



The Decade of Behavior (2000–2010) is a multidisciplinary initiative to focus the talents, energy, and creativity of the behavioral and social sciences on meeting many of society's most significant challenges. These include improving education and health care; enhancing safety in homes and communities; actively addressing the needs of an aging population; and helping to curb drug abuse, crime, high-risk behaviors, poverty, racism, and cynicism towards government.

The beginning of the 21st Century is the ideal time to highlight how insight into behavior will help meet these worldwide challenges. Behavioral and social scientists are encouraged to bring their research results forward to help inform the public and the public policy process about the Decade of Behavior major themes:

- Improving health
- Increasing safety
- Improving education
- Increasing prosperity
- Promoting democracy



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BEHAVIOR MATTERS:

How Research Improves Our Lives

We all know that behavior makes a difference in our lives, but how many of us can identify research on behavior that has led to improvement of our lives? This publication presents some examples of how behavioral research has led to innovations in health, safety, education, or social interactions to improve our lives. They are listed under four content areas—living better by design, living happier, living healthier, and living together.

As you read these examples, we hope you will be pleased and surprised at how broadly behavioral research affects our lives. Each of the 10 examples is a snapshot of one of many research areas. We have written them to pique your interest and attention, not to be comprehensive or exhaustive. We have noted references to the original research articles if you wish to pursue the topics further.

We hope that these examples will inspire you to help spread the word that behavior matters!

This publication, the first in a Decade of Behavior series, focuses on psychological research—in concert with American Psychological Association President Philip Zimbardo's initiative: Psychology Makes a Significant Difference! Please visit the Web site for this initiative and add your own examples of behavioral research and application. See <http://research.apa.org/survey/compendium/>.

LIVING BETTER BY DESIGN

Roadway Safety

Imagine that you're driving down an unfamiliar highway one rainy night. You're trying to read the highway signs as you look for the correct exit, but you're having problems reading them from a distance, and the glare of your headlights isn't making the situation any better. Suddenly, you hear a fire engine's siren, but it's so dark, you can't see the bright red truck. What's the cause of these visual problems, and can anything be done to improve the situation? Researchers in the field of human factors and ergonomics are working on the answers.



Human factors and ergonomics research is geared toward making our world safer and more user friendly. These researchers examine the interface between humans and their environments by looking at safety, comfort, usability, and productivity. The field is multidisciplinary, with research done by psychologists, engineers, industrial designers, medical doctors, and a wide range of other professionals. Much of human factors and ergonomics research relies upon psychological research done on human visual and auditory perception.

Our eyes have two types of light-sensitive receptor cells: rods and cones. The rods are primarily brightness

receptors, work best in dim light, and do not transmit color information. The cones are color receptors and work best under bright lighting conditions. Because the color-transmitting cones don't work well in the dark, some colors are easier for us to see in the dark. We are most sensitive to greenish-yellow colors under dim conditions, making lime shades easiest to see in dim lighting. Awareness of these perceptual differences is causing industry to modify some long-standing traditions. For example, fire engines, which have been traditionally red, are now being produced in a lime-green shade, making them easier to spot at night. Researchers comparing the accident rates of red and lime-green fire engines found that the red fire engines were more than twice as likely to be involved in accidents! Many communities are switching from red to lime-green, applying the findings of human factors and ergonomics research and saving lives.

In addition to making emergency vehicles easier for us to see, ergonomists are also working on improving traffic safety through road-sign enhancements. For the past 40 years, highway signs have traditionally used a bold font and high-brightness reflective materials. At night, when headlights shine upon signs, this font-reflective material combination results in a visibility-reducing blurring effect known as halation. In 1998, human factors researchers created a new font that they dubbed "Clearview." The new font has larger interior spaces in each letter, decreasing the blurring effect and making signs easier to read. In fact, researchers found that Clearview signs gave drivers a 16% increase in recognition distance, allowing drivers more time to read signs and react appropriately. If the Department of Transportation adopts the Clearview font, highway accident rates could decrease.

