

# Alterations in Recollection of Unusual and Unexpected Events

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## Introduction

One of the authors, Elizabeth F. Loftus, has for some years been investigating the circumstances under which information received subsequent to a complex natural event, such as an accident or a crime, causes systematic and predictable changes in witnesses' recollections of the event (see Loftus, 1979, for a review of this research). Sightings of unidentified flying objects (UFOs) and of unknown or rare animal species (the topic of cryptozoology) are in some ways very similar to the witnessing of a crime or of an accident. In particular, crimes, accidents, UFOs, and unidentifiable animals are all phenomena that present considerable challenges to accurate perception, interpretation, and recall.

In the present paper, we first very briefly review some recent findings on the alteration of human recollection. This review is necessarily less than comprehensive, but we hope that it gives at least the flavor of recent research. Next, we suggest some applications of recent recollection-change research to the evaluation of reports from persons who claim to have witnessed anomalous events, such as the appearance of UFOs.

## The Alteration of Eyewitness Recollections

Numerous experiments have been conducted showing that memory for details of a complex event, such as a crime or an accident, can under some circumstances be affected by both pre- and post-event experiences. The experimental paradigm used in recollection-change studies can be described in terms of two essential stages. (1) Acquisition: A subject views for the first time a slide sequence or a film depicting an event, such as a simulated automobile accident or a crime. (2) Retention and change: A subject encounters and incorporates additional information subsequent to the original event. New information might be embedded in a misleading message or in a biasing question, or even in a sketch or a photograph. Private rehearsal of the event, or discussion with friends or family, or even questioning by a careless investigator, can be a source of misleading opinions and information. In other

cases, misleading information is derived not from current sources, but from older memories that are revived in the course of reminiscence. Whatever the source, additional information is acquired and is often readily integrated with original memory for the event. Thus, both pre- or post-event information has in fact altered the content of what is recalled or recognized. Once created, the new memory can be as real and as vivid to the person as a memory acquired as the result of "genuine" perception.

Loftus, Miller, and Burns' (1978) experiment can be regarded as a prototype of the recollection-change procedure. In that experiment, subjects viewed a slide sequence that depicted an automobile accident. In the middle of the sequence one group of subjects viewed a red Datsun stopped at a yield sign, while a second group of subjects viewed the same red Datsun stopped at a stop sign. Either immediately after the slide presentation, or following some longer interval of delay, one of two sets of questions was distributed to each subject. Some subjects were given questions that included a potentially misleading item of information, whereas other subjects received questions that included no misinformation. For example, the item "Did another car pass the red Datsun while it was stopped at the stop sign?" contained misinformation when it was asked of subjects who had actually viewed a yield sign. Finally, subjects were tested for recollection of details of the original incident, including recollection of the sign. Depending somewhat on the intervals between viewing the accident and receiving subsequent questions, and between the accident and the final test of recollection, as many as 80% of the subjects indicated that the content of what they remembered had been altered by the post-event misinformation. Specifically, they recalled a stop sign when a yield sign had actually been seen, or a yield sign when a stop sign had been seen. Thus, memory for a complex natural event appears to be vulnerable to the influence of information received subsequent to the event itself. What follows is a summary of some of the major experimental variables that have been found to moderate the alteration of memory by post-event information.

### Critical Factors in Recollection Change

It is not possible in this paper to offer a comprehensive review of the growing body of recollection change literature. Short of being comprehensive, it is possible to briefly describe several variables that are already fairly well understood, and to summarize some of the experiments that served initially to demonstrate the significance of these variables. Such relatively well understood variables include (1) the intervals between an event, a subsequent misleading message, and a final test of recollection; (2) the presence of warnings; (3) the syntactic form of questions and messages; and (4) attitude change.

#### *Intervals of Delay*

The intervals of delay between viewing an initially unexpected event, encountering a subsequent potentially misleading message, and engaging in a

final test of recollection have all been found to be major determinants of change in memory for an event (Loftus et al., 1978). In this research, the number of subjects for whom a change in recollection occurred increased with longer as opposed to shorter intervals before encountering the post-event misinformation. Additionally, the number of subjects for whom a change in recollection occurred was greatest when the final test of recollection occurred immediately after reading the post-event misinformation rather than after some delay. Thus, recollection change appears to be enhanced by the fading of original memory with the passage of time, and the change is most readily secured if tested while the post-event misinformation is still relatively current.

### *Warnings*

A series of experiments reported by Greene, Flynn, and Loftus (1982) indicates that the alteration of recollection can often be minimized if subjects are warned that a post-event message that they are about to receive might contain misinformation. However, the immediacy of the warning appears to be critical. That is, to be effective, the warning must be given immediately before presentation of the otherwise misleading message.

Subjects began by viewing slides that depicted a wallet snatching. Five minutes after viewing, subjects were exposed to a version of the event ostensibly written by another witness. For some subjects the version included some items of misinformation. Some of the misinformed subjects were warned that the message might contain inaccuracies. For different groups of subjects, the warning was given either immediately before the slides were presented, immediately after the slide presentation, immediately before the misleading message was presented, or immediately before the final test of recollection. Finally, a test of recollection was given and subjects were urged to respond on the basis of their personal memories.

