses respectively. According to the concept of equipotentiality, humans also respond in a similar way. So using these principles learned in experiments with animals and as applied to learning and education, students can be rewarded directly through signal learning which is the eliciting of a response such as is the result of the introduction of aversive or rewarding positive or negative stimuli. In the academic realm, other signal responses can include the positive desire for success. Classical conditioning includes the concept of extinction (reversion to an original condition after a positive or negative stimulus is eliminated), spontaneous recovery (a reappearance of a dormant response such as remembering forgotten words or concepts), stimulus generalization (generalizing to other situations applying language learning to real life situations or mathematical principles to solve actual problems presented by reality), stimulus discrimination (response to some stimuli but not to others when different effects are discovered such as learning what words and concepts are important and useful to learn), and higher-order conditioning (when a different stimulus with the same result is substituted for the original stimulus such as different rewards in different games are offered). Habit (routine and repetition such as following the same schedule everyday in the language classes or the same verbal or language patterns), contiguity theory (the proximity and logistics of the stimulus and response), inhibiting factors (punishment and fear of failure), and one-trial learning are also employed as aspects of classical conditioning.

Classical conditioning involves a reflexive response shifting from one stimulus to another.

The most well known example are the experiments with the dogs of the Russian scientist Ivan Pavlov, the founder of classical conditioning research, whose salivation rate was observed when presented with food also began to salivate in expectation of being fed when noticing the laboratory assistants, or the dogs' feeders, only entering their room. The unlearned and inborn conditioning process involves first the unconditioned stimulus (food) and the unconditioned response (salivation) which is later introduced with conditioned stimulus (a bell ringing) that is reacted to with a conditioned response (salivation). Pavlov described areas of conditioning including acquisition (initial learning), extinction (unlearning or forgetting through disuse or no reward), spontaneous recovery (remembering or reactivating), stimulus generalization (reacting to a different but similar stimulus), stimulus discrimination (determining the difference between positive and negative stimuli). Classical conditioning helps explain emotions such as happiness, anger, excitement, and anxiety and the expectations that accompany them. For example the sight of a test might produce an emotion such as anxiety whereas a plate of food might elicit pleasant emotions of anticipation.

Operant conditioning or connectionism (which is voluntary and initiated by the operant or organism) occurs when a response is followed by a reinforcing stimulus. Operant conditioning involves such concepts as shaping or successive approximations, chaining or sequential responses - and these concepts are used often in language classes, primary and secondary (conditioned), reinforcers, reward (either through positive reinforcement which is the introduction of a pleasant

stimulus such as giving the students the school in-house currency for good performance or through negative reinforcement which is the removal of an aversive stimulus such as allowing the students back in the room after they have been sent out), punishment (either through positive reinforcement which is the presentation of an aversive stimulus such as scolding and sending them out of the room or negative reinforcement which is the removal of a pleasant stimulus such as the removal of their in-house school currency). Factors affecting the effectiveness of reinforcement are timing (pacing, planning, scheduling of tasks), magnitude (intensity of the reinforcer and the level of difficulty of the presented concepts), appeal (attractiveness of the curriculum and its presentation with its attending elation or depression effect), and consistency (maintaining a certain level of expectations). Schedules of reinforcement include fixed ratio (scheduled, expected rewards), variable ratio (surprise rewards), fixed interval (e.g. giving time limits for games), variable interval (changing intervals over time to either speed up or slow down activities), and differential rates of high (when everyone knows the answers) and low (when none or few students know the answers) response. Stimulus control includes antecedent stimulus (to prepare the respondent for future stimuli), discriminative stimuli (responses are relative to given situations or appropriateness), stimulus generalization (adapting knowledge or language skills to new generalized situations), cuing (prompting), setting events (complex environmental settings designed to elicit particular responses such as the settings of educational institutions), behavioral momentum (changes in environmental stimuli which is necessary to keep a child's short attention span on track and this is done with a variety of techniques and activities in the school and classroom). All of these techniques help realize the educational objectives as formulated by B.S. Bloom through the taxonomy of knowledge, comprehension, application, analysis, synthesis, and evaluation.

Operant conditioning requires action on the part of the learner whereas classical conditioning does not. In classical conditioning the reward is the stimulus, in operant conditioning the reward is external to the stimulus. Operant conditioning involves increasing a behaviors with rewards or reinforcers or decreasing a behavior by using punishment techniques.

American psychologist Edward L. Thorndike, in the late 19th century, developed the puzzle box where a reward outside of the box could be obtained after the animal learned the method of opening the box conceived of the law of effect which states: "Responses to a situation that are followed by satisfactions are strengthened; responses that are followed by discomfort are weakened." (Omrod, 2004).

American psychologist B. F. Skinner, who created the term operant conditioning, developed the Skinner Box where the animal stays inside the box and by only pushing a lever or button receives food as a reinforcer for its behavior. He also claimed these reward and punishment procedures involved in operant conditioning could be used for humans in behavior modification, aversion therapy, educational procedures, language acquisition, business motivation, sports performance, psychological therapy, etc. Operant conditioning, the study of which was originated by Skinner, is the shaping of behavior with reinforcement and punishment. The main principles are reinforcement, punishment, shaping, extinction, discrimination, and generalization.

Reinforcement is strengthening behavior with a pleasant stimulus for positive reinforcement and with an unpleasant stimulus for negative reinforcement including escape and avoidance. A

reinforcement schedule specifies the frequency and timing of reinforcers and Skinner identifies four main types: fixed-ratio (a reinforcer for each number of responses like a factory worker paid per product), variable-ratio (random number of responses to receive a reinforcer like throwing dice), fixed-interval (reinforcement is received after time elapses like a student watching the clock toward the end of the class period) , and variable-interval (reinforcement after a certain amount of time like a teacher giving a pop quiz or prizes given at unscheduled times in the future).

Punishment is a way to weaken behavior so that it will not reoccur. Positive punishment involves reducing a behavior with an unpleasant stimulus if the behavior occurs such as aversion therapy or spanking and corporal punishment while negative punishment involves the removal of a pleasant stimulus such as allowing no TV watching or grounding teenagers.

Shaping is a reinforcement technique that is used to teach animals or people new behaviors that are not natural to them such as teaching an elephant to walk on its hind legs by rewarding them with food for that behavior.

Extinction is the elimination of a behavior through disuse or lack of continuing rewards or reinforcers. Under these circumstances the response rate is decreased and then eventually ceases.

Generalization and *discrimination* function in operant conditioning in ways similar to classical conditioning. In generalization, a learned behavior is performed appropriately in other, but similar situations. In discrimination, different but similar stimuli are differentiated by the organism when it is found that the stimuli produce different results.

Applications of Operant Conditioning can be used in many areas. In schools and in the classroom teachers can reinforce behavior with rewards and privileges. The rewards can also be in the form of points, stickers, stars, grades, play money or even real money or prizes. "Skinner urged educators to focus on reinforcing student successes rather than on punishing student failures. In desperation, teachers often find themselves punishing misbehaviors, through such aversive consequences as displeasure, ridicule, and failing grades, rather than reinforcing appropriate responses; as Skinner puts it teachers 'induce students to learn by threatening them for not learning' (Skinner, 1968)." (Omrod, 2004).

Though some may feel it is too much like feeding fish to dolphins to train them to perform tricks, the offering of rewards to encourage learning or academic success, as is done in some of the ESL schools where I have taught, can be an effective method to stimulate interest in learning and does correspond to the "real world" practice of paying people to perform jobs or services. The point should be made that rewards come in a variety of forms, such as a supportive smile, a hardy laugh, a thumbs up gesture, or a physical or metaphorical pat on the back for encouragement. It can also be in the form of points, stickers, stars, grades, play money or even real money or prizes. The reward can be immediate, which is more along the lines of operant conditioning, or it can be delayed which could encourage sustained, progressive, and continual growth and achievement in order to receive a reward at the "light at the end of the tunnel".

Concerning the ESL classes I have taught, in the privately owned school language schools, the children students sometimes receive as rewards play money currency which is spendable only in the school to buy school supplies such as book bags, pens, pencils, erasers, paint, etc. Some might find this somewhat mercenary but it seems to work as a positive reinforcer since the children enjoy the contest of seeing how many cards or how much in-house currency they can accumulate just as adults do with real currency in the business world. These cards are given instantaneously, one at a time, at the moment the achievement is done such as winning a game or having the highest test score, etc. This practice in fact follows the requirements for operant conditioning which are: " (1) the reinforcer must follow the response, (2) the reinforcer must follow immediately, (3) the reinforcer must be contingent on the response" (Omrod, 2004, p. 53).

Concerning a delayed reward to promote sustained behavior, another approach used that can be used to promote good classroom behavior is to give stickers for good citizenship so that the students receiving the most stickers at the end of the year can be awarded with certificates or prizes for good citizenship. If these practices motivate the learners to learn then there should not be negative effects in this type of system but this sort of practice and done to this extent would not occur, and indeed might not be allowed, in some public schools even though the students in public schools do get stars, awards, grades, and certificates for academic achievement and good behavior.

Other concepts important to the practices of behaviorism are the development of self-efficacy and self-regulation.

Self-efficacy is the condition in which people are more likely to engage in certain behaviors when they believe they are capable of executing those behaviors successfully. (Omrod, 2004, p. 142). Self-efficacy involves choice of activities, goals, effort and persistence and learning and achievement (Omrod, 2004, p. 143). Self-efficacy requires practice, repetition, modeling (from the teacher and from other students), praise and encouragement, positive operant conditioning (reward and punishment), and the development of self confidence. Repetition plays a major role in self efficacy especially in young learners. In older, more mature learners self-efficacy is impacted by the relevance of the subject matter. In older learners the lessons need to have meaning in the learner's life. Repetition counts for something but if the learner is not interested, or does not see the relevance or importance of subject matter then self-efficacy is negatively impacted.

Self-regulation requires self discipline and a daily, weekly, and yearly (perhaps over several years) schedule, exercise, and good daily health habits (such as eating well, not smoking, etc.). Time management skills are necessary for the implementation of self-regulation. Students should also be taught how to prioritize their tasks and for this reason schedules are very important. The use of exercise and playing a team sport can also help students increase their self-regulation regimen as well as their coordination skills and self confidence. Playing sports also teaches discipline and time management skills.

Another form of behaviorist activity involves modeling or replicating behavior that is to be emulated. Some of the language schools provide workshops for the teachers to learn new teaching techniques and activities and this is done by modeling the workshop's presenter, texts, and other teachers or fellow workshop participants. Besides watching the presenter's presentations and

demonstrations, the teachers engage in partner-based activities and then within small groups and then sometimes within a larger group. The partner based and small group (three or four people) based activities can be helpful for all subjects but especially for language, or English as a second language, classes since it allows the students more opportunities to speak the language that they are studying rather than waiting to be called on one at a time in a large classroom setting. Some of the activities are game type activities such as board games, bingo, match games, fill in the blank games, spelling games, etc. where the teachers practice the activities by watching each other and modeling each other's examples. Some are group activities where, for example, each of two teams tries to be the first to unscramble letters in words or words in sentences which are written on small pieces of paper. First these activities are modeled for the participants in the workshops by the presenter and then the participants re-enact the modeled activity. The same procedure is done for the students in a classroom where the activity is modeled for them usually by the teacher so that they understand what they are to do.

In art classes, much of the learning of technique and skills is done through modeling. The student watches the teacher and then imitates the action to learn how to handle material or to draw or paint. For instance, in learning to paint portraits, the student studies various completed portraits that might have been done throughout history, then observes the teacher (live model) using certain materials and then watches as certain techniques are demonstrated such as how to draw a particular feature and the correct proportion of the parts of anatomy and mathematical formulas (such as comparisons of the distances of various features from one another, etc.). A similar technique involving listening (verbal instruction) is done while learning language as when the student listens to a word or phrase and then repeats it so this is also another type of modeling or learning by observing and then doing.

Cognitive Views of Learning

from the Meriam Webster Dictionary (2003):

Cognitivism: 1 : of, relating to, or involving cognition (the act or process of knowing including both awareness and judgment) **2** : based on or capable of being reduced to empirical factual knowledge

Cognitivism involves how we acquire knowledge and concepts through the perceptions of our senses.

Below is an interesting example of how we cognitively perceive words:

Aoccdmrig to a rscheearch at an Elingsh uinervtisy, it deosn't mtttaer in waht oredr the ltteers in a wrod are, the olny iprmoetnt tihng is taht frist and lsat ltteer is at the rghit pclae. The rset can be a toatl mses

and you can still read it without problem. This is because we do not read every letter by itself but the word as a whole. (Ross, 2003).

Following are several theoretical explanations of cognitive processes. Verbal learning is used in the language courses in the learning and explanation of new terminology and concepts. Also in the language courses that I teach, the principles of **Gestalt** psychology and theory are utilized particularly in the organization and presentation of the course material. Used in the course presentation are the law of proximity (items and subjects close together are linked as groups), law of similarity (similar items are viewed as a unit), law of closure (the observer fills in the missing pieces to form a complete picture or concept), law of Pragnanz (terseness or preciseness involving memory traces), and problem solving using restructuring and insight since human perception organizes concepts into comprehensible units or groups so that the whole can be "digested" gradually by consuming the groups or clusters of information.

Some of the findings of Jean **Piaget**, who said that people are active processors of information, are also used in the English as a second language course. Piaget said that knowledge can be described in terms of structures that change with development (scheme, cognitive structures, operations) and that learning is a process of assimilation and accommodation. People are motivated to make sense of the world and he identified four stages of development: sensorimotor, preoperational, concrete, and formal which are determined to some extent by the maturation of the individual.

Lev Vygotsky's developmental theory involves the following principles:

1. Internalization
2. In the first few years of life thought and language become increasing interdependent
3. Adults transfer their culture to children
4. Children learn from people more advanced than themselves
5. Challenging tasks promote maximum cognitive growth

Other concepts besides verbal learning are **serial learning** (sequential learning -- and this is most definitely used in the English language courses where new knowledge is built upon the foundations of previously learned knowledge -- which involves **paired associative learning** such as foreign words with their English equivalents or words with their definitions, **primary effect** where the first items are learned quickly, and **recency effect** where the last or most recent items are learned quickly), **overlearning** (which brings to mind the idea of "information overload", such as all of the overwhelming information in a large text book or in a course such as the language courses, which is presented at a rapid pace, the information of which can later be returned to and reviewed in order for assimilation to occur), **distributed practice** (pacing the distribution of information over a realistic period of time). Also, taken into consideration while presenting the language course information, are the characteristics of the course material, such as the difficulty or

simplicity of the presented information, that would affect the speed with which the learners can absorb it.

Cognitivism states that some types of learning might be unique to humans and that people learn best by becoming actively involved (such as our school's practice of TPR or Total Physical Response) and when knowledge is organized into comprehensible units. Also taken into consideration in the design of the language courses is that learning is a process of relating new information to previously learned information.

Another principle involved in the cognitive process is the transfer of learned material.

Vertical transfer is a sequential, additive process based on previous knowledge on which the new information is based such as in learning language, one begins with the alphabet then moves up to words then sentences and conversation or in learning mathematics one starts with numbers then proceeds to arithmetic then geometry then algebra, etc. . **Lateral transfer** involves transfer between two similar, but not interdependent, informational sources such as learning two languages at the same time. **Near transfer** is the transfer of problems or situations that have similar but different variable characteristics and that are solved by the same solutional formula. **Far transfer**, which is less frequent than near transfer, involves problems with very different variable characteristics but that are solved by the same solutional formulas.

Specific transfer involves overlapping or parallel learning and transfer tasks. An example of this in the foreign language field would be the naming of the parts of speech (noun, verb, adjective, etc.) which would transfer and apply to English, French, Chinese, etc. **General transfer**, which is less frequent than specific transfer, such as study habits for one subject could transfer to another, e.g. from mathematics to language. **Formal discipline** involves having a regimen, structure, or curriculum for a course of study and this is also used in learning English as a second language.

Situated learning concerns learning within a context and relative to a particular situation. This is used often in language acquisition such as in the total immersion techniques for learning a new language. For example, to learn a foreign language, it is probably best to learn it within the country where it is spoken and used so that one is constantly surrounded by the use of the language skills that the learner is acquiring. The most difficult subjects to learn would be those that contain **inert knowledge** or knowledge that would not much be used outside of the classroom. An example of this could be learning to speak Latin although the learning to read and write Latin could transfer to learning other languages. Some people mistakenly think that learning algebra is inert knowledge though in actuality such knowledge is useful in many practical situations.

Factors that affect transfer include and that apply to the learning of a new language:

1. Meaningful, understood, and relevant data transfer more readily than data obtained through rote memorization.
2. Thoroughly learned information transfers more readily than superficial knowledge.

3. The more similar a situation is to the original learned skill the more likely transfer will occur.
4. Principles and concepts are more easily transferred than specific, concrete facts.
5. Practice increases the extent to which transferred skills can be applied to new situations ("practice makes perfect").
6. Increase in the time lapse between the original learned skill and its application decreases the extent of the transfer.

"Modern cognitive psychologists believe that learning involves complex mental processes, including memory, attention, language, concept formation, and problem solving. They study how people process information and form mental representations of people, objects, and events." (Mazur, 2002). Cognitive learning theory involves the processes of obtaining, remembering, and applying knowledge. Cognitive learning is concerned with mental processes, and, unlike behaviorist learning, does not require learning to be done from a model and also does not require previous direct experience. Learning is manifested by a change in knowledge which also causes a change in behavior even though the learning itself is not directly noticeable. Latent learning is an internal process that changes the mental processes but is not indicated through changes in behavior. In 1930 American psychologist Edward C. Tolman, who considered himself to be a field theorist, demonstrated latent learning by showing that rats can make cognitive maps of a maze which they could use if it became necessary for them. Insight is solving through revelation a problem not solved before by the person with the problem. Inventions are examples of solutions through insight. Kohler demonstrated how a chimpanzee can use insight or ingenuity to solve problems in order to obtain food.

