Enhancing the Cognitive Interview with an alternative procedure to witness-compatible questioning: Category Clustering Recall

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Abstract

The Cognitive Interview (CI) is one of the most widely studied and used methods to interview witnesses. However, new component techniques for further increasing correct recall are still crucial. We focused on how a new and simpler interview strategy, Category Clustering Recall (CCR), could increase recall in comparison with witness-compatible questioning and tested if a Revised Cognitive Interview (RCI) with CCR instead of witness-compatible questioning and without the change order and change perspective mnemonics would be effective for this purpose. Participants watched a mock robbery video and were interviewed 48 hours later with either the CI or the RCI. Recalled information was classified as either correct, incorrect or confabulation. Although exclusion of the change order and change perspective mnemonics in the RCI group might have caused a slight decrease in recall during the last interview phases, the RCI group generally produced more correct information than the CI group, with a lower number of confabulations. Further analyses revealed CCR was largely responsible for this increase in correct recall. CCR is a very promising interview technique which allowed the interviewer to obtain more detailed information without additional questions and may have, in certain situations, several practical advantages over a questioning phase.

Keywords: Cognitive Interview; Category Clustering Recall; Witness-compatible Questioning; Change Order; Change Perspective

Interviewing witnesses is a crucial procedure which can determine police investigations' outcome (Fisher, 2010). However, what witnesses report seldom corresponds fully with the witnessed event because memory is not so accurate and witnesses frequently omit information and commit errors (Paulo, Albuquerque, & Bull, 2013). Inadequate interviewing techniques, sometimes used during police investigations, can augment this problem and lead to poor testimonies (Milne & Bull, 1999). To provide police officers with adequate interviewing techniques, Fisher and Geiselman (1992) developed the enhanced cognitive interview which is now commonly referred to as the cognitive interview (CI). The original CI initially included four cognitive mnemonics or interview techniques that aim to enhance recall: report everything, mental reinstatement of context, change order, and change perspective. The CI also comprises several social and communicative components which are crucial for conducting appropriate investigative interviews, such as rapport building, witness-compatible questioning, transferring control of the interview to the witness, and mental imagery (Fisher & Geiselman, 1992). One can read Geiselman and Fisher (2014) or Paulo et al. (2013) for more information about the CI as well as the theories underlying this interview protocol and procedures (Tulving, 1991; Tulving & Thomson, 1973).

Several studies have demonstrated this interview technique can increase the number of correct units of information recalled by witnesses while maintaining high accuracy rates (Memon, Meissner, & Fraser, 2010; Paulo et al., 2013). Such a finding is frequently referred to as the CI superiority effect. This has been replicated in many countries, such as the USA, England, Australia, Brazil, and Portugal (Paulo, Albuquerque, Saraiva, & Bull, 2015b; Stein & Memon, 2006), with different witnesses — for example, children, adults, and elderly (Goodman & Melinder, 2007; Verkampt & Ginet, 2009; Wright & Holliday, 2006), with different delays between the witnessed event and the interview — minutes to months (Larsson, Granhag, & Spjut, 2002), and different events — such as a crime, a traffic accident,

or a phone call (Campos & Alonso-Quecuty, 1999), both in laboratory and field studies (Memon et al., 2010; Colomb & Ginet, 2012; Colomb, Ginet, Wright, Demarchi, & Sadler, 2013).

The CI has been widely trained and used by police forces in many countries such as England, Wales, and Australia. However, this interview comprises multiple mnemonics and instructions which can contribute differently to CI superiority effect (Griffiths & Milne, 2010). Even though procedures such as establishing rapport (Kieckhaefer, Vallano, & Compo, 2014; Nash, Nash, Morris, & Smith, 2015; Vallano & Compo, 2015), asking for an initial free report (Lamb, La Rooy, Malloy, & Katz, 2011) or mental reinstatement of context (Milne & Bull, 1999) have been found to be important techniques for obtaining more information, other CI components may be less effective. Change order and change perspective mnemonics which can be useful for some specific purposes such as increasing cognitive load (Vrij, Fisher, & Blank, 2015) are somewhat controversial procedures for enhancing recall, particularly the change perspective mnemonic (Boon & Noon, 1994; Brown, Lloyd-Jones, & Robinson, 2008; Clarke & Milne, 2001; Clifford & George, 1996; Dando, Wilcock, & Milne, 2008; Kebbell, Milne, & Wagstaff, 1999; Mello & Fisher, 1996). These two techniques have been criticized mainly for three reasons: (i) these procedures take considerable interviewing time which is often scarce in police investigations; (ii) these procedures usually elicit very limited additional information (Bensi, Nori, Gambetti, & Giusberti, 2011); and (iii) police officers often consider these two procedures to be ineffective, time-consuming and difficult to use (Dando et al., 2008; Kebbell et al., 1999). Therefore, replacing or removing change order and change perspective mnemonics from the interview has been discussed to develop shorter and more efficient interview protocols (Colomb & Ginet, 2012; Dando, Wilcock, & Milne, 2009).

