



Who? What? When? Using a timeline technique to facilitate recall of a complex event

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ABSTRACT

Accurately recalling a complex multi-actor incident presents witnesses with a cognitively demanding retrieval task. Given the important role played by temporal context in the retrieval process, the current research tests an innovative timeline technique to elicit information about multiple perpetrators and their actions. Adopting a standard mock witness paradigm, participants were required to provide an account of a witnessed event. In Experiment 1, the timeline technique facilitated the reporting of more correct details than a free recall, immediately and at a two-week retention interval, at no cost to accuracy. Accounts provided using the timeline technique included more correct information about perpetrator specific actions and fewer sequencing errors. Experiment 2 examined which mnemonic components of the timeline technique might account for these effects. The benefits of exploiting memory organization and reducing cognitive constraints on information flow are likely to underpin the apparent timeline advantage.

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Introduction

Homicide, violent assault, rape and public disorder are complex crimes that often involve multiple perpetrators. Statistics show that 39% of all violent crime (Home Office Statistics, 2010), 58% of serious and violent crime committed by juveniles (Federal Interagency Forum on Child & Family Statistics, 2011) and up to 23% of sexual assaults (Woodhams, Cooke, Harkins, & da Silva, 2012) implicate multiple assailants. Such crimes pose a significant problem for investigators and the Courts, particularly when an individual suspect does not dispute their presence at the scene of a crime but denies participatory involvement (Roberts, 2003). Successful prosecutions of the guilty require evidence demonstrating a direct link between perpetrators and their criminal actions. Obtaining the best quality witness statements possible in such circumstances is imperative. However, little empirical research has examined the accuracy of witness accounts when more than one perpetrator is involved and no research has exploited contemporary theoretical accounts of memory with a view to facilitating enhanced recall and reporting of multiple perpetrator actions and sequence details. Drawing on the basic memory literature and novel paradigms

in survey methodology, the current research tests an innovative approach to eliciting witness information about the actions of multiple perpetrators.

By definition, a perpetrator's actions are temporally associated with both the perpetrator–actor and the sequence in which the actions took place. Tulving (1983) argued that information in episodic memory is associated with the temporal–spatial context in which it was encoded and, as a consequence, retrieval can rely heavily on reinstating the appropriate contextual representations. The basic memory literature confirms that episodic memory is temporally ordered and that temporal context plays an important role in the retrieval process during free recall (Howard & Kahana, 1999; Kahana, 1996; Unsworth, 2008). Indeed, phenomena such as the temporal contiguity effect (whereby items encoded in close temporal proximity tend to be recalled in close proximity) suggest the temporal clustering of items is a “ubiquitous property” of sequence recall (Polyn, Norman, & Kahana, 2009, p. 130; see Kahana, Howard, & Polyn, 2008).

Recall tasks and investigative interview techniques, in laboratory or field settings, rarely exploit temporal context explicitly when eliciting witness recall. Indeed, many interviews simply involve a question-and-answer exchange determined by the interviewer. Only one technique, the Cognitive Interview (Fisher & Geiselman, 1992; see Fisher, 2010), actively promotes witness-compatible questioning and implicitly draws on temporal context and temporal ordering to facilitate recall (i.e. mental reinstatement of context and reverse order recall mnemonics). In contrast,

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many interview approaches oblige witnesses to ‘start at the beginning’. While this type of linear reporting provides an organizing narrative structure, it may not be an optimal approach for facilitating the recall or reporting of complex events involving multiple perpetrators. Providing such an account necessarily involves selecting which information to provide first (e.g. descriptions, actions, sequence of events) and switching between elements when reporting information about different perpetrators and differentiating between who did what and when. Planning, organizing and maintaining these various elements in memory places heavy demands on cognitive resources. Indeed, switching between episodic elements and ‘holding’ information in limited working memory is likely to disrupt retrieval strategies and limit output (Oberauer & Bialkova, 2009). Furthermore, in verbal interviews, conversational maxims may make it difficult for the witness to suddenly introduce an item that has been retrieved spontaneously but is unrelated to the current phase of the narrative. In written accounts, it may be pragmatically difficult to add additional information without extensive editing. In either case, adding information that is out of sequence will disrupt the narrative flow of the ‘story’ and may be resisted (cf. Grice, 1975). A main aim of the current research was to test a reporting method that (i) capitalizes on temporal context and (ii) provides witnesses with an intuitive organizing structure that facilitates reporting while reducing processing demands.