Types of knowledge according to cognitive learning theory are:

General: Generally useful information .

Domain Specific: Information specific to one situation

Declarative: Words, facts, etc.

Procedural: Knowledge used in performing tasks.

Conditional: Appropriate use of declarative and procedural knowledge.

Metacognition: Knowledge about one's own thinking. .

Constructivist Perspective The learner as an active participant

Exogenous Constructivism: People make models of the external world within their minds .

Endogenous Constructivism: knowledge is derived from previous knowledge and not

empirically derived by the observer.

Dialectical Constructivism: knowledge developed through the interaction of internal, cognitive and external (environmental) factors.

Radical Constructivism: subjectivity or personal relativism of perceptions.

Perception: The interpretation of sensory information based on past experiences. (Woolford, 1997).

The main areas of cognitive learning are memorizing, understanding, and applying and are listed below with examples of how they are used within the context of teaching English as a second language

Memorization:

This is used in the memorization of spelling words, vocabulary words, pronunciation, definitions of words and grammatical rules.

Understanding:

When doing any activity or exercise it is important to check for understanding before a task begins. It is best not to ask "Do you understand?" because they might say "yes" but in fact do not understand. It is best to not repeat the target question or concept when asking a question which checks for understanding. In all of the activities the point is to get the students to understand since without understanding there is no communication. One of their vocabulary words recently was "communicate" and the text book define it for the children: "to read, write, or draw for someone" and I added "so that they can understand you" because without the element of understanding no communication occurs.

Application:

This is one of the most important areas of cognitive learning because it is necessary to apply one's knowledge in order to make it worthwhile for having obtained it in the first place. Going on field trips, having students engage in participatory activities, reading out loud, repeating after the teacher, role playing, and having conversations and discussions in English are all ways that the learners can begin to apply their knowledge. The general reason for them to study English in the first place is so that they can communicate with English speakers so that they can someday travel, live, work or study in an English speaking country or in their own country they can communicate internationally for travel, work, business, or social purposes. With this knowledge, their horizons will be greatly expanded and the possibilities for new opportunities can increase exponentially.

Memory and Motivation

from the Meriam Webster Dictionary (2003):

Memory: **1 a :** the power or process of reproducing or recalling what has been learned and retained especially through associative mechanisms **b :** the store of things learned and retained from an organism's activity or experience as evidenced by modification of structure or behavior or by recall and recognition; synonyms: remembrance, recollection, reminiscence.

Motivation: **1 a :** the act or process of motivating **b :** the condition of being motivated
2 : a motivating force, stimulus, or influence: incentive

Learning and memory involve storage, encoding (modified information, changed, and simplified) and retrieval.

In 1890 William James identified the three components of memory as after image, primary memory, and secondary memory. Using a similar concept, W. Watkinson and R. Shiffrin (1968) identified the dual-store model which consists of **sensory memory** (unlimited capacity, visual and auditory form of storage of a very brief duration), **short term** (working) memory or STM which is affected by intensity, novelty, incongruity, emotion, and personal significance), and **long term** memory or LTM. long term memory storage processes involve selection, rehearsal, meaningful learning, internal organization, elaboration and embellishment, visual imagery, and procedural knowledge. Factors affecting working memory are working memory, prior knowledge, prior misconceptions, expectations, verbalization, enactment, and repetition and review. Long term memory can be encoded with symbols (numbers, words, etc.), appearance, meanings, and actions and is organized with hierarchies (the entire network of information within a category), propositional network (the chain of thought within a network), and parallel distributed processing (numerous informational nodes being processed simultaneously). *Concepts, schemas* (a connected set of ideas), *scripts* (how events typically transpire), and *conceptual change* are involved in the processes of long term memory. Long term memory involves retrieval using *associative cues, construction, and forgetting*. Forgetting can be caused by decay, obliterative subsumption (information replaced by new information), interference (one set of information interfering with recalling another set), failure to retrieve, repression (repressing painful memories), nonstorage, and construction error ("remembering" unencountered information).

Increase of wait time by three seconds (Mohatt and Erickson, 1981; Rowe, 1974, 1987; Tharp, 1989; Tobin, 1987) can increase student participation, better quality of student response, better classroom performance, different kinds of questions, flexibility in instruction, and changes in expectations (Omrod, 2004). I have noticed this while teaching the ESL classes that, that the students like the excitement of playing word games, etc., it is helpful to their learning process if I briefly pause while waiting for answers rather than expecting rapid-fire interaction.

Learning also involves metacognition, self-regulated learning, and study strategies which can include meaningful learning and elaboration, organization, note taking, identifying important information, summarizing, comprehension monitoring, and mnemonics.

Some examples of **mnemonics** are the well known Roy G. Biv for remembering the colors in the rainbow or attaching definitions according to the sounds in the word or other associations. For example, "stalactites" hold "tight" to the ceiling and "stalagmites" "might" make it to the ceiling. Or "meteoroid" sounds like "asteroid" or something from outer space, "meteor" can make one think of a meteor shower through the Earth's atmosphere, and "meteorite" sounds like an earthly rock like bauxite or graphite. "Lava" is the most visible and obvious and is therefore the most often used word whereas "magma", as is expected since it is underground and out of sight, is the least used word.

Also in the ESL classes I have been teaching many visual learning devices, including flash cards, have been used. Pictures, role play, and drawing all give a visual dimension to the learning of a language. For example, to a very young child first learning the word "look", the two Os in the word can be made into eyes. Also, realia is effective where real objects are used to teach principles to be learned such as dissecting a frog for biology class or using a real clock to teach the students how to tell time.

The **social nature of learning** involves student interaction with adults and peers and includes apprenticeships, class discussions, reciprocal teaching (gradually turns the teaching role over to students), cooperative learning, peer tutoring, community of learners, and technology-based solutions (computers, online courses, audio-visual equipment, etc.). Apprenticeship includes modeling, coaching, scaffolding (support system), articulation, reflection, increasing complexity and diversity of tasks, and exploration. Norm Chomsky in the 1950s developed the ideas of shaping, reinforcement, generalization, discrimination, and observational learning for children and adults learning language

Factors that influence learning ability are motivation, prior experience, intelligence, and learning and developmental disorders. Memory and learning are interrelated and the processes of each are similar. Although the English language uses a single word for memory, there are many different kinds. Usually the three main types listed are sensory memory, short-term or working memory, and long-term memory. .

Encoding is the process of perceiving information and bringing it into the memory system. **Recoding** is also called chunking, because separate bits of information can be grouped into meaningful units, or chunks. For example, unscrambling individual nonsensical letters into one meaningful word can make those collection of letters remembered and this technique can be used in my ESL language classes. One recoding method that people often use to remember information to rehearse the information, or to repeat it mentally. Also useful is elaborative processing, which involves thinking about information in a meaningful way and associating it with existing information in long-term memory.

Explicit memory refers to the conscious recollection of facts. Recognition tests require students to examine a list of items and find the ones they have seen before, or to decide if they have seen an item before, or identify the correct choice. Multiple-choice and true-false exams are kinds of recognition tests and these are used often while teaching my ESL classes.

In some cases, recall can be even more effective than recognition in teaching ESL there is quite a bit of eliciting to get the students to recall an answer. In a class of fifteen students usually the collective consciousness of the class usually brings up a correct answer especially if they have been told the answer previously within the course lessons.

Implicit memory refers to using stored information without trying to retrieve it.

Psychologists use the term priming to describe the relatively automatic change in performance resulting from prior exposure to information. Priming occurs even when people do not consciously remember being exposed to the information.

A **retrieval cue** is any stimulus that helps us recall information in long-term memory and this technique is used often to get the ESL students to recall words by eliciting responses from the students by supplying clues and prompts. Distinctiveness is another principle that determines the effectiveness of retrieval cues. Overt cues such as sights and sounds can induce remembering such as, for the ESL students, recorded music. One listening exercise is to get the students to listen to songs and give them paper with the songs lyrics but with some of the lyrics blank so that they have to fill in the blanks with the word as sung in the song that they are listening to.

There is also mood-dependent memory such as *deja vu* and *jamais vu* (someone sees something they have seen before but they think they have not). There is also the tip-of-the-tongue state and flashbulb memory (a clear memory of a traumatic or important event).

Another way our cognitive system introduces error is by means of inference. Forgetting is defined as the loss of information over time. The decay theory of forgetting is the oldest idea about forgetting that says that forgetting caused by decay. But reminiscing of long ago memories seems to contradict this theory. Some scientists say that forgetting occurs because of interference from other information or activities over time. The two types of interference are proactive interference, where prior learning interferes with the ability to recall newer information, and retroactive interference, where new information interferes with the ability to recall earlier information or experiences. Repression, which refers to forgetting an unpleasant event, is another cause of forgetting. The idea of repression was introduced by Sigmund Freud

Concerning the physiological processes of learning, remembering involves the chemical connections within the brain and alterations in the neural pathways. Long term memories are thought to be stored in the **hippocampus** and the **prefrontal cortex** links the long-term memories to the senses so that one can respond to events as they happen. The **cerebellum** processes the skill memories so that movements are coordinated.

Learning is usually most efficient and rapid when the learner is motivated and attentive.

Motivation can be **intrinsic** (internal rewards) or **extrinsic** (external rewards). Motivation involving the basic human needs includes drive theory (survival drive, etc.), arousal (attentiveness), Maslow's *hierarchy of needs* (physiological, safety, belonging, esteem, and self-actualization), competence and self-worth, and relatedness (feeling of social connectedness). Individuals have different needs for affiliation, approval, and achievement. Also, related to

motivation is affect which includes the emotions of pleasure, anxiety, excitement, pride, depression, anger, guilt, etc. (Omrod, 2004).

Cognitive factors in motivation include intrinsic motivation such as self-efficacy, self-determination, and response from others as well as establishing goals towards which the student progresses. Motivational attributions include contingencies (conditional possibilities), self-efficacy, learning strategies, metacognition (people's recognition and regulation of their own learning processes), self-regulated learning, self-worth, self-handicapping, relatedness, expectancies, values, and affect. (Omrod, 2004).

Motivation is the cause of an organism's behavior. In a human being, motivation involves both conscious and unconscious drives. Psychological theories must account for a "primary" level of motivation to satisfy basic needs, such as those for food, oxygen, and water, and for a "secondary" level of motivation to fulfill social needs such as companionship and achievement. The primary needs must be satisfied before an organism can attend to the secondary drives.

Motivation can be primary such as the need for food and clothing or secondary such as the need for companionship and success (and perhaps fashionable clothing). The American psychologist Abraham Maslow devised a hierarchy of needs that, according to his theory, explain human behavior. Maslow states that the needs are: (1) physiological; (2) safety; (3) love and belonging; (4) esteem; (5) self-fulfillment and curiosity and (6) self-actualization. Some theories say that an organism is thought to desire a state of no stimulation which brings to mind the Buddhist concept of nirvana. Though recent cognitive theories of motivation, however, say humans want to optimize, rather than minimize, stimulation and this better explains their exploratory nature and the need for variety, art, travel, and curiosity. (Mazur, 2002).

The teacher functions as a facilitator and mediator between the student and the body of knowledge to be learned and should provide the sort of knowledge, expertise, and training necessary for the students' intellectual and cultural growth. The teacher can only make the students aware of the immediate and future extrinsic rewards. Concerning intrinsic and extrinsic learning, I think when we as learners read or study, for our own enjoyment or edification, subjects on our own that we are not required to take then we are involved in more intrinsically motivated behavior. The contents of online courses or other university courses could conceivably be studied by the learners themselves at their own structure and pace and that type of motivation could perhaps be considered intrinsic depending upon the ultimate intent of the learners. Enrolling in a course for credit and usually working toward a degree implies that the enrolled student is extrinsically motivated in taking the courses.

Intrinsic motivation, by definition of the word, is internal to the student so therefore it can not be increased by the teacher through a series of immediate rewards and punishments or the promise of future rewards and punishments of success, communication skills, technical skills, career advancement, and material possessions or of the lack of the previously mentioned rewards. For these reasons the teacher can only offer extrinsic motivation since intrinsic motivation comes from within the student. In my ESL classes the extrinsic rewards include the in-house school

currency given to them for positive achievements and scaffolding and support from the teachers, staff, and peers.

A student's motivation as a graduate student is a combination of intrinsic and extrinsic factors and my educational motivation has been throughout my life. An infant or very young child is motivated intrinsically out of curiosity and survival drives. Later, the motivation becomes more extrinsic as the child attempts to please its parents and others. I think as a person matures, in addition to the rewards that are intrinsic and for personal satisfaction, the rewards are external to the internalized knowledge and become increasingly more extrinsic in nature. As a motivational technique, in the ESL classes I have been teaching, in-house school currency is given as a reward for good performance -- or they are taken away as punishment. Another motivational technique is posting the Student of the Week's name in the front of the classroom every week on a poster created for that purpose. These externalized rewards can include success, communication skills, technical skills, career advancement, and material possessions or of the lack of the previously mentioned rewards and are in line with the concepts of B.F. Skinner as described in his theories of operant conditioning. Also, students can be motivated to learn by taking elective courses that are of use and interest to them.

During each ESL classes, at some point, I always ask the students: Why do you study English? The answers vary. Some even say that they are forced to or have to. But others give more positive answers. I tell them that, if they are to live, study, travel, or work abroad, they will need to learn English since it is the international business. Other reasons are: to enjoy cultural products such as music with lyrics, movies, books, magazines, and the Internet. Even if they never leave their country they at some point will need to communicate internationally for international trade or social communication and they might also need to communicate with foreign visitors to their country who most probably will speak English. Most of them are motivated since they are interested in a university education in the future and they realize that it is essential for them to learn English. All of these reasons provide motivation to study and learn English.

Conclusion

Behaviorism is important in learning a new language in that it is the physical participation -- some have referred to this as total physical response -- that instills the knowledge that is learned. As in a flashbulb memory or with traveling, there is nothing like actually being at an event in remembering that event. To be able to actually use the acquired knowledge is really the purpose of learning it. So in order to be able to actually read, write, speak, listen to, and understand a language one must physically participate in the behavior involved in doing these activities. As a behaviorist technique, modeling is an effective way of learning a language by imitation or emulation especially when pronunciation is involved.

Cognitively, the physiological processes involved in learning are important but at the chemical and cellular biological level these processes are of interest primarily to scientists to study in order to improve learning abilities for learners in all areas. In language learning, cognition and understanding is essential to learning the meanings of words and concepts and even for the learning of the formation of letters and the arrangement of letters for words for spelling purposes.

Memory assures that the knowledge is retained to be later retrieved and motivation supplies the fuel for all learning. If the student can see no reason for his learning a particular subject then the chances of his adhering to an academic program are minimal at best. To demonstrate to the students the practical uses of learning is one of the best services a teacher can provide and, in the field of language learning, the uses of the new language. These uses include communication through reading, writing, speaking, and listening to English speaking people, in order to be able to travel worldwide, study in a foreign country, live in a foreign country, to meet people from all over the world, to do business internationally, to meet and entertain English speaking people within their own country, and also to enjoy English language cultural products such as books, magazines, movies, games, compact disks, and the Internet, to name a few.

Learning involves the concepts of behaviorism, cognitivism, memory, and motivation.

The concepts from each of these areas can be applied toward all areas of learning including the teaching of English as a second language, in which I have been involved for the last several years. With their newfound knowledge, the language learners can (as students, travelers, hosts to foreigners, friends of foreigners, or business people) communicate worldwide using the international language of English thus helping to create a more communicating, democratic, and peaceful world.

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Colleen,

I'll revise the conclusion and send it with the attachment soon. I'll try to make the final version as succinct yet thorough as I can.

Thank you for your feedback,

Richard

Colleen,

So that you can read the course project from your email box from your computers, I am sending the course project as an attachment to you.

Thank you for your insights and for guiding us through an interesting course.

Thank you,

Richard

CLASSICAL CONDITIONING:

Another form of learning is classical conditioning, in which a reflexive or automatic response transfers from one stimulus to another. For instance, a person who has had painful experiences at the dentist's office may become fearful at just the sight of the dentist's office building. Fear, a natural response to a painful stimulus, has transferred to a different stimulus, the sight of a building. Most psychologists believe that classical conditioning occurs when a person forms a mental association between two stimuli, so that encountering one stimulus makes the person think of the other. People tend to form these mental associations between events or stimuli that occur closely together in space or time.

Classical conditioning was discovered by accident in the early 1900s by Russian physiologist Ivan Pavlov. Pavlov was studying how saliva aids the digestive process. He would give a dog some food and measure the amount of saliva the dog produced while it ate the meal. After the dog had gone through this procedure a few times, however, it would begin to salivate before receiving any food. Pavlov reasoned that some new stimulus, such as the experimenter in his white coat, had become associated with the food and produced the response of salivation in the dog. Pavlov spent the rest of his life studying this basic type of associative learning, which is now called classical conditioning or Pavlovian conditioning.

The conditioning process usually follows the same general procedure. Suppose a psychologist wants to condition a dog to salivate at the sound of a bell. Before conditioning, an unconditioned stimulus (food in the mouth) automatically produces an unconditioned response (salivation) in the dog. The term unconditioned indicates that there is an unlearned, or inborn, connection between the stimulus and the response. During conditioning, the experimenter rings a bell and then gives food to the dog. The bell is called the neutral stimulus because it does not initially produce any salivation response in the dog. As the experimenter repeats the bell-food association over and over again, however, the bell alone eventually causes the dog to salivate. The dog has learned to associate the bell with the food. The bell has become a conditioned stimulus, and the dog's salivation to the sound of the bell is called a conditioned response.