For instance, Davis, McMahon, and Greenwood (2005) found a CI short version

without additional recall attempts might considerably reduce interview time with only a small information loss (13%). Dando, Wilcock, Behnkle, and Milne (2011) found participants interviewed without the change order and change perspective mnemonics were able to recall as much information as participants interviewed with a full CI protocol, with higher accuracy. The same authors found recalling in reverse order might be less effective than another free recall (Dando et al., 2011). On the other hand, Bensi et al. (2011) found a second recall provided in reverse order was more effective than a motivated second free retrieval attempt. Therefore, whether these two original cognitive interview mnemonics or other additional recall attempts are worth using is arguable since these often only produce very limited additional information (Davis et al., 2005).

Nonetheless, it can be crucial for an interviewer to obtain more information. Witness compatible-questioning which involves asking mainly open-ended questions compatible with the witness' previous recall and retrieval pattern, might be useful for this purpose (Fisher, 2010). However, matching questions to witnesses' free recall may require a lot of cognitive effort and training on the part of the interviewer. In the traditional type of witness compatible questioning the interviewer has to actively listen to the witness while possibly taking notes to help him/ her plan the subsequent questions and interview procedures (Paulo et al., 2013). Therefore, even though witness-compatible questioning can be very valuable in some situations, according to Fisher (2010) this is probably the most difficult skill of the CI to employ and some interviewers may inadvertently use an interviewer-centred approach (e.g., asking too many questions) or a cross-examination-style questioning which can be detrimental to obtaining accurate reports (O'Neill & Zajac, 2012) and lead the witness to adopt a less participative role during the interview. Therefore, using instead another technique to obtain more information could be very valuable. Since lack of training on witness interviewing is frequently stated by some police officers as a major problem (Dando et al.,

2008; Wright & Holliday, 2005), a simpler technique can be particularly useful when less experienced police officers consider they are not fully prepared to implement witness-compatible questioning.

For this purpose, Paulo, Albuquerque and Bull (2016) suggested asking witnesses for a second retrieval attempt with Category Clustering Recall (CCR). This recall strategy consists of asking witnesses to recall one more time everything they can remember about the crime episode but, this time, witnesses are asked to organize their recall/speech into broad information categories which are present in almost every crime (i.e., person details, object details, location details, action details, conversation details and sound details), instead of temporal clusters as used with the change order mnemonic. Paulo et al. (2016) found participants who used CCR during a second recall attempt were able to recall substantially more information without compromising accuracy in comparison with participants who used the change order mnemonic, also during a second recall attempt. Furthermore, they believe this interview strategy may have several advantages: (i) Recalling a crime event in category clusters might be more natural and compatible with the witness' mental organization of the event because people often naturally/spontaneously encode, organize and recall information in semantic categories (Dalrymple-Alford & Aamiry, 1969; Manning & Kahana, 2012; Robinson, 1966). (ii) Since category clustering is often performed spontaneously, witnesses might be more familiarized with this technique and use less cognitive resources to perform it, focusing more on recall; (iii) According to the spreading-activation theory of semantic processing (Collins & Loftus, 1975), successively recalling information (e.g., 'paper', 'desk', and 'pencil') related to one specific cluster (e.g., objects) gradually triggers other memories (e.g., 'counter') which are closely related to this cluster and might otherwise not be activated and recalled; (iv) This procedure was effective without additional questioning. Use of the CCR only requires the interviewer to be able to explain to the witness a simple instruction.

Therefore CCR requires less effort, interference, adjustment, and training from the interviewer in comparison with witness-compatible questioning.

Nonetheless, even though Paulo et al. (2016) found a second recall with CCR was more effective than a second recall in the reverse order and considered CCR was effective without additional questioning, they did not directly compare CCR with witness-compatible questioning and suggested doing this in future studies. Therefore, to see if CCR could be a viable alternative to witness-compatible questioning, the present study directly compared these two procedures.

