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The effects of the age of eyewitnesses on the accuracy and suggestibility of their testimony.

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Running head: Age and eyewitness testimony.

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Abstract.

Previous studies have compared the performance of young adult eyewitnesses with that of children or elderly witnesses, but few studies have allowed direct comparison of the performance of all three age groups. The accuracy and suggestibility of accounts of a video recording of a kidnapping was investigated using an experimental eyewitness paradigm. Subjects were drawn from three age groups; children (aged 7 - 9 years); young adults (aged 16 - 18 years) and elderly subjects (aged 60 - 85 years). Subjects' accuracy in answering non-misleading questions and their susceptibility to misleading information was measured.

Both the elderly and child subjects gave fewer correct answers and more incorrect answers to non-misleading questions than did young adults. The elderly subjects gave fewer correct responses but also fewer incorrect responses to non-misleading questions than did child subjects. Children were more suggestible than either elderly or young adults. No significant difference was found in the suggestibility of elderly and young adults. Contrary to the trace strength hypothesis no relationship was found between accuracy of recall and suggestibility.

Introduction.

Psychological research has revealed great variability in the accuracy with which different individuals can remember witnessed events, and in the extent to which their recollections can be distorted by misleading post-event information (e.g. Wells and Loftus, 1984). One demographic variable that has been identified as a general indicator of an eyewitness's reliability is their age. In particular, young children and the elderly have often, but not always, been found to make less reliable witnesses than young adults (e.g. Ceci and Bruck, 1993; List, 1986).

Many studies have looked at how the ability to accurately report a witnessed event may vary as a function of age. Children have frequently been found to perform less accurately than adults when asked specific questions or given a free recall test about an event (e.g. Dent, 1988; Warren & Lane, 1995). However, these differences can be reduced or even eliminated if memory is tested by recognition, rather than recall measures (e.g. Dent and Stephenson, 1979). Furthermore, some studies have found that when the witnessed event is of particular interest to the child or the learning context is appropriately reinstated at the time of questioning, young children can perform at levels of accuracy that are similar to or even exceed adult levels of accuracy (e.g. Dent and Stephenson, 1979; Wilkinson, 1988).

At the other end of the age continuum, there is little doubt that general memorial abilities usually decline after middle-age (Salthouse, 1996). More specifically, the elderly have been found to perform more poorly than young adults on visual memory tasks (e.g. Farrimond, 1968) and often give relatively less accurate accounts of witnessed events than young adults (e.g. Yarmey & Kent, 1980). Such age differences have been revealed by both recall and recognition tests, although age differences are less obvious when memory is tested by recognition (Craik, 1977; Erber, 1974; Schonfield and Robertson, 1966).

Although the available literature on the eyewitness performance of children relative to young adults and of the elderly relative to young adults is extensive, we know of only two studies that have directly compared the levels of accuracy reached by children, young adults and the elderly in an eyewitness situation (List, 1986; Loftus, Levidow and Duensing, 1992). In List's study, the elderly were found to be less accurate than 10 year olds and college students in their free recall of shoplifting videos. When memory was tested by recognition measures, 10 year olds were found to be less accurate than college students and the elderly. In Loftus et al' s study, elderly subjects (aged 65 - 85 years) performed worse than all other age groups (aged 5 - 65 years) when questioned with objective yes-no questions about a video they had viewed. However, the methodology used in this study means the results need to be interpreted with caution. The experiment was presented to subjects as an interactive exhibit in a science museum and as a consequence, many important variables were not controlled. For example, the interval between presentation of the film and the recall test was not controlled and there was no limit to the number of times each subject could take the recall test. In conclusion, further research is required to assess the relative accuracy of eyewitness accounts of young children, young adults and elderly people.

A witness will not be able to show accurate recall or recognition of an event if their memory is influenced by erroneous post-event information. Research over the past twenty-five years has revealed impressive evidence that eyewitness accounts can be distorted by new information, inconsistent with the original event, that has been encountered in the interval between witnessing an event and recalling it (e.g. Loftus, 1979). Such information could, for example, be encountered through the assumptions made by police interviewers or through overhearing another witness's account of events.