The results indicated that warning given immediately prior to the presentation of misinformation increased subjects resistance to the misinformation and minimized the changes in recollection. However, warnings given at other times, earlier or later, were of little or no value to subjects. Another variable in the study, the amount of time taken by subjects to read the message, provided a clue to the interpretation of these results. In brief, subjects who received warnings immediately prior to reading the misinformation read more slowly, and no doubt more carefully, than did subjects who received warnings at other points in time.

In sum, there appears to be one optimal moment when warnings are effective in reducing subjects' usual gullibility and lack of caution. That critical moment comes just as subjects are about to be exposed to post-event misinformation.

### *The Syntactic Form of Misleading Questions*

We have seen that properly timed warnings make it possible for subjects to detect discrepancies in a post-event message. In a rather similar manner,

the syntax of a potentially misleading message can also serve to conceal, or to reveal, the misinformation.

In one experiment (Loftus, 1981; Loftus & Greene, 1980), students attending a university lecture were surprised by an intruder who suddenly entered the lecture hall, loudly insulted the professor, and then just as suddenly departed. Immediately following the unexpected event, students answered a 15 item questionnaire calling for recollection of details of the incident.

For some students, the questionnaire included one item that referred misleadingly to a nonexistent moustache. In fact, two versions of the misleading question were presented to different groups of subjects. In one version, the moustache was the subject of a simple interrogative sentence: Was the moustache worn by the tall intruder light or dark brown? In the second version, the moustache was the object of an auxiliary clause: Did the intruder who was tall and had a moustache say anything to the professor? A third group was not asked anything about the moustache at all.

Two days later, subjects were once more tested for recollection of details of the incident. In this final test, subjects were asked to indicate whether they had actually seen a moustache on the intruder. Many of the subjects who had been misleadingly questioned about the moustache reported that the intruder had indeed been wearing a moustache. Few of the subjects who had not encountered a misleading question believed that there had been a moustache. Equally significant, subjects were more likely to falsely recall the nonexistent facial hair if it had been suggested in an auxiliary clause than if it had occurred as the subject of a question.

A clue to explaining the greater effectiveness of the auxiliary clause lies in the complementary finding that most subjects, upon further interrogation, were typically unable after two days to recall having read a reference to a moustache when the moustache had been mentioned in an auxiliary clause. However, subjects were more likely to recall having read about a moustache when it appeared as the focus of an intervening question. It seems plausible that more attention would be given to the subject of a simple sentence than to the object of a minor clause in a complex sentence. We conclude that subjects' recollections are more readily altered by misinformation that has been casually or unintentionally assimilated than by information that has been given direct and critical attention. We also conclude that misinformation that has been slowly scrutinized is likely to be rejected, whereas misinformation that is quickly assimilated with minimal attention can be added indiscriminately to the existing store of information about an event.

### *Attitude Change*

Apparently, a change in attitude can under some circumstances induce a corresponding change in recollection. Recent studies (Ross, McFarland, & Fletcher, 1981; Ross, McFarland, Conway, & Zanna, 1983) have shown that people are typically revisionist historians with respect to their autobiographies. In a typical experiment, subjects received a persuasive message intended to

alter their attitudes towards the benefits of vigorous physical exercise. The message was attributed either to a highly credible source, a leading researcher in the area of exercise, or alternatively, to a less credible source, a spokesperson for the Fat is Beautiful Organization. Not surprisingly, attitude change was greatest in subjects for whom the persuasive message had been attributed to a credible source. Finally, subjects were asked to recall their own recent exercise programs. Interestingly, subjects exposed to the credible communicator recalled their exercise routines as having been less vigorous than did subjects exposed to the less persuasive communicator. In short, people sometimes alter recollection of their own recent behavior to conform to newly acquired attitudes.

In summary, we have reviewed a number of studies indicating the capacity of several variables to affect the alteration of recollection. In several of these studies, the subjects' detection of discrepancies in a post-event message, or failure to detect discrepancies appears to have been a crucial factor. Indeed, retention intervals, warnings, and syntax are all variables that appear to affect subjects' ability to detect discrepancies. Thus, the detection of discrepancies appears to be an important mediating variable, that is, a common underlying factor in the operation of a number of circumstantial variables. In a similar vein, if people assume a correspondence between their present attitudes and their past behavior, then they are likely to recall selectively supporting evidence and to overlook, or to fail to recall, that which is less supportive. Thus, attitude-consistent information is strengthened in the process of recollection, and attitude-inconsistent information fades or is replaced. In any case, the basic fact that newly acquired information, as well as recently changed attitudes, can alter recollection has been well established. We will turn now to the specific problem of assessing the likelihood of recollection alteration in eyewitness accounts of UFOs.

### **Post-event Information and the UFO Witness: Betty Hill**

Perhaps the most famous UFO witness is Betty Hill (Schwarz, 1977a, 1977b; Story, 1980). In any case, enough has been reported about the Hill case to allow consideration of several factors that could have contributed to the alteration of Betty Hill's recollection of an unusual event.