Ergonomics researchers have also made an important, life-saving contribution to the design of automobiles: the

placement of brake lights. Prior to 1985, high-mounted brake lights located at the base of the rear windshield were not standard. Psychologist John Voevodsky created a light system that would indicate vehicle deceleration. The device was first tested on taxicabs in the 1970s and proved so effective at reducing collisions, injuries, and costs associated with accidents that in September 1985, high-mounted brake lights became standard for the auto industry. The new brake lights' effectiveness has been attributed to their being located within the driver's line of sight, to the greater amount of attention drivers pay to the triangular formation of the standard lights and the high-mounted light, and, at night, to the availability of a light source that is separate from running lights and turn signals.

Allen, M. J. (1970). *Vision and highway safety*. Philadelphia: Chilton.

Garvey, P. M., Pietrucha, M. T., & Meeker, D. (1997). Effects of font and capitalization on legibility of guide signs. *Transportation Research Record No. 1605*, 73-79.

Solomon, S. S., & King, J. G. (1985). Influence of color on fire vehicle accidents. *Journal of Safety Research*, 26, 47.

Voevodsky, J. (1974). Evaluation of a deceleration warning light for reducing rear-end automobile collisions. *Journal of Applied Psychology*, 59, 270-273.

Boosting Brain Power

The human brain is the result of 500 million years of evolutionary development. It is more complex than any computer, a biological marvel of engineering. Psychologists, neurologists, and biologists are all working on techniques and tools to unlock the mysteries of the brain's functioning.

Some noninvasive tools used to study the brain include neuropsychological tests, electroencephalograms (EEG), computerized axial tomography (CAT), positron emission tomography (PET), magnetic resonance imaging (MRI), and functional magnetic resonance imaging (fMRI). Some of the more advanced tools, such as the fMRI, allow researchers to actually watch activity levels in specific brain regions as people work on a variety of tasks.

As we come to understand the workings of the brain, researchers are studying further to see if it is possible to directly control brain function. This cutting-edge research could one day help people suffering from spinal cord injuries use brain signals to control prosthetic limbs or move mechanical devices attached to their bodies simply by thinking about it! This seems like the plot of a science fiction movie, but researchers have in fact already used this technology to teach rats and monkeys to move a mechanical arm.

One dramatic technique, the implantation of electrodes into the brain's cortex, allows the activity of large numbers of individual neurons to be recorded and examined. John Chapin and Miguel Nicolelis, both neurobiologists, have used the psychological techniques of operant conditioning developed over decades of research on animal learning to gain some control over brain signals. The rats learn to press a lever that, in turn, activates a robotic arm delivering a reward. Electrodes implanted in the rats' brains allow the researchers to observe and record the brain signals that accompany the lever-pressing activity. Control of the robotic arm is then switched from physical lever pressing to a device monitoring the rat's brain signals. When the brain signals match the signals that occur when the rats are actually physically pressing the lever, the robotic arm moves and delivers a reward to the animal—even though the rat is not actually pressing the lever, just creating the brain signals associated with that action.

This work has been replicated in monkeys by researchers at Duke University. Like the rats, these monkeys had electrodes implanted in various regions of the brain's cortex. Their neuronal firing patterns were recorded as they performed different tasks, including reaching for bits of food. The monkeys were eventually able to use their brain signals to feed themselves with the robotic arm, without actually reaching for the food. Researchers then transmitted the brain signals over the Internet, allowing the monkeys to control another robotic arm in a lab 600 miles away!

These amazing results could one day be used to create sophisticated brain-machine interfaces. Simple interfaces have already been tested with victims of paralysis who have learned to use their brain waves to control the movement of a cursor on a computer screen, allowing them to communicate. More complicated interfaces could eventually be used to teach victims of paralysis to use their brain signals to control prosthetic limbs that are connected to their electrode implants. Eventually, the electrode interfaces will be replaced by smaller "neurochips" that will be able to record information from a larger sampling of neurons. This technology, created by interdisciplinary teams using techniques developed by experimental psychologists, is helping us to explore one of the last frontiers, the human brain.

Chapin, J., Moxon, K., Karen, A., Markowitz, R. S., & Nicolelis, M. A. (1999). Real-time control of a robot arm using simultaneously recorded neurons in the motor cortex. *Nature Neuroscience*, 2(7), 664-670.