Loftus, Miller and Burns (1974) introduced an experimental eyewitness paradigm, consisting of three phases, which is still widely used and on which the present study is based. In the initial phase of the experiment, subjects saw a sequence of slides depicting a car accident. In the second phase subjects were exposed to post-event verbal information by answering questions. A control group received post-event information that was consistent with the witnessed event, and an experimental group were presented with information containing information which was inconsistent with the original event. The relevant information was whether a road sign had read 'stop' or 'yield' (give way). In the final phase of the experiment, memory for the original event was tested using a forced-choice recognition test. Loftus et al. found that subjects who had been exposed to misleading information were more likely than control subjects to select the incorrect sign at test.

The effect of misleading information has proved to be a robust phenomenon, however there is still much debate over the mechanism(s) responsible for it (Wright, 1995). Loftus (1979) suggested that the misleading information can permanently alter the memory trace of the original event, deleting existing trace items and replacing them with misleading items. (Termed 'destructive updating' by Wright, 1995). An alternative interpretation is that of 'supplementation'; in which the relevant information was not encoded during the original event and that the witness relies upon the misleading post-event information to make a response in the test phase of the experiment. A third interpretation

is that the original event 'co-exists' with the misleading alternative but is unretrievable due to access competition provided by the misleading information at the time of retrieval. Evidence consistent with the co-existence hypothesis has been provided by Bekerian and Bowers (1983) who found that reinstating the event context at the time of retrieval by presenting recognition slides in the same order as the events had originally occurred, increased the level of performance of misinformed subjects to that of controls. Bekerian and Bowers (1983) concluded that the misinformation effect is due to retrieval difficulties caused by the absence of cues that were present at the time of encoding the original event.

If memories of an original event and misleading post-information co-exist a subject may be misled because of source-monitoring difficulties (e.g. Belli, Lindsay, Gales & McCarthy, 1994). Misled subjects are hypothesised to have access to traces of both the original and the misleading event information but they cannot distinguish between the sources of this information. As the misleading information is more recent, and therefore more salient in memory, this information may be more likely to be retrieved. The original event may then be wrongly attributed as being the source of the misleading information. Other researchers have argued that the misinformation effect is the result of social rather than of cognitive mechanisms (e.g. Dodd and Bradshaw, 1980). For example, misled subjects may recall the misleading information because they trust the experimenter or simply because they want to please the experimenter. Subjects may comply with an experimenter by agreeing that misleading information is true or subsequently producing in an answer containing the misleading information which the experimenter introduced earlier in the procedure.

Whatever mechanisms are responsible for the misinformation effect, an important question that has been raised is whether the age of a witness affects their susceptibility to misleading information. Some research suggests that young children and the elderly are more vulnerable to suggestion than are young adults . Research has focused mainly on the effects of misleading post-event information on young children's accounts of events because of legal concern regarding uncorroborated testimony from young children especially in cases of sexual and physical abuse (Flin, 1995). If psychological research was to indicate that children are disproportionately influenced by misleading post-event suggestions, it could seriously undermine the credibility and usefulness of children's testimonies in such legal proceedings. However, recent research into the suggestibility of children in eyewitness situations has produced contradictory results between (and sometimes within) studies.

Many eyewitness studies have found young children to have heightened levels of suggestibility relative to older children and adults. For example, Cohen and Harnick (1980) presented 9 year olds, 12 year olds and college students with short film clips of petty thefts. When questioned in a leading manner immediately afterwards, the two older age groups were found to be significantly less suggestible than 9 year olds. However age differences were not significant when subjects were questioned again one week later using a multiple choice format. King and Yuille (1987) exposed 6, 9, 11 and 16 year olds to a live staged event. When subjects were subsequently questioned in a leading manner, the 6 year olds were found to be more suggestible than the 9-16 year olds. Other researchers that have found evidence of developmental differences in the effects of misleading post-event suggestions include Ceci, Ross and Toglia (1987) and Goodman and Reed (1986).

The importance of the legal implications of psychological research on the suggestibility of children's testimony has led researchers to study situations which are of direct relevance to testimony in court. As children are often required to give testimony because they have been the victim of abuse, researchers have sought to study situations in which the children were questioned, perhaps after a long delay, about events that were of personal significance, stressful or potentially embarrassing, in which the child participated (e.g. Davies, Tarrant & Flin, 1989; Goodman, Rudy, Bottoms & Aman, 1990). Goodman et al. studied the accuracy and suggestibility of children's recall of events which involved playing games with a male confederate of the experimenter or recall of events which occurred when the children received their inoculations. The main conclusion of these studies was that even children as young as four generally resisted including post-event misleading information into their accounts, especially for issues that were central to the episode and could have led to suspicions of abuse. However, even in these studies seven year olds were more accurate than four year olds in answering specific questions and were less suggestible than the four year olds.

