Dissecting Research

MV AP Psychology 2016-17

Name:_____

Teacher:_____

Class Period:_____

DISSECTING RESEARCH

Certain theorists conducted famous studies that are essential for you to know in AP Psychology. The purpose of this assignment is not only to make you more familiar with the assigned studies, but also for you to think critically about how these psychologists conducted their research. You will also analyze whether these studies *true* experiments and if they were ethical.

Over the course of the semester, you will be required to read and dissect 6 famous studies – 20 points per assignment, 120 points total.

The following guidelines MUST be followed to receive credit for these assignments.

- Must be completed and turned in through Google Classroom.
- All Dissecting Reseach assignments are due on or before the assigned dates provided by your teacher.
    - ***No late assignments will be accepted regardless of absence. Be sure to plan ahead!***

Required Elements:

- Paragraph #1: Summarize the study
    - What was the psychologist's hypothesis?
    - Explain how the psychologist conducted the study.
- Paragraph #2: Summarize the results
    - What results did the psychologist get from running the study?
    - What was the impact of the psychologist's research on the field of psychology?
- Paragraph #3: Evaluate if the study was a *true* experiment
    - True experiments have independent variables that can be manipulated by the researcher to create the experimental and control groups. Does the study have both a control group and an experimental group? Use evidence to support your answer.
- Paragraph #4: Was this study ethical?
    - Think back to our discussions of ethics in Psychology. Does the assigned study follow the ethical guidelines we discussed?
    - You must use 2 pieces of evidence from the reading to support your claim.

Studies & AP Unit of Study:

- *One Brain or Two* [**Brain + Bio**]
- *Autobiographical Memories & Olfactory Senses* [**Sensation + Perception**]
- *I Can See It All Over Your Face!* [**Motivation + Emotion**]
- *Watch Out for the Visual Cliff* [**Developmental**]
- *Relaxing Your Fears Away* [**Disorders + Treatment**]
- *To Help or Not to Help* [**Social**]

DISSECTING RESEARCH RUBRIC

Paragraph #1

Hypothesis – if/then, own words ___/2

Study description – detailed ___/3

Paragraph #2

Description of results – should include statistics ___/3

Influence on the field - detailed ___/2

Paragraph #3

Is it truly an experiment? ___/1

Included specific evidence to support the existence (or nonexistence) of experimental & control groups ___/4

Paragraph #4

Was the study ethical? (claim) ___/1

Included 2 guidelines & supporting evidence ___/4

Dissecting Research #1

One Brain or Two?

Gazzaniga, M. S. (1967). The split brain in man. *Scientific American, 217* (2), 24-29.

You are probably aware that the two halves of your brain are not the same and that they perform different functions. For one thing, the left side of your brain is responsible for movement in the right side of your body, and vice versa. Even beyond this, though, the two brain hemispheres appear to have even greater specialized abilities.

It has come to be rather common knowledge that, for most of us, the left brain controls the ability to use language while the right is involved more in spatial relationships, such as those needed for artistic activities. It is well known that stroke or accident victims who suffer damage to the left side of the brain will usually lose their ability to speak (often this skill returns with practice and training). Many people believe that each half, or "hemisphere," of your brain may actually be a completely separate mental system with its own individual abilities for learning, remembering, perceiving the world, and even feeling emotions. The concepts underlying this popular awareness are the result of many years of rigorous scientific research on the effects of splitting the brain into two separate hemispheres.

Research in this area was pioneered by Roger W. Sperry (1913-1994). In his early work with animal subjects, Sperry made many remarkable discoveries For example, consider a cat that has had surgery to cut the connection between the two halves of its brain and to alter its optic nerves so that its left eye only transmitted information to the left hemisphere and the right eye only to the right hemisphere. Following surgery, the cat appeared to behave normally and exhibit virtually no ill effects. Then the cat's right eye was covered, and the cat learned a new behavior, such as walking through a short maze to find food. After the cat became skilled at maneuvering through the maze, the eye cover was shifted to its left eye. Now when the cat was placed in the maze, its left brain had no idea where to turn and the animal had to relearn the entire maze from the beginning.

Sperry conducted many related studies over the next 30 years and in 1981 received the Nobel Prize for his work on the specialized abilities of the two halves of the brain. When his research endeavors turned to human subjects in the early 1960s, he was joined in his work by Michael Gazzaniga. Although Sperry is considered the founder of split-brain research, Gazzaniga's article has been chosen because it is a clear, concise summary of their early collaborative work with human subjects and is cited consistently in many general psychology texts. Its selection is in no way intended to overlook or over-shadow either Sperry's leadership in this field or his great contributions. Gazzaniga, in large part, owes his early research, and his ongoing leadership in the area of hemispheric specialization, to Roger W. Sperry (see Sperry, 1968; Puente, 1995).

To understand split-brain research, some knowledge of human physiology is required. The two hemispheres of your brain are in constant communication with one another via the *corpus callosum*, is a structure made up of about 200 million nerve fibers. If your corpus callosum is cut, this major line of communication is disrupted, and the two halves of your brain must then function independently. So, if we want to study each half of your brain separately, all we need to do is surgically sever your corpus callosum.

But can scientists divide the brains of humans? This sounds like psychology by Dr. Frankenstein! Obviously, research ethics would never allow such drastic methods simply for the purpose of studying the specialized abilities of the brain's two hemispheres. However, in the late 1950s, the field of medicine provided psychologists with a golden opportunity. In some people with very rare and very extreme cases of uncontrollable epilepsy, seizures could be virtually eliminated by surgically severing the corpus callosum. This operation was (and is) extremely successful, as a last resort, for those patients who cannot be helped by any other means. When this article was written in 1966, 10 such operations had been undertaken, and four of the patients consented to participate in examination and testing by Sperry and Gazzaniga to determine how their perceptual and intellectual skills were affected as a result of this surgical treatment.

Theoretical Propositions

The researchers wanted to explore the extent to which the two halves of the human brain are able to function independently, and whether they have separate and unique abilities. If the information traveling between the two halves of your brain is interrupted, would the right side of your body suddenly be unable to cooperate with the left? If language is controlled by the left side of the brain, how would your ability to speak and understand words be affected by this surgery? Would thinking and reasoning processes exist in both halves separately? If the brain is really two separate brains, would a person be capable of functioning normally when these two brains are no longer able to communicate? Since we received sensory input from both the right and the left, how would the sense of vision, hearing, and touch be affected? Sperry and Gazzaniga attempted to answer these and many other questions in their studies of split-brain individuals.

Method

The researchers developed three types of tests to explore a wide range of mental (cognitive) capabilities of the patients. One was designed to examine visual abilities. They devised a technique to allow a picture of an object, a word, or parts of words to be transmitted only to the visual area (called a "field") in *either* the right- or left-brain hemisphere, but not to both. Normally both of your eyes send visual information to both sides of your brain. However, with exact placement of items or words in front of you, and with your eyes fixed on a specific point, images can be fed to only the right or the left visual field of your brain.

Another testing situation was designed for tactile (touch) stimulation. Here, participants could feel, but not see an object, a block letter, or even a word in cutout block letters. The apparatus consisted of a screen with a space under it for the subject to reach through and touch the items without being able to see them. The visual and tactile devices could be used simultaneously so that, for example, a picture of a pen could be projected to one side of the brain and the same object could be searched for by either hand among various objects behind the screen (see Figure 1).

Finally, testing auditory abilities was somewhat more tricky. When sound enters either of your ears, sensations are sent to both sides of your brain. Therefore, it is not possible to limit auditory input to only one side of the brain even in split-brain patients. However, it is possible to limit the *response* to such input to one brain hemisphere. Here is how this was done. Imagine that several common objects (a spoon, a pen, a marble) are placed into a cloth bag, and you are then asked, verbally, to find certain objects by touch. You would probably have no trouble doing so. If you placed your left hand in the bag, it is being controlled by the right side of your brain, and vice versa. Do you think either side of your brain could do this task alone? As you will see in a moment, both halves of the brain are not equally capable of responding to this auditory task. What if you are not asked for specific objects, but are simply requested to reach into the bag and identify objects by touch? Again, this would not be difficult for you, but it would be quite difficult for a split-brain patient.

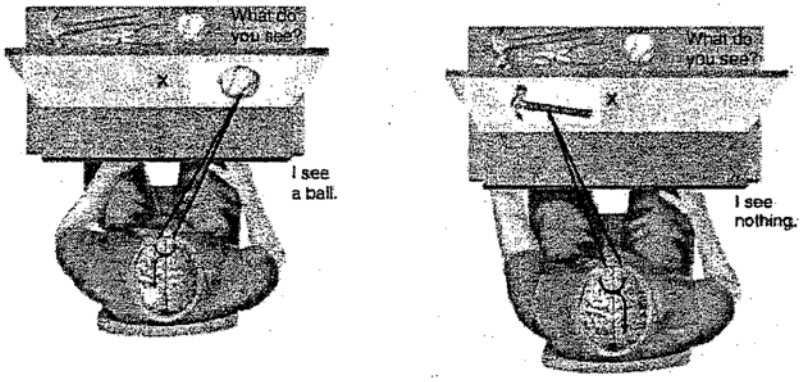
Gazzaniga combined all of these testing techniques to reveal some fascinating findings about how the brain functions.

Results

First of all, you should know that following this radical brain surgery, the patients' intelligence level, personality, typical emotional reactions, and so on were relatively unchanged. They were very happy and relieved that they were now free of seizures. Gazzaniga reported that one patient, while still groggy from surgery, joked that he had "a splitting headache." When testing began, however, these subjects demonstrated many unusual mental abilities.

Visual Abilities

Figure 1. A typical visual testing device for split-brain subjects.



One of the first tests involved a board with a horizontal row of lights. When a patient sat in front of this board and stared at a point in the middle of the lights, the bulbs would flash across both the right and left visual fields. However, when the patients were asked to explain what they saw, they said that only the lights on the left side of the visual field, the patients claimed to have seen nothing. A logical conclusion from these findings was that the right side of the brain is blind. Then an amazing thing happened. The lights were flashed again, only this time the patients were asked to point to the lights that had flashed. Although they had said they only saw the lights on the right, they pointed to all the lights in both visual fields. Using this method of pointing, it was found that both halves of the brain had seen the lights and were equally skilled in visual perception. The important point here is that when the patients failed to *say* that they had seen all the lights, it was not because they didn't see them, but because the center for speech is located in the brain's left hemisphere. In other words, in order for you to say you saw something, the object has to have been seen by the left side of your brain.