Current Study

In the present study, a Revised Cognitive Interview (RCI) with CCR instead of a witness-compatible questioning phase was used to achieve our main goal, i.e., assess if using semantic clustering to guide retrieval instead of witness-compatible questioning would allow participants to recall more correct information. Furthermore, in the RCI condition the change order and change perspective mnemonics were removed to analyze if replacing these with this simpler instruction for recalling new information (*Please focus for a couple of minutes on the video recording you have viewed two days ago, and tell me if you can remember anything else*) would also have an impact on recall in this particular situation. Two main hypotheses were established: (i) Participants interviewed with CCR during a second recall attempt will recall more information than participants interviewed with witness-compatible questioning (Dalrymple-Alford & Aamiry, 1969; Manning & Kahana, 2012; Robinson, 1966); (ii) Replacing change order and change perspective mnemonics with a simpler instruction for recalling new information will not reduce the amount of recalled information.

Method

Participants

A total of 44 Portuguese psychology students, 37 female and seven male, with an age range from 18 to 35 years (M = 20.14, SD = 3.98) participated in this study. First-year psychology students were selected as participants for three main reasons: (1) being first-year students, these participants had no previous courses regarding investigative interviewing or human memory functioning; (2) mock witnesses were used instead of real crime witnesses to achieve high levels of experimental control allowing us, for instance, to use exactly the same crime video for all participants while maintaining very high levels of similarity between interviews of the same interview condition and to accurately measure certain variables (e.g., report accuracy) which could otherwise not be measured; (3) a course credit program for students to participate in scientific studies, already implemented in our University, encouraged these participants to comply with the given instructions and to participate adequately in this experiment. Participants were randomly assigned to one of two interview groups with 22 participants each. One group was interviewed with the full Cognitive Interview (CI). This group had 18 female participants and four male participants with an age range from 18 to 35 years (M = 20.55, SD = 4.14). The other group of participants was interviewed with the revised cognitive interview (RCI). This group had 19 female participants and 3 male participants with an age range from 18 to 35 years (M = 19.73, SD = 3.87).

Design

A between-participants design was used with interview condition as the independent variable with two levels: Cognitive Interview (CI) or Revised Cognitive Interview (RCI). Reported information and accuracy were measured in units of information and proportions, respectively.

Materials

Participants watched the recording on a Fujitsu L7ZA LCD computer screen. A video recording was edited from the second episode of the 2004 Portuguese television drama 'Inspector Max' (Riccó & Riccó, 2004) and was three minutes and 11 seconds long. This non-violent video recording shows a male-armed subject walking inside a bank and taking several hostages to carry the robbery. The robber verbally and physically interacts with the hostages, with the cashier and a police officer who later approaches the robber. All interviews were video and audio recorded.

Procedure

Ethics committee approval was obtained. Having signed a consent form after reading general information about the study, participants took part in two sessions. At the first session, after being randomly assigned to one of the two interview conditions (CI vs. RCI), participants were shown the video recording. Participants were asked to pay as much attention as possible to the video recording because they would be later interviewed about this. A second session took place approximately 48 hours later and each participant was interviewed with the CI or the RCI.

Interview protocol. The CI protocol employed (Fisher & Geiselman, 1992) had previously been translated and adapted for the Portuguese language and found to be effective with a Portuguese population (Paulo, Albuquerque, & Bull, 2015a; Paulo et al., 2015b).

Both interview protocols included two CI cognitive mnemonics: Report Everything and Context Reinstatement, and the social and communicative components described in Fisher and Geiselman (1992) such as rapport building or transfer of control. These CI mnemonics and social components were identical in both interview conditions. The Fisher and Geiselman (1992) guidelines for conducting the CI were followed for all interview conditions. As described below, preliminary phase (1), initial free report (2) and closure (6)

were exactly alike in both interview conditions. Phase 5 was exclusive to the CI protocol. A brief comparison between the two interview protocols (CI vs. RCI) is provided in Table 1.

Insert Table 1

During Phase 1 (preliminary phase) procedures such as greeting, establishing rapport, explaining the instructions and interview purpose to the witness, transferring control of the interview to the witness and asking not to guess were followed for both interview protocols.

During Phase 2 (initial free report) all participants were asked to recall what they could remember about the video in any order and pace they desired. They were reminded to report everything they could remember with as much detail as possible and mental reinstatement of context was applied.