Laubach, M., Wessberg, J., & Nicolelis, M. A. (2000). Cortical ensemble activity increasingly predicts behavior outcomes during learning of a motor task. *Nature*, 405(6786), 567-571.

LIVING HAPPIER

Beating Fear

If you're like most people, some things are terribly frightening to you. Everyone has fears. But for some, these fears interfere with normal, everyday activities. When a fear is strong and irrational, it is labeled as a phobia. People with phobias have fears that they know are out of proportion to the harm the focus of their fears can actually cause.

The most common phobias are agoraphobia (fear of open spaces), social phobias (fear of being evaluated or embarrassed), and specific phobias (such as fear of snakes, flying, or water). Phobias usually don't go away on their own. Fortunately, psychologists have devised a type of therapy, called desensitization therapy, to help people overcome their fears. Interestingly, this therapy grew out of a long tradition of research on animal learning.



In 1860, Ivan Pavlov was studying the digestive system. To measure salivation, he gave food to dogs connected to saliva-collecting devices. Pavlov noticed that the dogs began salivating even before they were actually given their food; in fact, dogs seemed to drool as soon as they heard his footsteps approaching. Further studies confirmed this observation: A signal, like his footsteps, that reliably predicted food brought out the same response as food, that is, it made the dogs salivate. This type of learning is called classical conditioning or Pavlovian conditioning.

We now know from countless studies on animals and humans that many physical and emotional responses, not only salivation, can become conditioned to events that once were neutral or nonemotional. For example, although there is nothing inherently frightening or dangerous about blood, many people have learned to fear it because blood is often associated with pain and discomfort. Research on fear conditioning has given psychologists insight into alleviating fears: If conditioning can produce a fear, it can also reduce a fear.

During the 1960s, psychologists developed desensitization therapy, a fear- and anxiety-reducing technique based on classical conditioning theory. Desensitization therapy involves pairing something that is incompatible with fear and anxiety, such as a state of complete relaxation, with the fear-producing event. Therapy participants are asked to create a list of 10 to 15 scenes involving their fear, arranged from least to most anxiety-provoking. The psychologist works with the client to create a state of deep relaxation, then asks the client to imagine the least upsetting scene for several seconds. With the client in a state of deep relaxation, the scene will not be able to produce its usual panic-inducing effects. Then the client is asked to imagine a more fearful scene. This process is continued until the client can imagine the fearful scenario for increasingly longer periods without anxiety. The process is repeated until even the most anxiety-provoking scenario, and ultimately, the actual fear-producing event or object, no longer produces an anxiety response, giving previously phobic people the opportunity to live normal lives. Today, virtual reality computer technology is used in desensitization therapy to provide safe, controllable exposure to feared objects. And it all began with Pavlov's drooling dogs!

Pavlov, I. P. (1902). *The work of the digestive glands* (W.H. Thompson, Trans.). London: Griffin. (Original work published in 1897.)

Wolpe, J. (1958). *Psychotherapy by reciprocal inhibition*. Stanford, CA: Stanford University Press.

Supporting Each Other

Imagine that you've just had a terrible day...what do you do? Do you call a close friend or family member, knowing that they'll help you feel better? If you do, you're using



what psychologists call a social support network. Social support consists of the resources and interactions that other people provide to help you cope with a problem. These resources are not necessarily material in nature, like money, and can include intangibles, such as advice, a

helping hand, or sympathy. Research has shown that a social support network does more than make you feel better after a bad day, it can actually influence your blood pressure, chances of dying after a heart attack, recovery rates from an illness, and your ability to quit smoking and lose weight.

It seems that we've inherited our support-seeking behaviors from our primate ancestors. Shelley Taylor, a psychologist at UCLA, has recently described a phenomenon she calls

“Tend-and-Befriend.” According to Taylor, in times of stress, primates will “affiliate,” or form social groups. This group formation occurs particularly often among females, who, because of the presence of young, are often not as able as males to abandon stressful situations. The Tend-and-Befriend process involves activities that will protect the self and offspring from danger, such as the creation of protective social networks. For example, although all primates live in groups, females will seek out smaller, all-female networks to provide additional support for themselves and their offspring. Human females also tend to be more engaged in social networks than males, especially under conditions of stress.