Tactile Abilities

You can try this test yourself. Put your hands behind your back. Then have someone place familiar objects (a spoon, a pen, a book, a watch) in either your right or left hand and see if you can identify the object. You would not find this task to be very difficult, would you? This is basically what Sperry and Gazzaniga did with the split-brain patients. When an object was placed in the right had in such a way that the patient could not see or hear it, messages about the object would travel to the left hemisphere and the patient was able to name the object and describe it and its uses. However, when the same objects were placed in the left hand (connected to the right hemisphere), the patients could not name them or describe them in any way. But did the patients *know* what the object was? In order for the researchers to find out, they asked the subjects to match the object in their left hand (without seeing it, remember) to a group of various objects presented to them. This they could do as easily as you or me. Again, this places verbal ability in the left hemisphere of the brain. Keep in mind that the reason you are able to name the un-seen objects in your left hand is that the information from the right side of your brain is transmitted via the corpus callosum to the left side, where your center for language says "that's a spoon!"

Visual Plus Tactile Tests

Combining these two types of tests provided support for the findings above and also offered additional interesting results. If subjects were shown a picture of an object to the right hemisphere only, they were unable to name it or describe it. In fact, there might be no verbal response at all or even a denial that anything had been presented. But if the patients were allowed to reach under the screen with their left hand and touch a selection of objects, they were always able to find the one that had been presented visually.

The right hemisphere was found to be able to think about and analyze objects as well. Gazzaniga reported that when the right hemisphere was shown a picture of an item such as a cigarette, the subjects could touch 10 objects behind the screen that did not include a cigarette, and select an object that was most closely related to the item pictured – in this case an ashtray. He went on to explain:

> Oddly enough, however, even after their correct response, and while they were holding the ashtray in their left hand, they were unable to name or describe the object or the picture of the cigarette. Evidently, the left hemisphere was completely divorced, in perception and knowledge, from the right. (p. 26)

Other tests were conducted to shed additional light on the language-processing abilities of the right hemisphere. One very famous, ingenious, and revealing use of the visual apparatus came when the word HEART was projected to the patients so that HE was sent to the right visual field and ART was sent to the left. Now, keeping in mind (your connected mind) the functions of the two hemispheres, what do you think the patients verbally reported seeing? If you said ART, you were correct. However, and here is the revealing part, when the subjects were presented with two cards with the words HE and ART printed on them and asked to point with the left hand to the word they had seen, they all pointed to HE! This demonstrated that the right hemisphere is able to comprehend language, although it does so in a different way from the left: in a nonverbal way.

The auditory tests conducted with the patients produced similar results. When patients were asked to reach with their left hand into a grab bag hidden from view and pull out certain specific objects (a watch, a marble, a comb, a coin) they had no trouble. This demonstrated that the right hemisphere was comprehending language. It was even possible to describe a related aspect of an item with the same accurate results. An example given by Gazzaniga was when the patients were asked to find in a grab bag full of plastic fruit "the fruit monkeys like best," they retrieved a banana. Or when told "Sunkist sells a lot of them," they pulled out an orange. However, if these same pieces of fruit were placed out of view in the patients' left hand, they were unable to say what they were. In other words, when a verbal response was required, the right hemisphere was unable to speak.

One last example of this amazing difference between the two hemispheres involved plastic block letters on the table behind the screen. When patients were asked to spell various words by feeling with the left hand they had an easy tie doing so. Even if three or four letters that spelled specific words were placed behind the screen, they were able, left-handed, to arrange them correctly into words. However, immediately after completing this task, the sujbects could not name the word they had just spelled. Clearly, the left hemisphere of the brain is superior to the right for speech (in some left-handed people, this is reversed). But in what skills, if any, does the right hemisphere excel? Sperry and Gazzaniga found in this early work that visual tasks involving spatial relationships and shapes were performed with greater proficiency by the left hand (even though these patients were all right-handed). As can be seen in Figure 2, copying three-dimensional drawings (using the pencil behind the screen) was much more successful with the left hand.

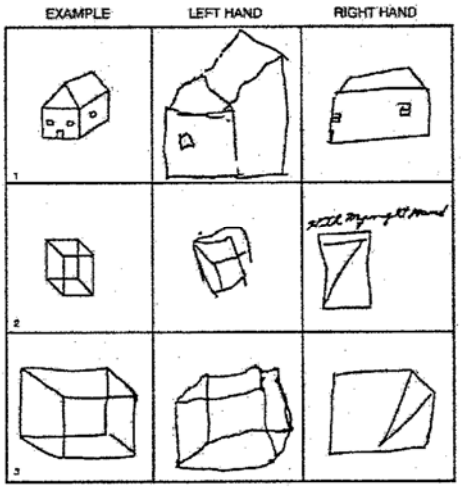
Finally, the researchers wanted to explore emotional reactions of split-brain patients. While performing visual experiments, Sperry and Gazzaniga suddenly flashed a picture of a nude woman to either the left or right hemisphere. In one instance, when this picture was shown to the left hemisphere of a female patient:

> She laughed and verbally identified the picture of a nude. When it was later presented to the right hemisphere, she said . . . she saw nothing, but almost immediately a sly smile spread over her face and she began to chuckle. Asked what she was laughing at, she said: "I don't know . . . nothing . . . oh – that funny machine." Although the right hemisphere could not describe what it had seen, the sight nevertheless elicited an emotional response like the one evoked in the left hemisphere. (p. 29)

Discussion

The overall conclusion drawn from the research reported in this article was that there are two different brains within each person's cranium, each with complex abilities. Gazzaniga notes the possibility that if our brain is really two brains, then perhaps we have the potential to process twice as much information if the two halves are divided. Indeed, there is some research evidence to suggest that split-brain patients have the ability to perform two cognitive tasks as fast as a normal person can carry out one.

Figure 2. Drawings made by split-brain patients. (Adapted from "The Split Brain in Man," by Michael S. Gazzaniga.)



Significance of Findings

These findings and the subsequent research carried out by Sperry and Gazzaniga and others are extremely significant and far-reaching. We now know that the two halves of your brain have many specialized skills and functions. Your left brain is "better" at speaking, writing, mathematical calculation, and reading is the primary center for language. Your right hemisphere, however, possesses superior capabilities for recognizing faces, solving problems involving spatial relationships, symbolic reasoning, and artistic activities.

Our increased knowledge of the specialized functioning of the brain allows us to treat victims of stroke or head injury more effectively. By knowing the location of the damage, we can predict what deficits are likely to exist as the patient recovers. Through this knowledge, therapists can employ appropriate relearning and rehabilitation strategies to help patients recover as fully and quickly as possible.

Gazzaniga and Sperry, after years of continuous work in this area, concluded that each hemisphere of your brain really is a mind of its own. In a later study, split-brain patients were tested on much more complex problems than have been discussed here. One question asked was, "What profession would you choose?" A male patient verbally (left hemisphere) responded that he would choose to be a draftsman, but his left hand (right hemisphere) spelled by touch in block letters *automobile race* (Gazzaniga & LeDoux, 1978). In fact, Gazzaniga has taken this theory a step further. He now maintains that even in people whose brains are normal and intact, there may not be complete communication between the two hemispheres (Gazzaniga, 1985). For example, if certain bits of information, such as those forming an emotion, are not stored in a language format, the left hemisphere may not have access to it. The result of this is that you may feel sad and not be able to say why. Since this is an uncomfortable cognitive situation, the left hemisphere may try to find a verbal reason to explain the sadness (after all, language is its main job). However, since your left hemisphere does not have all the necessary data, its explanation may actually be wrong!

Criticisms

The findings from the split-brain studies carried out over the years by Sperry, Gazzaniga, and others have rarely been disputed. The main body of criticism about this research has focused instead on the way the idea of right- and left-brain specialization has filtered down to popular culture and the media.

There is now a widely believed myth that some people are more *right-brained* or *left-brained*, or that one side of your brain needs to be developed in order for you to improve certain skills. Jarre Levy, a psychobiologist at the University of Chicago, has been in the forefront of scientists who are trying to dispel the notion that we have two separately functioning brains. She claims that it is precisely because each hemisphere has separate functions that they must integrate their abilities instead of separating them, as is commonly believed. Through such integration, your brain is able to perform in ways that are greater than and different from the abilities of either side alone.

When you read a story, for example, your right hemisphere is specializing in emotional content (humor, pathos), picturing visual descriptions, keeping track of the story structure as a whole, and appreciating artistic writing style (such as the use of metaphors). While all this is happening, your left hemisphere is understanding the written words, deriving meaning from the complex relationships among words and sentences, and translating words into their phonetic sounds so that they can be understood as language. The reason you are able to read, understand, and appreciate a story is that your brain functions as a single, integrated structure (Levy, 1985).

In fact, Levy explains that no human activity uses only one side of the brain. “The popular myths are interpretations and wishes, not the observations of scientists. Normal people have not half a brain, nor two brains, but one gloriously differentiated brain, with each hemisphere contributing its specialized abilities” (Levy, 1985, p. 44).

Dissecting Research #2

A Naturalistic Analysis of Autobiographical Memories Triggered by Olfactory, Visual, and Auditory Stimuli

By: Rachel S. Herz
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Introduction

Descriptive autobiographical memory studies have shown that odor-evoked memories are highly emotional as measured by self-report (Laird, 1935; Herz and Cupchik, 1992). Several laboratory experiments have further demonstrated that memories associated to odors are more emotional than memories associated to cues perceived through other sensory systems (vision, tactile, verbal; Herz and Cupchik, 1995; Herz, 1996, 1998b). Chu and Downes (2002) also noted that compared to verbal odor labels, odors themselves were especially potent reminders of autobiographical experiences. The first comparative autobiographical memory study was conducted by Rubin et al. (1984).

One important factor that we have recently explored is that memory selection may have been confused with memory recollection. In an effort to remedy this problem we recently conducted a study involving a new two stage protocol in which individuals were given a verbal odor name (e.g. 'Coppertone suntan lotion') and were then asked to think of a memory from their past and to rate it on a variety of dimensions. They were then given either a visual (a photograph of a Coppertone bottle) or an olfactory (the odor of Coppertone) version of the cue and were asked to think about their memory again. Selecting the memories in response to verbal names prior to the introduction of the sensory cues allowed for matching of the memories selected in the two cue conditions. We found that memories that were re-induced by odors were reliably perceived as more emotional and more suggestive than memories re-induced by the visual version of the same cue. From this data we concluded that the distinguishing emotional quality of odor-induced memories is due to processes occurring during sensory recollection and not due to memory selection (Herz and Schooler, 2002).

Notably, the comparative autobiographical memory research to date has only tested olfaction against visual and verbal stimuli. Other sensory modalities, particularly audition, need to be evaluated before claims regarding the unique emotional potency of odor-evoked memories can be made. Audition is an especially important contrast cue because music is considered to be a very potent emotional reminder. It is therefore important to contrast the experience of memories triggered by odors with memories triggered by the auditory version of the same stimuli to establish the extent to which odor-induced memories are unique in their emotional potency. For this study, the researcher believes that memories triggered by olfactory cues will be more strongly recalled than memories triggered by visual or auditory cues.