During Phase 3, both groups were reminded about the report everything instruction: *(…) I know it may seem redundant, but it is highly important you continue to report everything you can remember (…) report not only new information you might recall, but also all information you've already reported (…)*. Participants were also encouraged to apply their best effort and these procedure's importance was explained: *Please focus as hard as you can (…) even thought this task might seem redundant, it is highly important (…).*

The CI group experienced witness-compatible questioning with mainly broad open-ended questions (M = 8.73, SD = 1.98) and a lower number of specific close-ended questions (M = 1.91, SD = .19). The number of questions asked was not limited in advance and it was the role of the experienced interviewer to establish how many open-ended questions and close-ended questions (to further address the information the interviewee was providing) were adequate for obtaining as much new information as possible and increasing the overall volume of details. Similar broad questions were asked to all participants (e.g., *Please describe*

everything you can remember about the crime scene; Please describe everything you can remember about the weapon — if the participant previously reported seeing a weapon). However, slight differences across participants in the number and type of questions used (see average number of open-ended and close-ended questions above) was necessary to conduct appropriate witness-compatible questioning which requires being adapted to participants' previous recall. All questions were compatible with the witness' previous recall. Mental imagery instructions were also used — for example, *you told me you looked at the weapon when the robber entered the bank. Can you please close your eyes …, think about everything you remember concerning the weapon …, its color …, its shape …, and when you have a full picture of the weapon in your mind describe everything you can remember about it.*

Participants in the RCI were asked to use Category Clustering Recall (CCR). This recall strategy consisted on asking participants to recall one more time everything they could remember about the crime episode but this time organize their recall/speech into seven information categories (person details; person location details; object details, object location details; action details, conversation details; sound details). Paulo et al. (2016) suggested using these information categories because (i) these are frequently important topics for a police investigation, therefore commonly used in investigative interviews' coding process; (ii) these are very broad categories which are present in almost every crime, therefore minimizing the interviewer's impact on the participant's report and replacing the use of specific questions; (iii) 'conversation' and 'sound' categories focus on a different sensorial mode (hearing instead of vision) which can be important for eliciting new information (Fisher & Geiselman, 1992). Participants in the RCI group were not given any additional instructions or asked any additional questions during this interview phase.

During Phase 4 (second recall) participants in the CI group were asked to report everything they could remember about the video once again, but this time organize their

recall/speech into temporal clusters (in reverse order). Participants were again encouraged to give this report and this procedure's importance was explained (as described above for the RCI group during phase 3). Participants in the RCI group were instead not asked to recall one more time what they could remember about the video. They were simply asked to focus one last time on the video recording and try to remember additional details they had not previously recalled: *Please focus for a few minutes on the video recording you have viewed two days ago and tell me if you can remember anything else*.

During Phase 5 (third recall) participants in the CI condition were asked to adopt a different internal perspective in order to try to remember new details: *(…) please focus on the event as if it was a normal event at the bank instead of a robbery as you probably assumed before seeing the robber entering the bank (…) Can you remember anything else?*. This phase was not conducted for the RCI group.

On the last phase (closure), for both groups appreciation for participants' hard work and cooperation was acknowledged and neutral topics were again discussed.

Interviewer training. An expert in the CI who had followed several qualified courses on investigative interview techniques consisting of more than 50 lecture hours, practice, role-playing exercises, and feedback/ evaluation conducted all interviews. To assure interviewer's performance was adequate and consistent across interview conditions, interview protocols were read verbatim whenever possible (e.g., questioning needs to be adapted according to participants' previous recall). Furthermore, an independent expert on psychology randomly checked 25% of the interviews to evaluate the interviewer's verbal and non-verbal behavior with a structured evaluation grid which included qualitative parameters such as the questioning used, established rapport, instructions clarity, and interviewer's posture/behavior. The independent expert concluded these parameters were adequate and consistent across interview conditions.

Coding. Interview recordings were coded with the template scoring technique from Memon, Wark, Bull, and Köhnken (1997). A comprehensive list of details in the video recording was compiled and units of information were categorized as referring to (i) a person; (ii) an action; (iii) an object; (iv) a location; (v) a conversation; or (vi) a sound, resulting in 378 units of information. Recalled information was classified as either correct, incorrect (e.g., saying the pistol was brown when it was black) or confabulation (mentioning a detail or event which was not present or did not happen). Also noted was the phase within the interview in which a unit of information was recalled. If a unit of information (correct or not) was repeated during the same or a subsequent phase, this information was scored only the first time it was mentioned (Prescott, Milne, & Clark, 2011). Subjective statements or opinions were disregarded (e.g., 'The robber was gorgeous').