In comparison, some studies have found young children to be no more suggestible or less suggestible than older children and adults (Marin, Holmes, Gruth & Kovac, 1979; Rudy & Goodman,

1991; Flin, Boon, Knox & Bull, 1983.) Duncan, Whitney and Kunen (1982) produced evidence that younger children are sometimes less suggestible than older children; 6, 8 and 10 year olds were shown a sequence of cartoon slides and then questioned about what they had seen. After controlling for the amount of information remembered, the younger children were found to be less susceptible to misleading post event suggestions than the older children. The main reason why there are discrepancies between the results of studies in this area is that studies often differ in the type of event to be remembered, the timing of the misleading information, the length of the retention interval and the age of the subjects tested (Loftus and Davies, 1984; Ceci and Bruck, 1993). Furthermore, methodological concerns, including the size of the samples used, the number of misleading items, the experimental context used and the linguistic complexity of the misleading questions have been raised over studies on both sides of the debate about children‘s suggestibility (Ceci and Bruck, 1993).

Compared to the interest shown in investigating misinformation effects in children, very little research has looked at the effects of misleading post-event suggestions on elderly people's memory for events. We know of only two modern studies that have directly assessed the susceptibility of the elderly to misleading information in eyewitness situations (Cohen and Faukner, 1989; Loftus et al, 1992). Both of these studies found the elderly to be more suggestible than young adults. In Cohen and Faukner' s study, young adults (mean age = 35 years) and the elderly (mean age = 70 years) were shown a silent film clip of a kidnapping. Ten minutes later, subjects were given a written account of the film to read. For misinformed subjects, this account contained two items of misleading event information. After a further ten minutes, subjects were given a 3-choice recognition test. Significant misinformation effects were found for both age groups, but the elderly misinformed subjects were found to choose the misleading information answer more often than the younger misinformed subjects. In Loftus et al.'s study, subjects were misled about the colour of a car seen in a video. It was found that 5-10 year olds were more misled than 11 - 65 year olds, and that 65-85 year olds were more likely to be misled than 5-65 year olds. However concerns about the methodology of this study have already been outlined above. Furthermore, Loftus et al' s analysis of suggestibility effects was based on only one misleading item and as a consequence the results found may not be reliable. Nevertheless, it is not unreasonable to expect the elderly to be relatively more vulnerable to the distorting effects of misleading post-event suggestions because they have been found to perform relatively poorly on source attribution tasks (e.g. McIntyre and Craik, 1987), and it has been suggested that remembering the source of information may be important in resisting the distorting effects of misleading post-event information (e.g. Belli et al, 1994). Therefore, if the elderly are more likely to forget the source of the misleading information they have encountered, they may be more likely than younger adults to recall this information as if it had actually been encountered during the original event.

One of the many explanations put forward to explain the age differences in suggestibility that have been found is the trace strength hypothesis (e.g. Brainerd and Reyna, 1988). Brainerd and Reyna suggested that age differences in suggestibility may be purely dependent on age dependent trends in forgetting or learning rates rather than age per se with a weak trace caused by inadequate learning or speedy forgetting being more susceptible to subsequent alteration by misleading post-event information. A weak memory trace may be more likely to lead to the acceptance of misleading information because when misleading information is encountered discrepancies may be less likely to be detected between this information and the original event and the misleading information may be accepted uncritically (termed the principle of discrepancy detection by Tousignant, Loftus and Hall, 1986). Loftus et al (1992) suggested that they had found indirect evidence that age differences in suggestibility may be explained by the trace strength hypothesis. This evidence was the finding that, overall, the youngest and the oldest subjects in their study performed relatively inaccurately on non-misleading questions and were also relatively more suggestible than middle age groups on misleading items. However, a correlation analysis was not carried out on individual scores. Therefore it is possible that the elderly and young subjects scoring high on suggestibility were not the same elderly and young subjects scoring low on accuracy for non-misleading questions. Further investigations in this area are necessary before any conclusions can be reached about the applicability of the trace strength hypotheses to age related differences in suggestibility.