Materials and Methods

Participants were 70 visitors (42 female, 28 male; age range 7–79, mean = 33 years) to the Smithsonian Institution in Washington, DC who were attending 'Brain: The World Inside Your Head,' a 5 year traveling science exhibition. Volunteers participated in this study if they visited the Sensory Memory exhibit and provided their consent or, in the case of children, assent along with parental consent, to participate in the study. None of the participants were regular smokers and all stated that they had a normal sense of smell. Each participant was tested individually.

The study involved three memory items: popcorn, fresh-cut-grass and camp-fire. The memory items were specifically selected to be likely to elicit past personal memories. The olfactory version of the stimuli were oil-based beads obtained from Escential Resources, Inc. (CA). The beads were presented in sealed containers with an opening at the top for sniffing. Visual versions of the items were prototypic representations presented as 5-second movies. They were animated scenes of: a bowl of overflowing popcorn, a lawnmower moving over a field of grass and a brightly burning campfire in a dark night. The auditory versions were prototypic 5-second sound clips. They were the sound: of popcorn popping, a lawn mower starting up and mowing and a slow–moderate crackling fire. Visual and auditory stimuli were controlled by a computer console.

After providing consent, the participant was told that s/he had to come up with a specific personal memory concerning a particular person, place or event (i.e. an autobiographical memory) for each item presented.

The experiment was conducted in two phases carried out in sequence, for each memory item. In phase 1, the participant was asked to think of a personal memory that the item (e.g. 'popcorn') was associated to (a verbal task) . After providing a brief verbal description of their memory to the experimenter, who jotted it down, they were asked to rate their memory on four scales: emotionality (how emotional to you feel now as you remember the event); vividness (how vivid or clear is your memory); evocativeness (as you think about the memory, how brought back to the original time and place are you); and specificity (how specific is your memory). Each response was made using a 1–9 Likert scale (1 = not at all, 9 = extremely).

Phase 2 immediately followed in which the participant was presented with the same item (e.g. popcorn) in its various sensory forms (visual, olfactory and auditory), one at a time and for each sensory form was asked to think about their memory again and to rate it on the same four scales. Thus, participants evaluated each memory four times: first recalled verbally and then re-recalled visually, auditorily and olfactorily. The verbal cue for the memory was always presented first. After each sensory-cued evaluation was made, participants were asked if they were thinking of the same memory as they had initially reported to the item's verbal label.

At the end of the experimental procedures, participants were asked several demographic questions, including where they currently lived (state or country and residential community type: city, suburbia, rural). Lastly, participants were given a short version of the 'Attention to and Importance of Odors Questionnaire' (AIO questionnaire; Wrzesniewski et al., 1999); the higher the score the greater the individual's orientation is to their odor world. After these final assessments, the purpose of the experiment was fully explained and participants were thanked. All components of the procedures were optional and all volunteers completed the entire study, except for six (three male, three female) who did not complete the questionnaire.

Results

Reponses to the memory ratings were analyzed by cue-form (verbal, visual, auditory, olfactory. Statistical analyses revealed that when an item was presented in olfactory form it was evaluated as more emotional than in verbal, visual or auditory form. Likewise, participants stated that they felt more brought back to the original event when the cue was in olfactory form than in the other sensory formats.

The personality factor of odor orientation was examined by analyzing the AIO questionnaire data. Total scores on the questionnaire were computed for each subject; the higher the score the greater the importance of odor in the subject's life. There was no relationship between how important odors were to an individual and whether the memory cue was in olfactory form.

Conclusions & Discussion

Herz and Schooler (2002) showed that autobiographical memories elicited by odors were more emotional and evocative than memories cued by the visual and verbal variant of the same item. This finding was replicated and extended here including auditory variations for the first time. When a memory item was presented in olfactory form it elicited a more emotional and evocative recollection than when the same item was presented in visual, verbal or auditory format. Moreover, by having participants select their memory prior to encountering the olfactory cue, it is clear that the unique qualities associated with odor cued memories were not due to what memories were selected, but rather with processes involved in recollection. The finding that odors elicited more emotional and evocative memories than visual as well as auditory cues is important because it clearly demonstrates that the distinguishing emotional characteristics of odor-evoked memory extends beyond the visual/verbal modality. The fact that auditory stimuli were less emotional than odors and no different from visual stimuli is further noteworthy because the subjective perception of auditory stimuli is that they can be very emotional and a serious rival to odors (Royet et al., 2000).

The present and previous data illustrating the emotional potency of odor-induced memory is consistent with neuroanatomy. The olfactory area is unique among the senses in synapsing directly with the amygdala–hippocampal

complex, the neural substrate of emotional memory (Aggleton and Mishkin, 1986; Cahill et al., 1995). The amygdala is also essential for human olfactory memory (Buchanan et al., 2003). Moreover, we have recently demonstrated using fMRI that there is a direct neurobiological correlation between the subjective experience of emotion during autobiographical recall to an odor cue and heightened activity in the amygdala. This is not the case when the same memory is triggered by the visual version of that same item or when a memory is triggered by a similar odor that was not related to a significant experience (Herz et al., 2003). In our fMRI study personally significant odors elicited greater amygdala activation than similar but non-personally meaningful odors. Thus, despite the fact that odors can be inherently emotional stimuli, in cross-modal comparative autobiographical analyses only odors directly linked with a personal emotional event produced distinctively higher levels of amygdala activation.

In terms of individual difference personality factors, analysis of the AIO questionnaire data revealed that women were more oriented towards odor than men, even though they did not differ from men in their memory ratings elicited by odors versus the other cue-forms. Previous findings have also shown that subject sex is a factor in olfactory perception and cognition and that when differences exist they favor females (Brand and Millot, 2001). To the extent that the AIO questionnaire tapped into olfactory experiences in daily life, it appears that women tend to be more interested and attentive to odors than men. In general, the demographic findings underscore the importance of experience on autobiographical memory.

Previous and current findings together strongly argue that there is a privileged and possibly unique connection between emotion and olfaction during recollection. However, this does not entirely resolve the question of how odor-induced memories may be different from other memory experiences. Odor-induced memory research in my laboratory was instigated by an interest in investigating the frequent claim that ‘odors are the best cues to memory’. From over a decade of research involving laboratory, naturalistic and neuroimaging methods, we have shown that odors elicit very emotional memories. However, odors do not elicit memories that are more accurate than other cues. Memory certainty based on high emotional involvement but uncorrelated with accuracy is similar to what is observed under other highly emotional memory situations, such as eye witness testimony (Wells and Loftus, 2003).

It currently remains unknown whether the reason why odors are thought to be ‘the best cues to memory’ is not only because of their emotionality, but more importantly because they may be able bring to consciousness memories that would otherwise be forever forgotten. An odor has a far greater chance of never being encountered again than a visual or auditory stimulus does. The specificity of odors as encoding cues may therefore enable them to elicit memories where no other cue can suffice. The first association made to an odor is very hard to unlearn and subsequent associations to the same scent are difficult to form. A growing body of evidence is establishing that odor-induced memories are distinguished from other memory experiences by their emotional potency. Other ways in which odors might be special and/or superior memory cues now need to be explored.

Dissecting Research #3

I Can See It All Over Your Face!

Ekman, P., & Friesen, W.V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology,17*, 124-129.

Think of something funny. What is the expression on your face? Now think of something in your past that made you sad. Did your face change? Chances are it did. Undoubtedly, you are aware that certain facial expressions coincide with specific emotions. And, most of the time, you can probably tell how people are feeling emotionally from the expressions on their faces. Now, consider this: Could you be equally successful in determining someone's emotional state based on facial expression if that person is from a different culture – say, Romania, Sumatra, or Mongolia? In other words, do you believe facial expressions of emotion are universal? Most people believe that they are, until they stop and consider how radically different other cultures are from their own. Think of the multitude of cultural differences in styles of dress, gestures, personal space, rules of etiquette, religious beliefs, attitudes, and so on. With all these differences influencing behavior, it would be rather amazing if any human characteristics, including emotional expressions, were identical across all cultures.

Paul Ekman is considered the leading researcher in the area of the facial expression of emotion. This article details his early research, which was designed to demonstrate the universality of these expressions. Although the authors acknowledged in their introduction that previous researchers had found some evidence that facial behaviors are determined by culturally variable learning, they argued that previous studies were poorly done and, in reality, expressions for basic emotions are equivalent in all cultures.

Several years prior to this study, Ekman and Friesen had conducted research in which they showed photographs of faces to college-educated people in Argentina, Brazil, Chile, Japan, and the United States. All the participants from every country correctly identified the same facial expressions as corresponding to the same emotions regardless of the nationality of the person in the photo. The researchers presented their findings as evidence of the universality of emotional expressions. However, as Ekman and Friesen themselves pointed out, these findings were open to criticism because members of the cultures studied had all been exposed to international mass media (movies, magazines, television), which are full of facial expressions that might have been transmitted to all these countries. What was needed to prove the universality of emotional expression was to study a culture that had not been exposed to any of these influences. Imagine how difficult (perhaps impossible) it would be to find such a culture given today's mass media. Well, even in 1971 it wasn't easy.

Ekman and Friesen traveled to the southeast highlands of New Guinea to find participants for their study among the Fore people who still existed as an isolated Stone Age society. Many of the members of this group had experienced little or no contact with modern cultures. Therefore, they had not been exposed to emotional facial expressions other than those of their own culture.

Theoretical Propositions

The theory underlying Ekman and Friesen's study was that specific facial expressions corresponding to basic emotions are universal. Ekman and Friesen stated it quite simply:

> The purpose of this paper was to test the hypothesis that members of a preliterate culture who had been selected to ensure maximum visual isolation from literate cultures will identify the same emotion concepts with the same faces as do members of literate Western and Eastern cultures. (p. 125)

Method

The more isolated subgroup of the Fore was that group referred to as the South Fore. The individuals selected to participate in the study had seen no movies, did not speak English or Pidgin, had never worked for a Westerner, and had never lived in any of the Western settlements in the area. A total of 189 adults and 130 children were chosen to participate, out of a total South Fore population of about 11,000. For comparison, 23 adults were chosen who had experienced a great deal of contact with Western society through watching movies, living in the settlements, and attending missionary schools.

Through trial and error, the researchers found that the most effective method of asking the participants to identify emotions was to present them with three photographs of different facial expressions and to read a brief description of an emotion-producing scene or story that corresponded to one of the photographs. The participant could then simply point to the expression that best matched the story. The stories used were selected very carefully to be sure that each scene was

related to only one emotion and that it was recognizable to the Fore people. Table 1 lists the six stories developed by Ekman and Friesen. The authors explained that the fear story had to be longer to prevent the participants from confusing it with surprise or anger.

