enced many times is going to be remembered better than something that is encountered only once. "A person who saw the same suspect go into a certain door repeatedly will presumably remember it better than a person who saw that event only once" (p. 302).

### Detail Salience

When a complex incident is witnessed, not all of the details within that incident are equally salient, or memorable, to the viewer or hearer. Some things just catch our attention more readily than others. A salient detail is one that has a high probability of being spontaneously mentioned by individuals who witness a particular event.

The importance of the salience of a detail can be seen in an experiment reported by Marshall and colleagues (1971). These investigators showed a movie to a total of 151 witnesses, all of whom were males between twenty-one and sixty-four years of age. They were recruited through several community service clubs and through the Fire Department of Ann Arbor, Michigan. The movie was in color, with sound, and lasted about two minutes. The following description of it was taken from the original article:

> Two college-age boys are seen throwing a football. The camera pans from them, showing a large building and parking lot and stops at the doorway of a supermarket from which several people emerged. A young man and woman carrying packages and engaged in conversation come from the doorway and walk behind a row of cars. The man says he forgot to get something and leaves. The woman continues walking and is struck by a car backing out of the parking line. She loses hold of her package and falls to the pavement. The car stops; the driver gets out, approaches the woman and says, "Don't you ever watch where you're going?" The woman gets up and swears at him. Her companion returns running and shouts something. A scuffle ensues between the companion and the driver. The companion is pushed to the pavement, spilling the contents of his package. The boys who played football earlier in the picture appear, ask what happened, and restrain the men. One of the boys trots off in the direction of the supermarket entrance saying he will call the police. (p. 1662)

After the witnesses had finished viewing the film, they were given the following instructions: "You were all witnesses to the events shown in the film. Each of you will be interviewed by a man who is an expert legal interviewer. He will want to find out everything that you, as a witness, saw and heard in this film. He

hasn't seen the film, so he doesn't know what the real facts are. Therefore, it will be very important for you to be careful and precise in answering his questions." The witnesses were assigned to separate rooms where individual interviews were conducted. Only about two or three minutes elapsed between the film and the beginning of the interview. Each witness was urged to be as complete as possible and as accurate as possible, that is, "to tell the truth, the whole truth, and nothing but the truth" as if he were in a courtroom.

Before the experiment began the investigators tested the movie to determine the salience of the perceivable items by simply measuring the frequency with which they were mentioned. The film was shown to high school students and to staff members who worked with one of the researchers. These individuals simply listed what they had seen. Of the nearly nine hundred possible items that were present, some were never mentioned while some were mentioned by almost everyone. The latter items can be considered to be highly salient items.

The investigators wanted to determine whether the salience of items affected the accuracy and completeness of a witness's report about those details. To determine the accuracy score for, say, highly salient items, the investigators examined only the responses referring to highly salient items. The accuracy score was calculated by dividing the number of items mentioned correctly by the total number of sample items mentioned. The completeness score was calculated by dividing the number of sample items in a category mentioned by the total number of sample items that could have been mentioned. In this same way both accuracy and completeness scores could also be obtained for less salient items.

The results shown in table 3.1 were obtained when subjects were quizzed using a multiple-choice format only (for example, "Where did the incidents happen: in a vacant lot, in a street, on a sidewalk, in a parking lot, or someplace else?"). Subjects were much more complete and accurate when reporting items of higher rather than lower salience. Items that were highest of all in salience received accuracy and completeness scores of 98. Those that were lowest in salience received scores below 70.

In this experiment the salience of an item was determined by the ratings of individuals. It is not always possible to know on what bases these ratings were made. Is a highly salient item one that was visible for a long period of time, in the center of the field

Table 3.1. Average accuracy and completeness index scores for items according to their level of salience.[a] (Adapted from Marshall et al. 1971.)

| Salience category | Accuracy | Completeness |
|---|---|---|
| 0.00 | 61 | 64 |
| .01- .12 | 78 | 81 |
| .13- .25 | 81 | 82 |
| .26- .50 | 83 | 92 |
| .51-1.00 | 98 | 98 |

a. 0.51-1.00 means that the item was highly salient, that is, noticed by over 50 percent of a group of people who viewed the movie. Data are presented for conditions in which witnesses were tested with a multiple-choice format.

of view, very large in size, bright or well lighted, in motion or highly active, or rather important in function? Any of these could contribute to an item's being declared salient rather than nonsalient. It is likely that we would see effects for each of these different "ways of being salient" in terms of an item's memorability. Many of them were captured in Gardner's (1933) remark: "The extraordinary, colorful, novel, unusual, and interesting scenes attract our attention and hold our interest, both attention and interest being important aids to memory. The opposite of this principle is inversely true—routine, commonplace and insignificant circumstances are rarely remembered as specific incidents" (p. 324).