Inter-rater reliability. To assess inter-rater reliability, 11 (25%) interviews were selected randomly and scored independently by a researcher who was naive to the experiment aims and hypothesis but familiar with the template scoring method and had access to the crime video. Intraclass correlation coefficients (ICC) were calculated for correct information, incorrect information, and confabulations, and for the six information categories (person, action, etc.). High inter-rater reliability was found for all measures in that ICC values ranged between .985 and 1.000 with an overall ICC of .993.

Results

Bonferroni corrections were applied when multiple statistical tests were conducted on a single data set to avoid type 1 error. Otherwise, an alpha level of .05 was used for all statistical tests (Field, 2009).

Even though participants in the CI group performed one more retrieval attempt (phase 5) than participants in the RCI group, interview length was similar for both groups. Interview

duration according to interview condition and interview phase is presented in Table 2 as are the recall data.

Insert Table 2

First, a multivariate ANOVA was conducted to observe if interview condition had an effect on recall performance throughout the entire interview (all interview phases combined), operationalized in three measures: (1) number of correct units of information recalled; (2) number of errors committed; and (3) number of confabulations committed. This found a significant difference in recall performance according to interview condition, F (3, 40) = 3.16, p = .035, *Wilk's* Λ = .81, η_p^2 = .19. The univariate F tests found participants in the RCI group (M = 93.18, SD = 23.28, 95% CI [82.86, 103.50]) recalled more correct units of information than participants in the CI group (M = 79.32, SD = 21.66, 95% CI [69.72, 88.92]), F (1, 42) = 4.18, p = .047, η_p^2 = .09. Furthermore, participants in the RCI group committed a lower number of confabulations (M = .59, SD = .80, 95% CI [.24, .94]) than participants in the CI group (M = 1.46, SD = 1.50, 95% CI [.79, 2.12]), F (1, 42) = 5.67, p = .022, η_p^2 = .12. There was no difference between participants in the RCI group (M = 6.45, SD = 3.57, 95% CI [4.87, 8.04]) and participants in the CI group (M = 5.82, SD = 3.30, 95% CI [4.35, 7.28]) regarding number of errors committed throughout the interview, F (1, 42) = .38, p = .543, η_p^2 = .01.

Next, two mixed 2 × 3 ANOVAs were conducted to see if interview condition (CI vs. RCI) as well as interview phase (Phase 2 vs. Phase 3 vs. Phase 4) had an effect on: (i) number of correct units of information newly recalled on each phase, and (ii) recall accuracy (ratio between the number of correct units of information recalled over all the recalled units of information). Preliminary phase and closure phase were not included in these analyses

because participants did not recall information at these interview phases, as well as Phase 5 (third recall for new information with change perspective), which was also excluded, since only the CI group performed this interview phase (see Table 2 for recall measures during this interview phase).

Regarding (i) number of correct units of information newly recalled, a main interview condition effect for participants' number of correct units of information recalled was found, F (1, 42) = 5.40, p = .025, η_p^2 = .11. As previously reported, participants in the RCI condition recalled more details than participants in the CI condition. An interview phase effect for participants' number of correct units of information newly recalled was also found, F (1.592, 66.882) = 210.34, p < .001, η_p^2 = .83, as well as an interaction effect between interview condition and interview phase, F (1.592, 66.882) = 22.51, p < .001, η_p^2 = .35. Next we conducted a number of selected Student's t tests to further understand the interview phase and interaction effects described above. Seven Student's t tests were conducted so, due to the Bonferroni correction, an alpha level of .007 was used to interpret these t tests to avoid type 1 error (Field, 2009). Participants recalled fewer new units of information in phase 4 (see Table 2), in comparison with phase 3, t (43) = 15.23, p < .001, d = 3.44, and phase 2, t (43) = 15.98, p < .001, d = 3.39. No differences were found between participants in the RCI condition and participants in the CI condition for the number of correct units of information newly recalled during phase 2 (initial free recall), t (42) = .37, p = .716, d = .11. Nonetheless, during phase 3 (questioning vs. CCR) participants who performed a second recall attempt with CCR (RCI group) recalled more new correct units of information (see Table 2) than participants who answered to a witness-compatible questioning (CI group), t (42) = 6.83, p < .001, d = 2.06. During phase 4 (second full recall with reverse order vs. simple instruction for recalling new information) participants who performed a second full recall in reverse order (CI group) recalled more new correct units of information than participants who were simply asked to try