In the study reported here, we compared the reliability of children, young adults and the elderly as eyewitnesses in terms of their accuracy in non-misleading circumstances and their suggestibility in misleading circumstances within a single experiment. The stimulus material consisted of a video of a

kidnapping of a newly-born baby from a hospital ward. This material was chosen because it portrayed an event, which included no violence, and addressed concerns relevant to subjects of all ages. Goodman et al. (1990) argued that fear of separation from loved ones is a central concern for children. A major aim of the study was to directly test the trace strength explanation of age differences in suggestibility. Previous research suggests that young children and elderly subjects would be less accurate in their recall than young adults. If any effect of misleading information arises because of difficulty monitoring the source of misleading information and the trace strength hypothesis is true, a correlation should be found between the initial accuracy of event recall and suggestibility. This correlation should be consistent across subjects of all three age groups.

Method.

Subjects: A total of 147 subjects (95 females and 52 males) participated in the experiment. The subjects were divided into 3 age groups : **Children** (n = 52, 25 females and 27 males) aged 7 - 9 years (mean age = 8); **Young adults** (n = 53, 34 females and 19 males) aged 16 -19 years (mean age = 17); and **Elderly** (n = 42, 36 females and 6 males) aged 60 - 85 years (mean age = 70). The mean age at which the elderly subjects had completed their full-time education was 14 years. All subjects were recruited from the same geographical area. The children were primary school pupils, the young adults were further-education college students and the elderly subjects were residents of one of two sheltered housing complexes or members of a social club. All subjects had normal hearing and vision or hearing and vision corrected to normal.

Design: The experiment had a factorial design with 2 between-subjects factors: age of subject (child, young adult, elderly) and experimental condition (control, misinformed). It consisted of three phases. First, subjects watched a short video. Second, they answered 17 questions about the video. Four of these questions included misleading information for subjects in the misinformed condition. Subjects' accuracy was assessed by the number of correct answers and incorrect answers given to non-critical questions during this phase. In the third phase, subjects answered 20 questions, of which four tested for acceptance of misleading information. Suggestibility was assessed as the number of these 4 questions to which subjects gave the post-event misleading information which had been included during phase 2 for subjects in the misinformed group.

Materials and procedure: Within each age group, subjects were randomly assigned to either the control condition or the misinformed condition. Subjects were then shown a 3 minute video recording in groups of 7 to 28 subjects. The video recording showed a baby being abducted from a hospital by a woman posing as a nurse. Subjects were instructed to watch the video carefully as their memory for events would be tested afterwards. None of the subjects had seen the video before.

Immediately after viewing the video, subjects were asked 17 specific questions requiring short answers. The questions were administered verbally by the experimenter to groups of subjects. Subjects were instructed to write their individual responses on the answer sheet provided and were told that it was preferable to leave a question unanswered rather than give an answer of which they were unsure. The questions were presented in the same order as the events had appeared in the video. All subjects were asked the same 13 non-critical questions which assessed accuracy of recall for details of the video (e.g. 'What was the name of the baby?'). The wording of the remaining 4 questions varied according to the experimental condition. For subjects in the misinformed condition, these 4 questions presented misleading information that was inconsistent with events in the video. For subjects in the control condition, these questions did not contain misleading information. That is:-

> For question number 1, control subjects were asked, 'At the beginning of the film, what song was the mother singing to her baby?' while misinformed subjects were asked, 'At the beginning of the film, what song was the mother singing to her baby as she gave him his bottle?'. *(The mother had actually been stroking the baby's face with a teddy and cuddling the baby)*.
> For question 7, control subjects were asked, 'Was the kidnapper wearing a watch?' while misinformed subjects were asked, 'Which arm was the kidnapper wearing her watch on?' *(The kidnapper had not actually been shown to be wearing a watch).*
> For question 12, control subjects were asked, 'What did the nurse tell security to do?' while misinformed subjects were asked, 'After running into the corridor to use the telephone, what

did the nurse tell security to do?' *(The telephone had actually been in the mother's bedroom)*.