Health psychologists have been studying the ways in which social support is related to our physical and mental health. They have found that the number of people that we know and the social resources that they can provide influence our anxiety and depression levels, our recovery rates from illness and surgery, and our ability to adjust to chronic conditions, such as arthritis and kidney disease. There are a host of mechanisms through which social support could affect these health outcomes. Sheldon Cohen, a psychologist at Carnegie Mellon University, examined potential physiological mechanisms and found that support is related to better immune system function. Thomas Wills, a psychologist focusing on behavioral mechanisms, found that individuals with higher levels of social support engage in fewer health damaging behaviors, such as using alcohol, cigarettes, and drugs.

Social support is so influential to our well-being that it is now being used as a tool to help people with a variety of medical conditions. Psychologists and medical doctors have worked together to create support networks for people who need help coping with acute and chronic illnesses, such as cancer and asthma. Support groups are also helping people

to recover from procedures such as mastectomies, heart surgery, and stomach bypass surgery. These groups are inexpensive and effective, helping to improve people’s health while simultaneously lowering health care expenditures. The research suggests that increasing the size of people’s social networks helps them to avoid coping behaviors with negative consequences, decreases depression and anxiety, decreases the body’s physiologic reaction to stress, increases healthy behaviors, and increases immune function.

Cohen, S., & Herbert, T. B. (1996). Health psychology: Psychological factors and physical disease from the perspective of human psychoneuroimmunology. *Annual Review of Psychology, 47*, 113-142.

Taylor, S. E., Klein, L. C., Lewis, B. P., Gruenewald, T. L., Gurung, R. A., & Updegraff, J. A. (2000). Biobehavioral responses to stress in females: Tend-and-befriend, not fight or flight. *Psychological Review, 107*(3), 411-429.

Wills, T. A. (1990). Multiple networks and substance use. *Journal of Social and Clinical Psychology, 9*, 78-90.

LIVING HEALTHIER

Healing Touch

Who doesn't enjoy a good back rub? Every year, people spend millions of dollars on appointments with professionals trained in a variety of massage techniques. Long thought to be a luxurious way of reducing stress, psychologists now have empirical evidence that touch therapies such as massage can, among other things, improve health, reduce pain, increase alertness, facilitate growth in infants, and reduce health care expenditures.

There are many examples of touch in the animal world and a growing body of evidence of a biological purpose for such touch. Dogs love to have their stomachs rubbed, horses enjoy being scratched behind the ears, and rodents often sleep piled on top of each other. Psychologist Jeff Alberts and his colleagues study the sensory experiences of fetal and newborn rats. They have found that female rats instinctively touch and manipulate their babies in order to provide a variety of sensory experiences to them. This enrichment of the young rat's environment begins before birth, when the pregnant female vigorously grooms and scratches her abdomen. After birth, the mother cleans and handles the babies, licking them and moving them from place to place. A rat baby who is removed from the mother at birth has lower growth hormone levels



and is 40% less likely to survive than those who receive maternal stimulation.

A similar story can be told for the role of tactile stimulation, or touch, in the human world. Psychologist Tiffany Field has developed a touch therapy regimen that has proved highly effective at curing a variety of ills. Dr. Field began her work with premature infants, who received 15-minute massages 3 times a day. Infants who received the massage gained 47% more weight and went home 6 days sooner than infants who were treated conventionally. One year later, massaged babies still weighed more than untreated babies and scored higher on a test of infant development. If all the nation's 470,000 premature infants received this simple touch therapy, nearly 5 billion dollars in health care costs could be saved!

Massage therapy has also been used to alleviate suffering from painful medical conditions, such as juvenile rheumatoid arthritis. After 1 month of parent-provided massage therapy, children with rheumatoid arthritis had less anxiety and pain and lower levels of stress hormones. This type of therapy alleviates stress, depression, and anxiety levels in individuals suffering from post-traumatic stress disorder, bulimia, and chronic fatigue syndrome. Some of the most impressive results have occurred for patients suffering from autoimmune disorders. For example, when parents massaged their diabetic children, anxiety and depression levels decreased in both parents and children, and the children's blood glucose levels decreased significantly.