to recall new details (RCI group), t (42) = 4.95, $p < .001$, $d = 1.49$. However, as shown in Table 2, the number of newly recalled correct units of information was very low for both groups during phase 4, as well as for the CI group during phase 5. Furthermore, as also shown in Table 2, although participants in the CI group recalled more new correct units of information during phase 2 (initial free recall) in comparison with phase 3 (questioning), t (21) = 3.21, $p = .004$, $d = .90$, participants in the RCI group recalled more new correct units of information during phase 3 (second recall with CCR) in comparison with phase 2 (initial free report), t (21) = 3.85, $p = .005$, $d = .86$. Lastly, because each interview condition (see Table 1) has three recall phases (CI: initial free recall, second full recall in reverse order, and new information recall from a different perspective; RCI: initial free recall, second full recall with CCR, and new information recall with a simpler instruction) we compared these sequentially. As shown above, no differences were found between participants in the RCI condition and participants in the CI condition during the initial free recall. For the second full recall attempt (CI: reverse order; RCI: CCR), participants in the RCI group recalled significantly more information than participants in the CI group (see Table 2), t (42) = 17.70, p < .001, d = 5.34. Lastly, regarding the third recall attempt for new information (CI: change perspective; RCI: simpler instruction) no differences were found for the number of correct units of information recalled according to interview condition, t (42) = 1.85, p =.071, d = .56.

Regarding (ii) recall accuracy, no interview condition effect, F (1, 28) = 2.65, p = .115, $\eta_p^2 = .09$, interview phase effect, F (1.286, 36.001) = 2.70, $p = .100$, $\eta_p^2 = .09$, or interaction effect, F (1.286, 36.001) = .55, $p = .509$, $\eta_p^2 = .02$, was found.

Discussion

This study examined whether Category Clustering Recall (CCR) could, in comparison with witness-compatible questioning, increase the amount of information witnesses are able to

report during an investigative interview. Furthermore, this study assessed if a shorter and simpler instruction for recalling new information at a later interview phase would be, in this particular situation, as effective as a full additional recall attempt in reverse order as commonly used in the Cognitive Interview (CI). Our main finding was participants who performed CCR (RCI condition) were able to recall a considerably higher number of newly correct details with very high report accuracy. However, participants who performed a full second recall attempt in reverse order (CI group) were able to recall more new details at this later interview phase than participants who were simply asked to try to recall new details. Nonetheless, recall during these last interview phases (phase four and phase five) was low for both groups.

Since Paulo et al. (2016) recently found using CCR can enhance recall in comparison with the change order mnemonic during a second recall attempt, the present study assessed whether CCR could also be a viable alternative to witness-compatible questioning for obtaining as much new information as possible, i.e., increasing the overall volume of details. This study found participants who performed a second recall task with CCR (RCI group), instead of being asked to answer a witness-compatible questioning with mainly open-ended questions (CI group), provided more new correct units of information. The CCR superiority effect regarding recall quantity is not only noticeable on new recall for phase 3 (where this manipulation was conducted) but also on recall quantity for the entire interview, even though participants in the CI condition had one more interview phase and recalled more new information at later interview phases, as we will address below. The CCR superiority effect regarding recall quantity is also noticeable when recall phases are compared according to interview condition, with a second full recall attempt with CCR (RCI group) being more effective than a second full recall attempt in reverse order (CI group). As comparing these two recall phases (CCR and change order) was not central to this study, these were used at

different times of the interview. Nonetheless, Paulo et al. (2016) controlled this variable and found a similar result. Furthermore, participants in the RCI group surprisingly recalled more new information during their second recall with CCR than during their first recall attempt (initial free report). This is quite an unusual result since the initial free report is usually where a higher number of new details are recalled (Fisher & Geiselman, 1992; Paulo, Albuquerque, & Bull, 2013) as replicated in this study for the CI group. Thus, using category clustering to guide recall of a crime event may be even more effective than an initial free recall attempt and may help to obtain additional information when the initial free report is less detailed. This is a very important finding which should be further addressed. Furthermore, although participants in the RCI condition recalled more information, interview length was similar for both interview conditions. The CCR took an average of six more minutes to be conducted in comparison with a questioning phase, but this is not an unexpected result given participants require more time to provide more information and this additional interview time would not normally represent a major constraint.