For question 17, control subjects were asked, 'What was the colour of the car that the kidnapper got into?' while misinformed subjects were asked, 'What colour was the car in which the two men were sitting waiting for the kidnapper?' *(There was actually only one man seen sitting in the car)*.

Subjects were not informed that some of the questions might contain misleading information. There was a 15 minute interval after the first recall test. During this interval, the young adult and elderly subjects completed a written verbal test and the children returned to their school lessons. After the 15 minute interval, subjects were instructed to think back to the video and were given a second test consisting of 20 specific questions. The questions were read aloud by the experimenter in the same order as the events had occurred in the video and all subjects were asked the same 20 questions. Four of the questions (question numbers 2, 8, 13, and 20) were critical questions and tested for acceptance of the misleading information included in questions 1, 7, 12 and 17 of the first questionnaire. (e.g. 'How many men were seen sitting in the car waiting for the kidnapper?') The remaining questions were filler questions which asked about events in the film.

Results.

***Accuracy*.**

Subjects' answers to the 13 non-critical questions for the first test (phase 2) were scored for correct, incorrect and 'don't know' responses. For this analysis, subjects in the control and misinformed groups were grouped together, as a preliminary analysis had shown no effect of experimental condition on non-critical questions. Table 1 shows the mean percentage of non-critical questions answered correctly, incorrectly or not answered (don't know) as a function of subjects' age.

Correct responses: A one-way ANOVA showed that there was a significant effect of age on the proportion of non-critical questions answered correctly $F(2, 144)=40.51$, $p<.0001$. Post-hoc Bonferroni tests revealed that both the children and elderly subjects made significantly fewer correct responses than young adults (48.1 %, and 40.3%, vs. 63.1% respectively), and that the elderly subjects made significantly fewer correct responses than the children ($p<.05$ for all comparisons).

Incorrect responses: A one-way ANOVA showed that there was a significant effect of age on the proportion of non-critical questions answered incorrectly $F(2, 144)=22.92$, $p<.0001$. Post-hoc Bonferroni tests revealed that both the children and elderly subjects gave significantly more incorrect responses than the young adults (28.9%, and 21.7%, vs. 12.3% respectively), and that the elderly subjects made significantly fewer incorrect responses than the children ($p<.05$ for all comparisons).

Don't know responses: A one-way ANOVA showed that there was a significant effect of age on the proportion of non-critical questions answered by a 'don't know' response $F(2, 144)=16.47$, $p<.0001$. Post-hoc Bonferroni tests revealed that elderly subjects gave significantly more 'don't know' responses than either the young adults or children (38.0%, vs. 24.6%, and 23.0% respectively), and that there was no significant difference between the number of 'don't know' responses made by young adults and children.

	Children (7-9 years)	Young adults (16-19 years)	Elderly (60-85 years)
Correct	48.1%	63.1%	40.3%
Incorrect	28.9%	12.3%	21.7%
Don't know	23.0%	24.6%	38.0%

Table 1: Mean percentage of non-critical questions answered correctly, incorrectly or not answered (don't know) as a function of subjects' age.

Suggestibility.

Subjects' answers to the 4 critical questions in the second test (phase 3) were scored as correct, misinformed responses (containing misleading information presented during phase 2), incorrect (containing other incorrect responses) or 'don't know' responses.

Correct responses: Table 2 shows the mean proportion of critical questions answered correctly as a function of subjects' age and experimental condition. These data were subjected to 3 (age group) x 2 (condition) ANOVA with two between-subjects factors. Both the main effect of age, $F(2, 141)=5.82$, $p<.005$, and the main effect of condition were significant, $F(1, 141)=49.88$, $p<.0001$. Subjects in the misinformed condition gave fewer correct responses overall than subjects in the control condition (43.4% vs. 70.8%). Furthermore, there was a significant age X condition interaction, $F(2,141)=3.27$, $p<.05$. Post-hoc Bonferroni tests revealed that children in the control group gave significantly more correct responses than misinformed children and that young adults in the control group gave significantly more correct responses than misinformed young adults ($p<.05$ for both comparisons). The difference between the number of correct responses given by elderly subjects in the control and misinformed conditions was not significant. Bonferroni tests also revealed that, within the misinformed condition, both the young adults and elderly subjects gave significantly more correct responses than the children. However, there was no significant difference between misinformed elderly and young adult subjects in the percentage of correct responses made.