Principles of Classical Conditioning

Following his initial discovery, Pavlov spent more than three decades studying the processes underlying classical conditioning. He and his associates identified four main processes: acquisition, extinction, generalization, and discrimination.

Acquisition

The acquisition phase is the initial learning of the conditioned response—for example, the dog learning to salivate at the sound of the bell. Several factors can affect the speed of conditioning during the acquisition phase. The most important factors are the order and timing of the stimuli. Conditioning occurs most quickly when the conditioned stimulus (the bell) precedes the unconditioned stimulus (the food) by about half a second. Conditioning takes longer and the response is weaker when there is a long delay between the presentation of the conditioned stimulus and the unconditioned stimulus. If the conditioned stimulus follows the unconditioned stimulus—for example, if the dog receives the food before the bell is rung—conditioning seldom occurs.

Extinction

Once learned, a conditioned response is not necessarily permanent. The term extinction is used to describe the elimination of the conditioned response by repeatedly presenting the conditioned stimulus without the unconditioned stimulus. If a dog has learned to salivate at the sound of a bell, an experimenter can gradually extinguish the dog's response by repeatedly ringing the bell without presenting food afterward. Extinction does not mean, however, that the dog has simply unlearned or forgotten the association between the bell and the food. After extinction, if the experimenter lets a few hours pass and then rings the bell again, the dog will usually salivate at the sound of the bell once again. The reappearance of an extinguished response after some time has passed is called spontaneous recovery.

Generalization

After an animal has learned a conditioned response to one stimulus, it may also respond to similar stimuli without further training. If a child is bitten by a large black dog, the child may fear not only that dog, but other large dogs. This phenomenon is called generalization. Less similar stimuli will usually produce less generalization. For example, the child may show little fear of smaller dogs.

Discrimination

The opposite of generalization is discrimination, in which an individual learns to produce a conditioned response to one stimulus but not to another stimulus that is similar. For example, a child may show a fear response to freely roaming dogs, but may show no fear when a dog is on a leash or confined to a pen.

Applications of Classical Conditioning

After studying classical conditioning in dogs and other animals, psychologists became interested in how this type of learning might apply to human behavior. In an infamous 1921 experiment, American psychologist John B. Watson and his research assistant Rosalie Rayner conditioned a

baby named Albert to fear a small white rat by pairing the sight of the rat with a loud noise. Although their experiment was ethically questionable, it showed for the first time that humans can learn to fear seemingly unimportant stimuli when the stimuli are associated with unpleasant experiences. The experiment also suggested that classical conditioning accounts for some cases of phobias, which are irrational or excessive fears of specific objects or situations. Psychologists now know that classical conditioning explains many emotional responses—such as happiness, excitement, anger, and anxiety—that people have to specific stimuli. For example, a child who experiences excitement on a roller coaster may learn to feel excited just at the sight of a roller coaster. For an adult who finds a letter from a close friend in the mailbox, the mere sight of the return address on the envelope may elicit feelings of joy and warmth.

Psychologists use classical conditioning procedures to treat phobias and other unwanted behaviors, such as alcoholism and addictions. To treat phobias of specific objects, the therapist gradually and repeatedly presents the feared object to the patient while the patient relaxes. Through extinction, the patient loses his or her fear of the object. In one treatment for alcoholism, patients drink an alcoholic beverage and then ingest a drug that produces nausea. Eventually they feel nauseous at the sight or smell of alcohol and stop drinking it. The effectiveness of these therapies varies depending on the individual and on the problem behavior. See *Psychotherapy: Behavioral Therapies*.

Contemporary Theories

Modern theories of classical conditioning depart from Pavlov's theory in several ways. Whereas Pavlov's theory stated that the conditioned and unconditioned stimuli should elicit the same type of response, modern theories acknowledge that the conditioned and unconditioned responses frequently differ. In some cases, especially when the unconditioned stimulus is a drug, the conditioned stimulus elicits the opposite response. Modern research has also shown that conditioning does not always require a close pairing of the two stimuli. In taste-aversion learning, people can develop disgust for a specific food if they become sick after eating it, even if the illness begins several hours after eating.

Psychologists today also recognize that classical conditioning does not automatically occur whenever two stimuli are repeatedly paired. For instance, suppose that an experimenter conditions a dog to salivate to a light by repeatedly pairing the light with food. Next, the experimenter repeatedly pairs both the light and a tone with food. When the experimenter presents the tone by itself, the dog will show little or no conditioned response (salivation), because the tone provides no new information. The light already allows the dog to predict that food will be coming. This phenomenon, discovered by American psychologist Leon Kamin in 1968, is called blocking because prior conditioning blocks new conditioning.

IV OPERANT CONDITIONING

One of the most widespread and important types of learning is operant conditioning, which involves increasing a behavior by following it with a reward, or decreasing a behavior by following it with punishment. For example, if a mother starts giving a boy his favorite snack every day that

he cleans up his room, before long the boy may spend some time each day cleaning his room in anticipation of the snack. In this example, the boy's room-cleaning behavior increases because it is followed by a reward or reinforcer.

Unlike classical conditioning, operant conditioning requires action on the part of the learner.

Unlike classical conditioning, in which the conditioned and unconditioned stimuli are presented regardless of what the learner does, operant conditioning requires action on the part of the learner. The boy in the above example will not get his snack unless he first cleans up his room. The term operant conditioning refers to the fact that the learner must operate, or perform a certain behavior, before receiving a reward or punishment.

Thorndike's Law of Effect

Edward L. Thorndike In the late 19th century American psychologist Edward L. Thorndike conducted some of the first experiments on animal learning. Thorndike formulated the law of effect, which states that behaviors that are followed by pleasant consequences will be more likely to be repeated in the future. UPI/Corbis Some of the earliest scientific research on operant conditioning was conducted by American psychologist Edward L. Thorndike at the end of the 19th century. Thorndike's research subjects included cats, dogs, and chickens. To see how animals learn new behaviors, Thorndike used a small chamber that he called a puzzle box. He would place an animal in the puzzle box, and if it performed the correct response (such as pulling a rope, pressing a lever, or stepping on a platform), the door would swing open and the animal would be rewarded with some food located just outside the cage. The first time an animal entered the puzzle box, it usually took a long time to make the response required to open the door. Eventually, however, it would make the appropriate response by accident and receive its reward: escape and food. As Thorndike placed the same animal in the puzzle box again and again, it would make the correct response more and more quickly. Soon it would take the animal just a few seconds to earn its reward.

Based on these experiments, Thorndike developed a principle he called the law of effect. This law states that behaviors that are followed by pleasant consequences will be strengthened, and will be more likely to occur in the future. Conversely, behaviors that are followed by unpleasant consequences will be weakened, and will be less likely to be repeated in the future. Thorndike's law of effect is another way of describing what modern psychologists now call operant conditioning.

B. F. Skinner's Research

Skinner Box American psychologist B. F. Skinner designed an apparatus, now called a Skinner box, that allowed him to formulate important principles of animal learning. An animal placed inside the box is rewarded with a small bit of food each time it makes the desired response, such as pressing a lever or pecking a key. A device outside the box records the animal's responses. Yoav Levy/Phototake NYC

American psychologist B. F. Skinner became one of the most famous psychologists in history for his pioneering research on operant conditioning. In fact, he coined the term operant conditioning. Beginning in the 1930s, Skinner spent several decades studying the behavior of animals-usually rats or pigeons-in chambers that became known as Skinner boxes. Like Thorndike's puzzle box, the Skinner box was a barren chamber in which an animal could earn food by making simple responses, such as pressing a lever or a circular response key. A device attached to the box recorded the animal's responses. The Skinner box differed from the puzzle box in three main ways: (1) upon making the desired response, the animal received food but did not escape from the chamber; (2) the box delivered only a small amount of food for each response, so that many reinforcers could be delivered in a single test session; and (3) the operant response required very little effort, so an animal could make hundreds or thousands of responses per hour. Because of these changes, Skinner could collect much more data, and he could observe how changing the pattern of food delivery affected the speed and pattern of an animal's behavior.

B. F. Skinner American psychologist B. F. Skinner became famous for his pioneering research on learning and behavior. During his 60-year career, Skinner discovered important principles of operant conditioning, a type of learning that involves reinforcement and punishment. A strict behaviorist, Skinner believed that operant conditioning could explain even the most complex of human behaviors. William Coupon/Liaison Agency

Skinner became famous not just for his research with animals, but also for his controversial claim that the principles of learning he discovered using the Skinner box also applied to the behavior of people in everyday life. Skinner acknowledged that many factors influence human behavior, including heredity, basic types of learning such as classical conditioning, and complex learned behaviors such as language. However, he maintained that rewards and punishments control the great majority of human behaviors, and that the principles of operant conditioning can explain these behaviors.

Principles of Operant Conditioning

Operant Conditioning Operant conditioning, pioneered by American psychologist B. F. Skinner, is the process of shaping behavior by means of reinforcement and punishment. This illustration shows how a mouse can learn to maneuver through a maze. The mouse is rewarded with food when it reaches the first turn in the maze (A). Once the first behavior becomes ingrained, the mouse is not rewarded until it makes the second turn (B). After many times through the maze, the mouse must reach the end of the maze to receive its reward (C).

In a career spanning more than 60 years, Skinner identified a number of basic principles of operant conditioning that explain how people learn new behaviors or change existing behaviors. The main principles are reinforcement, punishment, shaping, extinction, discrimination, and generalization.

Reinforcement

Positive reinforcement is a method of strengthening behavior by following it with a pleasant stimulus.

In operant conditioning, reinforcement refers to any process that strengthens a particular behavior—that is, increases the chances that the behavior will occur again. There are two general categories of reinforcement, positive and negative. The experiments of Thorndike and Skinner illustrate positive reinforcement, a method of strengthening behavior by following it with a pleasant stimulus. Positive reinforcement is a powerful method for controlling the behavior of both animals and people. For people, positive reinforcers include basic items such as food, drink, sex, and physical comfort. Other positive reinforcers include material possessions, money, friendship, love, praise, attention, and success in one's career.

Depending on the circumstances, positive reinforcement can strengthen either desirable or undesirable behaviors. Children may work hard at home or at school because of the praise they receive from parents and teachers for good performance. However, they may also disrupt a class, try dangerous stunts, or start smoking because these behaviors lead to attention and approval from their peers. One of the most common reinforcers of human behavior is money. Most adults spend many hours each week working at their jobs because of the paychecks they receive in return. For certain individuals, money can also reinforce undesirable behaviors, such as burglary, selling illegal drugs, and cheating on one's taxes.

Negative reinforcement is a method of strengthening a behavior by following it with the removal or omission of an unpleasant stimulus. There are two types of negative reinforcement: escape and avoidance. In escape, performing a particular behavior leads to the removal of an unpleasant stimulus. For example, if a person with a headache tries a new pain reliever and the headache quickly disappears, this person will probably use the medication again the next time a headache occurs. In avoidance, people perform a behavior to avoid unpleasant consequences. For example, drivers may take side streets to avoid congested intersections, citizens may pay their taxes to avoid fines and penalties, and students may do their homework to avoid detention.

Reinforcement Schedules

Casino Gambling Gamblers at a casino in Atlantic City, New Jersey, try their luck at the slot machines. Because slot machines pay off on a variable-ratio schedule—that is, after an unpredictable number of tries—the gamblers drop in coins at a steady rate. Jeff Greenberg/Photo Researchers, Inc.

A reinforcement schedule is a rule that specifies the timing and frequency of reinforcers. In his early experiments on operant conditioning, Skinner rewarded animals with food every time they made the desired response—a schedule known as continuous reinforcement. Skinner soon tried rewarding only some instances of the desired response and not others—a schedule known as partial reinforcement. To his surprise, he found that animals showed entirely different behavior patterns.

Skinner and other psychologists found that partial reinforcement schedules are often more effective at strengthening behavior than continuous reinforcement schedules, for two reasons. First, they usually produce more responding, at a faster rate. Second, a behavior learned through a partial reinforcement schedule has greater resistance to extinction—if the rewards for the behavior are discontinued, the behavior will persist for a longer period of time before stopping. One reason extinction is slower after partial reinforcement is that the learner has become accustomed to

making responses without receiving a reinforcer each time. There are four main types of partial reinforcement schedules: fixed-ratio, variable-ratio, fixed-interval, and variable-interval. Each produces a distinctly different pattern of behavior.

On a fixed-ratio schedule, individuals receive a reinforcer each time they make a fixed number of responses. For example, a factory worker may earn a certain amount of money for every 100 items assembled. This type of schedule usually produces a stop-and-go pattern of responding: The individual works steadily until receiving one reinforcer, then takes a break, then works steadily until receiving another reinforcer, and so on.

On a variable-ratio schedule, individuals must also make a number of responses before receiving a reinforcer, but the number is variable and unpredictable. Slot machines, roulette wheels, and other forms of gambling are examples of variable-ratio schedules. Behaviors reinforced on these schedules tend to occur at a rapid, steady rate, with few pauses. Thus, many people will drop coins into a slot machine over and over again on the chance of winning the jackpot, which serves as the reinforcer.

On a fixed-interval schedule, individuals receive reinforcement for their response only after a fixed amount of time elapses. For example, in a laboratory experiment with a fixed-interval one-minute schedule, at least one minute must elapse between the deliveries of the reinforcer. Any responses that occur before one minute has passed have no effect. On these schedules, animals usually do not respond at the beginning of the interval, but they respond faster and faster as the time for reinforcement approaches. Fixed-interval schedules rarely occur outside the laboratory, but one close approximation is the clock-watching behavior of students during a class. Students watch the clock only occasionally at the start of a class period, but they watch more and more as the end of the period gets nearer.

Variable-interval schedules also require the passage of time before providing reinforcement, but the amount of time is variable and unpredictable. Behavior on these schedules tends to be steady, but slower than on ratio schedules. For example, a person trying to call someone whose phone line is busy may redial every few minutes until the call gets through.

Punishment

Whereas reinforcement strengthens behavior, punishment weakens it, reducing the chances that the behavior will occur again. As with reinforcement, there are two kinds of punishment, positive and negative. Positive punishment involves reducing a behavior by delivering an unpleasant stimulus if the behavior occurs. Parents use positive punishment when they spank, scold, or shout at children for bad behavior. Societies use positive punishment when they fine or imprison people who break the law. Negative punishment, also called omission, involves reducing a behavior by removing a pleasant stimulus if the behavior occurs. Parents' tactics of grounding teenagers or taking away various privileges because of bad behavior are examples of negative punishment. Considerable controversy exists about whether punishment is an effective way of ... eliminating unwanted behaviors.

Considerable controversy exists about whether punishment is an effective way of reducing or eliminating unwanted behaviors. Careful laboratory experiments have shown that, when used properly, punishment can be a powerful and effective method for reducing behavior. Nevertheless, it has several disadvantages. When people are severely punished, they may become angry, aggressive, or have other negative emotional reactions. They may try to hide the evidence of their misbehavior or escape from the situation, as when a punished child runs away from home. In addition, punishment may eliminate desirable behaviors along with undesirable ones. For example, a child who is scolded for making an error in the classroom may not raise his or her hand again. For these and other reasons, many psychologists recommend that punishment be used to control behavior only when there is no realistic alternative.

Shaping

Killer Whale Performing A killer whale jumps out of a pool at Marine World, a theme park in Vallejo, California. Through shaping, a type of operant conditioning, a trainer can teach killer whales and other animals behaviors they have never performed before. Shaping uses rewards to gradually guide an animal toward a desired behavior. In this case, the desired behavior is touching the ball above the water, and the reward for the killer whale is fish. Renee Lynn/Photo Researchers, Inc.

Shaping is a reinforcement technique that is used to teach animals or people behaviors that they have never performed before. In this method, the teacher begins by reinforcing a response the learner can perform easily, and then gradually requires more and more difficult responses. For example, to teach a rat to press a lever that is over its head, the trainer can first reward any upward head movement, then an upward movement of at least one inch, then two inches, and so on, until the rat reaches the lever. Psychologists have used shaping to teach children with severe mental retardation to speak by first rewarding any sounds they make, and then gradually requiring sounds that more and more closely resemble the words of the teacher. Animal trainers at circuses and theme parks use shaping to teach elephants to stand on one leg, tigers to balance on a ball, dogs to do backward flips, and killer whales and dolphins to jump through hoops.

Extinction

As in classical conditioning, responses learned in operant conditioning are not always permanent. In operant conditioning, extinction is the elimination of a learned behavior by discontinuing the reinforcer of that behavior. If a rat has learned to press a lever because it receives food for doing so, its lever-pressing will decrease and eventually disappear if food is no longer delivered. With people, withholding the reinforcer may eliminate some unwanted behaviors. For instance, parents often reinforce temper tantrums in young children by giving them attention. If parents simply ignore the child's tantrums rather than reward them with attention, the number of tantrums should gradually decrease.

Generalization and Discrimination

Generalization and discrimination occur in operant conditioning in much the same way that they do in classical conditioning. In generalization, people perform a behavior learned in one situation in other, similar situations. For example, a man who is rewarded with laughter when he tells certain jokes at a bar may tell the same jokes at restaurants, parties, or wedding receptions. Discrimination is learning that a behavior will be reinforced in one situation but not in another. The man may learn that telling his jokes in church or at a serious business meeting will not make people laugh. Discriminative stimuli signal that a behavior is likely to be reinforced. The man may learn to tell jokes only when he is at a loud, festive occasion (the discriminative stimulus). Learning when a behavior will and will not be reinforced is an important part of operant conditioning.