A total of 40 photographs of 24 different people, including men, women, boys, and girls, were used as examples of the six emotional expressions. These photographs had been validated previously by showing them to members of various other cultures. Each photograph had been judged by at least 70% of observers in at least two literate Western or Eastern cultures to represent the emotion being expressed.

TABLE 1 Ekman and Friesen's Stories Corresponding to Six Emotions

EMOTION	STORY
1. Happiness	His (her) friends have come and he (she) is happy.
2. Sadness	His (her) child (mother) has died and he (she) feels very sad.
3. Anger	He (she) is angry and about to fight.
4. Surprise	He (she) is just now looking at something new and unexpected.
5. Disgust	He (she) is looking at something he (she) dislikes; or he (she) is looking at something that smells bad.
6. Fear	He (she) is sitting in his (her) house all alone and there is no one else in the village. There is no knife, ax, or bow and arrow in the house. A wild pig is standing in the door of the house and the man (woman) is looking at the pig and is very afraid of it. The pig has been standing in the doorway for a few minutes, and the person is looking at it very afraid, and the pig won't move away from the door, and he (she) is afraid the pig will bite him (her).

(Adapted from p. 126.)

The actual experiment was conducted by teams consisting of one member of the research group and one member of the South Fore tribe, who explained the task and translated the stories. Each adult participant was shown three photographs (one correct and two incorrect), told the story that corresponded to one of them, and asked to choose the expression that best matched the story. The procedure was the same for the children, except that they only had to choose between two photographs, one correct and one incorrect. Each participant was presented with various sets of photographs so that no single photograph ever appeared twice in the comparison.

The translators received careful training to ensure that they would not influence the participants. They were told that no responses were absolutely right or wrong and were asked not to prompt the participants. Also, they were taught how to translate the stories exactly the same way each time and to resist the temptation to elaborate and embellish them. To avoid unintentional bias, the Western member of the research team avoided looking at the participant and simply recorded the answers given.

Remember that these were photographs of expressions of emotions on the faces of Westerners. Could the Fore people correctly identify the emotions in the photographs, even though they had never seen a Western face before?

TABLE 2 Percent of Adults Correctly Identifying Emotional Expressions in Photographs

EMOTION IN STORY	NUMBER OF SUBJECTS	PERCENT CHOOSING CORRECT PHOTOGRAPH
Happiness	220	92.3
Anger	98	85.3
Sadness	191	79.0
Disgust	101	83.0
Surprise	62	68.0
Fear	184	80.5
Fear (with surprise)	153	42.7

(Adapted from p. 127.)

Results

First, analyses were conducted to determine if any responses differed between males and females or between adults and children. The adult women tended to be more hesitant to participate and had experienced less contact with Westerners than the men had. However, no significant differences in ability to correctly identify the emotions in the photographs were found among any of the groups.

Table 2 and Table 3 summarize the percentage of correct responses for the six emotions by the least Westernized adults and the children, respectively. Not all participants were exposed to all emotions, and sometimes participants were exposed to the same emotion more than once. Therefore, the number of participants in the tables does not equal the overall total number of participants. All the differences were statistically significant except when participants were asked to distinguish fear from surprise. In this situation, many errors were made, and for one group, surprise was actually selected 67% of the time when the story described fear.

The researchers also compared the Westernized and non-Westernized adults. No significant differences between these two groups were found on the number who chose the correct photographs. Also, no differences were found between younger and older children. As you can see in Table 3, the children appeared to perform better than the adults, but Ekman and Friesen attributed this to the fact that they had to choose between only two photographs instead of three.

TABLE 3 Percent of Children Correctly Identifying Emotional Expressions in Photographs

EMOTION IN STORY	NUMBER OF SUBJECTS	PERCENT CHOOSING CORRECT PHOTOGRAPH
Happiness	135	92.8
Anger	69	85.3
Sadness	145	81.5
Disgust	46	86.5
Surprise	47	98.3
Fear	64	93.3

(Adapted from p. 127.)

Discussion

Ekman and Friesen did not hesitate to draw a confident conclusion from their data: “The results for both adults and children clearly support our hypothesis that particular facial behaviors are universally associated with particular emotions” (p. 128). They based their conclusion on the fact that the South Fore group had no opportunity to learn anythign about Western expressions and, thus, had no way of identifying them, unless the expressions were universal.

As a way of double-checking their findings, the researchers recorded members of the isolated Fore culture portraying the same six facial expressions. Later, when these videos were shown to college students in the United States, the students correctly identified the expressions corresponding to each of the emotions:

> The evidence from both studies contradicts the view that all facial behavior associated with emotion is culture-specific, and that posed facial behavior is a unique set of culture-bound conventions not understandable to members of another culture. (p. 128)

The one exception to their consistent findings – that of the confusion participants seemed to experience in distinguishing between expressions of fear and surprise – Ekman and Friesen explained by acknowledging that certainly some cultural differences are seen in emotional expression, but that this did not detract from the preponderance of evidence that nearly all the other expressions were correctly interpreted across the cultures. They speculated that fear and surprise may have been confused “because in this culture fearful events are almost always surprising; that is, the sudden appearance of a hostile member of another village, the unexpected meeting of a ghost or sorcerer, etc.” (p. 129).

Implications of the Research

This study by Ekman and Friesen served to demonstrate scientifically what you already suspected: Facial expressions of emotions are universal. However, you might still be asking yourself "What is the significance of this information?" Well, part of the answer to that question relates to the nature-nurture debate over whether human behaviors are present at birth or are acquired through learning. Because facial expressions for the six emotions used in this study appear to be influenced very little by cultural differences, it is possible to conclude that they must be innate, that is, biologically *hardwired* in the brain at birth.

Another reason behavioral scientists find the notion of universal emotional expressions interesting is that it addresses the issues about how humans evolved. In 1872, Darwin published his famous book *The Expression of Emotion in Man and Animals*. He maintained that facial expressions were adaptive to their environment, thereby enhancing their ability to survive. The idea behind this was that if certain messages could be communicated within and across species of animals through facial expressions, the odds of surviving and reproducing would be increased. For example, an expression of fear would provide a silent warning of imminent danger from predators, an expression of anger would warn less dominant members of the group to stay away from more powerful ones, and an expression of disgust would communicate a message of "Yuck! Don't eat that, whatever you do" and prevent a potential poisoning. These expressions, however, would do the animals no good if they were not universally recognized among all the individuals making up the species. Even though these expressions may now be less important to humans in terms of their survival value, the fact that they are universal among us would indicate that they have been passed on to us genetically from our evolutionary ancestors and have assisted us in reaching our present position on the evolutionary ladder.

A fascinating study demonstrated this *leftover* survival value of facial expressions in humans. The researchers (Hansen & Hansen, 1988) reasoned that if facial expressions could warn of impending danger, then humans should be able to recognize certain expressions, such as anger, more easily than other, less threatening expressions. To test this, they presented participants with photographs of large crowds of people with different facial expressions. In some of the photographs, all the people's expressions were happy except for one that was angry. In other photographs, all the expressions were angry, except for one that was happy. The participants' task was to pick out the face that was different. The amount of time it took the participants to find a single happy face in a crowd of angry faces was significantly longer than when they searched a crowd of happy faces for a single angry face. Furthermore, as the size of the crowds in the photographs increased, the time for participants to find the happy face also increased, but finding the angry face did not take significantly longer. This and other similar findings have indicated that humans may be biologically programmed to respond to the information provided by certain expressions better than others because those expressions offered more survival information.

Recent Applications

Other more recent studies in various areas of research have relied on Ekman's early findings in attempting to improve our understanding of children and adults with developmental or learning disabilities. One such study found that children diagnosed with autism (a pervasive developmental disorder marked by language deficits, social withdrawal, and repetitive self-stimulation behaviors) appear to have difficulty recognizing the facial expressions that correspond to basic emotions (Bolte & Poustka, 2003). This difficulty was even more pronounced in families with more than one autistic child and may help explain why many autistic individuals show difficulty interpreting emotional responses from others.

The influence of Ekman's research, however, is not limited to humans. Ekman's 1971 study has been cited in research on the emotions of, believe it or not, *farm animals* (Desire, Boissy, & Veissier, 2002). These researchers suggest that the welfare of farm animals depends, in part, on their emotional reactions to their environment. When individual animals feel in harmony with their environment, their welfare is maximized; however, "any marked deviation from the state, if perceived by the individual, results in a welfare deficit due to negative emotional experiences" (p. 165).

A study citing Ekman's 1971 article attempted to shed light on exactly how one, specific facial feature – the eyebrows – contributes to facial recognition (Sadr, Jarudi, & Sinha, 2003). Previous research had centered more on the eyes and mouth, but these researchers found that the eyebrows may be more important than the eyes themselves. The authors concluded "that the absence of eyebrows in familiar faces leads to a very large and significant disruption in recognition of performance. In fact, a significantly greater decrement in face recognition is observed in the absence of eyebrows than in the absence of eyes" (p. 285). So, if you are ever in need of an effective disguise, be sure to cover your eyebrows!

Conclusion

Over the past three decades following his early cross-cultural studies on emotional expressions, Ekman has continued his research individually and in collaboration with Friesen and several other researchers. Within this body of work, many fascinating discoveries have been made. One further example of Ekman's research involves what is called the *facial feedback theory* of emotional expressions. The theory states that the expression on your face actually feeds information back to your brain to assist you in interpreting the emotion you are experiencing. Ekman tested this idea by identifying the exact facial muscles involved in each of the six basic emotions. He then instructed participants to tense these muscles into expressions resembling the various emotions. When they did this, Ekman was able to measure physiological responses in the participants that corresponded to the appropriate emotion resulting from the facial expression alone, and not from the actual presence of the emotion itself (Ekman, Levensen, & Friesen, 1983).

Ekman has also extended his research into the area of deception and how the face and the body *leak* information to others about whether someone is telling the truth. In general, his findings have indicated that people are able to detect when others are lying at a slightly better than chance level when observing just their facial expressions. However, when allowed to observe another's entire body, participants were much more successful in detecting lies, indicating that the body may provide better clues to certain states of mind than the face alone (see Ekman, 1985, for a complete discussion of this issue). Most recently, Ekman has distilled his extensive research in a book titled, *Emotions Revealed: Recognizing Faces and Feelings to Improve Communication and Emotional Life*, written to help all of us apply his work on the recognition of the meaning of facial expressions to improving our communication and interactions with romantic partners, children, coworkers, and even strangers (Ekman, 2007).

Ekman and his associates have provided us with a large literature on the nonverbal communication provided by facial expressions (see Ekman, 2003). And research in this area continues. It is likely that studies will continue as we become increasingly skilled at the process that was the title of Ekman and Friesen's 1975 book, *Unmasking the Face*.