	Children (7-9 years)	Young adults (16-19 years)	Elderly (60-85 years)
Control	68.8%	76.9%	65.0%
Misinformed	30.4%	51.9%	50.0%

Table 2: Mean percentage of critical questions answered correctly as a function of subjects' age and experimental condition.

Misled responses. Table 3 shows the mean proportion of critical questions answered with misleading information as a function of subjects' age and experimental condition. These data were subjected to 3 (age group) x 2 (condition) ANOVA with two between-subjects factors. The main effect of age, $F(2,141)=6.4$, $p<.005$, and the main effect of condition, $F(1, 141)=71.7$, $p<.0001$ were significant. Misinformed subjects gave significantly more misinformed answers than control subjects (46.7% vs.18.7%). The age x condition interaction was significant, $F(2, 141)=5.1$, $p<.01$. Post-hoc Bonferroni tests revealed that for both children and young adults, misinformed subjects gave significantly more misinformed responses than did control subjects ($p< .05$ for both comparisons). The difference between the number of misinformed responses given by elderly subjects in the control and misinformed conditions was not significant. Bonferroni tests also revealed that, within the misinformed condition, children gave significantly more misinformed responses than both young adult and elderly subjects ($p< .05$ for both comparisons). However there was no significant difference within the misinformed condition between the young adult and elderly subjects in the percentage of misinformed responses given.

	Children (7-9 years)	Young adults (16-19 years)	Elderly (60-85 years)
Control	19.8%	13.9%	23.8%
Misinformed	59.8%	39.4%	38.6%

Table 3: Mean percentage of critical questions answered with misleading information as function of subjects' age and experimental condition.

Other responses. The mean percentages of incorrect (other than misinformed) responses and 'don't know' responses made by subjects are shown in Table 4 . There were too few data to analyse.

Condition	Response	Children (7-9 yrs.)	Young adults (16-19yrs.)	Elderly (60-85 yrs.)
Control	Incorrect	2.7%	1.9%	2.3%
	Don't know	7.1%	6.7%	9.1%
Misinformed	Incorrect	0%	3.7%	2.5%
	Don't know	11.5%	5.5%	8.8%

Table 4: Mean percentage of critical questions answered incorrectly (other than with misleading information) or not answered (don't know) as a function of subjects' age and experimental condition.

Analysis of individual critical questions.

It should be noted that while, within the misinformed condition, children were found to be significantly more misled overall on critical questions, they were not found to be more likely than young adult and elderly subjects to give a misinformed answer to every critical question. Table 5 shows, for each critical question, the percentage of misinformed subjects within each age group that gave a misinformed response. A series of comparisons across age group for the difference between two independent proportions (Ferguson, 1976, p. 173) were made for each critical question. No difference between the children and young adults or between the children and elderly subjects were found in the proportion of misinformed answers given to question number 2 and 13. However, for question number 8 the children gave significantly more misinformed responses than young adults, $z=2.93$, $p<.01$, but there was no significant difference between the children and elderly subjects. For question number 20, the children gave significantly more misinformed responses than both the young adults ($z=3.89$, $p<.001$) and the elderly subjects($z=3.55$, $p<.001$).

Question number	Children (7-9 years)	Young adults (16-19 years)	Elderly (60-85 years)
2	14.3%	26.9%	0%
8	96.4%	65.4%	81.9%
13	25.0%	15.4%%	18.2%%
20	96.4%	50.0%	54.5%%

Table 5: The percentage of subjects in the misinformed condition who were misled on critical questions as a function of age group and question number.

The relationship between accuracy and suggestibility.

A Pearson's correlation coefficient was calculated to assess the relationship between accuracy and suggestibility in misinformed subjects. The variables correlated, for misinformed subjects only, were the percentage of correct answers given to the non-critical questions in phase 2 and the percentage of correct answers given to the critical questions in phase 3. The correlation was not significant ($r(76)=.18$, $p=.12$). A second correlation between the percentage of correct answers given to the non-critical questions in phase 2 and the percentage of critical questions on which subjects were misled in phase 3 gave a similar result ($r(76)=-.16$).

Discussion.