Applications of Operant Conditioning

Operant conditioning techniques have practical applications in many areas of human life. Parents who understand the basic principles of operant conditioning can reinforce their children's appropriate behaviors and punish inappropriate ones, and they can use generalization and discrimination techniques to teach which behaviors are appropriate in particular situations. In the classroom, many teachers reinforce good academic performance with small rewards or privileges. Companies have used lotteries to improve attendance, productivity, and job safety among their employees.

Psychologists known as behavior therapists use the learning principles of operant conditioning to treat children or adults with behavior problems or psychological disorders. Behavior therapists use shaping techniques to teach basic job skills to adults with mental retardation. Therapists use reinforcement techniques to teach self-care skills to people with severe mental illnesses, such as schizophrenia, and use punishment and extinction to reduce aggressive and antisocial behaviors by these individuals. Psychologists also use operant conditioning techniques to treat stuttering, sexual disorders, marital problems, drug addictions, impulsive spending, eating disorders, and many other behavioral problems. See Behavior Modification.

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COGNITIVISM

from an email letter my sister Kap sent:

Aoccdmrig to a rscheearch at an Elingsh uinervtisy, it deosn't mtttaer in waht oredr the ltteers in a wrod are, the olny iprmoetnt tihng is taht frist and lsat ltteer is at the rghit pclae. The rset can be a toatl mses and you can sitll raed it wouthit porbelm. Tihs is bcuseae we do not raed ervey lteter by it slef but the wrod as a wlohe. (Ross, 2003).

Bill Ross
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The Cognitive Approach

Unlike behaviorists, cognitive psychologists believe that it is essential to study an individual's thoughts and expectations in order to understand the learning process. In 1930 American psychologist Edward C. Tolman investigated cognitive processes in learning by studying how rats learn their way through a maze. He found evidence that rats formed a "cognitive map" (a mental map) of the maze early in the experiment, but did not display their learning until they received reinforcement for completing the maze—a phenomenon he termed latent learning. Tolman's experiment suggested that learning is more than just the strengthening of responses through reinforcement.

Modern cognitive psychologists believe that learning involves complex mental processes, including memory, attention, language, concept formation, and problem solving. They study how people process information and form mental representations of people, objects, and events. (Mazur, 2002).

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Action 4.1

As related to the structuring of any course, including the teaching of English as a second language, several applications of the cognitive learning theories are utilized. In the chapter of the Omrod text entitled Antecedents and Assumptions of Cognitivism, several theoretical explanations of cognitive processes are offered. Verbal learning is used for the learning and explanation of new terminology and concepts. Also while teaching any subject including English as a second language, the principles of **Gestalt** psychology and theory are utilized particularly in the organization and presentation of the course material. Used in course presentations are the law of proximity (items and subjects close together are linked as groups), law of similarity (similar items are viewed as a unit), law of closure (the observer fills in the missing pieces to form a complete picture or concept), law of Pragnanz (terseness or preciseness involving memory traces), and problem solving using restructuring and insight. (Omrod, 2004). In short, this view holds that human perception organizes concepts into comprehensible units or groups so that the whole can be "digested" gradually by consuming the groups or clusters of information.

Some of the findings of Jean **Piaget**, who said that people are active processors of information, are used while presenting course information. Piaget said that knowledge can be described in terms of structures that change with development (scheme, cognitive structures, operations) and that learning is a process of assimilation and accommodation. People are motivated to make sense of the world and he identified the four stages of development as sensorimotor, preoperational, concrete, and formal all of which are determined to some extent by the maturation of the individual.

Other concepts, besides verbal learning, are **serial learning** (sequential learning -- and this is most often used in all course presentations -- which involves **paired associative learning** such as foreign words with their English equivalents or words with their definitions, **primary effect** where the first items are learned quickly, and **recency effect** where the last or most recent items are learned quickly), **overlearning** (which brings to mind "information overload" such as all of the

overwhelming information in a large text book presented all at once or at a rapid pace, the information of which can later be returned to and reviewed in order for assimilation to occur), **distributed practice** (pacing the distribution of information over a realistic period of time). Also, taken into consideration while presenting the course information, are the characteristics of the course material that would affect the speed with which the learners can absorb it.

Cognitivism states that some types of learning might be unique to humans, people learn best by becoming actively involved (which is a reason to take a university course, and also, concerning this course: participation in the Course Room dialogues, the dyad activities, reading the texts, writing the assignments, etc.), and when knowledge is organized into comprehensible units. Also taken into consideration in the design of this course is that learning is a process of relating new information to previously learned information. (Ormrod, 2004).

Reference:

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from U4D2

This is an individual assignment: Describe your own metacognitive strategies. What additional strategies might enhance your learning? How might you help your learners develop similar strategies? Use your text if you like and include at least one additional reference in support of your response

There are many useful problem solving activities and metacognitive strategies mentioned in the text to help facilitate memorization. Some of the ones mentioned are combining algorithms, hill climbing, means-ends analysis, working backward, using visual imagery (this technique is used often), drawing analogies, representativeness, and availability. Both meaningless and meaningful problem solving or techniques can be used. Though they might be considered meaningless, mnemonic devices are used often such as the cited Roy G Biv. I learned the order of the planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto) by making up the sentence "My very early mother jumped swiftly under new planets" -- It doesn't make any sense but I remembered them that way.

Cognitive Learning Theory: A general approach that views learning as an active mental process of acquiring, remembering, and using knowledge. Learning is evidenced by a change in knowledge which makes a change in behavior possible. Learning itself is not directly observable.

Types of Memory

Sensory: The sensory Register is a system of receptors which hold sensory information for a very brief period. We retain an exact image of the information as it occurred, however, we have no use for the retention all stimuli exactly as seen, heard, smelled, felt, or tasted so this information lasts but a split second. Only the things we want to remember we move into working memory

EG. Aroha looks at the books on the shelf. For a brief second when she closes her eyes she

can see an exact image of everything she saw.

Working: Also known as short term memory. It is the information from the sensory register you are focusing on at a given moment. Information can be held for approximately 20 seconds without maintenance rehearsal.

Eg. Ms Jones tries to remember a student's name by saying, "her name is Roberta, Roberta, Roberta, Roberta, Roberta." As long as she says the name, it is in active use in working memory. The name is short enough that it fits the limitations of the articulatory loop (1.5 seconds).

Longterm: Is the permanent store of information, virtually unlimited in capacity. Problems with recall lies in method of retrieval.

Eg. Joshua remembers his telephone number because it is in his long term memory.

Types of Knowledge

General: Information that is useful in many different kinds of tasks. Skills used both in and out of school.

Eg. How to add and subtract to make change.

Domain Specific: Information that generally applies only to one situation.

Eg. Knowledge that a "roux" is a butter and flour mixture used in cooking.

Declarative: Verbal information, lists of facts. Information that can be taught through lecture or acquired through books, verbal exchange, Braille, sign language, etc.

Eg. Jose could give his phone number when asked by the teacher.

Procedural: Knowledge that is demonstrated when we perform a task.

Eg. Laiani may know what ingredients go into a cake (declarative knowledge) but how to combine them to make a cake is procedural knowledge.

Conditional: Knowing when and why to use declarative and procedural knowledge.

Eg. You may know what a Kokanee is (declarative knowledge) and you may know how to catch one (procedural knowledge) but knowing under what conditions you should fish shallow or deep is conditional knowledge.

Metacognition: Knowledge about our own thinking. Planning how much time to allocate to a certain task, monitoring how well we are doing and if we should change strategies, and evaluating our efforts to see if we have done an adequate job.

Eg. Lee was asked by his teacher to reflect on the work in his portfolio and write a short piece evaluating why this was his best work.

Rote Memorization: Remembering information by repetition without necessarily understanding the meaning of the information. Considered to be a very low level of learning but occasionally necessary. Memorization can be hampered by the serial position effect, which is the tendency to remember the beginning and the end but not the middle of the list.

Eg. Although he was not sure why, Chao memorized the state capitals of all the states in the United States.

Rote Memorization Tools:

Part Learning: Breaking of a list of rote items into shorter lists to learn.

Distributed Learning: Practice in brief periods with rest intervals over time. (One of the best ways to put information into long term memory.)

Massed learning: Practice for a single extended period also known as cramming.

Mnemonics: Techniques for remembering.

Loci Method: Technique associating items with specific places.

Acronym: Technique for remembering names, phrases, or steps by using the first letter of each words to form a new memorable word.

Key Word: System associating new words or concepts with similar sounding cue words.

Gestalt Theory: German for pattern or whole. Gestalt theorists believe that we organize our perceptions into coherent wholes. This theory has given way to more current explanations of perception called "top down processing" and "bottom up processing".

Constructivist Perspective The view that emphasizes the active role of the learner in building understanding and making sense of information.

Exogenous Constructivism: Individuals reconstruct outside reality by building accurate mental representations that reflects "the way things really are" in the external world.

Endogenous Constructivism: Assumes that knowledge is abstracted from old knowledge and not from accurately mapping the outside world.

Dialectical Constructivism: Suggests that knowledge grows through the interaction of internal(cognitive) and external (environmental and social) factors.

Radical Constructivism: Suggests that we live in a relativistic world that can only be understood from individually unique perspectives. no individual view point is less correct than another's.

Perception: The interpretation of sensory information based on past experiences.

Eg. Jane is being noisy and you begin to count to three. When Jane's mother counts to three it means she is being naughty and it about to be spanked. You are confused as to why Jane cowers whenever you count to three. (Woolford, 1997).

Levels of Cognitive Learning 7

The major levels of cognitive learning can be classified as memorizing, understanding, and applying. Most content can be learned at any of these three levels of learning. For example, you can memorize a definition of performance-based assessment as indicated by being able to restate it, you can understand what performance-based assessment is by being able to relate it to relevant prior knowledge, and you can learn to use performance-based assessment in your training. Too often we teach at the wrong level or test at the wrong level (inconsistent with our goals).

Memorization. This is rote learning. It entails learners encoding facts or information in the form of an association between a stimulus and a response, such as a name, date, event, place or symbol. For example, these are facts: Columbus discovered America in 1492, $\pi = 3.1417$, $2 + 4 = 6$, "B" says "buh", ¶ is the symbol for a new paragraph. The behavior that indicates that this kind of learning has occurred is stating (or "regurgitating"), usually verbatim.

Understanding. This is meaningful learning. It entails learners relating a new idea to relevant prior knowledge, such as understanding what a revolutionary war is. The behaviors that indicate that this kind of learning has occurred include comparing and contrasting, making analogies, making inferences, elaborating, and analyzing (as to parts and/or kinds), among others.

Application. This is learning to generalize to new situations, or transfer learning. It entails learners identifying critical commonalities across situations, such as predicting the effects of price increases. The behavior that indicates that this kind of learning has occurred is successfully applying a generality (the critical commonalities) to a diversity of previously unencountered situations.

Memorization, though sometimes very important, is greatly overused in most training settings. Understanding is very important, but it is relatively complex, and has not received much attention by instructional theorists until very recently. Application is important and has received much attention by instructional theorists. It therefore provides a good place for us to begin.

Cognitive learning:

- makes extensive use of mental processes.
- does not require learning from a model.
- does not require any previous direct experience with the behavior.

Latent Learning

Latent learning is learning that changes mental processes (cognition), but is not immediately revealed through changes in behavior.

Most of the learning you do in the classroom is not immediately revealed by changes in your behavior. Therefore, your learning is latent until you reveal what you have learned by asking or answering a question, giving a presentation, or answering questions on a quiz or exam.

The classic animal demonstration of latent learning was Tolman's experiment showing that rats could form cognitive maps of a maze, which they could use to find their way through the maze when it became important to them. (Tolman considered himself a field theorist)

Insight

Insight occurs when you are suddenly able to solve a problem you have never solved before (or seen someone else solve before).

All inventions result from insight.

The classic demonstrations of insight in animals were from Kohler's observations on a chimpanzee named Sultan, who could figure out how to solve many new problems in order to obtain food.

TEXT: Cognitive learning related to the environment has typically been subsumed as a part of instruction in the more traditional areas of the secondary school curriculum, in particular in science and/or social studies classes. Because few secondary schools include discrete subjects in environmental areas in their curricula, presentation of environmental concepts generally is accomplished through use of the same instructional techniques as those employed in the courses in which they are considered, generally focusing on in-the-classroom learning.

A unique feature of environmental education is its intimate identification with outside-the-classroom phenomena. However, the typical pattern employed in such "in-the-environment" learning as does exist is to concentrate on the affective, frequently the motivational, aspects of outdoor education and field instruction. Most of the research dealing with learning in the environment centers on non-cognitive areas (Disinger, 1984).

Field instruction for cognitive purposes is not an innovation of this era. Attempts to instruct in the field have been charted through the centuries, up to and including the present. Socrates and Aristotle led their followers directly to the natural environment for observation and discussion about nature; expressions of similar efforts still are being evidenced.

Even though general sentiment is supportive of the value of learning in a direct environmental setting, actual efforts at implementation of field instructional programs have been limited. Mason (1980) identified a number of factors contributing to limited instructional use of field activity, among them lack of planning time, lack of resource people for assistance, failure of the school to assume trip risk, lack of a satisfactory method of covering other classes, restrictions placed on field

work by school regulations, lack of administrative leadership, support, and encouragement, lack of funding, limited available transportation, too much "red tape," and excessive class size. Disinger (1984) additionally suggested a lack of teacher commitment to the concept of the field instruction-- "it is 'easier' to teach in the classroom than to plan and implement outside-the-four-walls initiatives."

EARLY STUDIES

Schellhammer (1935) investigated knowledge gains of two groups of high school biology students. His study covered a period of one year. Experimental and control groups were established, with the experimental group participating in a field excursion. Posttests were given to both groups; knowledge gains were found to be significant only with the experimental group. The groups were reversed (control becoming experimental, and vice-versa), and a new unit of study was taught following the same procedures. The new experimental group showed more significant gains than did the new control group.

The impact of extended excursions was studied by Raths (1936) with students who were taken to the coal fields of West Virginia on a ten-day trip. Students who had participated in the trip were judged to be superior in their abilities to evaluate tasks related to scientific inquiry, when compared to non-trip students.

Fraser (1939) worked with the same group of students as did Raths, but focused on gains in information that trip-students had evidenced. He distinguished knowledge gain from memorized information. Measurements of students' abilities to generalize and apply principles learned were made. He concluded that the greatest value of learning in the field was skill in knowledge acquisition and application.

Atyeo (1939) conducted a study in which he compared the results obtained from the use of an excursion technique with those of other teaching methods. He found that with an increase in excursions there was an increase in investigating the phenomena associated with the experience, and demonstrated that the excursion technique was superior to class discussion for teaching material requiring comparisons and knowledge of concrete objects.

When testing the usefulness of field trip guidebooks, outlines, instructional materials, and associated techniques, Evans (1958) found that classes that used the planned field trip technique learned more, retained more, and did better on tests than did classes not participating in field trips.

Testing the effectiveness of field trips in the teaching of college-level botany classes, Kuhnen (1959) found that groups actively involved in field trips showed some, but limited, superiority in knowledge gain over control groups instructed in a laboratory setting.

STUDENTS OF VARYING ABILITIES

Benz (1962) conducted an experimental evaluation of field trips for achieving informational gains in an earth science unit. Four classes of ninth graders (n=109 students) participated in the study. The experimental groups went on excursions to sites of geologic interest, while the control groups

remained in the classroom and reviewed the content through slides. Based on comparisons of pretest and post test results, Benz concluded that superior students tend to profit more from field trips than do students with average to less-than-average ability, but that field trips may contribute to the understanding of scientific principles for all students.

A comparison of two instructional methods--field instruction and discussion--was undertaken in a study by Bennett (1963). A unit on ecology was taught by both methods to separate groups of seventh graders. Bennett found no significant gain from the experimental field treatment as compared to the traditional classroom discussion method, but noted that the field experience technique was as effective as the discussion technique.

The effectiveness of learning geology through field experiences was probed by Glenn (1968), whose study involved a comparison of the field technique to the use of color slides with classroom discussion. In none of the comparisons did the field trip group score significantly higher than did the group taught with slides.

Goldsbury (1969) made a similar comparison, examining the effects on cognitive learning from the substitution of slide-tapes for an actual field experience. Test results indicated that the vicarious experience afforded through the slide-tape presentations was more effective than direct exposure to field trip experiences. However, direct experiences in the field coupled with exposure to slide-tapes in the classroom proved to be a more effective approach than either, separately.

Significant increases in student test scores resulted from use of pre-trip instructional materials, according to the results of a cognitive-gain study on a museum field trip experience for junior high school earth science students (Gennaro, 1981). An experimental group demonstrated statistically significant differences in gain scores as compared to a control group making the same field trip, but without pre-trip instruction.

In research conducted by MacKenzie and White (1982), the effects of field work on retention levels were examined among eighth and ninth graders in Australia. Three groups of students were involved. The same general learning program was employed in all treatments, but with different approaches to the excursion phase; there was an active processing excursion group, a traditional passive excursion group, and a group that did not have field work. Two tests were given, one on achievement of unit objectives and the other on formation of episodes and linking them with other knowledge items. Both tests were given prior to formal instruction; post tests were given during the summer holidays, just prior to the beginning of the new school year. Post test results indicated that the students who had field work performed better than did students who did not have either field component of instruction. Retention was superior in the group that participated in the active excursion program.

To evaluate the effects of field activities on student learning, Kern and Carpenter (1986) conducted a study with two sections of a college laboratory course in earth science. One section involved primarily classroom activities using a laboratory manual, while field-oriented activities were employed in the other. Comparisons of the performance of the two classes at the end of the term revealed almost identical levels of lower-order learning (recall), but higher-order skills were

demonstrated to a greater degree by the field-oriented section, indicating an enhanced ability to apply the information acquired.