Even though broad open-ended questions and information categories might be different in nature, a reduced number of questions during witness-compatible questioning could influence our results. As described in the method section, the number of questions asked to participants in the CI group was not limited in advance and it was the role of the experienced interviewer to determine how many open-ended questions and close-ended questions should be used (in average, 8.73 open-ended questions and 1.91 close-ended questions were asked during witness-compatible questioning). Since only seven information categories were used in CCR to guide recall (person details; person location details; object details, object location details; action details, conversation details; sound details), CCR superiority effect cannot be explained by the use of a lower number of open-ended questions (vs. the number of information categories).

Nonetheless, there are several theoretical reasons why CCR may have been effective. First, according to the spreading activation theory of semantic processing memory is often organized according to semantic similarity, thus activation of semantically related memories occurs when successively recalling information related to one specific semantic category (Collins & Loftus, 1975). Therefore, when asked to recall, for instance, objects, recalling 'chair' might prime similar objects recall (e.g., 'desk' and 'counter') that might gradually trigger the recall of other related objects, such as 'paper' and 'pencil', which might otherwise not be activated and recalled. Furthermore, the present study suggests CCR may be able to trigger recall of semantically related memories without consequent accuracy loss. Second, previous research shows organizing information (e.g., words) into semantic categories (e.g., animals, objects, and plants) either during encoding and/or recall (semantic clustering) typically allows participants to recall more information whether this is used spontaneously or not (Dalrymple-Alford & Aamiry, 1969; Manning & Kahana, 2012). Finally, recalling an event in category clusters might be a natural and familiar strategy compatible with the witnesses' mental organization of the event because people often spontaneously encode, organize, and/or recall information in semantic clusters (Paulo et al., 2016; Robinson, 1966).

Report accuracy was high for both interview groups. Furthermore, error and confabulation frequency was low for both groups, even though the number of committed confabulations was even lower for the RCI group. Therefore, even though CCR elicited more correct details it did not compromise report accuracy. High accuracy was expected for all interview conditions because all the interview protocols contained adequate instructions (e.g., instruction not to guess; rapport building; transfer of control, etc.) and adequate questioning (when questioning was used) in order to maximize report accuracy (Fisher & Geiselman, 2010). Furthermore, category clustering has previously been found to enhance recall in a second recall attempt regarding information quantity while not compromising recall accuracy

(Dalrymple-Alford & Aamiry, 1969; Manning & Kahana, 2012; Paulo et al., 2016; Robinson, 1966).

The change order and change perspective mnemonics have been particularly criticized (Bensi et al., 2011; Boon & Noon, 1994; Dando et al., 2011; Davis et al., 2005; Kebbell et al., 1999), so this study assessed whether these CI components could be replaced with a simpler instruction for recalling new information (*Please focus on the video recording and tell me if you can remember anything else?*). Participants who were given this simple recall instruction during phase 4 (RCI group) were only able to recall (in average) less than one new unit of information at this interview phase (phase 4). However, participants in the CI group who were instead asked to recall one more time everything they could remember in reverse order (phase 4 - change order) and after trying to remember new details while adopting a different internal perspective (phase 5 - change perspective), were able to recall a considerably higher average of new units of information (five units during phase 4 and two units during phase 5). Therefore, in this specific situation, the change order and change perspective instructions were more effective than simply asking the participant if she/ he can add any new detail to her/ his report. However, an alternative explanation could be participants in the RCI condition recalled less information when given this simple instruction at the end of the interview because these participants had previously recalled more information when interviewed with CCR (instead of witness-compatible questioning) consequently being less able to recall new information during this last interview phase. For fully addressing this result new studies with a different research design, where the only difference between interview conditions is at this later interview phase, are necessary.

Lastly, new information recall at these later interview phases was, as usually found in the CI literature (Davis et al., 2005), quite small regardless of what procedure was used. Maybe participants have somewhat ‘exhausted’ their memory capacity and are unable to

recall much more new details, or unwilling to apply more effort, particularly in the RCI condition where participants had already provided a very high number of new details during free recall and CCR.

Practical Implications

Not only did CCR allow the interviewer to obtain more detailed information which may be crucial for police officers and other professionals (Fisher 2010), it also may have several practical advantages over a questioning phase in some situations where an increase in the overall volume of details reported by the witness is necessary for the investigation.