The main aim of the present study was to investigate the effects of age on the reliability of the accounts of events given by eyewitnesses. Reliability was assessed in terms of accuracy of recall for events and susceptibility to erroneous post-event suggestions. Broadly the results were in line with, and provided important extensions to, the existing literature on eyewitness memory. The accuracy of recall to non-misleading questions will be discussed first.

The hypothesis that young children and elderly people would perform less accurately than young adults on questions about an event viewed on video was confirmed. Both young children and elderly people gave significantly more incorrect responses and significantly fewer correct responses than young adults. These results demonstrate that both immature cognitive development and advancing age can, under the conditions used in this present experiment, significantly reduce the reliability of an eyewitness's testimony. Such evidence is in line with previous studies (e.g. List, 1986).

It should be noted, however, that the young adults in the present study were all students enrolled in a further education college. In contrast the elderly subjects had left full-time education at an average age of 14 years. To the extent that education level and other associated demographic variables may affect accuracy of eyewitness testimony, the present study may have exaggerated the advantage shown by young adults relative to elderly people and children. When subjects are drawn from such wide age range as in the present study it is difficult to imagine how all differences between the age

cohorts could be controlled. However, the results on suggestibility and it's relationship with memory strength could not be compromised, even if demographic variables have affected the overall accuracy of recall. Although the elderly subjects left formal education earlier than the young adults, they were no more susceptible to misleading information. Furthermore, our data show no relationship between accuracy and suggestibility

A specific aim of the present study was to allow direct comparison of the eyewitness performance of both children and elderly people within the same study. Such a comparison shows that elderly people and children do not show qualitatively equivalent performance. Young children were found to give significantly more correct responses than elderly people (i.e. their recall was more complete), but elderly people were found to give fewer incorrect responses (i.e. what the elderly did recall was more reliable). Elderly subjects were more likely than either young adults or children to say that they didn't know the answer to a question. Therefore, despite the fact that the children's recollections were more complete than elderly peoples' recollections of events, the sparse information that the elderly subjects gave was more reliable. This finding suggests that young children, even when they are explicitly instructed not to do so, are more likely than the elderly to guess an answer to a question rather than admit that they do not know the answer. However, the effect cannot be explained simply by a reluctance of the children to provide a 'don't know' answer, because they did not make fewer 'don't know' responses than the young adults. The problem appears to be one of knowing when it is appropriate to say 'don't know'. Children may have given relatively large amounts of inaccurate information because, due to their lack of metacognitive ability, they may not have realised that it is possible to misremember what has occurred (Flavell, 1985).

In addition to giving an accurate account of events in normal, non-misleading post-event circumstances, the credible eyewitness should also be able to resist the potentially distorting effects of any misleading post-event suggestions that may be encountered. A second aim of the present study was to allow direct comparison of the susceptibility of children and elderly people to misleading suggestions.

The introduction of erroneous event information during the retention interval was found to have a significant impact on the accuracy of responses given to the relevant questions (the 'critical' questions in our experiment). The hypothesis that misinformed subjects would recall significantly fewer correct event details than control subjects in response to the critical questions was supported for children and young adults but not for elderly subjects. Elderly subjects showed a non-significant trend in the direction of an effect of misinformation. Elderly subjects in the misinformed condition gave about the same number of 'misled' responses as the young adults, but elderly subjects who were not exposed to misleading information gave more responses in the 'misled' category than did young adults in the control condition. Thus, the lack of an effect of misleading information for elderly subjects does not reflect a smaller effect of misleading information, but appears to arise because of greater number of incorrect answers given by elderly control subjects than by young adult controls.

The observed decrement in performance on critical questions in the misinformed condition was entirely attributable to the misleading information as misinformed subjects had performed as accurately as controls on non-critical questions. It should be noted that a significant misinformation effect was found even though all questions were presented in the same order as events had occurred in the video. Bekerian and Bowers (1983) found that by questioning subjects with questions that preserve the order of occurrences in the original event, the original event context was reinstated sufficiently to minimise the deleterious effects of misleading information. Our results do not support this conclusion and therefore do not provide any support for Bekerian and Bowers' co-existence hypothesis.