Dissecting Research #4

WATCH OUT FOR THE VISUAL CLIFF!

Gibson, E. J., & Walk, R. D. (1960). The "visual cliff." Scientific American, 202 (4), 67-71.

One of the most often told anecdotes in psychology concerns a man called S. B. (initials used to protect his privacy). S. B. had been blind his entire life until the age of 52, when a newly developed operation (the now-common corneal transplant) was performed on him and his sight was restored. However, S. B.'s new ability to see did not mean that he automatically perceived what he saw the way the rest of us do. One important example of this became evident soon after the operation, before his vision had cleared completely. S. B. looked out his hospital window and was curious about the small objects he could see moving on the ground below. He began to crawl out on his window ledge, thinking he would lower himself down by his hands and have a look. Fortunately, the hospital staff prevented him from trying this. He was on the fourth floor, and those small moving things were cars! Even though S. B. could now see, he was not able to perceive depth.

Our visual ability to sense and interpret the world around us is an area of interest to experimental psychologists. And within this lies the central question of whether such abilities are inborn or learned: the nature-nurture issue once again. Many psychologists believe that our most important visual skill is depth perception. You can imagine how difficult, and probably impossible, survival would be if you could not perceive depth. You would run into things, be unable to judge how far away a predator was, or step right off cliffs. Therefore, it might be logical to assume that depth perception is an inborn survival mechanism that does not require experience to develop. However, as Eleanor Gibson and Richard Walk point out in their article, "Human infants at the creeping and toddling stage are notoriously prone to falls from more or less high places. They must be kept from going over the brink by side panels on their cribs, gates on stairways, and the vigilance of adults. As their muscular coordination matures, they begin to avoid such accidents on their own. Common sense might suggest that the child learns to recognize falling-off places by experience-that is, by falling and hurting himself" (p. 64).

These researchers wanted to study this visual ability of depth perception scientifically in the laboratory. To do this, they conceived of and developed an experimental device they called the "visual cliff."

THEORETICAL PROPOSITIONS

If you wanted to find out at what point in the developmental process animals or people are able to perceive depth, one way to do this would be to put them on the edge of a cliff and see if they are able to avoid falling off. This is a ridiculous suggestion because of the ethical considerations of the potential injury to subjects who were unable to perceive depth (or more specifically, height). The "visual cliff' avoids this problem because it presents the subject with what appears to be a drop-off, when no drop-off actually exists. Exactly how this is done will be explained in a moment, but the importance of this apparatus lies in the fact that human or animal infants can be placed on the visual cliff to see if they are able to perceive the drop-off and avoid it. If they are unable to do this and step off the "cliff," there is no danger of falling. Gibson and Walk took a "nativist" position on this topic, which means that they believed that depth perception and the avoidance of a drop-off appear automatically as part of our original biological equipment and are not, therefore, products of experience. The opposing view, held by empiricists, contends that such abilities are learned. Gibson and Walk's visual cliff allowed them to ask these questions: At what stage in development can a person or animal respond effectively to the stimuli of depth and height? And do these responses appear at different times with animals of different species and habitats?

METHOD

The visual cliff consisted of a table about four feet high with a top made from a piece of thick, clear glass. Directly under half of the table (the shallow side) is a solid surface with a red-and-white checkered pattern. Under the other half is the same pattern, but it is down at the level of the floor underneath the table (the deep side). At the edge of the shallow side, then, is the appearance of a sudden drop-off to the floor although, in reality, the glass extends all the way across. Between the shallow and the deep side is a center board about a foot wide. The process of testing infants using this device was extremely simple.

The subjects for this study were 36 infants between the ages of 6 months and 14 months. The mothers of the infants also participated. Each infant was placed on the center board of the visual cliff and was then called by the mother first from the deep side and then from the shallow side.

In order to compare the development of depth perception in humans with that in other baby animals, the visual cliff allowed for similar tests with other species (without a mother's beckoning, however). These animals were placed on the center board and observed to see if they could discriminate between the shallow and deep sides and avoid stepping off "the cliff." You can imagine the rather unique situation in the psychology labs at Cornell University when the various baby animals were brought in for testing. They included chicks, turtles, rats, lambs, kids (baby goats, that is), pigs, kittens, and puppies. One has to wonder if they were all tested on the same day!

Remember, the goal of this research was to examine whether depth perception is learned or innate. What makes this method so ingenious is that it allowed that question to at least begin to be answered. After all, infants, whether human or animal, cannot be asked if they perceive depth, and, as mentioned earlier, they cannot be tested on real cliffs. In psychology, many answers are found through the development of new methods for studying the questions. And the results of Gibson and Walk's early study provide an excellent example of this.

RESULTS AND DISCUSSION

Nine children in the study refused to move off the center board. This was not explained by the researchers, but perhaps it was just infant stubbornness. When the mothers of the other 27 called to them from the shallow side, all the infants crawled off the board and crossed the glass. Only three of them, however, crept, with great hesitation, off the brink of the visual cliff when called by their mothers from the deep side. When called from the cliff side, most of the children either crawled away from the mother on the shallow side or cried in frustration at being unable to reach the mother without moving over the cliff. There was little question that the children were perceiving the depth of the cliff. "Often they would peer down through the glass of the deep side and then back away. Others would pat the glass with their hands, yet despite this tactile assurance of solidity would refuse to cross" (p. 64).

Do these results prove that humans' ability to perceive depth is innate rather than learned? Well, obviously it does not, since all the children in this study had at least six months of life experience in which to learn about depth through trial and error. However, human infants cannot be tested prior to six months of age because they do not have adequate locomotor abilities. It was for this reason that Gibson and Walk decided to test various other animals as a comparison. As you know, most nonhuman animals gain the ability to move about much sooner than humans. The results of the animal tests were extremely interesting, in that the ability of the various animals to perceive depth developed in relation to when the species needed such a skill for survival.

For example, baby chickens must begin to scratch for their own food soon after hatching. When they were tested on the visual cliff at less than 24 hours of age they never made the mistake of stepping off onto the deep side.

Kids and lambs are able to stand and walk very soon after birth. From the moment they first stood up, their response on the visual cliff was as accurate and predictable as that of the chicks. Not one error was made. When one of the researchers placed a one-day-old baby goat down on the deep side of the glass, it became frightened and froze in a defensive posture. If it was then pushed over the shallow side, it would relax and jump forward onto the seemingly solid surface. This indicated that the visual sense was in complete control and that the animals' ability to feel the solidity of the glass on the deep side had no effect on the response.

For the rats, it was a different story. They did not appear to show any significant preference for the shallow side of the table. Why do you suppose this difference was found? Before you conclude that rats are just stupid, consider Gibson and Walk's much more likely explanation: A rat does not depend very much on vision to survive. Because it is nocturnal, a rat locates food by smell and moves around in the dark using cues from the stiff whiskers on its nose. So when a rat was placed on the center board, it was not fooled by the visual cliff because it was not using vision to decide which way to go. To the rat's whiskers, the glass on the deep side felt the same as the glass on the shallow side and, thus, the rat was just as likely to move off the center board to the deep side as to the shallow side.

You might expect the same results from kittens. They are basically nocturnal and have sensitive whiskers. However, cats are predators, not scavengers like rats. Therefore, they depend more on vision. And, accordingly, kittens were found to have excellent depth perception as soon as they were able to move on their own: at about four weeks.

Although at times this research article (and this discussion) risks sounding like a children's animal story, it has to be reported that the species with the worst performance on the visual cliff was the turtle. The baby turtles chosen to be tested were of the aquatic variety, because the researchers expected that since the turtles' natural environment was water, they might prefer the deep side of the cliff. However, it appeared that the turtles were "smart" enough to know that they were not in water, and 76% of them crawled off onto the shallow side. But 24% went "over the edge." "The relatively large minority that chose the deep side suggests either that this turtle has poorer depth perception than other animals, or its natural habitat gives it less occasion to 'fear' a fall" (p. 67). Clearly, if you live your life in water, the survival value of depth perception, in terms of avoiding falls, would be diminished.

Gibson and Walk pointed out that all of their observations were consistent with evolutionary theory. That is, all species of animals, if they are to survive, need to develop the ability to perceive depth by the time they achieve independent movement. For humans, this does not occur until around six months of age; but for chickens and goats, it is nearly immediate (by one day); and for rats, cats, and dogs, about four weeks of age. The authors conclude, therefore, that this capacity is inborn, because to learn it through trial and error would cause too many potentially fatal accidents. So, if we are so well prepared biologically, why do children take so many falls? Gibson and Walk explained that the human infants' perception of depth had matured sooner than had their skill in movement. During testing, many of the infants supported themselves on the deep side of the glass as they turned on the center board, and some even backed up onto the deep side as they began to crawl toward the mother across the shallow side. If the glass had not been there, some of the children would have fallen off the cliff!

CRITICISMS AND SUBSEQUENT RESEARCH

The most common criticism of the researchers' conclusions revolves around the question of whether they really proved that depth perception is innate in humans. As mentioned earlier, by the time infants were tested on the visual cliff, they had already learned to avoid such situations. A later study placed younger infants, ages two to five months, on the glass over the deep side of the visual cliff. When this happened, all of the babies showed a decrease in heart rate. Such a decrease is thought to be a sign of interest, not fear, which is accompanied by heart rate increases (Campos et al., 1978). This indicates that these younger infants had not yet learned to fear the drop-off and would learn the avoidance behavior somewhat later. These findings argued against Gibson and Walk's position.

It is important to notice, however, that while there was and still is controversy over just when we are able to perceive depth (the nativists vs. the empiricists), much of the research that is done to find the answer incorporates the visual cliff apparatus developed by Gibson and Walk. Additionally, other related research using the visual cliff has turned up some fascinating findings.

One example is the work of Sorce et al. (1985). They put one-year-old infants on a visual cliff for which the drop-off was neither shallow nor deep but in between (about 30 inches). As a baby crawled toward the cliff, it would stop and look down. On the other side, as in the Gibson and Walk study, the mother was waiting. Sometimes the mother had been instructed to maintain an expression of fear on her face while other times the mother looked happy and interested. When infants saw the expression of fear, they refused to crawl any farther. However, most of the infants who saw their mother looking happy checked the cliff again and crawled across. When the drop-off was made flat, the infants did not check with the mother before crawling across. This method of nonverbal communication used by infants in determining their behavior is called social referencing.

RECENT APPLICATIONS

Gibson and Walk's ground-breaking invention of the visual cliff still exerts a major influence on current studies of human development, perception, emotion, and even mental health. Here is a brief sample.