Touch seems to work through its stress relieving properties: Because stress raises levels of hormones that can inhibit immune system functioning, reducing stress enhances immune function and improves health.

Field, T., Schanberg, S. M., Scafidi, F., Bauer, C. R., Vega-Lahr, N., Garcia, R., et al. (1986). Tactile/kinesthetic stimulation effects on preform neonates. *Pediatrics*, 77, 654-658.

Ronca, E. R., Lamkin, C. A., & Alberts, J. R. (1993). Maternal contributions to sensory experience in the fetal and newborn rat. *Journal of Comparative Psychology*, 1, 61-74.

Stopping the Hurt

From stubbed toes to broken limbs, we've all experienced pain. As children, we quickly learn to recognize objects and situations that induce pain: fire, needles, doctor visits, and falls from bicycles. But have you ever noticed a bruise and realized that you have no idea when the injury actually occurred? How is it possible that a bumped shin could go unnoticed at some times, yet result in pain at other times? Or consider "phantom-limb pain," the pain that people feel in arms and legs that have been amputated. Though limbs are no longer attached to the body or brain, we can still experience them as though they were. Pain was once thought to be communicated directly from an injured body part to a pain center in the brain via a network of nerves. But phenomena such as injury without pain and phantom-limb pain prompted researchers to learn otherwise.

In 1965, psychologist Ronald Melzack and physiologist Patrick Wall proposed that pain involves the interactions between many parts of the brain that work together to lead to the experience of pain. According to Melzack and Wall's gate-control theory of pain, a neural "gate" exists that uses sensory, attention, memory, and emotion input to determine whether a specific pattern of nerve impulses is worth sending on to yet another area of the brain as a signal. So, when you realize that you have an inexplicable bruise on

your leg, your neural “gate” may have been closed to that particular pattern of nerve impulses, preventing you from feeling the pain of the bumped shin. What could have closed the gate? Perhaps you were excited about something when the bump occurred, and this distraction closed the gate on the incoming nerve signals. It can also work the other way around. Some situations such as high stress may leave the “gate” open, so you experience unusually intense pain.

The gate control theory does more than just explain the pain pathway. It also has helped devise ways to improve the quality of life for those suffering from pain syndromes. Chronic pain can be debilitating and life altering. Before the gate control theory of pain was developed, neurologists would surgically sever nerves, cut spinal cords, and amputate limbs in their attempts to relieve the suffering of seemingly inexplicable chronic pain. These surgical efforts to interrupt the transmission of nerve impulses to the brain did not always work and often resulted in phantom-limb pain. Things are different now. Today, when a patient reports chronic pain with no apparent physiological cause, they are often referred to a multidisciplinary pain management team. Doctors from a variety of disciplines work together to understand each patient’s needs and to develop an individualized pain therapy regimen. Pain psychologists play an important role as members of these teams, conducting assessments that help to guide the course of treatment.

Because pain perception is strongly influenced by situations that leave the “gate” open—job stress, family stress, social support, and depression—psychological treatment for pain includes a variety of techniques that help to close the gate and decrease sensitivity to pain. These techniques include biofeedback, relaxation, meditation, and hypnosis. When these therapies are applied, the need for medication is diminished or eliminated, and quality of life

quickly improves. Thanks to Melzack and Wall’s Gate Control theory of pain, we now know that pain is not a strictly medical phenomenon, but involves both the mind and the body.

Melzack, R., & Wall, P. D. (1994). Pain mechanisms: A new theory. In A. Steptoe and J. Wardle (Eds.), *Psychosocial processes and health: A reader* (pp. 112-131). New York: Cambridge University Press.

Sharing Our Lives With Pets

Pets can be an important part of our lives. Dogs were our first pets, domesticated thousands of years ago when humans began associating with wolves. Since then, humans have

formed strong bonds with other domesticated animals, most notably cats. Whether your favorite animal is a Great Dane, Siamese cat, or dwarf hamster, chances are that you’re reaping some important benefits from being a pet owner.