Examination of the number of errors made by misinformed subjects relative to the control group in Tables 3 and 4, shows that the relative inaccuracy of the misinformed subjects was predominantly due to recall of the misinformation. When subjects encountered misleading post-event information, this information tended to be incorporated into their accounts of the original event. However, differences between misinformed and control subjects in the percentage of wrong (other than misinformed) or 'don't know' responses are small. Therefore, encountering erroneous post-event information does not seem to have made subjects any more unsure or confused than they would normally be about their memories for the event. If both the original and misinformed items of event information were available in memory, as the co-existence hypothesis suggests, it would be

reasonable to expect some misinformed subjects to become confused about which item actually belongs to the original event and consequently give more 'don't know' responses than control subjects. As this was not found to be the case, the data suggest that when misinformed subjects are misled it is either because the misinformation replaces the memory trace of the original event or because it supplements the memory trace in which the relevant information was not encoded in the first place.

Evidence was found that the accounts given by very young eyewitnesses may be especially vulnerable to the detrimental effects of erroneous post-event suggestions. Within the misinformed condition, children were found to be less likely than young adults or elderly subjects to give the correct response to critical questions and more likely to give a misinformed response. Thus, the hypothesis that misinformed children would be more misled by erroneous post-event suggestions than misinformed young adults was confirmed.

Although children were more likely than young and elderly adults to accept misleading post-event information when the data is averaged across all four critical questions, analysis of performance on each individual critical question showed that children were not more likely than adults to accept misleading post-event suggestions for all items. Two of the critical questions concerning relatively peripheral details (the presence of a watch and the number of people waiting in a car) did indeed reveal that children were more likely than adults to accept misleading information. However, the remaining 2 critical questions concerning the main events of the video (the mother cuddling her baby and the nurse phoning security) showed that children were no more likely than adults to accept misleading items of information. The finding that children can resist post-event suggestions concerning some event information equally as well as adults, especially in relation to events of central importance is encouraging evidence for legal applications and consistent with previous research which was designed to more closely replicate testimony in cases of abuse (e.g. Goodman et al., 1990; Rudy & Goodman, 1991).

The present study found that there was no significant difference between misinformed elderly and young adults in the amount of correct or misleading information recalled in response to critical questions. This result highlights another difference between elderly and child witnesses. Although both young and old were less accurate than adults in the first recall phase, the old were no more likely to be misled than were young adults but children were more susceptible to misleading information. In the second test phase there were too few incorrect and 'don't know' responses to analyse. However, the children's acceptance of misleading information cannot be explained by a reluctance to not give an answer. The trend is towards children giving the highest proportion of 'don't know' responses in the second recall test. The failure to find any differences in suggestibility between young and elderly adults conflicts with the results of the only other two recent studies that have compared these two age groups (Cohen and Faukner, 1989; Loftus et al, 1992), although methodological flaws with the latter study have already been noted.

The trace strength hypothesis of misinformation effects (e.g. Brainerd and Reyna, 1988) was addressed by our experiment. Brainerd and Reyna suggested that age differences in suggestibility may be due to correlated differences in learning or forgetting rates, rather than age per se. They hypothesised that people who have a weaker memory trace for events would as a consequence be more susceptible to change by erroneous post-event information. The finding in the present study that young children were relatively less accurate on non-critical questions and relatively more suggestible is consistent with this hypothesis. However, the finding that elderly subjects were relatively inaccurate on non-critical questions but no more suggestible than young adults was not consistent with the trace strength hypothesis. Furthermore, the correlation between accuracy and suggestibility scores of misinformed subjects were was not significant. Therefore, the data are inconsistent with the trace strength hypothesis.

In conclusion, age differences were found in the accuracy with which eyewitnesses can recall witnessed events. Both young children and elderly people were found to give fewer correct answers and more incorrect answers when questioned immediately after viewing a video of a kidnapping than young adults. Elderly subjects were found to give fewer incorrect responses and fewer correct responses to non-critical questions than did young children. These findings suggest that young children and the elderly remember witnessed events less accurately than young adults and therefore make less reliable eyewitnesses. The credibility of the child witness was further reduced by the

finding that, children were more suggestible than young or elderly adults. However, the children were not more misled than the young or elderly adults on questions about the central action in the video. A direct comparison between the performance of young children and elderly subjects showed that although elderly subjects provided less complete recall, they also included less incorrect information than did young children, and that elderly subjects did not show the children's susceptibility to misleading information. Therefore, the performance of elderly and child witnesses was qualitatively different. The results did not support either the co-existence hypothesis or the trace strength hypothesis.

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