A recent study by Berger and Adolph cited Gibson and Walk's early study in their research on how toddlers analyze the characteristics of tasks involving heights, specifically crossing over a bridge (Berger & Adolph, 2003). The researchers coaxed very young toddlers (16 months) to cross bridges of various widths. Some of the bridges had handrails while others did not. They found that the babies were significantly more likely to cross wider bridges than narrower ones (pretty smart for 16 months!). More interesting, however, was the finding that they were more likely to attempt the narrow bridge if it had handrails. "Infants who explored the bridge and handrail before stepping onto the bridge and devised alternative bridge-crossing strategies were more likely to cross successfully. [These] results challenge

traditional conceptualizations of tools: babies used the handrail as a means for augmenting balance and for carrying out an otherwise impossible goal-directed task" (p. 594).

Another practical application of the visual cliff study looked at the possibilities for using virtual reality to help developmentally disabled children learn to deal safely with the physical environment around them. Strickland (1996) developed a system that incorporates virtual reality to help autistic children safely explore and interact with the world around them. Often these children pose a danger to themselves because their perceptions are either distorted or not fully developed. So, for example, an autistic child might not perceive drop-offs such as those represented by the visual cliff and, therefore, be prone to dangerous falls. According to Strickland, however, virtual reality allows us to design custom programs so each individual child may gain valuable motor experience without danger of physical injury.

CONCLUSION

Through the inventiveness of Gibson and Walk, behavioral scientists have been able to study depth perception in a clear and systematic way. Behavioral scientists continue to debate the question of whether this and other perceptual abilities are innate or learned. The truth may lie in a compromise that proposes an interaction between nature and nurture. Perhaps, as various studies have indicated, depth perception is present at birth, but fear of falling and avoidance of danger is learned through experience, after the infant is old enough to crawl around enough to "get into trouble." But whatever the questions are, elegant methodological advances such as the visual cliff allow us to continue to find the answers. Berger, S., & Adolph, K. (2003). Infants use handrails as tools in a locomotor task.

Dissecting Research #5

RELAXING YOUR FEARS AWAY

Wolpe, J. (1961). The systematic desensitization treatment of neuroses. Journal of Nervous and Mental Diseases, 132, 180-203.

Before discussing the very important technique in psychotherapy called systematic desensitization (which means decreasing your level of anxiety or fear very gently and gradually), the concept of neuroses should be clarified. Neuroses is a somewhat outdated term used to refer to a group of psychological problems for which extreme anxiety was the central characteristic. Today, such problems are usually called anxiety disorders. We are all familiar with anxiety, and sometimes experience a high degree of it in situations that make us nervous, such as public speaking, job interviews, exams, and so on. However, when someone suffers from an anxiety disorder, the reactions are much more extreme, pervasive, frequent, and debilitating. Often such disorders interfere with a person's life so that normal and desired functioning is impossible.

The most common anxiety-related difficulties are phobias, panic disorder, and obsessive-compulsive disorder. If you have ever suffered from one of them, you know that this kind of anxiety can take control of your life. This chapter's discussion of Joseph Wolpe's (1915-1997) work in treating those disorders will focus primarily on phobias.

The word phobia comes from Phobos, the name of the Greek god of fear. The ancient Greeks painted images of Phobos on their masks and shields to frighten their enemies. A phobia is an irrational fear. In other words, it is a fear reaction that is out of proportion with the reality of the danger. For example, if you are strolling down a path in the forest and suddenly happen upon a rattlesnake, coiled and ready to strike, you will feel fear (unless you're Indiana Jones or something). This is not a phobia, but a normal, rational fear response to a real danger. On the other hand, if you are unable to go to the zoo because you might see a snake in a glass cage, that would probably be considered a phobia. This may sound humorous to you, but to those who suffer from phobias, it's not funny at all. Phobic reactions are extremely uncomfortable events that involve symptoms such as dizziness, heart palpitations, feeling faint, hyperventilation, sweating, trembling, and nausea. A person with a phobia will carefully avoid situations in which the feared stimulus might be encountered. Often, this avoidance can interfere drastically with a person's desired functioning in life.

Phobias are divided into three main types. Simple phobias involve irrational fears of animals (such as rats, dogs, spiders, or snakes) or specific situations such as small spaces (claustrophobia) or heights (acrophobia). Social phobias are characterized by irrational fears about interactions with others, such as public speaking or fear of embarrassment. Finally, agoraphobia is the irrational fear of being in unfamiliar, open, or crowded spaces. While the various types of phobias are quite different, they share at least two common features: they are all irrational, and they all are treated in similar ways.

Early treatment of phobias centered around the Freudian concepts of psychoanalysis. This view maintains that a phobia is the result of unconscious psychological conflicts stemming from childhood traumas. It further contends that the phobia may be substituting for some other, deeper fear or anger that the person is unwilling to face. For example, a man with an irrational fear of heights (acrophobia) may have been cruelly teased as a small boy by his father, who pretended to try to push him off a high cliff. Acknowledging this experience as an adult might force the man to deal with his father's general abusiveness (something he doesn't want to face), so he represses it, and it is expressed instead in the form of a phobia. In accordance with this view of the source of the problem, psychoanalysts historically attempted to treat phobias by helping the person to gain insight into unconscious feelings and release the hidden emotion, thereby freeing themselves of the phobia in the process. However, such techniques, while useful for most other types of psychological problems, have proven relatively ineffective in treating phobias. It appears that even when someone uncovers the underlying unconscious conflicts that may be related to the phobia, the phobia itself persists.

Joseph Wolpe was not the first to suggest the use of a behavioral technique called systematic desensitization, but he is generally credited with perfecting it and applying it to the treatment of anxiety disorders. The behavioral approach differs dramatically from psychoanalytic thinking in that it is not concerned with the unconscious sources of the problem or with repressed conflicts. The fundamental idea of behavioral therapy is that you have learned an ineffective behavior (the phobia), and now you must unlearn it. This formed the basis for Wolpe's method for the treatment of phobias.

THEORETICAL PROPOSITIONS

Earlier research by Wolpe and others had discovered that fear reactions in animals could be reduced by a simple conditioning procedure. For example, suppose a rat behaves fearfully when it sees a realistic photograph of a cat. If the rat is given food every time the cat is presented, the rat will become less and less fearful, until finally the fear response disappears entirely. The rat had originally been conditioned to associate the cat photo with fear. However, the rat's response to being fed was incompatible with the fear response. Since the fear response and the feeding response cannot both exist at the same time, the fear was inhibited by the feeding response. This incompatibility of two responses is called reciprocal inhibition (when two responses inhibit each other, only one may exist at a given moment). Wolpe proposed the more general proposition that "if a response inhibitory to anxiety can be made to occur in the presence of anxiety-provoking stimuli ... the bond between these stimuli and the anxiety will be weakened" (p. 180). He also argued that human anxiety reactions are quite similar to those found in the animal lab and that the concept of reciprocal inhibition could be used to treat various human psychological disorders.

In his work with people, the anxiety-inhibiting response was deep relaxation rather than feeding. The idea was based on the theory that you cannot experience deep physical relaxation and fear at the same time. As a behaviorist, Wolpe believed that the reason you have a phobia is that you learned it sometime in your life through the process of classical conditioning, by which some object became associated in your brain with intense fear (see Pavlov's research). We know from the work of Watson (see Watson's study with little Albert) and others that such learning is possible even at very young ages. So, in order to treat your phobia, you must experience a response that is inhibitory to fear or anxiety (relaxation) while in the presence of the feared situation. Will this treatment technique work? Wolpe's article reports on 39 cases randomly selected out of 150, where the subjects' phobias were treated by the author using his systematic desensitization technique.

METHOD

Imagine that you suffer from an irrational fear of heights called acrophobia. This problem has become so extreme that you have trouble climbing onto a ladder to trim the trees in your yard or going above the second floor in an office building. Your phobia is interfering so much with your life that you decide to seek out psychotherapy from a behavior therapist such as Joseph Wolpe. Your therapy will consist of several stages.

Relaxation Training

The first several sessions will deal very little with your phobia. Instead, the therapist will focus on teaching you how to relax your body. Wolpe recommended a form of progressive muscle relaxation introduced by Edmund Jacobson in 1938 that is still in common therapeutic use today. The process involves tensing and relaxing various groups of muscles (such as the arms and hands, the face, the back, the stomach, the legs, etc.) throughout the body until a deep state of relaxation is achieved. This relaxation training may take most of your first five or six sessions with the therapist. After the training, you are able to place yourself in this state of relaxation whenever you want. It should be noted that for most of the cases reported in this article, Wolpe also incorporated hypnosis to ensure full relaxation, but this has since been shown to be usually unnecessary for effective therapy because full relaxation can be obtained without the need of hypnosis.

Construction of an Anxiety Hierarchy

The next stage of the process is for you and your therapist to develop a list of anxiety-producing situations or scenes involving your phobia. The list would begin with a situation that is only slightly uncomfortable and proceed through increasingly more frightening scenes until finishing with the most anxiety-producing event. The number of steps in a patient's hierarchy varies from 5 or 6 to 20 or more. Table 1 shows what might appear on your list for your phobia of heights, as well as a hierarchy directly from Wolpe's article about a patient suffering from claustrophobia.

Desensitization

Now comes the actual unlearning. According to Wolpe, no direct contact with the feared situations is necessary to reduce a person's sensitivity to them. The same effect could be accomplished through description and imagination. Remember, you developed your phobia through the process of association, so you will eliminate the phobia the same way. First, you are instructed to place yourself in a state of deep relaxation as you have been taught. Then the therapist begins with the first step in your hierarchy and describes the scene to you: "You are

walking down the sidewalk and you come to a large grating. As you continue walking, you can see through the grating to the bottom 10 feet below." Your job is to imagine the scene while remaining completely relaxed. If this is successful, the therapist will proceed to the next step: "You are sitting in an office on the third floor ... ," and so on. If at any moment during this process you feel the slightest anxiety, you are instructed to raise your index finger. When this happens, the presentation of your hierarchy will stop until you have returned to full relaxation. Then the descriptions will begin again from a point further down the list so that you can maintain your relaxed state. This process continues until you are able to remain relaxed through the entire hierarchy. Once you accomplish this, you might repeat the process several times in subsequent therapy sessions. In Wolpe's work with his clients, the number of sessions for successful treatment varied greatly. Some people claimed to be recovered in as few as six sessions, while one took nearly 100 (this was a patient with a severe phobia of death,

plus two additional phobias). The average number of sessions was around 12. This, by the way, was considerably fewer than the number of sessions generally required for formal psychoanalysis, which usually lasted years.

The most important question relating to this treatment method is this: Does it work?

RESULTS

The 39 cases reported in Wolpe's article involved many different phobias. The themes of their hierarchies included, among others, claustrophobia, storms, being watched, crowds, bright light, wounds, agoraphobia, falling, rejection, and snakelike shapes. The success of their therapy was judged by the patients' own reports and by occasional direct observation. Generally, patients who report improvement and gradual recovery describe the process in ways that led Wolpe to accept their reports as credible. The desensitization process was rated as either completely successful (freedom from phobic reactions), partially successful (phobic reactions of 20% or less of original strength), or unsuccessful.