UNDERSTANDING AND RETENTION

Designed to examine the nature of ideas that students hold about specific scientific concepts and to investigate modes of instruction that would effectively help them gain an accurate understanding of their world, Lisowski's study (1987) focused on students' conceptions of ecological concepts and the influence of field instruction strategies on their understanding and retention of these concepts. An experiential seven-day field program served as the learning strategy for three independent groups of secondary students. These students responded to a specially designed cognitive instrument made up of higher-order items prior to, during, and four weeks after the field program. All groups exhibited significant post test gains and showed evidence of retention of the targeted concepts. Gains in scores in the major concept strands were positively related to the instructional emphasis given to those areas. The effectiveness of the field program was apparent, in that the specific concepts emphasized were learned and retained.

In Wise and Okey's meta-analysis of instructional strategies (1983), one category examined was presentation mode. This category included those means of instruction where the setting was different from a traditional learning environment; field instruction was a targeted mode of learning within this category. The mean effect size obtained for cognitive and other (attitudinal, problem-solving) outcomes was .26, based on 103 studies. Thus, field instruction was usually found to be more effective than traditional strategies of learning.

Summary

The relative sparsity of research literature dealing with cognitive learning about the environment, in the environment, is an indication that little cognitive instruction in secondary schools takes place in field settings. However, those studies which have been reported indicate that field-based instruction is a teaching technique worthy of additional, extensive rigorous study by educational researchers. The research data reviewed indicate that there are substantial achievement differences in the effectiveness of different approaches to field-based instruction. Both teachers and investigators should study successful approaches to improve their work.

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Below are some notes used in writing the final paper:

MEMORY AND MOTIVATION

A Language Learning

Learning to speak and understand a language is one of the most complex types of learning, yet all normal children master this skill in the first few years of their lives. The familiar principles of shaping, reinforcement, generalization, discrimination, and observational learning all play a role in a child's language learning. However, in the 1950s American linguist Noam Chomsky proposed that these basic principles of learning cannot explain how children learn to speak so well and so rapidly. Chomsky theorized that humans have a unique and inborn capacity to extract word meanings, sentence structure, and grammatical rules from the complex stream of sounds they hear. Although Chomsky's theory is controversial, it has received some support from scientific evidence that specific parts of the human brain are essential for language. When these areas of the brain are damaged, a person loses the ability to speak or comprehend language.

B Learning by Listening and Reading

Because people communicate through language, they can learn vast amounts of information by listening to others and by reading. Learning through the spoken or written word is similar to observational learning, because it allows people to learn not simply from their own experiences, but also from the experiences of others. For example, by listening to a parent or instructor, children can learn to avoid busy streets and to cross the street at crosswalks without first experiencing any positive or negative consequences. By listening to and observing others, children can learn skills such as tying a shoelace, swinging a baseball bat, or paddling a canoe. Listening to the teacher and reading are essential parts of most classroom learning.

Much of what we read and hear is quickly forgotten. Learning new information requires that we retain the information in memory and later be able to retrieve it. The process of forming long-term memories is complex, depending on the nature of the original information and on how much a person rehearses or reviews the information. See Memory.

C Concept Formation

Concept formation occurs when people learn to classify different objects as members of a single category. For example, a child may know that a mouse, a dog, and a whale are all animals, despite their great differences in size and appearance. Concept formation is important because it helps us identify stimuli we have never encountered before. Thus, a child who sees an antelope for the first time will probably know that it is an animal. Even young children learn a large number of such concepts, including food, games, flowers, cars, and houses. Although language plays an important

role in how people learn concepts, the ability to speak is not essential for concept formation. Experiments with birds and chimpanzees have shown that these animals can form concepts.

FACTORS THAT INFLUENCE LEARNING ABILITY

A variety of factors determine an individual's ability to learn and the speed of learning. Four important factors are the individual's age, motivation, prior experience, and intelligence. In addition, certain developmental and learning disorders can impair a person's ability to learn.

A Age

Animals and people of all ages are capable of the most common types of learning-habituation, classical conditioning, and operant conditioning. As children grow, they become capable of learning more and more sophisticated types of information. Swiss developmental psychologist Jean Piaget theorized that children go through four different stages of cognitive development. In the sensorimotor stage (from birth to about 2 years of age), infants use their senses to learn about their bodies and about objects in their immediate environments. In the pre-operational stage (about 2 to 7 years of age), children can think about objects and events that are not present, but their thinking is primitive and self-centered, and they have difficulty seeing the world from another person's point of view. In the concrete operational stage (about 7 to 11 years of age), children learn general rules about the physical world, such as the fact that the amount of water remains the same if it is poured between containers of different shapes. Finally, in the formal operational stage (ages 11 and up), children become capable of logical and abstract thinking. See also Child Psychology.

If older adults remain healthy, their learning ability generally does not decline with age.

Adults continue to learn new knowledge and skills throughout their lives. For example, most adults can successfully learn a foreign language, although children usually can achieve fluency more easily. If older adults remain healthy, their learning ability generally does not decline with age. Age-related illnesses that involve a deterioration of mental functioning, such as Alzheimer's disease, can severely reduce a person's ability to learn.

B Motivation

Learning is usually most efficient and rapid when the learner is motivated and attentive. Behavioral studies with both animals and people have shown that one effective way to maintain the learner's motivation is to deliver strong and immediate reinforcers for correct responses. However, other research has indicated that very high levels of motivation are not ideal. Psychologists believe an intermediate level of motivation is best for many learning tasks. If a person's level of motivation is too low, he or she may give up quickly. At the other extreme, a very high level of motivation may cause such stress and distraction that the learner cannot focus on the task. See Motivation.

C Prior Experience

How well a person learns a new task may depend heavily on the person's previous experience with similar tasks. Just as a response can transfer from one stimulus to another through the process of

generalization, people can learn new behaviors more quickly if the behaviors are similar to those they can already perform. This phenomenon is called positive transfer. Someone who has learned to drive one car, for example, will be able to drive other cars, even though the feel and handling of the cars will differ. In cases of negative transfer, however, a person's prior experience can interfere with learning something new. For instance, after memorizing one shopping list, it may be more difficult to memorize a different shopping list.

D Intelligence

Psychologists have long known that people differ individually in their level of intelligence, and thus in their ability to learn and understand. Scientists have engaged in heated debates about the definition and nature of intelligence. In the 1980s American psychologist Howard Gardner proposed that there are many different forms of intelligence, including linguistic, logical-mathematical, musical, and interpersonal intelligence. A person may easily learn skills in some categories but have difficulty learning in others. See Intelligence.

E Learning and Developmental Disorders

A variety of disorders can interfere with a person's ability to learn new skills and behaviors. Learning and developmental disorders usually first appear in childhood and often persist into adulthood. Children with attention-deficit hyperactivity disorder (ADHD) may not be able to sit still long enough to focus on specific tasks. Children with autism typically have difficulty speaking, understanding language, and interacting with people. People with mental retardation, characterized primarily by very low intelligence, may have trouble mastering basic living tasks and academic skills. Children with learning or developmental disorders often receive special education tailored to their individual needs and abilities.

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[The paintings of Franco Magnani, a San Francisco artist, demonstrate his remarkable memory for his childhood village of Pontito, Italy. Here, one of his paintings of Pontito, top, is juxtaposed with an actual photograph of the village. Magnani left the village in 1958 in his mid-20s. Eight years later, during a serious illness, he began dreaming about Pontito in extraordinarily vivid detail. Soon the images came to him during the daytime with almost hallucinatory power. Impulsively, and working entirely from memory, he began painting and drawing different scenes of the village. Although some of his works show near-photographic accuracy, many contain distortions that serve to portray the village in an idyllic light.]

[In this information-processing model of memory, information that enters the brain is briefly recorded in sensory memory. If we focus our attention on it, the information may become part of working memory (also called short-term memory), where it can be manipulated and used. Through encoding techniques such as repetition and rehearsal, information may be transferred to long-term memory. Retrieving long-term memories makes them active again in working memory.]

Memory (psychology), processes by which people and other organisms encode, store, and retrieve information. Encoding refers to the initial perception and registration of information. Storage is the retention of encoded information over time. Retrieval refers to the processes involved in using stored information. Whenever people successfully recall a prior experience, they must have encoded, stored, and retrieved information about the experience. Conversely, memory failure—for example, forgetting an important fact—reflects a breakdown in one of these stages of memory.

Memory is critical to humans and all other living organisms. Practically all of our daily activities—talking, understanding, reading, socializing—depend on our having learned and stored information about our environments. Memory allows us to retrieve events from the distant past or from moments ago. It enables us to learn new skills and to form habits. Without the ability to access past experiences or information, we would be unable to comprehend language, recognize our friends and family members, find our way home, or even tie a shoe. Life would be a series of disconnected experiences, each one new and unfamiliar. Without any sort of memory, humans would quickly perish.

Philosophers, psychologists, writers, and other thinkers have long been fascinated by memory. Among their questions: How does the brain store memories? Why do people remember some bits of information but not others? Can people improve their memories? What is the capacity of memory? Memory also is frequently a subject of controversy because of questions about its accuracy. An eyewitness's memory of a crime can play a crucial role in determining a suspect's guilt or innocence. However, psychologists agree that people do not always recall events as they actually happened, and sometimes people mistakenly recall events that never happened.

Memory and learning are closely related, and the terms often describe roughly the same processes. The term learning is often used to refer to processes involved in the initial acquisition or encoding of information, whereas the term memory more often refers to later storage and retrieval of information. However, this distinction is not hard and fast. After all, information is learned only when it can be retrieved later, and retrieval cannot occur unless information was learned. Thus, psychologists often refer to the learning/memory process as a means of incorporating all facets of encoding, storage, and retrieval.

In this information-processing model of memory, information that enters the brain is briefly recorded in sensory memory. If we focus our attention on it, the information may become part of working memory (also called short-term memory), where it can be manipulated and used. Through encoding techniques such as repetition and rehearsal, information may be transferred to long-term memory. Retrieving long-term memories makes them active again in working memory.

Although the English language uses a single word for memory, there are actually many different kinds. Most theoretical models of memory distinguish three main systems or types: sensory memory, short-term or working memory, and long-term memory. Within each of these categories are further divisions.

Sensory memory refers to the initial, momentary recording of information in our sensory systems. When sensations strike our eyes, they linger briefly in the visual system. This kind of sensory

memory is called iconic memory and refers to the usually brief visual persistence of information as it is being interpreted by the visual system. Echoic memory is the name applied to the same phenomenon in the auditory domain: the brief mental echo that persists after information has been heard. Similar systems are assumed to exist for other sensory systems (touch, taste, and smell), although researchers have studied these senses less thoroughly.

American psychologist George Sperling demonstrated the existence of sensory memory in an experiment in 1960. Sperling asked subjects in the experiment to look at a blank screen. Then he flashed an array of 12 letters on the screen for one-twentieth of a second, arranged in the following pattern:

Subjects were then asked to recall as many letters from the image as they could. Most could only recall four or five letters accurately. Subjects knew they had seen more letters, but they were unable to name them. Sperling hypothesized that the entire letter-array image registered briefly in sensory memory, but the image faded too quickly for subjects to “see” all the letters. To test this idea, he conducted another experiment in which he sounded a tone immediately after flashing the image on the screen. A high tone directed subjects to report the letters in the top row, a medium tone cued subjects to report the middle row, and a low tone directed subjects to report letters in the bottom row. Sperling found that subjects could accurately recall the letters in each row most of the time, no matter which row the tone specified. Thus, all of the letters were momentarily available in sensory memory.

Sensory memory systems typically function outside of awareness and store information for only a very short time. Iconic memory seems to last less than a second. Echoic memory probably lasts a bit longer; estimates range up to three or four seconds. Usually sensory information coming in next replaces the old information. For example, when we move our eyes, new visual input masks or erases the first image. The information in sensory memory vanishes unless it captures our attention and enters working memory.

Psychologists originally used the term short-term memory to refer to the ability to hold information in mind over a brief period of time. As conceptions of short-term memory expanded to include more than just the brief storage of information, psychologists created new terminology. The term working memory is now commonly used to refer to a broader system that both stores information briefly and allows manipulation and use of the stored information.

We can keep information circulating in working memory by rehearsing it. For example, suppose you look up a telephone number in a directory. You can hold the number in memory almost indefinitely by saying it over and over to yourself. But if something distracts you for a moment, you may quickly lose it and have to look it up again. Forgetting can occur rapidly from working memory. For more information on the duration of working memory, see the Rate of Forgetting section of this article.

Psychologists often study working memory storage by examining how well people remember a list of items. In a typical experiment, people are presented with a series of words, one every few seconds. Then they are instructed to recall as many of the words as they can, in any order. Most

people remember the words at the beginning and end of the series better than those in the middle. This phenomenon is called the serial position effect because the chance of recalling an item is related to its position in the series. The results from one such experiment are shown in the accompanying chart entitled “Serial Position Effect.” In this experiment, recall was tested either immediately after presentation of the list items or after 30 seconds. Subjects in both conditions demonstrated what is known as the primacy effect, which is better recall of the first few list items. Psychologists believe this effect occurs because people tend to process the first few items more than later items. Subjects in the immediate-recall condition also showed the recency effect, or better recall of the last items on the list. The recency effect occurs because people can store recently presented information temporarily in working memory. When the recall test is delayed for 30 seconds, however, the information in working memory fades, and the recency effect disappears.

Working memory has a basic limitation: It can hold only a limited amount of information at one time. Early research on short-term storage of information focused on memory span-how many items people can correctly recall in order. Researchers would show people increasingly long sequences of digits or letters and then ask them to recall as many of the items as they could. In 1956 American psychologist George Miller reviewed many experiments on memory span and concluded that people could hold an average of seven items in short-term memory. He referred to this limit as “the magical number seven, plus or minus two” because the results of the studies were so consistent. More recent studies have attempted to separate true storage capacity from processing capacity by using tests more complex than memory span. These studies have estimated a somewhat lower short-term storage capacity than did the earlier experiments. People can overcome such storage limitations by grouping information into chunks, or meaningful units. This topic is discussed in the Encoding and Recoding section of this article.

Working memory is critical for mental work, or thinking. Suppose you are trying to solve the arithmetic problem 64×9 in your head. You probably would need to perform some intermediate calculations in your head before arriving at the final answer. The ability to carry out these kinds of calculations depends on working memory capacity, which varies individually. Studies have also shown that working memory changes with age. As children grow older, their working memory capacity increases. Working memory declines in old age and in some types of brain diseases, such as Alzheimer’s disease.

Working memory capacity is correlated with intelligence (as measured by intelligence tests). This correlation has led some psychologists to argue that working memory abilities are essentially those that underlie general intelligence. The more capacity people have to hold information in mind while they think, the more intelligent they are. In addition, research suggests that there are different types of working memory. For example, the ability to hold visual images in mind seems independent from the ability to retain verbal information.

C Long-Term Memory

The term long-term memory is somewhat of a catch-all phrase because it can refer to facts learned a few minutes ago, personal memories many decades old, or skills learned with practice. Generally, however, long-term memory describes a system in the brain that can store vast amounts of

information on a relatively enduring basis. When you play soccer, remember what you had for lunch yesterday, recall your first birthday party, play a trivia game, or sing along to a favorite song, you draw on information and skills stored in long-term memory.

Psychologists have different theories about how information enters long-term memory. The traditional view is that that information enters short-term memory and, depending on how it is processed, may then transfer to long-term memory. However, another view is that short-term memory and long-term memory are arranged in a parallel rather than sequential fashion. That is, information may be registered simultaneously in the two systems.

There seems to be no finite capacity to long-term memory. People can learn and retain new facts and skills throughout their lives. Although older adults may show a decline in certain capacities—for example, recalling recent events—they can still profit from experience even in old age. For example, vocabulary increases over the entire life span. The brain remains plastic and capable of new learning throughout one's lifetime, at least under normal conditions. Certain neurological diseases, such as Alzheimer's disease, can greatly diminish the capacity for new learning.

Psychologists once thought of long-term memory as a single system. Today, most researchers distinguish three long-term memory systems: episodic memory, semantic memory, and procedural memory.

C1 Episodic Memory

Episodic memory refers to memories of specific episodes in one's life and is what most people think of as memory. Episodic memories are connected with a specific time and place. If you were asked to recount everything you did yesterday, you would rely on episodic memory to recall the events. Similarly, you would draw on episodic memory to describe a family vacation, the way you felt when you won an award, or the circumstances of a childhood accident. Episodic memory contains the personal, autobiographical details of our lives.

Semantic memory refers to our general knowledge of the world and all of the facts we know. Semantic memory allows a person to know that the chemical symbol for salt is NaCl, that dogs have four legs, that Thomas Jefferson was president of the United States, that 3×3 equals 9, and thousands of other facts. Semantic memories are not tied to the particular time and place of learning. For example, in order to remember that Thomas Jefferson was president, people do not have to recall the time and place that they first learned this fact. The knowledge transcends the original context in which it was learned. In this respect, semantic memory differs from episodic memory, which is closely related to time and place. Semantic memory also seems to have a different neural basis than episodic memory. Brain-damaged patients who have great difficulties remembering their own recent personal experiences often can access their permanent knowledge quite readily. Thus, episodic memory and semantic memory seem to represent independent capacities.

Procedural memory refers to the skills that humans possess. Tying shoelaces, riding a bicycle, swimming, and hitting a baseball are examples of procedural memory. Procedural memory is often

contrasted with episodic and semantic memory. Episodic and semantic memory are both classified as types of declarative memory because people can consciously recall facts, events, and experiences and then verbally declare or describe their recollections. In contrast, non-declarative, or procedural, memory is expressed through performance and typically does not require a conscious effort to recall.