Firstly, CCR is easier to use in comparison with appropriate witness-compatible questioning which typically requires extensive training and experience from the interviewer and is one of the hardest interview procedures to conduct, partly because it needs to be highly adapted to each witness and each report. Moreover, since CCR requires probably less effort from the interviewer, she/ he can allocate more resources to attentively listen to and monitor the witness, plan the subsequent interview phases, take notes if necessary, etc. Secondly, since CCR is a guided recall task (no questions were included) instead of a questioning task, CCR may involve less interference from the interviewer. Interviewers' interference can easily have a negative impact on recall (e.g., detail and accuracy), for instance, when inadequate questions are asked (e.g., suggestive questions), when the interviewer inadvertently uses an interviewer-centred questioning method and the interviewee perceives that since the interviewer is asking him several questions she /he can adopt a less participative role during the interview (e.g., provide shorter responses) or when the interviewer unintentionally uses a cross-examination-style questioning (O'Neill & Zajac, 2012). Therefore, using a recall task instead of a questioning phase might encourage the interviewee to actively participate in the interview and be more responsible for his/ her own report (transfer of control). Thirdly, even

though most interviewing procedures (e.g., rapport building, CCR, etc.) require flexibility, CCR is more generic than witness-compatible questioning since, while using CCR, the interviewer uses very broad information categories present in almost every crime, to guide recall. Again, this can be useful particularly for less experienced police officers who might lack the ability to fully adapt each interview procedure to each witness.

Nonetheless, CCR should not be used instead of witness-compatible questioning at all times. As Paulo et al. (2016) stated these techniques are often complementary. Furthermore, witness-compatible questioning can be used not only to increase the overall volume of reported details but also to increase the specificity of the answer. Thus, witness-compatible questioning can be very important particularly when more experienced police officers are conducting the interview and want to address a specific topic or question.

Lastly our study further supports a possible alternative for time critical situations might be to exclude the later recall attempts from the interview protocol regardless of how they are conducted (e.g., reverse order, different perspective, second free recall or a simple instruction to recall new information) since these procedures seem to be unable to elicit a considerable number of new details which might justify using these in time-demanding situations (Dando et al., 2011; Davis et al., 2005).

Conclusions

Professionals and researchers have now available a new tool to help obtaining more correct information from the witness which was not only previously been found to be more effective than the change order mnemonic in a second recall attempt (Paulo et al., 2016), but also may be particularly useful in situations where a recall strategy might be more appropriate than a questioning strategy (e.g., when increasing the overall volume of details reported by the witness is the interviewers' main goal). Even though CCR might already be partially used

in the field during witness-compatible questioning (Can you describe everyone at the crime scene?), this is likely to occur in many different ways which might have different efficacy and likely to be combined with additional questions (e.g., was anyone else there?). To our knowledge, this is the first study which used CCR without additional questioning and found this procedure to be very effective in comparison with witness-compatible questioning and even in comparison with an initial free recall attempt.

Conflict of interest statement

The authors declare there are no conflicts of interest.

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Table 1

Comparison between the two interview protocols (CI vs. RCI) according to interview phase

	Phase 1	**Phase 2**	**Phase 3**	**Phase 4**	**Phase 5**	**Phase 6**
CI	Preliminary	Free Recall	Questioning	Second Recall (Reverse Order)	New information recall (Change Perspective)	Closure
RCI	Preliminary	Free Recall	Second Recall (CCR)	New information recall	X	Closure

Note: CCR, Category Clustering Recall

Table 2

Number of newly recalled units of information, accuracy and interview time (in minutes) according to interview condition and interview phase.

	Unit of Information				**Accuracy**				**Interview Time**			
	CI		**RCI**		**CI**		**RCI**		**CI**		**RCI**	
Interview Phase	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
2 – Initial Free Report	42.18	16.58	40.46	14.67	.94	.04	.96	.04	9	2	8	2
3 – Quest. / CCR	30.18	9.14	51.86	11.75	.89	.07	.91	.05	10	3	16	6
4 – RO / New inf.	5.36	3.71	.91	2.02	.92	.11	.97	.09	5	2	2	1
5 – New inf. w/ CP	2.14	2.36			.83	.28			3	1		

Note: CCR, category clustering recall; RO, reverse order; CP, change perspective; Quest., questioning; New inf., new information recall