For the 39 cases, there were a total of 68 phobias treated. Sixty-two of these (in a total of 35 patients) were judged to be completely or partially successful. This was a success rate of 91 %. The remaining six hierarchies (9%) were unsuccessful. The average number of sessions needed for successful treatment was 12.3. Wolpe explained that most of the unsuccessful cases displayed special problems that did not allow for proper desensitization to take place, such as an inability to imagine the situations presented in the hierarchy.

Critics of Wolpe, mainly from the psychoanalytic camp, claimed that his methods were only treating the symptoms and not the underlying cause of the anxiety. They maintained that other symptoms would appear to replace the ones treated in this way. They likened it to a leaking dike: when one hole is plugged, another appears. Related to this was the question of how lasting this treatment would be. Any form of therapy would be of little value if the symptoms returned soon after the sessions ended. Wolpe responded to criticisms and questions by obtaining follow-up reports from 25 of the 35 patients who had received successful desensitization at various times from six months to four years after treatment. Upon examining the reports he wrote, "There was no reported instance of relapse or new phobias or other neurotic symptoms. I have never observed resurgence of neurotic anxiety when desensitization has been complete or virtually so" (p. 200).

DISCUSSION

The discussion in Wolpe's article focuses on responding to the skepticism of the psychoanalysts at the time his research was done. During the 1950s, psychoanalysis was a very common and popular form of psychotherapy. As behavior therapies began to make their way into the mainstream of clinical psychology, a great deal of controversy was created, much of which continues in various forms today. Wolpe pointed out that the desensitization method offered several advantages over traditional psychoanalysis (see p. 202 of the original study):

1. The goals of psychotherapy can be clearly stated in every case.
2. Sources of anxiety can be clearly defined.
3. Changes in the patient's reactions during descriptions of scenes from the hierarchy can be measured during the sessions.
4. Therapy can be performed with others present (Wolpe found that having others present, such as therapists in training, during the sessions did not interfere with the effectiveness).
5. Therapists can be interchanged if desired or necessary.

SUBSEQUENT RESEARCH AND RECENT APPLICATIONS

Since Wolpe published this article and a book on the use of reciprocal inhibition in psychotherapy (Wolpe, 1958), the use of systematic desensitization has grown to the point that now it is considered the treatment of choice for anxiety disorders, especially phobias. This growth has been due in large part to more recent and more scientific research on its effectiveness.

A study by Paul (1969) treated college students who suffered from extreme phobic anxiety in public- speaking situations. First, all the subjects were asked to give a short, ad-libbed speech to an unfamiliar audience. Their degree of anxiety was measured by observer's ratings physiological measures, and a self-report questionnaire. The students were then randomly assigned to three treatment groups: (1) systematic desensitization, (2) insight therapy (similar to psychoanalysis), or (3) no treatment (control). Experienced therapists carried out the treatment in five sessions. All the subjects were then placed in the same public- speaking situation, and all the same measures of anxiety were taken. Figure 1 summarizes the results. Clearly, systematic desensitization was significantly more effective in reducing anxiety on all measures. Even more convincing was that in a two-year follow-up, 85% of the desensitization group still showed significant improvement, compared with only 50% of the insight group.

Numerous studies on behavior therapy continue to cite Wolpe's early work as part of their theoretical underpinnings. His application of classical conditioning concepts to the treatment of psychological disorders has become part of intervention strategies in a wide range of settings. For example, one study (Fredrickson, 2000) relied in part on Wolpe's concept of reciprocal inhibition in developing a new treatment strategy for difficulties stemming primarily from negative emotions such as anxiety, depression, aggression, and stress-related health problems. Fredrickson proposes assisting and teaching patients with such psychological problems to generate more and stronger positive emotions, such as love, optimism, joy, interest, and contentment, which directly inhibit negative thinking. The author contends that:

Positive emotions loosen the hold that negative emotions gain on an individual's mind and body by undoing the narrowed psychological and physiological preparation for specific action. Therapies optimize health and well-being to the extent that they cultivate positive emotions. Cultivated positive emotions not only counteract negative emotions, but also broaden individuals' habitual modes of thinking, and build their personal resources for coping. (p. 1)

Another article resting on Wolpe's research studied the effectiveness of systematic desensitization for a condition many students know all too well: math phobia (Zettle, 2003). In this study Wolpe's treatment techniques were used to help students overcome extreme levels of math anxiety. Participants were given instructions on progressive muscle relaxation and a tape to practice relaxing each day at home. Each student worked with the researcher to develop an 11-item math fear heirarchy containing items such as "being called upon by my math instructor to solve a problem at the blackboard," or "encountering a word problem I don't know how to solve on the final" (p. 205). The hierarchy was then presented to each student as described earlier in this reading. To summarize briefly, it worked! At the end of the treatment, 11 out of 12 students "displayed recovery or improvement in their levels of math anxiety .... Furthermore, clinically significant reductions in math anxiety were maintained during the 2 months of follow-up (p. 209)."

CONCLUSION

Wolpe was quick to point out that the idea of overcoming fear and anxiety was not new. "It has long been known that increasing measures of exposure to a feared object may lead to the gradual disappearance of the fear" (p. 200). In fact, you probably already knew this yourself, even if you had never heard of systematic desensitization prior to reading this chapter. For example, imagine a child who is about 13 years old and has a terrible phobia of dogs. This fear is probably the result of a frightening experience with a dog when the child was much younger, such as being jumped on by a big dog, being bitten, or even having a parent who was afraid of dogs. Because of these experiences, the child developed an association between dogs and fear. If you wanted to cure this child of the fear of dogs, how might you break that association? Many people's first response to this question is, "Buy the child a puppy!" If that's what you thought of, you have just recommended a form of systematic desensitization.

Dissecting Research #6

TO HELP OR NOT TO HELP

Darley, J. M., & Latane, B. (1968). Bystander intervention in emergencies: Diffusion of responsibility. Journal of Personality and Social Psychology, 8, 377-383.

One of the most influential events in the history of psychology and psychological research was not an experiment or a discovery made by a behavioral scientist, but a news item about a violent and tragic event in New York City that was picked up by most media news services across the United States. In 1964, Kitty Genovese was returning to her apartment in a quiet, middle-class neighborhood in Queens after closing the Manhattan bar that she managed. As she left her car and walked toward her building, she was viciously attacked by a man with a knife. As the man stabbed her several times, she screamed for help. One neighbor yelled out his window for the man to "leave that girl alone," at which time the attacker began to walk away. But then he turned, knocked Genovese to the ground, and began stabbing her again. She continued to scream until finally someone telephoned the police. The police arrived two minutes after they were called, but Genovese was already dead and her attacker had disappeared. The attack had lasted 35 minutes. During police investigations, it was found that 38 people in the surrounding apartments had witnessed the attack, but only one had eventually called the police. One couple (who said they assumed someone else had called the police) had moved two chairs next to their window in order to watch the violence. Genovese's killer, Winston Moseley, now in his late 60s, remains incarcerated at a maximum-security prison in upstate New York.

If someone had acted sooner to help Genovese, she probably would have survived. New York City and the nation were appalled by the seeming lack of caring on the part of so many neighbors who had failed to try to stop this violent act. People attempted to find a reason for this inaction. The alienation caused by living in a large city was blamed; the neighborhood of Queens was blamed; basic human nature was blamed.

The Genovese tragedy sparked the interest of psychologists, who set out to try to understand what psychological forces might have been at work to prevent all those people from helping. There is an area of psychology that studies what behavioral scientists call prosocial behavior, or behavior that produces positive social consequences. Topics falling into this research area include altruism, cooperation, resisting temptation, and helping. If you witness an emergency situation in which someone may be in need of help, there are many factors that affect your decision to step in and offer assistance. John Darley at New York University and Bibb Latane at Columbia, both social psychologists, were among those who wanted to examine these factors. They termed the behavior of helping in emergencies, bystander intervention (or in this case, nonintervention).

Have you ever been faced with a true emergency? Contrary to what you may think from watching television and reading newspapers, emergencies are not very common. Darley and Latane estimated that the average person will encounter fewer than six emergencies in a lifetime. This is good and bad: good for obvious reasons; bad because if and when you find yourself facing an emergency, you will have to decide what to do, without the benefit of very much experience. Society dictates that we take action to help in emergencies, but often, as in the famous Genovese case, we do not. Why is this? Could it be because we have so little experience that we do not know what to do? Is it because of the alienation caused by urban living? Or are humans, by nature, basically uncaring?

Following the Genovese murder, Darley and Latane analyzed the bystanders' reactions. They theorized that the large number of people who witnessed the violent event decreased the willingness of individuals to step in and help. They decided to test their theory experimentally.

THEORETICAL PROPOSITIONS

Your common sense might tell you that the more bystanders there are in an emergency, the more likely someone will intervene. But Darley and Latane hypothesized just the opposite. They believed that the reason no one took steps to help Kitty Genovese was a phenomenon they called diffusion of responsibility. That is, as the number of bystanders in an emergency increases, the greater is the belief that "someone else will help, so I don't need to." Have you ever witnessed an accident on a busy street or arrived at the scene of one soon after it has happened? Chances are that as you drove by you made the assumption that someone surely has called the police or ambulance by now, and therefore you did not feel

the personal responsibility to do so. But imagine discovering the same accident on a deserted country road with no one else around. Would your response be different? Mine probably would be, too.

The concept of diffusion of responsibility formed the theoretical basis for this chapter's study. The trick was to re-create a Genovese-like situation in the laboratory so that it could be manipulated and examined systematically. Darley and Latane were very ingenious in designing an experiment to do this.

METHOD

For obvious reasons, it would not be practical or even possible to reproduce the events of the Kitty Genovese murder for experimental purposes. Therefore, a situation needed to be devised that would approximate or simulate a true emergency so that the intervention of bystanders could be observed. In this experiment, Darley and Latane told students in an introductory psychology class at New York University that they were interested in studying how students adjust to university life in a highly competitive, urban environment and what kinds of personal problems they were experiencing. The students were asked to discuss their problems honestly with other students, but to avoid any discomfort or embarrassment, they would be in separate rooms and would speak with each other over an intercom system. This intercom, they were told, would only allow one student to speak at a time. Each student would be given two minutes, after which the microphone for the next student would be activated for two minutes, and so on.

All of this was a cover story designed to obtain natural behavior from the subjects and to hide the true purpose of the experiment. The most important part of this cover story was the way the students were divided into three different experimental conditions. The subjects in group 1 believed that they would be talking with only one other person; those in group 2 believed there would be two other people on the intercom; and the group 3 subjects were told that there were five other people on the line. In reality, each subject was alone and all the other voices were on tape.