Could you learn how to tie your shoelaces or to swim through purely declarative means—say, by reading or listening to descriptions of how to do it? If it would be possible at all, the process would be slow, difficult, and unnatural. People best gain procedural knowledge by practicing the procedures directly, not via instructions given in words. Verbal coaching in sports is partly a case of trying to impart procedural knowledge through declarative means, although coaching by example (and videotape) may work better. Still, in most cases there is no substitution for practice. Procedural learning may take considerable effort, and improvements can occur over a long period of time. The accompanying chart, entitled “Practice and Speed in Cigar-Making,” shows the effect of practice on Cuban factory workers making cigars. The performance of the workers continued to improve even after they had produced more than 100,000 cigars.

Although long-term episodic, semantic, and procedural memory all represent independent systems, it would usually be wrong to think of a particular task as relying exclusively on one type. The examples used above (remembering yesterday’s events, knowing that Thomas Jefferson was president, or tying shoes) represent relatively pure cases. However, most human activities rely on the interaction of long-term memory systems. Consider the expression of social skills or, more specifically, table manners. If you know to set the dinner table with the fork to the left of each plate, is this an example of procedural memory, semantic memory, or even episodic memory from having witnessed a past example? Probably the answer is some blend of all three. In addition, procedural memory does not apply only to physical skills, as in the previous examples. Complex cognitive behavior, such as reading or remembering, also has a procedural component—the mental procedures we execute to perform these activities. Thus, the separation of procedural and declarative memory from one another is not clear-cut in all cases.

Encoding is the process of perceiving information and bringing it into the memory system. Encoding is not simply copying information directly from the outside world into the brain. Rather, the process is properly conceived as recoding, or converting information from one form to another. The human visual system provides an example of how information can change forms. Light from the outside world enters the eye in the form of waves of electromagnetic radiation. The retina of the eye transduces (converts) this radiation to bioelectrical signals that the brain interprets as visual images. Similarly, when people encode information into memory, they convert it from one form to another to help them remember it later. For example, a simple digit, such as 7, can be recoded in many ways: as the word seven, the roman numeral VII, a prime number, the square root of 49, and so on. Recoding is routine in memory. Each of us has a unique background and set of experiences that help or hinder us in learning new information. An ornithologist could learn a list of obscure bird names much more easily than most of us due to his or her prior knowledge about birds, which would permit efficient recoding.

Recoding is often the key to efficient remembering. To understand the concept of recoding, first try to remember the following series of numbers by reading it once out loud, closing your eyes, and trying to recall the items in their correct order: one, four, nine, one, six, two, five, three, six, four, nine, six, four, eight, one. Test yourself now. If you are like most people, you might have recalled around 7 of the 15 digits in their correct order. However, a simple recoding strategy would have helped you to recall them effortlessly. Write the numbers out in digits and you may notice that they represent the squares of the numbers of 1 to 9: 1, 4, 9, 16, 25, 36, 49, 64, 81. That is, 1 squared is 1, 2 squared is 4, 3 squared is 9, 4 squared is 16, and so on. Recoding the series of numbers as a meaningful rule—the squares of the numbers 1 to 9—would have permitted you to remember all 15 digits. Although this example is contrived, the principle that underlies it is universally valid: How well a person remembers information depends on how the information is recoded. Recoding is sometimes called chunking, because separate bits of information can be grouped into meaningful units, or chunks. For example, the five letters e, t, s, e, and l can be rearranged into sleet and one word remembered instead of five individual units.

Psychologists have studied many different recoding strategies. One common strategy that people often use to remember items of information is to rehearse them, or to repeat them mentally. However, simply repeating information over and over again rarely aids long-term retention—although it works perfectly well to hold information, such as a phone number, in working memory. A more effective way to remember information is through effortful or elaborative processing, which involves thinking about information in a meaningful way and associating it with existing information in long-term memory.

One effective form of effortful processing is turning information into mental imagery. For example, one experiment compared two groups of people that were given different instructions on how to encode a list of words into memory. Some people were told to repeat the words over and over, and some were told to form mental pictures of the words. For words referring to concrete objects, such as truck and volleyball, forming mental images of each object led to better later recall than did rote rehearsal.

Thinking about the meaning of information is also a good technique for most memory tasks. Studies have found that the more deeply we process information, the more likely we are to recall it later. In 1975 Canadian psychologists Fergus Craik and Endel Tulving conducted a set of experiments that demonstrated this effect. The experimenters asked subjects to answer questions about a series of words, such as bear, which were flashed one at a time. For each word, subjects were asked one of three types of questions, each requiring a different level of processing or analysis. Sometimes subjects were asked about the word's visual appearance: "Is the word in upper case letters?" For other words, subjects were asked to focus on the sound of the word: "Does it rhyme with chair?" The third type of question required people to think about the meaning of the word: "Is it an animal?" When subjects were later given a recognition test for the words they had seen, they were poor at recognizing words they had encoded superficially by visual appearance or sound. They were far better at recognizing words they had encoded for meaning. (See the accompanying chart entitled "Depth of Processing and Memory.")

Although some information requires deliberate, effortful processing to store in long-term memory, a vast amount of information is encoded automatically, without effort or awareness. Every day each of us encodes and stores thousands of events and facts, most of which we will never need to recall. For example, people do not have to make a conscious effort to remember the face of a person they meet for the first time. They can easily recognize the person's face in future encounters. Studies have shown that people also encode information about spatial locations, time, and the frequency of events without intending to. For instance, people can recognize how many times a certain word was presented in a long series of words with relative accuracy.

People have developed many elaborate and imaginative recoding strategies, known as mnemonic devices, to aid them in remembering information. For descriptions of mnemonic devices, see the Ways to Improve Memory section of this article.

IV MEMORY RETRIEVAL

Encoding and storage are necessary to acquire and retain information. But the crucial process in remembering is retrieval, without which we could not access our memories. Unless we retrieve an experience, we do not really remember it. In the broadest sense, retrieval refers to the use of stored information.

For many years, psychologists considered memory retrieval to be the deliberate recollection of facts or past experiences. However, in the early 1980s psychologists began to realize that people can be influenced by past experiences without any awareness that they are remembering. For example, a series of experiments showed that brain-damaged amnesic patients—who lose certain types of memory function—were influenced by previously viewed information even though they had no conscious memory of having seen the information before. Based on these and other findings, psychologists now distinguish two main classes of retrieval processes: explicit memory and implicit memory.

A Explicit Memory

Explicit memory refers to the deliberate, conscious recollection of facts and past experiences. If someone asked you to recall everything you did yesterday, this task would require explicit memory processes. There are two basic types of explicit memory tests: recall tests and recognition tests.

In recall tests, people are asked to retrieve memories without the benefit of any hints or cues. A request to remember everything that happened to you yesterday or to recollect all the words in a list you just heard would be an example of a recall test. Suppose you were briefly shown a series of words: cow, prize, road, gem, hobby, string, weather. A recall test would require you to write down or say as many of the words as you could. If you were instructed to recall the words in any order, the test would be one of free recall. If you were directed to recall the words in the order they were presented, the test would be one of serial recall or ordered recall. Another type of test is cued recall, in which people are given cues or prompts designed to aid recall. Using the above list as an example, a cued recall test might ask, "What word on the list was related to car?" In school, tests that require

an essay or fill-in-the-blank response are examples of recall tests. All recall tests require people to explicitly retrieve events from memory.

Recognition tests require people to examine a list of items and identify those they have seen before, or to determine whether they have seen a single item before. Multiple-choice and true-false exams are types of recognition tests. For example, a recognition test on the list of words above might ask, “Which of the following words appeared on the list? (a) plant (b) driver (c) string (d) radio.”

People can often recognize items that they cannot recall. You have probably had the experience of not being able to answer a question but then recognizing an answer as correct when someone else supplies it. Likewise, adults shown yearbook pictures of their high-school classmates often have difficulty recalling the classmates’ names, but they can easily pick the classmates’ names out of a list.

In some cases, recall can be better than recognition. For example, if asked, “Do you know a famous person named Cooper?” you might answer “no.” However, given the cue “James Fenimore,” you might recall American writer James Fenimore Cooper, even though you did not recognize the surname by itself.

Implicit memory refers to using stored information without trying to retrieve it. People often retain and use prior experiences without realizing it. For example, suppose that the word serendipity is not part of your normal working vocabulary, and one day you hear the word used in a conversation. A day later you find yourself using the word in conversation and wonder why. The earlier exposure to the word primed you to retrieve it automatically in the right situation without intending to do so.

Another example of implicit memory in everyday life is unintentional plagiarism. That is, people can copy the ideas of others without being aware they are doing so. The most famous case involved British singer-songwriter George Harrison, formerly of the Beatles. Harrison was sued because his 1970 hit song “My Sweet Lord” sounded strikingly similar to “He’s So Fine,” a 1963 hit by The Chiffons. Harrison denied that he had intentionally copied the earlier song but admitted that he had heard it before writing “My Sweet Lord.” In 1976 a judge ruled against Harrison, concluding that the singer had been unconsciously influenced by his memory.

Psychologists use the term priming to describe the relatively automatic change in performance resulting from prior exposure to information. Priming occurs even when people do not consciously remember being exposed to the information. One way to look for evidence of implicit memory, therefore, is to measure priming effects. In typical implicit memory experiments, subjects study a long list of words, such as assassin and boyhood. Later, subjects are presented with a series of word fragments (such as a__a__in and b__ho_d) or word “stems” (as _____ or bo_____) and are instructed to complete the fragment or stem with the first word that comes to mind. The subjects are not explicitly asked to recall the list words. Nevertheless, the previous presentation of assassin and boyhood primes subjects to complete the fragments with these words more often than would be expected by guessing. This priming effect occurs even if the subjects do not remember studying the words before—strong evidence of implicit memory. The hallmark of all implicit memory tests is that people are not required to remember; rather, they are given a task, and past experience is expressed on the test relatively automatically.

Remarkably, even amnesic individuals show implicit memory. In one experiment, amnesic patients and normal subjects studied lists of words and then were given both an explicit memory test (free recall) and an implicit memory test (word-stem completion). Relative to control subjects, the amnesic patients failed miserably at the free-recall test. Due to their memory disorder, they could consciously remember very few of the list words. On the implicit test, however, the amnesic patients performed as well or better than the normal subjects (see the accompanying chart entitled “Word Memory in Amnesia”). Even though the amnesic patients could not consciously access the desired information, they expressed prior learning in the form of priming on the implicit memory test. They retained the information without knowing it.

Studies have found that a person’s performance on implicit memory tests can be relatively independent of his or her performance on explicit tests. Some factors that have large effects on explicit memory test performance have no effect-or even the opposite effect-on implicit memory test performance. For example, whether people pay attention to the appearance, the sound, or the meaning of words has a huge effect on how well they can explicitly recall the words later. But this variable has practically no effect on their implicit memory test performance (see the accompanying chart entitled “Explicit and Implicit Memory”). Implicit tests seem to tap a different form of memory

One fascinating feature of remembering is how a cue from the external world can cause us to suddenly remember something from years ago. For example, returning to where you once lived or went to school may bring back memories of events experienced long ago. Sights, sounds, and smells can all trigger recall of long dormant events. These experiences point to the critical nature of retrieval in remembering.

A retrieval cue is any stimulus that helps us recall information in long-term memory. The fact that retrieval cues can provoke powerful recollections has led some researchers to speculate that perhaps all memories are permanent. That is, perhaps nearly all experiences are recorded in memory for a lifetime, and all forgetting is due not to the actual loss of memories but to our inability to retrieve them. This idea is an interesting one, but most memory researchers believe it is probably wrong.

Two general principles govern the effectiveness of retrieval cues. One is called the encoding specificity principle. According to this principle, stimuli may act as retrieval cues for an experience if they were encoded with the experience. Pictures, words, sounds, or smells will cause us to remember an experience to the extent that they are similar to the features of the experience that we encoded into memory. For example, the smell of cotton candy may trigger your memory of a specific amusement park because you smelled cotton candy there.

Distinctiveness is another principle that determines the effectiveness of retrieval cues. Suppose a group of people is instructed to study a list of 100 items. Ninety-nine are words, but one item in the middle of the list is a picture of an elephant. If people were given the retrieval cue “Which item was the picture?” almost everyone would remember the elephant. However, suppose another group of people was given a different 100-item list in which the elephant picture appeared in the same position, but all the other items were also pictures of other objects and animals. Now the retrieval

cue would not enable people to recall the picture of the elephant because the cue is no longer distinctive. Distinctive cues specify one or a few items of information.

Overt cues such as sights and sounds can clearly induce remembering. But evidence indicates that more subtle cues, such as moods and physiological states, can also influence our ability to recall events. State-dependent memory refers to the phenomenon in which people can retrieve information better if they are in the same physiological state as when they learned the information. The initial observations that aroused interest in state-dependent memory came from therapists working with alcoholic patients. When sober, patients often could not remember some act they performed when intoxicated. For example, they might put away a paycheck while intoxicated and then forget where they put it. This memory failure is not surprising, because alcohol and other depressant drugs (such as marijuana, sedatives, and even antihistamines) are known to impair learning and memory. However, in the case of the alcoholics, if they got drunk again after a period of abstinence, they sometimes recovered the memory of where the paycheck was. This observation suggested that perhaps drug-induced states function as a retrieval cue.

A number of studies have confirmed this hypothesis. In one typical experiment, volunteers drank an alcoholic or nonalcoholic beverage before studying a list of words. A day later, the same subjects were asked to recall as many of the words as they could, either in the same state as they were in during the learning phase (intoxicated or sober) or in a different state. Not surprisingly, individuals intoxicated during learning but sober during the test did worse at recall than those sober during both phases. In addition, people who studied material sober and then were tested while intoxicated did worse than those sober for both phases. The most interesting finding, however, was that people intoxicated during both the learning and test phase did much better at recall than those who were intoxicated only during learning, showing the effect of state-dependent memory (see the chart entitled “State-Dependent Memory”). When people are in the same state during study and testing, their recall is better than those tested in a different state. However, one should not conclude that alcohol improves memory. As noted, alcohol and other depressant drugs usually impair memory and most other cognitive processes. Those who had alcohol during both phases remembered less than those who were sober during both phases.

Psychologists have also studied the topic of mood-dependent memory. If people are in a sad mood when exposed to information, will they remember it better later if they are in a sad mood when they try to retrieve it? Although experiments testing this idea have produced mixed results, most find evidence for mood-dependent memory. Recall tests are usually more sensitive to mood- and state-dependent effects than are recognition or implicit memory tests. Recognition tests may provide powerful retrieval cues that overshadow the effects of more subtle state and mood cues.

Mood- and state-dependent memory effects are further examples of the encoding specificity principle. If mood or drug state is encoded as part of the learning experience, then providing this cue during retrieval enhances performance.

D Curious Phenomena of Retrieval

Psychologists have explored several puzzling phenomena of retrieval that nearly everyone has experienced. These include déjà vu, jamais vu, flashbulb memories, and the tip-of-the-tongue state.

D1 Déjà Vu and Jamais Vu

The sense of déjà vu (French for “seen before”) is the strange sensation of having been somewhere before, or experienced your current situation before, even though you know you have not. One possible explanation of déjà vu is that aspects of the current situation act as retrieval cues that unconsciously evoke an earlier experience, resulting in an eerie sense of familiarity. Another puzzling phenomenon is the sense of jamais vu (French for “never seen”). This feeling arises when people feel they are experiencing something for the first time, even though they know they must have experienced it before. The encoding specificity principle may partly explain jamais vu; despite the overt similarity of the current and past situations, the cues of the current situation do not match the encoded features of the earlier situation.

A flashbulb memory is an unusually vivid memory of an especially emotional or dramatic past event. For example, the death of Princess Diana in 1997 created a flashbulb memory for many people. People remember where they were when they heard the news, whom they heard it from, and other seemingly fine details of the event and how they learned of it. Examples of other public events for which many people have flashbulb memories are the assassination of U.S. President John F. Kennedy in 1963, the explosion of the space shuttle Challenger in 1986, and the bombing of the Oklahoma City federal building in 1995. Flashbulb memories may also be associated with vivid emotional experiences in one’s own life: the death of a family member or close friend, the birth of a baby, being in a car accident, and so on.

Are flashbulb memories as accurate as they seem? In one study, people were asked the day after the Challenger explosion to report how they learned about the news. Two years later the same people were asked the same question. One-third of the people gave answers different from the ones they originally reported. For example, some people initially reported hearing about the event from a friend, but then two years later claimed to have gotten the news from television. Therefore, flashbulb memories are not faultless, as is often supposed.

Flashbulb memories may seem particularly vivid for a variety of reasons. First, the events are usually quite distinctive and hence memorable. In addition, many studies show that events causing strong emotion (either positive or negative) are usually well remembered. Finally, people often think about and discuss striking events with others, and this periodic rehearsal may help to increase retention of the memory.

D3 Tip-of-the-Tongue State

Another curious phenomenon is the tip-of-the-tongue state. This term refers to the situation in which a person tries to retrieve a relatively familiar word, name, or fact, but cannot quite do so. Although the missing item seems almost within grasp, its retrieval eludes the person for some time. The feeling has been described as like being on the brink of a sneeze. Most people regard the tip-of-the-tongue state as mildly unpleasant and its eventual resolution, if and when it comes, as a

relief. Studies have shown that older adults are more prone to the tip-of-the-tongue phenomenon than are younger adults, although people of all ages report the experience.

Often when a person cannot retrieve the correct bit of information, some other wrong item intrudes into one's thoughts. For example, in trying to remember the name of a short, slobbering breed of dog with long ears and a sad face, a person might repeatedly retrieve beagle but know that it is not the right answer. Eventually the person might recover the sought-after name, basset hound.