Health psychologists have found that pets can improve our health in a variety of ways. They provide companionship and social support, just as friends and family members can. The companionship of pets can have

an especially big impact on older people, who often find that their human social network has shrunk. Researchers have shown that pets can improve not only our mental health, but our physical health as well. In 1990, Judith Siegel found that in stressful conditions, older people with pets made

fewer visits to the doctor than older people without pets. New research shows that relationships with animals can even reduce the risks associated with serious physical conditions, such as cardiovascular disease, by lowering blood pressure and cholesterol levels.

Animals that live and interact with humans need special training to optimize both their behavior and the way they are received by the world. Techniques used to train animals were developed by psychologists. In the 1930s, B. F. Skinner developed a procedure that he called operant conditioning. Operant conditioning focuses on increasing the frequency of behaviors through rewards and decreasing their frequency through non-reward. Skinner believed that an animal learns to repeat any behavior that is immediately followed by a reward. He developed and tested his ideas by studying rats in experimental cages that were set up to deliver and reward food whenever a rat pressed a lever.

By using operant conditioning, trainers have trained animals to perform all sorts of helpful behaviors for people with disabilities. Consider Skinner's rats' learning to press a lever. Before the rats learned to associate the lever with food pellets, why did they press the lever in the first place? After all, in order for a trainer to reward a behavior, the behavior needs to occur at least once. To teach an animal to perform a complicated task, trainers use an operant conditioning technique called shaping. Using this technique, behaviors that happen to occur and are close to the desired behavior are rewarded. For example, if you are training a dog to push an elevator button with its paw, you would reward the dog for showing any type of interest in the button. Once the dog knows that she will be rewarded for coming close to the button, you would give her a reward when she happens to touch the button. By using reinforcements to encourage behaviors ever closer to the

desired behavior, you will eventually get the dog to perform the specific desired act.

Through shaping procedures, animals can also be trained to perform a sequence of acts. Animals from dogs to monkeys to potbellied pigs are taught to perform such complex and useful tasks as pulling manual wheelchairs, turning lights on and off, pushing elevator buttons, retrieving dropped or hard-to-reach items, making purchases or banking transactions, opening and closing doors and drawers, and barking to get help. Their help has greatly improved the lives of people with spinal cord injury, Parkinson's disease, epilepsy, blindness, and many other challenges. Some dogs are even specially trained to visit elderly people in nursing homes and children in hospitals, providing them with some of the benefits of pet companionship. Of course, they receive love and excellent care in return.

Siegel, Judith M. (1990). Stressful life events and use of physician services among the elderly: The moderating role of pet ownership. *Journal of Personality & Social Psychology*, 58(6), 1081-1086.

Skinner, B. F. (1938). *The behavior of organisms: An experimental analysis*. New York: Appleton-Century.

LIVING TOGETHER

Preventing Violence

Violence seems to stalk our world. Not a day goes by that we don't hear about local murders and muggings, not to mention international violence, hatred, and tension.

A related phenomenon is “copycat” violence—aggressive acts committed after viewing or reading about similar acts. We may scoff at the notion of people engaging in violence because they watched a rock video on MTV or listened to an aggressive song, but could it be true? Psychological research suggests that aggressive acts are, at least in part, influenced by what we have observed and learned.

In 1965, psychologist Albert Bandura had children watch a video in which an adult punched, kicked, and hit a Bobo doll, an inflatable punching bag in the shape of a clown. The children were divided into three groups: One group saw the adult aggressor rewarded with praise and candy, another group watched the adult being verbally reprimanded, and the third group saw that there were no consequences for the adult's behavior. The children were then placed individually in a room full of toys, among them, a Bobo doll. Children who saw the doll aggressor either rewarded or suffering no consequences were more likely to commit their own violent acts against the doll, compared to children who had seen the adult aggressor punished. This learning by observing the behavior of others is called social learning or observational learning.