### Type of Fact

In addition to the salience of some particular detail that a witness might be asked to remember, another event factor, the *type* of detail or type of fact being queried, must be considered. Is the witness being asked to remember the height or weight of a criminal, the amount of time an incident lasted, the speed of a car before an accident, the details of a conversation, or the color of the traffic signal? These different types of facts are not equally easy to perceive and recall.

Cattell (1895) provided one of the earliest studies to examine recall of various types of information. During March 1893 he posed a series of questions to the fifty-six students in the junior class who were present on the particular day he chose for conducting his study. His first question was, "What was the weather

a week ago today?" The answers that the students gave were pretty much equally distributed over all kinds of weather which was possible at the beginning of March. Of the fifty-six people who answered, sixteen said it had been clear, twelve said it had been raining, seven said snow, nine said stormy, six said cloudy, and six said partly stormy and partly clear. Actually, on the day in question it had snowed in the morning and cleared in the late afternoon. Reflecting upon his findings, Cattell remarked, "It seems that an average man with a moderate time for reflection cannot state much better what the weather was a week ago than what it will be a week hence" (p. 761).

Next, Cattell asked his students a few questions designed to tap the ordinary accuracy of observation: "Do chestnut trees or oak trees lose their leaves the earlier in the autumn?" "Do horses in the field stand with head or tail to the wind?" "In what direction do the seeds of an apple point?" Although these questions were answered correctly more often than incorrectly, the difference was slight. The students were correct about 60 percent of the time. Thirty students thought that chestnut trees lose their leaves the earlier in autumn, while twenty-one were of the opposite opinion. Thirty-four students thought that horses in the field stand with tails to the wind, and nineteen thought they stand facing it. Twenty-four thought the seeds of an apple point "upward" or "toward stem" while eighteen thought they pointed "toward center," thirteen said "downward," and three said "outward." Cattell left it to the readers of his article to munch an apple and decide for themselves which direction the seeds in fact point. The important question he hoped to raise was this: What information can we possibly obtain by looking at the collection of answers that people give to a question?

Later in the questioning Cattell sought to determine the average accuracy in estimating weight, distance, and time. He asked his students to estimate the weight of the textbook the class had been using (William James' *Briefer Course in Psychology*), the distance between two buildings on the college grounds, and the time usually taken by students to walk from the entrance door of the building to the door of the lecture room.

The book actually weighed 24 ounces, whereas the average student's estimate was 17 ounces, a bit low. The distance between the two buildings was actually 310 feet; the estimate, 356 feet. The time taken to walk from the door to the lecture room was

actually 35 seconds, whereas the average estimate was 66 seconds. Thus, Cattell provided one of the first demonstrations of the invariable human tendency to overestimate the amount of time that some activity either took or generally takes.

The students were also asked questions designed to tap their recollection of statements that were made by the lecturer one week before and their recollection of details of the building in which the class had been meeting. Recollection in these areas was so poor that Cattell was prompted to remark that his findings were worthwhile if only to "emphasize the worthlessness of many hundred casual observations as compared with one measurement" (p. 764).

Cattell felt that his work and all work in the area of accuracy of observation would find useful application in courts of justice. He thought the probable accuracy of a witness could be measured and the witness's testimony could be weighted accordingly. "A numerical correction could be introduced for lapse of time, average lack of truthfulness, average effect of personal interest, etc. The testimony could be collected independently and given to experts who could affirm, for example, that the chances are 19 to 1 that the homicide was committed by the defendant, and 4 to 1 that it was premeditated" (p. 765-766). Here Cattell went a bit too far. Based upon the collection of studies on the accuracy of observation, experts are in no position to declare a defendant guilty or not. However, they are in a reasonably good position to describe in detail some of the factors that influence a witness's observation and some of the conditions that make accurate observation difficult.