One theory of the tip-of-the tongue state is that the intruding item essentially clogs the retrieval mechanism and prevents retrieval of the correct item. That is, the person cannot think of basset hound because beagle gets in the way and blocks retrieval of the correct name. Another idea is that the phenomenon occurs when a person has only partial information that is simply insufficient to retrieve the correct item, so the failure is one of activation of the target item (basset hound in this example). Both the partial activation theory and the blocking theory could be partly correct in explaining the tip-of-the-tongue phenomenon.

V ACCURACY AND DISTORTION OF MEMORY

One of the most controversial issues in the study of memory is the accuracy of recollections, especially over long periods of time. We would like to believe that our cherished memories of childhood and other periods in our life are faithful renditions of the past. However, several case studies and many experiments show that memories—even when held with confidence—can be quite erroneous.

The Swiss psychologist Jean Piaget reported a striking case from his own past. He had a firm memory from early childhood of his nurse fending off an attempted kidnapping, with himself as the potential victim. He remembered his nanny pushing him in his carriage when a man came up and tried to kidnap him. He had a detailed memory of the man, of the location of the event, of scratches that his nanny received when she fended off the villain, and finally, of a police officer coming to the rescue. However, when Piaget was 15 years old, his nanny decided to confess her past sins. One of these was that she had made up the entire kidnapping story to attract sympathy and scratched herself to make it seem real. The events Piaget so vividly remembered from his childhood had never actually occurred! Piaget concluded that the false memory was probably implanted by the nanny's frequent retelling of the original story over the years. Eventually, the scene became rooted in Piaget's memory as an actual event.

A Memory Reconstruction

Psychologists generally accept the idea that long-term memories are reconstructive. That is, rather than containing an exact and detailed record of our past, like a video recording, our memories are instead more generic. As a better analogy, consider paleontologists who must reconstruct a dinosaur from bits and pieces of actual bones. They begin with a general idea or scheme of what the dinosaur looked like and then fit the bits and pieces into the overall framework. Likewise, in remembering, we begin with general themes about past events and later weave in bits and pieces of detail to develop a coherent story. Whether the narrative that we weave today can faithfully capture

the distant past is a matter of dispute. In many cases psychologists have discovered that recollections can deviate greatly from the way the events actually occurred, just as in the anecdote about Piaget.

Sir Frederic Bartlett, a British psychologist, argued for the reconstructive nature of memory in the 1930s. He introduced the term schema and its plural form schemata to refer to the general themes that we retain of experience. For example, if you wanted to remember a new fairy tale, you would try to integrate information from the new tale into your general schema for what a fairy tale is. Many researchers have showed that schemata can distort the memories that people form of events. That is, people will sometimes remove or omit details of an experience from memory if they do not fit well with the schema. Similarly, people may confidently remember details that did not actually occur because they are consistent with the schema.

Another way our cognitive system introduces error is by means of inference. Whenever humans encode information, they tend to make inferences and assumptions that go beyond the literal information given. For example, one study showed that if people read a sentence such as “The karate champion hit the cinder block,” they would often remember the sentence as “The karate champion broke the cinder block.” The remembered version of the events is implied by the original sentence but is not literally stated there (the champion may have hit the block and not broken it). Many memory distortions arise from these errors of encoding, in which the information encoded into memory is not literally what was perceived but is some extension of it.

The question of memory distortion has particular importance in the courtroom. Each year thousands of people are charged with crimes solely on the basis of eyewitness testimony, and in many trials an eyewitness’s testimony is the main evidence by which juries decide a suspect’s guilt or innocence. Are eyewitnesses’ memories accurate? Although eyewitness testimony is often correct, psychologists agree that witnesses are not always accurate in their recollections of events. We have already described how people often remember events in a way that fits with their expectations or schema for a situation. In addition, evidence shows that memories may be distorted after an event has occurred. After experiencing or seeing a crime, an eyewitness is exposed to a great deal of further information related to the crime. The witness may be interrogated by police, by attorneys, and by friends. He or she may also read information related to the case. Such information, coming weeks or months after the crime, can cause witnesses to reconstruct their memory of the crime and change what they say on the witness stand.

American psychologist Elizabeth Loftus has conducted many experiments that demonstrate how eyewitnesses can reconstruct their memories based on misleading information. In one study, subjects watched a videotape of an automobile accident involving two cars. Later they were given a questionnaire about the incident, one item of which asked, “About how fast were the cars going when they hit each other?” For some groups of subjects, however, the verb hit was replaced by smashed, collided, bumped, or contacted. Although all subjects viewed the same videotape, their speed estimates differed considerably as a function of how the question was asked. The average speed estimate was 32 mph when the verb was contacted, 34 mph when it was hit, 38 mph when it was bumped, 39 mph when it was collided, and 41 mph when it was smashed. In a follow-up study, subjects were asked a week later whether there was any broken glass at the accident scene.

In reality, the film showed no broken glass. Those questioned with the word smashed were more than twice as likely to “remember” broken glass than those asked the question with hit. The information coming in after the original event was integrated with that event, causing it to be remembered in a different way.

This study, and dozens of others like it, shows the power of leading questions: The form in which the question is asked helps determine its answer. Our memories are not encapsulated little packets lying in the brain undisturbed until they are needed for retrieval. Rather, people are prone to the misinformation effect—the tendency to distort one’s memory of an event when later exposed to misleading information about it. Eyewitnesses’ testimony can be tainted and altered by information they hear or see after the critical event in question. Therefore, in court cases one must carefully consider whether the testimony of an eyewitness could possibly have been altered through misleading suggestions provided between the time of the crime and the court case.

The problem of determining whether memories are accurate is even more difficult when children are the witnesses. Research shows that in some situations children are more prone to memory distortions than are young adults. In addition, older adults (over 70 years of age) often show a greater tendency to memory distortion than do younger adults.

Even though psychologists have shown that memories can be distorted and that people can remember things that never occurred, our memories are certainly not totally faulty. Usually memory does capture the gist of events that have occurred to us, even if details may be readily distorted.

Can people recover memories of childhood experiences in adulthood, ones that they had never thought about since childhood? Can a powerful retrieval cue suddenly trigger a memory for some long-lost event? Although these questions are interesting, scientific evidence does not yet exist to answer them convincingly. Of course, people often do remember childhood experiences quite clearly, but these memories are usually of significant events that have been repeatedly retrieved over the years. The questions above, on the other hand, pertain to unique events that have not been repeatedly retrieved. Can people remember something when they are 40 years old that happened to them when they were 10 years old—something that they have never thought about during the intervening 30 years?

Such questions take on renewed relevance in what is called the recovered memory controversy. Although the term recovered memory could be applied to retrieval of any memory from the distant past, it is normally used to refer to a particular type of case in contemporary psychology: the long-delayed recovery of sexual abuse in childhood. In a typical case, a person—often, but not always, undergoing psychotherapy—claims to recover a memory of some horrific childhood event. The prototypical case involves an adult woman recovering a memory of being sexually abused by a male figure from her childhood, such as being raped by a father, uncle, or teacher. Sometimes the memory is recovered suddenly, but often the recovery is gradual, occurring over days and weeks. After recovering the memory, the person may confront and accuse the individual deemed responsible, or even take the person to court. The accused person almost always vehemently denies the allegation and claims the events never took place. Whom is to be believed?

A huge debate swirls over the accuracy of recovered memories. Proponents of their accuracy believe in the theory of repression, which is discussed in a subsequent section of this article. According to this theory, memories for terrible events (especially of a sexual nature) can be repressed, or banished to an unconscious state. The memories may lie dormant for years, but with great effort and appropriate cues, they can be retrieved with relative accuracy. Critics point out that there is little evidence supporting the concept of repression, aside from some reports on individual cases. The critics believe that the processes that give rise to false memories-suggestion and imagination-may better explain the phenomenon of recovered memories.

Without corroborating evidence, there is no way to check the accuracy of recovered memories. Thus, even though people may sincerely believe they have recovered a memory of an event from their distant past, the event usually remains a matter of belief, not of fact. Because psychologists know so little about recovery of distant memories, even of normal experiences, the debate over recovered memories is not likely to be resolved soon. For more detail on the recovered memory controversy, see the sidebar “Recovered Memories and False Memories” in Encarta Encyclopedia Deluxe.

VI WHY PEOPLE FORGET

Forgetting is defined as the loss of information over time. Under most conditions, people recall information better soon after learning it than after a long delay; as time passes, they forget some of the information. We have all failed to remember some bit of information when we need it, so we often see forgetting as a bother. However, forgetting can also be useful because we need to continually update our memories. When we move and receive a new telephone number, we need to forget the old one and learn the new one. If you park your car every day on a large lot, you need to remember where you parked it today and not yesterday or the day before. Thus, forgetting can have an adaptive function.

The subject of forgetting is one of the oldest topics in experimental psychology. German philosopher Hermann Ebbinghaus initiated the scientific study of human memory in experiments that he began in 1879 and published in 1885 in his book, *On Memory*. Ebbinghaus developed an ingenious way to measure forgetting. In order to avoid the influence of familiar material, he created dozens of lists of nonsense syllables, which consisted of pronounceable but meaningless three-letter combinations such as XAK or CUV. He would learn a list by repeating the items in it over and over, until he could recite the list once without error. He would note how many trials or how long it took him to learn the list. He then tested his memory of the list after an interval ranging from 20 minutes to 31 days. He measured how much he had forgotten by the amount of time or the number of trials it took him to relearn the list. By conducting this experiment with many lists, Ebbinghaus found that the rate of forgetting was relatively consistent. Forgetting occurred relatively rapidly at first and then seemed to level off over time (see the accompanying chart entitled “Forgetting Curve”). Other psychologists have since confirmed that the general shape of the forgetting curve holds true for many different types of material. Some researchers have argued that with very well learned material, the curve eventually flattens out, showing no additional forgetting over time.

Ebbinghaus's forgetting curve illustrated the loss of information from long-term memory. Researchers have also studied rate of forgetting for short-term or working memory. In one experiment, subjects heard an experimenter speak a three-letter combination (such as CYG or FTQ). The subjects' task was to repeat back the three letters after a delay of 3, 6, 9, 12, 15, or 18 seconds. To prevent subjects from mentally rehearsing the letters during the delay, they were instructed to count backward by threes from a random three-digit number, such as 361, until signaled to recall the letters. As shown in the accompanying chart entitled "Duration of Working Memory," forgetting occurs very rapidly in this situation. Nevertheless, it follows the same general pattern as in long-term memory, with sharp forgetting at first and then a declining rate of forgetting. Psychologists have debated for many years whether short-term and long-term forgetting have similar or different explanations.

B Decay Theory of Forgetting

The oldest idea about forgetting is that it is simply caused by decay. That is, memory traces are formed in the brain when we learn information, and they gradually disintegrate over time. Although decay theory was accepted as a general explanation of forgetting for many years, most psychologists do not lend it credence today for several reasons. First, decay theory does not really provide an explanation of forgetting, but merely a description. That is, time by itself is not a causative agent; rather, processes operating over time cause effects. Consider a bicycle left out in the rain that has rusted. If someone asked why it rusted, he or she would not be satisfied with the answer of "time out in the rain." A more accurate explanation would refer to oxidation processes operating over time as the cause of the rusty bicycle. Likewise, memory decay merely describes the fact of forgetting, not the processes that cause it.

The second problem for decay theory is the phenomenon of reminiscence, the fact that sometimes memories actually recover over time. Experiments confirm an observation experienced by most people: One can forget some information at one point in time and yet be able to retrieve it perfectly well at a later point. This feat would be impossible if memories inevitably decayed further over time. A final reason that decay theory is no longer accepted is that researchers accumulated support for a different theory—that interference processes cause forgetting.

According to many psychologists, forgetting occurs because of interference from other information or activities over time. A now-classic experiment conducted in 1924 by two American psychologists, John Jenkins and Karl Dallenbach, provided the first evidence for the role of interference in forgetting. The experimenters enlisted two students to learn lists of nonsense syllables either late at night (just before going to bed) or the first thing in the morning (just after getting up). The researchers then tested the students' memories of the syllables after one, two, four, or eight hours. If the students learned the material just before bed, they slept during the time between the study session and the test. If they learned the material just after waking, they were awake during the interval before testing. The researchers' results are shown in the accompanying chart entitled, "Forgetting in Sleep and Waking." The students forgot significantly more while they were awake than while they were asleep. Even when wakened from a sound sleep, they remembered the syllables better than when they returned to the lab for testing during the day. If

decay of memories occurred automatically with the passage of time, the rate of forgetting should have been the same during sleep and waking. What seemed to cause forgetting was not time itself, but interference from activities and events occurring over time.

There are two types of interference. Proactive interference occurs when prior learning or experience interferes with our ability to recall newer information. For example, suppose you studied Spanish in tenth grade and French in eleventh grade. If you then took a French vocabulary test much later, your earlier study of Spanish vocabulary might interfere with your ability to remember the correct French translations. Retroactive interference occurs when new information interferes with our ability to recall earlier information or experiences. For example, try to remember what you had for lunch five days ago. The lunches you have had for the intervening four days probably interfere with your ability to remember this event. Both proactive and retroactive interference can have devastating effects on remembering.

D Repression

Another possible cause of forgetting resides in the concept of repression, which refers to forgetting an unpleasant event or piece of information due to its threatening quality. The idea of repression was introduced in the late 19th century by Austrian physician Sigmund Freud, the founder of psychoanalysis. According to Freudian theory, people banish unpleasant events into their unconscious mind. However, repressed memories may continue to unconsciously influence people's attitudes and behaviors and may result in unpleasant side effects, such as unusual physical symptoms and slips of speech. A simple example of repression might be forgetting a dentist appointment or some other unpleasant daily activity. Some theorists believe that it is possible to forget entire episodes of the past—such as being sexually abused as a child—due to repression. The concept of repression is complicated and difficult to study scientifically. Most evidence exists in the form of case studies that are usually open to multiple interpretations. For this reason, many memory researchers are skeptical of repression as an explanation of forgetting, although this verdict is by no means unanimous. For further information on repressed memories, see the sidebar “Recovered Memories and False Memories” that accompanies this article.

VII BIOLOGICAL BASIS OF MEMORY

One of the most exciting topics of scientific investigation lies in cognitive neuroscience: How do physical processes in the brain give rise to our psychological experiences? In particular, a great deal of research is trying to uncover the biological basis of learning and memory. How does the brain code experience so that it can be later remembered? Where do memory processes occur in the brain?

In the early and mid-1900s, psychologists engaged in the “search for the engram.” They used the term engram to refer to the physical change in the nervous system that occurs as a result of experience. (Today most psychologists use the term memory trace to describe the same thing.) The researchers hoped to find some particular location in the brain where memories were stored. This early work, conducted mostly with animals, failed to find a specific locus of memory in the brain. For example, American psychologist Karl Lashley trained rats to solve a maze, then surgically

removed various parts of the rats' brains. No matter what part of the brain he removed, the rats always retained at least some ability to solve the maze. From such research, psychologists concluded that memory is distributed across the brain, not localized in one place.

Modern research confirms the hypothesis that memories are not localized in one place in the brain, but rather involve interacting circuits operating across the brain. Many of the neural regions used in perceiving and attending to information seem also to be involved in the encoding and subsequent retrieval of information. Thus, although different brain regions perform different memory-related processes, the memories themselves do not appear to reside in any particular place.

The hippocampus is thought to be one of the most important brain structures involved in memory. The case of the patient H.M. (only his initials were used to preserve his anonymity), one of the most famous case studies in neuropsychology, strikingly demonstrates the importance of the hippocampus. In 1953, as a 27-year-old man, H.M. underwent brain surgery to control severe epileptic seizures. The surgeons removed his medial temporal lobes, which included most of the hippocampus, the amygdala, and surrounding structures. Although the operation successfully controlled H.M.'s seizures, it had an altogether unexpected and devastating side effect: H.M. was unable to form new long-term memories in a way that he could later retrieve them. That is, he could not remember anything that happened to him after the surgery. His memory of events prior to the surgery was mostly intact, and his reasoning and thinking skills remained strong. But he could not remember meeting new people or new experiences for more than a few minutes. Researchers concluded that the hippocampus and its surrounding structures in the medial temporal lobe play a critical role in the encoding of episodic memories, especially in binding elements of memories together to locate the memories in particular times and places.

Further evidence for the importance of the hippocampus and other regions of the brain in human memory has been provided by advanced brain imaging techniques, such as positron emission tomography (PET) and functional magnetic resonance imaging (fMRI). Brain imaging methods allow researchers to see the activity of the living human brain on a computer screen as a person engages in different types of cognitive tasks, such as reading, solving math problems, or memorizing a list of words. These scanning methods take advantage of the fact that when a brain region becomes active, the rate at which neurons (brain cells) fire increases within this region. Increased neuronal firing in a region causes an increase in blood flow to that region, which the scanners can measure. Therefore, if a person is encoding new information into memory and the hippocampus is active during encoding, we would expect to see increased blood flow to the hippocampus. This is exactly the pattern observed in most studies.

Neuroimaging techniques have revealed other brain regions involved in memory. The frontal lobes play an important role in encoding and retrieving memories. For example, certain areas of the left frontal lobe seem especially active during encoding of memories, whereas those in the right frontal lobe are more active during retrieval. An area in the right anterior prefrontal cortex becomes active when a person is trying to retrieve a previously experienced episode. Some evidence indicates that this region may be even more active when the retrieval attempt is successful—that is, when the person not only attempts to remember but is able to remember some previous occurrence.

The study of the biochemistry of memory is another exciting scientific enterprise, but one that can only be touched upon here. Scientists estimate that an adult human brain contains about 100 billion neurons. Each of these is connected to hundreds or thousands of other neurons, forming trillions of neural connections. Neurons communicate by chemical messengers called neurotransmitters. An electrical signal travels along the neuron, triggering the release of neurotransmitters at the synapse, the small gap between neurons. The neurotransmitters travel across the synapse and act on the next neuron by binding with protein molecules called receptors. Most scientists believe that memories are somehow stored among the brain's trillions of synapses, rather than in the neurons themselves.