One obvious organizing principle in any episodic event is that it occurs within a particular time-frame (Lu, Harter, & Grasser, 2009). For an encoded event, witnesses will retrieve some point at which they believe an incident commenced (e.g. *three armed men ran into the bank*) and concluded (e.g. *the getaway car sped off through the intersection*). Between these two points, witnesses may access details of the sequence of events, including who did what, when, and to whom. Thus, one way to conceive of – and retrieve – the incident is with reference to a conceptual timeline between the start and end points.

Although research on witnesses’ episodic memory has not explored the use of timelines to facilitate recall, work in the autobiographical memory domain has focused on how events are organized across longer time periods, such as across the lifespan (Brown & Chater, 2001; Fradera & Ward, 2006). Drawing on Conway’s (1996) multi-level model of autobiographical memory, Belli and colleagues observed that participants in social, medical and economic surveys provided higher quality information when interviewed using techniques incorporating a temporal component, such as event history calendars, than standard interviews (Belli, 1998; Belli, Agrawal, & Bilgen, 2012; Belli, Stafford, & Alwin, 2009). In such interviews, calendars are usually only available to the interviewer who uses the temporal reference point (e.g. Belli, Shay, & Stafford, 2001). Extending the methodology, Van der Vaart (2004) asked respondents to complete a graphical timeline (a grid divided into years and months) prior to answering standardized questions concerning educational history. Use of the timeline procedure enhanced recall accuracy for information about educational courses completed. More recently, Van der Vaart and Glasner (2007) found that recall accuracy was higher when a timeline was present during a standardized interview and the beneficial effects of a timeline as a visual aid were particularly pronounced when the recall task was difficult. Belli (1998) argued that survey methodologies incorporating a temporal component are likely to activate points of association along a rich network of retrieval pathways resulting in enhanced quality and quantity of information regarding extended life periods (cf. Anderson, 1983). If this is the case, a similar argument might apply to investigative interviews probing recall of witnessed (episodic) events.

The current research takes up the challenge of developing a novel timeline technique to elicit information from witnesses. Across two experiments, mock witnesses in the timeline conditions

provided their own account of a witnessed event using a timeline-based report format. Unlike typical timeline methodologies in the survey domain (e.g. Van der Vaart and Glasner, 2007), the timeline format adapted for the current studies did not provide generic personal cues but instead presented a visual ‘timeline’ against which the witness could plot their recollection of the individuals, actions and sequence of events within the incident. In Experiment 1, recall was tested either shortly after exposure to a mock-crime or after a two-week delay. Given the predicted benefits of temporal context for recall, we hypothesized that using a timeline technique during recall would increase the quantity of accurate information reported both immediately and at delay (relative to a standard free recall test). Given the well-documented temporal contiguity effects in the basic memory literature, we predicted that participants using the timeline technique would provide more correct information about perpetrator actions and correctly link those actions to individual perpetrators. Finally, we predicted that witnesses using the timeline technique would be less likely to make errors in the sequencing of their accounts.

Experiment 1

Method

Design & participants

Eighty-one members of the public (39 males; 20–50 years of age; $M = 29$ years, $SD = 8.35$) with a minimum of secondary-level education were recruited from the local community via advertisements. The selection criteria for inclusion were that participants spoke English as their first language, were aged <50 years of age and wore corrective lenses as necessary. After witnessing the stimulus event, participants were randomly allocated within a 2 (Report Format: Timeline vs. Free Recall) \times 2 (Retention Interval: Immediate vs. Delayed) between-subjects design.

Materials

Stimulus event. A multi-perpetrator staged incident was scripted, recorded and edited into a short film (1 min 20 s). The event depicted an assault and robbery involving five male perpetrators and one female victim. In the incident, three males were shown loitering beside a parked car before being joined by two other males. A female, carrying a laptop bag, attempted to pass by the group. They encircled her and one of the group threatened her with an iron bar. The laptop bag was taken and passed between several perpetrators. One perpetrator filmed the assault on a cell phone. The event ended with the five perpetrators running away with the laptop.

Timeline technique. The timeline technique deployed in all Timeline conditions consisted of three elements: (i) A physical cardboard ‘timeline’ (33 in. \times 12 in.) with a line running across the mid-point to each end to represent the conceptual temporal space along which the incident ‘took place’ from start to finish; (ii) Person Description cards (5 in. \times 3 in.) and; (iii) Action Cards (3 in. \times 3 in.). Person Description cards were blank, white, lined record cards. Action cards were blank, yellow cards with a semi-adhesive strip on the back to facilitate removal and re-ordering during use on the timeline.

Procedure

Half of the participants provided their account shortly after watching the event while the other half arranged a return visit to the laboratory two weeks later. In both immediate and delayed Timeline conditions, participants used the physical timeline to structure their report of the witnessed event. They were instructed to use the Person Description cards to report any details they could remember about the people involved in the event, using a new

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