After Cattell's initial work, many investigators produced evidence of marked inaccuracies in the reporting of details such as time, speed, and distance. The judgment of speed is especially difficult, and practically every automobile accident results in huge variations from one witness to another as to how fast a vehicle was actually traveling (Gardner 1933). In one test administered to air force personnel who knew in advance that they would be questioned about the speed of a moving automobile, estimates ranged from ten to fifty miles per hour. The car they watched was actually going only twelve miles per hour (Marshall 1966/1969, p. 12).

As Cattell found out, most people have enormous difficulty estimating the duration of an event. But in this case the errors are

practically always in the same direction: people overestimate the amount of time an event took. In order to study the effects of eyewitness testimony in a realistic setting, Buckhout and his colleagues staged an assault on a California state university campus (Buckhout 1977; Buckhout et al. 1975). A distraught student "attacked" a professor in front of 141 witnesses. The entire event was recorded on videotape so that the actual incident could be compared with eyewitness accounts. The attack lasted only thirty-four seconds, and after it was over, sworn statements were taken from each of the witnesses. One question about the duration of the incident produced an average estimate of eighty-one seconds. Thus, the witnesses overestimated by a factor of almost two and a half to one.

Two additional studies show the same tendency to overestimate time. In the first (Marshall 1966) the subjects watched a forty-two-second film in which a young man rocks a baby carriage and then flees when a woman approaches him. A week after the subjects had seen the picture and after they had made written or oral reports on their recollection, they were asked how long the picture had taken. On the average the subjects thought it had lasted about a minute and a half. In the second study (Johnson and Scott 1976) unsuspecting subjects who were waiting to participate in an experiment overheard either a neutral or violent conversation going on in the next room. A person, referred to as the "target," then departed from the room, spending approximately four seconds in the presence of the waiting subjects. Both males and females overestimated the amount of time they thought they had viewed the target. Females reported that they had viewed him for an average of twenty-five seconds while males claimed it had been seven seconds, on the average. Thus, we have ample evidence that people overestimate the amount of time that a complex event takes. Furthermore, there is evidence that when a person is feeling stress or anxiety, the tendency to overestimate the passage of time is increased even further (Sarason and Stoops 1978).

Despite this lack of ability, witnesses are often asked to give time estimates in courts of law. The amount of time that something took can be critical to the outcome of a case. For example, several years ago I worked with the Seattle Public Defender's office on a case involving a young woman who had killed her boyfriend. The prosecutor called it first-degree murder, but her

lawyer claimed she had acted in self-defense. What was clear was that during an argument the defendant ran to the bedroom, grabbed a gun, and shot her boyfriend six times. At the trial a dispute arose about the time that had elapsed between the grabbing of the gun and the first shot. The defendant and her sister said two seconds, while a prosecution witness said five minutes. The exact amount of elapsed time made all the difference to the defense, which insisted the killing had occurred suddenly, in fear, and without a moment's hesitation. In the end the jury must have believed that the prosecution's witness had overestimated the time, for it acquitted the defendant.

In sum, there is solid evidence that errors occur in people's estimates of the duration of an incident, and the errors are in the direction of overestimation. Of course there are errors involved in the estimation of height and weight, shapes and colors, facial characteristics, and so on, but the errors do not tend to be in one particular direction. If people have difficulty perceiving this sort of information in the first place, then we can be sure that their later recall will reflect this difficulty.

### Violence of an Event

Clifford and Scott (1978), wondering whether people differ in their ability to perceive violent versus nonviolent events, constructed two black-and-white videotapes which showed two policemen searching for a criminal and eventually finding him with the reluctant help of a third person. In one tape—the nonviolent version—the third person's reluctance resulted in a verbal exchange among the three people and a number of weak restraining movements by one of the policemen. In the violent version, one of the policemen physically assaulted the third person. The critical sequences were spliced into the middle of the videotape so that the beginning and end of the two tapes were identical.

Forty-eight subjects, half men and half women, looked at one of the two versions of the tape. After some intervening activities, the subjects answered a forty-four-item questionnaire. For both men and women the ability to recall events was significantly worse for those who had seen the violent event than for those who saw the nonviolent version (fig. 3.1). Clifford and Scott argued that the effect might be due to the greater stress produced by the violent event. Whatever the exact reason for the reduced performance in the case of a violent incident, the practical signifi-