Betty Hill believes that she and her husband, Barney, were abducted by humanoids on the night of September 19, 1961, taken aboard an extraterrestrial vehicle, examined, and then apparently hypnotized by the humanoids before finally being released. According to Betty Hill's account, the humanoids had hypnotized the captives to prevent them from being able to recall the encounter. Nevertheless, Betty had disturbing dreams that suggested the experiences of a humanoid abduction. Eventually, in 1964, Betty Hill was able under hypnosis to recount a rather peculiar experience to psychiatrist Benjamin Simon.

It matters not at all, for purposes of the present analysis, whether the Hills were really abducted by humanoids. Obviously, we have no basis for answering

such a question. What we can accomplish is simply to identify some salient factors that are likely to have affected recollection in such a case.

First, it is significant that Betty Hill first recalled the event three years after it is purported to have occurred. As we have noted, the passage of time between an event and eventual recollection increases the likelihood of recollection change.

Second, Betty Hill had dreams that included images of humanoids and of spheroidal craft. Such dreams are apparently common, even among people who have never been abducted by extraterrestrials (Jung, 1959). Betty discussed these dream images with her husband and with her psychiatrist. It is conceivable, from the perspective of the present analysis, that dream images could have been a source of misleading and erroneous information. That is, Betty Hill could have incorporated the memory of a dream with the memory of a waking experience.

Third, Betty Hill's psychiatrist, Benjamin Simon, evidently supported Betty's interpretation of her memories, including the interpretation of her dreams and of hypnotically induced experiences, as being recollections of a genuine encounter with extraterrestrials. Recent research indicates that hypnosis often increases a witness's susceptibility to the memory-altering effects of misleading messages (Putnam, 1979; Sanders & Simmons, 1983). Thus, by placing his client in a state of hypnosis, and by allowing her to discuss dream images while in that hypnotic state, psychiatrist Simon may have inadvertently facilitated the alteration of recollection.

Fourth, Betty Hill claims to have had many other inexplicable experiences, both before and after the abduction. Betty Hill evidently interprets many events as being paranormal and is usually able to recall details that support such paranormal interpretations. It appears quite plausible that Betty Hill's recollections, regardless of their validity, have been affected by her favorable attitude towards paranormality as an explanatory concept.

In brief, dreams, hypnotic imaginings, and discussions with her spouse and with her psychiatrist are likely to have provided an adequate amount of misleading information to result in at least some degree of change in memory for Betty Hill. The length of time that elapsed between the original incident and eventual recollection and the witness's favorable attitudes towards paranormality may have contributed to memory alteration, too. The Hill case is one of the most widely credited UFO sightings. We have shown that the possibility of recollection change must be considered in an analysis of any such eyewitness account of a complex and obscure event.

### **Conclusions—How to Assess the Likelihood of Recollection Change in Eyewitness Accounts of Unusual and Unexpected Events**

An eyewitness's recollection of an unusual and unexpected event, such as the appearance of a UFO or of an unidentifiable animal, is likely to undergo alteration, and thus to be relatively less reliable, if:

1. A considerable period of time has elapsed since the original event. "A considerable period of time" is, of course, a relative concept. There are no absolute temporal bounds for reliable recollection. However, laboratory studies have shown that intervals of 30 minutes or less can be critical in memory for the kind of complex events that we have been considering.

2. The witness has been recently exposed to potentially misleading post-event information. Such information might be acquired through messages, interviewers' biasing questions, the witness's own reminiscence, discussion with friends or family, dreams, reading material, or any of a number of other sources. Often, subtle, easily overlooked sources of misinformation have been shown to have the most devastating effects on the reliability of eyewitness reports.

3. The witness holds attitudes, or has recently undergone a change of attitude, that would induce a particular bias in the recollection of details of an event.

Some exposure to potentially misleading information and some consequent risk of adulteration of eyewitness reports is, perhaps, unavoidable. The impact in any given case of such factors as the witness's own reminiscences or of conversations with friends can only be roughly assessed. Other sources of potentially misleading information can, however, be controlled. Biases of the principle investigator or of the field interviewer, for example, are sources of potentially misleading information, but researcher- and interviewer-bias effects can be curtailed with procedural and methodological controls (Rosenthal, 1966; Barber, 1976). Such controls would include the following: (1) standardization of interview protocol; (2) careful wording of questions to avoid inadvertent clues or biases; (3) extensive training and rehearsal of interviewers; (4) employing interviewers who have not been informed of research hypotheses; (5) "blind" control, that is, leaving the interviewer uninformed about the interviewee's identity, or status, within the design of the investigation; and, finally, (6) creation of a "quasi-experimental" research design (Campbell & Stanley, 1966), that is, employment of appropriate control groups, for example, a group of bogus witnesses who would enact the role of "actual" UFO witnesses. Controlling the effects of researcher-and-interviewer bias is especially important when the research depends on the validity of an eyewitness's report of an otherwise unverifiable and nonreplicable event.

In short, biased questioning by a careless investigator or recent discussion with family or friends can be a source of misleading opinions and information. Added information is acquired and is often readily combined with original memory for the event. When created, the new memory can be as real to the person as a memory acquired as the result of true perception.

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