Now that the size of the groups was varied, some sort of emergency had to be created. The researchers decided that a very realistically acted epileptic seizure would be interpreted by most people as an emergency. As the discussions over the intercom system between the subjects and the other "students" began, subjects heard the first student, a male, tell about his difficulties concentrating on his studies and problems adjusting to life in New York City. He then added, with some embarrassment, that he sometimes had severe seizures, especially when under a lot of stress. Then the conversation switched to the next student. In group 1, the actual subject's turn came next, whereas in the other two conditions, the subject heard one or more other students speak before his or her turu. Mter the subject spoke it was the first student's turn again. This is when the emergency occurred. The first student spoke normally as before, but then began to have a seizure (remember, this was all on tape). Latane and Darley quote the seizure in detail in a later report as follows:

> I-er-um-I think I-I need-er-if-if could-er-er somebody er-er-er-er-er-er give me a little-er-give me a little help here because-er-I-er-I'm-er-h-h-having a-a-a real problem-er right now and I-er-if somebody could help me out it would-it woulder-er-er s-s-sure be good ... because-er-there-er-ag cause I er-I-uh-I've got one of the-er-sei—er-er-things coming on and-and-and I could really use some help so if somebody would-er give me a little h-help-uh-er-er-er-er c-ould somebody-er er-help-er-uh-uh-uh [choking sounds] ... I'm gonna die-er-er ... help-er-er-seizure [chokes, then quiet]. (pp. 95-96)

To the subjects, this was clearly an emergency. There was no question that the "student" was in trouble and needed help immediately. In order to analyze the responses of the subjects, Darley and Latane measured the percentage of subjects in each condition who helped the student in trouble (helping was defined as leaving the cubicle and notifying the experimenter of the problem). They also measured the amount of time it took subjects to respond to the emergency and try to help. Subjects were given four minutes to respond, after which the experiment was terminated.

RESULTS

The findings from this study offered strong support for the researchers' hypothesis. As subjects believed there were a greater number of others present, the percentage who reported the seizure quickly, that is, as the attack was occurring, decreased dramatically (see Figure 1). Among those who eventually helped, the amount of delay in helping was greater when more bystanders were present. For group 1, the average delay in responding was less than one minute, whereas for group 3 it was over three minutes. Finally, the total number of subjects who reported the seizure at all, either during or

after it occurred, varied among the groups in a similar way. All of the subjects in group 1 reported the emergency, but only 85% of group 2 and 60% of group 3 did so at any time during the four-minute period.

DISCUSSION

As in the real-life case of Kitty Genovese, you might think that the subjects in this study were simply uncaring toward the victim having the seizure. However, Darley and Latane are quick to point out that this was not the reason for the inaction of subjects in groups 2 and 3 (or of Genovese's neighbors). All the subjects reported experiencing a great deal of anxiety and discomfort during the attack and showed physical signs of nervousness (trembling hands, sweaty palms). The researchers concluded, therefore, that the reason for their results must lie in the difference in the number of other people the subjects believed were present. Whenever your behavior is changed because of the presence of others, this is called social influence. Obviously, social influence played a significant role in this study. But we are still left wondering why. What was it about the presence of others that was so influential?

Darley and Latane claimed to have demonstrated and supported their theory of diffusion of responsibility. As the number of people in the group increased, the subject felt less personal or individual responsibility to take action. It was easier in groups 2 and 3 for the subjects to assume that someone else would handle the problem. In a related point, it is not only the responsibility for helping that is shared when others are present, but also the potential guilt or blame for not helping. Since helping others is considered to be a positive action in our culture, refusing or failing to help carries shameful connotations. If you are the only person present in an emergency, the negative consequences of not helping will be much greater than if others are there to bear some of the burden for nonintervention.

Another possible explanation for this type of social influence is something that psychologists have termed evaluation apprehension. Darley and Latane contended that part of the reason we fail to help when others are present is that we are afraid of being embarrassed or ridiculed. Imagine how foolish you would feel if you were to spring into action to help someone who did not need or want your help. I remember a time when, as a teenager, I was swimming with a large group of friends at a neighbor's pool. As I was about to dive from the board I saw the neighbor's 13-year-old daughter lying facedown on the bottom of the pool. I looked around and no one else seemed to be aware of, or concerned about, this apparent emergency. Was she drowning? Was she joking? I wasn't sure. Just as I was about to yell for help and dive in for the rescue, she swam lazily to the surface. I had hesitated a full 30 seconds out of the fear of being wrong. Many of us have had experiences such as this. The problem is, they teach us the wrong thing: helping behavior carries with it the possibility of looking foolish.

SIGNIFICANCE OF THE FINDINGS

From this and other studies, Darley and Latane became the leading researchers in the field of helping behavior and bystander intervention. Much of their early work was included in their book The Unresponsive Bystander: Why Doesn't He Help? (Latane & Darley, 1970). In this work, they outlined a model for helping behavior that has become widely accepted in the psychological literature on helping. They proposed five steps you probably would go through before intervening in an emergency:

1. You, the potential helper, must first notice that an event is occurring. In the study this chapter examines, there was no question that such notice would occur, but in the real world, you may be in a hurry or your attention may be focused elsewhere, and you might completely fail to notice the event.
2. You must interpret the situation as one in which help is truly needed. This is a point at which fear of embarrassment exerts its influence. Again, in the present study, the situation was not ambiguous and the need for help was quite clear. In reality, however, most potential emergencies contain some degree of doubt or ambiguity, such as in my swimming pool example. Or, imagine you see a man stagger and pass out on a busy city sidewalk. Is he sick or just drunk? How you interpret the situation will influence your decision to intervene. Many of those who failed to help in the Genovese case claimed that they thought it was a lover's quarrel and did not want to get involved.
3. You have to assume personal responsibility. This will usually happen immediately if you are the only bystander in the emergency. If others are also present, however, you may instead place the responsibility on them. This step was the focus of this chapter's experiment. The more people present in an emergency, the more diffused the

responsibility, and the less likely help will occur.

4. If you assume responsibility, you then must decide what action to take. Here, if you do not know what to do or you do not feel capable of taking the appropriate action, you will be less likely to help. In our present study, this issue of competence did not playa part, since all that the subject had to do was report the seizure to the experimenter. But if a crowd were to witness a pedestrian run over by a car, a member of the group who was a doctor, a nurse, or a paramedic would be more likely to intervene because he or she would know what to do.
5. Finally, after you've decided what action to take, you have to take it. Just because you know what to do doesn't guarantee that you will do it. Now you will weigh the costs and benefits of helping. Are you willing to personally intervene in a fight in which one or both of the participants has a knife? What about victims of accidents-can you help them, or will you make things worse by trying to help (the competence issue again)? If you get involved, can you be sued? What if you try to help and end up looking like a fool? Many such questions, depending on the situation, may run through your mind before you actually take action.

SUBSEQUENT FINDINGS AND RECENT APPLICATIONS

Both the Kitty Genovese murder and the experiment we have been discussing here involved groups of onlookers who were cut off from each other. What do you suppose would happen if the bystanders could see and talk to each other? Would they be more likely to intervene when they could be judged by others? Darley and Latane believed that in some cases, even groups in close contact would be less likely than individuals to help. This would be especially true, they theorized, when the emergency is somewhat ambiguous.

For example, imagine you are sitting in a waiting room and smoke begins to stream in through a vent. You become concerned and look around at the others in the room. But everyone else appears quite calm and unconcerned. So, you think your reaction to the smoke must be exaggerated, and you decide against taking any action. Why? Because if you take action and are wrong (maybe it wasn't smoke, just steam or something from the next room), you would feel sheepish and embarrassed. However, you don't realize that everyone in the room is feeling the same as you and hiding it,just as you are, to avoid embarrassment! Meanwhile, no one is doing anything about the smoke. Sound unbelievable? Well, it's not.

Latane and Darley (1968) tested this idea in a slightly later study by creating the situation just described. Psychology students volunteered to participate in interviews to "discuss some of the problems involved in life at an urban university." When they arrived for the interview, they were seated in a room and asked to fill out a preliminary questionnaire. After a few minutes, smoke began to pour into the room through a vent. The smoke was a special mixture of chemicals that would not be dangerous to the subjects. After several minutes, the smoke became so thick that vision in the room was obscured. The researchers timed the subjects to see how long they would wait to report the smoke. Some of the subjects were in the room alone; others were with either two or three confederates, believed by the subject to be other participants, who behaved very passively when the smoke appeared. Once again, Latane and Darley's results supported their theory. Fifty-five percent of the subjects in the alone condition reported the smoke within the first two minutes, while only 12% of the subjects in the other two groups did so. Moreover, after four minutes, 75% of the alone subjects had acted, but no additional subjects in the other groups ever reported the smoke.

Beyond their specific findings, Darley and Latane's groundbreaking research on helping behavior and diffusion of responsibility continues to influence a wide array of studies on very topical issues. For example, an article applied Darley and Latane's findings to issues of child abuse and domestic violence (Hoefnagles & Zwikker, 2001). The goal of the study was to shed light on the characteristics of individuals who witness child abuse. The researchers analyzed nearly 700 records of bystanders (other than human services professionals) who reported incidents of child abuse. Their investigation revealed the bystanders to be a very diverse group of both male and females in various age groups, including many children. Various characteristics of the bystanders, including sex, age, and their perceptions of what they saw and heard were shown to influence their interpretation of the abusive event and their confidence that the event was truly abusive. This knowledge is an important factor in working to intervene in and reduce the incidence of child abuse and domestic violence.

Another study demonstrated the cognitive power of the bystander effect and diffusion of responsibility. In a recent study titled, Crowded Minds: The Implicit Bystander Effect, by a team of researchers that included Darley, found that merely imagining being in a group changed helping behavior (Garcia, et al., 2002). In this study, subjects were asked either to imagine that they were part of a group of people or alone with one other person. Then, all subjects were asked to

donate to a charity. The participants who imagined themselves in the presence of others donated significantly less money, and felt less personal accountability than those who imagined being alone with one other person. These findings imply that our brains immediately "leap" at the chance to assume less individual responsibility when we are part of a group.

CONCLUSION

The results of this body of research may seem rather pessimistic, but you should recognize that these studies deal with extremely specific situations in which people fail to help. Frequent examples may be found every day of people helping other people, of altruistic behaviors, and heroic acts. Darley and Latane's research is important, however, not only to explain a perplexing human behavior, but to help change it. Perhaps, as more people become aware of the bystander effect, they will make the extra effort to intervene in an emergency, even if others are present. In fact, research has demonstrated that people who have learned about the bystander effect, are more likely to help in emergencies (Beaman et al., 1978). The bottom line is this: Never assume that others have intervened or will intervene in an emergency. Always act as if you are the only person there.