Scientists who study the biochemistry of learning and memory often focus on the marine snail *Aplysia* because its simple nervous system allows them to study the effects of various stimuli on specific synapses. A change in the snail's behavior due to learning can be correlated with a change at the level of the synapse. One exciting scientific frontier is discovering the changes in neurotransmitters that occur at the level of the synapse.

Other researchers have implicated glucose (a sugar) and insulin (a hormone secreted by the pancreas) as important to learning and memory. Humans and other animals given these substances show an improved capacity to learn and remember. Typically, when animals or humans ingest glucose, the pancreas responds by increasing insulin production, so it is difficult to determine which substance contributes to improved performance. Some studies in humans that have systematically varied the amount of glucose and insulin in the blood have shown that insulin may be the more important of the two substances for learning.

Scientists also have examined the influence of genes on learning and memory. In one study, scientists bred strains of mice with extra copies of a gene that helps build a protein called N-methyl-D-aspartate, or NMDA. This protein acts as a receptor for certain neurotransmitters. The genetically altered mice outperformed normal mice on a variety of tests of learning and memory. In addition, other studies have found that chemically blocking NMDA receptors impairs learning in laboratory rats. Future discoveries from genetic and biochemical studies may lead to treatments for memory deficits from Alzheimer's disease and other conditions that affect memory.

VIII MEMORY IMPAIRMENT: THE AMNESIAS

Amnesia means loss of memory. There are many different types of amnesias, but they fall into two major classes according to their cause: functional amnesia and organic amnesia. Functional amnesia refers to memory disorders that seem to result from psychological trauma, not an injury to the brain. Organic amnesia involves memory loss caused by specific malfunctions in the brain. Another type of amnesia is infantile amnesia, which refers to the fact that most people lack specific memories of the first few years of their life.

A Functional Amnesia

Severe psychological trauma can sometimes cause functional amnesia. People with functional amnesia seem to have nothing physically wrong with their brain, even though the traumatic event presumably affects their brain in some way. In dissociative amnesia (sometimes called limited

amnesia), a person loses memory of some important past experiences. For example, a person victimized by a crime may lose his or her memory for the event. Soldiers returning from battle sometimes experience similar symptoms.

Another type of functional amnesia is dissociative fugue, also referred to as functional retrograde amnesia. People with this disorder have much more extensive forgetting that may obscure their whole past. They commonly forget their personal identity and personal memories, and they often unexpectedly wander away from home. Typically the fugue state ends by itself within a few days or weeks. Often, after recovery the individual fails to remember anything that occurred during the fugue state.

Dissociative identity disorder, also called multiple personality disorder, is a type of amnesia in which a person appears to have two or more distinct personal identities. These identities alternate in their control of the individual's conscious experiences, thoughts, and actions. In many cases, the person's primary identity cannot recall what happened while the individual was controlled by another identity.

Although functional amnesias are a recurrent theme of television shows and movies, relatively few well-documented cases exist in the scientific literature. Most experts believe that these conditions do exist, but that they are exceedingly rare.

Organic amnesia refers to any traumatic forgetting that is produced by specific brain damage. Typically, these amnesias occur as part of brain disorders caused by tumors, strokes, head trauma, or degenerative diseases, such as Alzheimer's disease. However, certain psychoactive drugs (drugs affecting mood or behavior) can cause amnesia, as can certain dietary deficiencies and electroconvulsive therapy for depression. Organic amnesias may be temporary or permanent. Amnesia resulting from a mild concussion or from electroconvulsive therapy is usually temporary, whereas severe head injuries may lead to permanent memory loss.

The case of the patient H.M., described earlier in this article, is an example of organic amnesia. In 1953 brain surgery for epilepsy left H.M. with dramatic anterograde amnesia, meaning he was unable to remember new information and events that occurred after his operation. Somewhat surprisingly, this severe impairment in the ability to learn new information was accompanied by no detectable impairment in his general intellectual ability or in his ability to use or understand language. H.M. also showed some retrograde amnesia, or inability to remember events before the onset of the surgery. For example, he could not recall that his favorite uncle had died three years earlier. Still, most of his general knowledge was intact, and he performed well on a test of famous faces (of people who had become famous prior to 1950).

Studies of H.M. and other amnesic patients have provided surprising insights into the workings of memory. One remarkable finding is that even though H.M. had severe anterograde amnesia, he (and other amnesic patients like him) still performed normally on tests of implicit memory. For example, H.M. could learn new motor skills, even though he would have no conscious memory of doing so. Even in dense, or severe, amnesias, not all memory abilities are impaired. For more information on implicit memory, see the Implicit Memory section of this article.

Korsakoff's syndrome, also called Korsakoff's psychosis, is a disorder that produces severe and often permanent amnesia. In this condition, years of chronic alcoholism and thiamine (vitamin B1) deficiency cause brain damage, particularly to the thalamus, which helps process sensory information, and to the mammillary bodies, which lie beneath the thalamus. Some patients also have damage to the cortex and cerebellum. Korsakoff's patients show severe anterograde amnesia, or difficulty learning anything new. In addition, most suffer from retrograde amnesia ranging from mild to severe and typically cannot remember recent experiences. The condition is also associated with other intellectual deficits, such as confusion and disorientation. Korsakoff's syndrome is named after Sergei Korsakov (Korsakoff), the Russian neurologist who first described it in the late 19th century.

Amnesia also occurs in Alzheimer's disease, a condition in which the neurons in the brain gradually degenerate, hindering brain function. Damage to the hippocampus and frontal lobes impairs memory. Many other types of organic amnesias exist. For example, in large doses, most depressant drugs can cause acute loss of memory. With severe alcohol or marijuana intoxication, people often forget events that occurred while under influence of the drug.

C Infantile Amnesia

Infantile amnesia, also called childhood amnesia, refers to the fact that people can remember very little about the first few years of their life. Surveys have shown that most people report their earliest memory to be between their third and fourth birthdays. Furthermore, people's memories of childhood generally do not become a continuous narrative until after about seven years of age.

Psychologists do not know what causes infantile amnesia, but they have several theories. One view is that brain structures critical to memory are too immature during the first few years of life to record long-term memories. Another theory is that children cannot remember events that occurred before they mastered language. In this view, language provides a system of symbolic representation by which people develop narrative stories of their lives. Such a narrative framework may be necessary for people to remember autobiographical events in a coherent context.

The phenomenon of infantile amnesia does not mean that infants and young children cannot learn. After all, babies learn to stand, walk, and talk. Scientific evidence indicates that even young infants can learn and retain information well. For example, one experiment found that three-month-old babies could learn that kicking their legs moves a mobile over their crib. Up to a month later, the babies could still demonstrate their knowledge that kicking moved the mobile. Infants and toddlers seem to retain implicit memories of their experiences.

IX EXCEPTIONAL MEMORY

All people differ somewhat in their ability to remember information. However, some individuals have remarkable memories and perform feats that normal individuals could never hope to achieve. These individuals, sometimes called mnemonists (pronounced "nih-MAHN-ists"), are considered to have exceptional memory.

Psychologists have described several cases of exceptional memory. Aleksandr R. Luria, a Russian neuropsychologist, described one of the most famous cases in his book *The Mind of a Mnemonist* (1968). Luria recounted the abilities of S. V. Shereshevskii, a man he called S. Luria studied Shereshevskii over many years and watched him perform remarkable memory feats. However, until Luria began studying these feats, Shereshevskii was unaware of how extraordinary his talents were. For example, Shereshevskii could study a blackboard full of nonsense material and then reproduce it at will years later. He could also memorize long lists of nonsense syllables, extremely complex scientific formulas, and numbers more than 100 digits long. In each case, Shereshevskii could recall the information flawlessly, even if asked to produce it in reverse order. Luria reported one instance in which Shereshevskii was able to recall a 50-word list when the test was given without warning 15 years after presentation of the list! He recalled all 50 words without a single error.

The primary technique Shereshevskii used was mental imagery. He generated very rich mental images to represent information. In addition, part of his ability might have been due to his astonishing capacity for synesthesia. Synesthesia occurs when information coming into one sensory modality, such as a sound, evokes a sensation in another sensory modality, such as a sight, taste, smell, feel, or touch. All people have synesthesia to a slight degree. For example, certain colors may “feel” warm or cool. However, Shereshevskii’s synesthesia was extremely vivid and unusual. For example, Shereshevskii once told a colleague of Luria’s, “What a crumbly yellow voice you have.” He also associated numbers with shapes, colors, and even people. Synesthetic reactions probably improved Shereshevskii’s memory because he could encode events in a very elaborate way. But they often caused him confusion, too. For example, reading was difficult because each word in a sentence evoked its own mental image, interfering with comprehension of the sentence as a whole.

A second case of exceptional memory illustrates the talent some people display for remembering certain types of material. In a series of tests in the 1980s and 1990s, Rajan Srinivasen Mahadevan (known as Rajan) demonstrated a remarkable talent for remembering numbers, but for other types of material, his memory ability tested in the normal range. Rajan memorized the mathematical ratio π , which begins 3.14159 and continues indefinitely with no known pattern, to nearly 32,000 decimal places! If given a string of digits, within a few seconds he could accurately say whether or not the string appears in the first 32,000 digits of π . He could also rapidly identify any of the first 10,000 digits of π when given a specific decimal place. For example, he could tell what digit is in decimal place 6,243 in about 12 seconds, and he rarely made errors on this task. Rajan demonstrated great skill at learning new numerical information.

Shereshevskii and Rajan scored in the normal range on standard intelligence tests. Another group of people, those with savant syndrome (formerly called idiot savants), usually score low on intelligence tests but have one “island” of outstanding cognitive ability. Many children and adults who are deemed savants have extraordinary memory. Psychologists have studied many cases of savant syndrome, but its nature remains a mystery.

Cases of exceptional memory stand as remarkable puzzles whose implications for normal memory functioning are unclear. In some cases the remarkable talents exemplify techniques (such as mental imagery) that are known to magnify normal memory ability. These striking cases have not been integrated well into the scientific study of memory, but generally stand apart as curiosities that cannot yet be explained in any meaningful way.

X WAYS TO IMPROVE MEMORY

Memory improvement techniques are called mnemonic devices or simply mnemonics. Mnemonics have been used since the time of the ancient Greeks and Romans. In ancient times, before writing was easily accomplished, educated people were trained in the art of memorizing. For example, orators had to remember points they wished to make in long speeches. Many of the techniques developed thousands of years ago are still used today. Modern research has allowed psychologists to better understand and refine the techniques.

All mnemonic devices depend upon two basic principles discussed earlier in this article: (1) recoding of information into forms that are easy to remember, and (2) supplying oneself with excellent retrieval cues to recall the information when it is needed. For example, many schoolchildren learn the colors of the visible spectrum by learning the imaginary name ROY G. BIV, which stands for red, orange, yellow, green, blue, indigo, violet. Similarly, to remember the names of the Great Lakes, remember HOMES (Huron, Ontario, Michigan, Erie, and Superior). Both of these examples illustrate the principle of recoding. Several bits of information are repackaged into an acronym that is easier to remember. The letters of the acronym serve as retrieval cues that enable recall of the desired information.

Psychologists and others have devised much more elaborate recoding and decoding schemes. Three of the most common mnemonic techniques are the method of loci, the pegword method, and the PQ4R method. Research has shown that mnemonic devices such as these permit greater recall than do strategies that people usually use, such as ordinary rehearsal (repeating information to oneself).

A Method of Loci

One of the oldest mnemonics is the method of loci (loci is a Latin word meaning “places”). This method involves forming vivid interactive images between specific locations and items to be remembered. The first step is to learn a set of places. For instance, you might familiarize yourself with various locations around your house: the front sidewalk, the front doorstep, the front door, the foyer and so on. Once you have permanently memorized the locations, you can then use them to recode experiences for later recall. You can use the method of loci to remember any set of information, such as a grocery list or points in a speech. The best strategy is to convert each item of information into a vivid mental image by putting it at a familiar location where it can be “seen” in the mind. So, for example, you might remember a grocery list as bread on the front sidewalk, milk on the front porch, bananas hanging from the front door, and so on. When you are at the grocery store and need to remember the list, you can mentally walk through the house and see what object is in each spot. The locations serve as retrieval cues for the desired information. Although this technique may seem far-fetched, with a little practice it can prove quite effective. In fact, the

amount of information one can remember using this method is limited only by the number of locations one has memorized.

Another mnemonic that relies on the power of visual imagery is called the pegword method. There are many variations on the pegword method, but they are all based on the same general principle. People learn a series of words that serve as “pegs” on which memories can be “hung.” In one popular scheme, the pegwords rhyme with numbers to make the words easy to remember: One is a gun, two is a shoe, three is a tree, four is a door, five is a hive, six is sticks, seven is heaven, eight is a plate, nine is wine, and ten is a hen. To learn the same grocery list, one might associate gun and bread by imagining the gun shooting the bread. Two is a shoe, so one would imagine a milk carton sitting in a giant shoe, and so on. When you need to remember the list of groceries, you simply recall the pegwords associated with each number; the pegwords then serve as retrieval cues for the groceries. Peg methods such as this one permit more flexible access to information than does the method of loci. For example, if you want to recite the items backwards for some reason, you can do so just as easily as in the forward direction. If you need to know the eighth item, you can say “eight is a plate” and mentally look at your image for the item on the plate.

C PQ4R Method

The PQ4R method is a mnemonic technique used for remembering text material. The name is itself a mnemonic device for the steps involved. If you are interested in better remembering a chapter from a textbook, you should first Preview the information by skimming quickly through the chapter and looking at the headings. The next step is to form Questions about the information. One way to do this is by simply converting headings to questions. Using this article as an example, you might ask, “What are the ways to improve memory?” The third step is to Read the text carefully trying to answer the questions. After reading, the next step is to Reflect on the material. One way would be to create your own examples of how the principles you are reading could be applied. The next step is to Recite the material after reading it. That is, put the book aside or look away and try to recall or to recite what you have just read. If you cannot bring it to mind now, you will have little chance later. The last step in PQ4R is to Review. After you have read the entire chapter, go through it again trying to recall and to summarize its main points.

Tests of the PQ4R method of reading text material have shown its advantages over the way people normally read. However, PQ4R method slows reading considerably, so students may not use the technique, even though it is more effective. Most mnemonic devices involve additional work, but they are well worth the investment for improving memory.

D Other Techniques

The principles of encoding, recoding, and retrieval discussed elsewhere in this article suggest other ways that memory can be improved. For example, encoding information in an elaborate, meaningful way helps in retention. There are many ways to encode information meaningfully. When possible, try to convert verbal information into mental images. When learning about events and facts, try to focus on their meaning rather than their superficial characteristics. Relating new

information to your personal experiences or to what you already know also makes it easier to retain the information.

Spacing out study sessions is another way to improve your memory. That is, if you are going to read a chapter twice before a test, retention is better if you allow some time to pass between readings, instead of reading the chapter twice in one sitting. Overall, spaced learning or spaced practice (learning opportunities that are spread out in time) is better than massed practice (back-to-back practice, in immediate succession) for retaining facts and skills over longer intervals. However, if a test occurs soon after learning, massed practice is as good as or better than spaced practice.

If you are having difficulty retrieving facts from your memory, try to remember the setting in which you originally learned them. This advice capitalizes on the encoding specificity principle. The more similar the retrieval environment is to the learning environment, the easier it will be to retrieve the information learned.

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MOTIVATION

Motivation, cause of an organism's behavior, or the reason that an organism carries out some activity. In a human being, motivation involves both conscious and unconscious drives. Psychological theories must account for a “primary” level of motivation to satisfy basic needs, such as those for food, oxygen, and water, and for a “secondary” level of motivation to fulfill social needs such as companionship and achievement. The primary needs must be satisfied before an organism can attend to secondary drives.

The American psychologist Abraham Maslow devised a six-level hierarchy of motives that, according to his theory, determine human behavior. Maslow ranks human needs as follows: (1) physiological; (2) security and safety; (3) love and feelings of belonging; (4) competence, prestige, and esteem; (5) self-fulfillment; and (6) curiosity and the need to understand. No single theory of motivation has been universally accepted, but a direction is evident. Formerly, many psychologists stressed the reduction of stimulation to its lowest possible level. An organism was thought to pursue that behavior most likely to bring about this desired state of no stimulation. Many human physiological systems do in fact operate in this manner. Recent cognitive theories of motivation, however, portray humans seeking to optimize rather than minimize stimulation and are thus better able to account for exploratory behavior, the need for variety, aesthetic reactions, and curiosity.

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from ask Earl, Yahoo Kids:

Dear Earl,

What is memory? Kat, Age 17 Dear Kat,

Memory is how your brain stores information and recalls what's stored. Electrochemical connections between brain cells and changes in the neural pathways in your brain make you remember things. Our brain processes different memories in different areas. Long-term memories are stored in the hippocampus, deep inside your brain. These memories are everything from what happened when you were three years old to the books you read last month. The prefrontal cortex links long-term memories to sights, sounds, and feelings so you can respond to events as they happen. The cerebellum processes skill memories to coordinate your movements. That's what lets you remember how to tie your shoes! In our [Brain](#) [http://yahooligans.yahoo.com/Science and Nature/Living Things/Biology/Anatomy/Nervous System/Brain The/](http://yahooligans.yahoo.com/Science_and_Nature/Living_Things/Biology/Anatomy/Nervous_System/Brain_The/) category, I found a great Exploratorium site all about [memory](#) <http://www.exploratorium.edu/memory/index.html>. Don't forget to check it out

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