Can we apply these findings to the real world? After all, it could be argued that it's natural for children—or at least some children—to hit and kick a blowup doll. In fact, field and laboratory research on media violence strongly suggests that viewing violent acts on TV and in the movies affects us negatively in several ways: (1) It decreases our

concerns about harm done to the victims, (2) it decreases our sensitivity to violent acts, and (3) it increases the likelihood of viewers emulating the aggressive acts. In 1998, the National Television Violence Study reported that 60% of television shows included violent acts. In light of the social learning phenomenon, the hours of television watched by Americans, and especially by children, present an alarming picture.

After Bandura demonstrated that children mimic the violent behaviors of an adult, researchers wondered if observational learning could be used to increase positive behaviors. Joyce Sprafkin and colleagues designed a study to test this hypothesis. They divided first graders into groups that watched different TV shows depicting varying degrees of helping behavior. Later, the children were placed in a situation where they had the opportunity to help the experimenter. Those who had watched the TV show depicting more helpful behaviors spent more of their time helping the experimenter, and were quicker to do so.

Unfortunately, another source of negative learning about violence is often found within the home and a child's family. The good news is that if violence is learned, nonviolent ways of interacting with the world can also be learned. Young children are particularly impressionable, and the lessons they learn while they are young have long-lasting effects. Psychologists and early childhood educators are working together to teach parents and other caregivers to discipline without violence and to model positive, nonviolent ways of dealing with everyday problems.

For more information about teaching nonviolence to children, visit www.actagainstviolence.org.

Bandura, A. (1965). Influence of models' reinforcement contingencies on the acquisition of imitated responses. *Journal of Personality and Social Psychology, 1*, 589-595.

National Television Violence Survey. (1998). *National television violence survey volume 3*. Thousand Oaks, CA: Sage Publications.

Sprafkin, J. N., Liebert, R. M., & Poulos, R. W. (1975). Effects of a prosocial televised example on children's helping. *Journal of Experimental Child Psychology, 20*, 119-126.

Sitting in Judgment

Do you remember what you ate for breakfast this morning? Can you recall the name of your fifth-grade teacher? Do you think you would be able to remember the face of someone who mugged you? Whether or not you recall these events depends on the many mental processes that underlie how we perceive, interpret, retrieve, and use information about the world around us—processes of great interest to memory researchers.

One of today's most interesting applications of psychology and memory research is in the field of criminal justice. Witnesses to crimes are often called upon to describe what they saw and identify suspects, and juries give great weight to their testimony. But how reliable are these recollections of events that may have happened fast and under stressful conditions? Inaccurate eyewitness accounts can—and have—led to the imprisonment of innocent people and to freedom for guilty perpetrators. In order to reduce the rates of false identifications, psychologists have worked extensively to determine and improve the accuracy of eyewitness accounts.

Research has shown that a number of factors can affect the acquisition and retention of new memories about an event. For crime events, the duration and degree of violence and the presence of a weapon draw attention away from other details of the crime, decreasing the likelihood of correct identification of the perpetrator. Memory is also decreased by poor questioning techniques. For example, poorly designed police lineups can reduce the accuracy of the eyewitness.

Psychologist Elizabeth Loftus has been involved in the study of memory as it relates to eyewitness testimony since the 1970s. Much of her work has examined the suggestibility of eyewitness memory and has shown that memories can be altered by later events. In one study, Loftus had study participants watch a videotape of a car accident. Immediately afterwards, the participants answered questions about what they had seen. Some of the questions intentionally included misleading information, such as, "How fast was the white sports car going when it passed the barn while traveling on the country road?" In fact, the videotape had not shown the car passing a barn at all. A week later, 17% of the participants claimed to have seen the car pass a barn. The mere suggestion that there had been a barn had created a "memory!"

Our ability to recognize perpetrators in a police lineup is also subject to external influences. When eyewitnesses are told to identify a suspect, they seldom are told that the actual perpetrator might not be in the lineup. Research has shown that when witnesses are told the real perpetrator may not be there, the rate of false identifications is much lower; eyewitnesses so instructed are less likely to assume that the lineup member who most closely resembles their memory of the perpetrator is the guilty party. Using this simple technique, eyewitness misidentifications can be cut nearly in half.

These psychological research experiments have demonstrated that our eyewitness recollections are far from perfect and subject to intentional and unintentional manipulations. The implications of this research are disturbing: We may firmly believe that we are accurately recalling an event when in fact the accuracy of our memories, unbeknownst to us, reflects external influences such as the method by which we are questioned or our integrating different events over time. In response to these issues, former U.S. Attorney General Janet Reno ordered that a panel of experts be formed to address the ways in which the justice system could improve the accuracy of eyewitness testimony. This eight-member panel, with two psychologist members, worked to create a document titled *Eyewitness Evidence: A Guide for Law Enforcement* (www.ncjrs.org/pdffiles1/nij/178240.pdf), the first set of national guidelines for the collection of accurate and unbiased eyewitness evidence. Thanks to psychological research, our justice system will be able to base its judgments on more accurate information.

Loftus, E. F. (1975). Leading questions and the eyewitness report. *Cognitive Psychology*, 7, 560-572.

Malpass, R. S., & Devine, P. G. (1981). Eyewitness identification: Lineup instructions and the absence of the offender. *Journal of Applied Psychology*, 66, 482-489.

Stebly, N. M. (1997). Social influence in eyewitness recall: A meta-analytic review of line-up instruction effects. *Law and Human Behavior*, 21, 283-298.

Overcoming Prejudice

Have you ever felt that people have made assumptions about you based on your age, race, gender, religion, or physical appearance? Most of us have, at times, felt like we were being prejudged, or stereotyped, by those who don't know us well, and most of us probably infer a host of things about others based on their outward features.

While many of us feel that stereotyping is unsavory, it is very difficult to avoid categorizing people to some extent. This is because our perceptual and cognitive systems have evolved so that we can quickly categorize situations, people, and objects. This ability is beneficial in many ways and helps us make rapid and appropriate responses. However, we apply rapid categorization so well that it can lead to prejudice, discrimination, and social injustice.



It is not difficult to think of examples of prejudice (negative attitudes toward people based on their membership in a particular group) and discrimination (behaviors that reflect prejudicial attitudes) that we encounter in day-to-day life. Our automatic tendency to categorize often leads to what psychologists call in-groups and out-groups, that is, groups to which we do and do not belong. For example, the members of your softball team are your in-group, while members of the other teams constitute the out-groups.

In the 1950s, social psychologist Muzafer Sherif observed a group of 11-year-old boys at summer camp in Robbers Cave, OK. The boys were divided into two groups, the Eagles and the Rattlers, and lived in separate cabins while participating in activities together. After a week of group activities, the Eagles and the Rattlers were pitted against one another in a series of competitions. The groups quickly became hostile toward each other, refusing to befriend and discriminating against members of the other team. In one week, Sherif and his colleagues had created groups that were prejudiced against each other. The psychologists attempted to reduce the group hostility by increasing the degree of contact between the Eagles and the Rattlers, but quickly learned that this only increased the level of distrust. However, when the groups were encouraged to work together on projects that were important to each of them, hostility and conflict decreased, and the boundaries between groups were practically eliminated.

Psychologists studying intergroup relations have begun to apply the results of the Robbers Cave work and other experiments to reduce prejudice in the real world. In 1954, the Supreme Court ruled that schools could no longer be segregated along racial lines. During the *Brown v. Board of Education* trial, social psychologists testified that segregation was not only the result of racial prejudice, but actually increased levels of prejudice and hostility. Around this time, psychologist Gordon Allport put forth his contact hypothesis: Direct contact between groups can change their negative attitudes toward each other. While contact appears to be sufficient when group conflict is modest, studies on desegregated schools showed that simple contact between hostile groups does not improve their relations. Instead, certain conditions must be satisfied, including: (1) equal status in the classroom, (2) personal, one-on-one interactions between group members, (3) participation in cooperative activities, and (4) intergroup

contact supported by the external community. These principles have been successfully applied to schools, athletic teams, military organizations, and workplaces. Psychologists studying intergroup relations will continue to play an important role in improving how members of the many groups in our diverse society relate to each other.

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