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# IMPLICATION DEGREE AND DELAY ON RECALL OF EVENTS: AN EXPERIMENTAL AND HDV STUDY

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**Abstract**

This paper has done an experiment to test the effect of both retention (immediate vs. delayed one week) and implication degree (neutral vs. involved perspectives) over accuracy and quality of a complex event memory. 56 subjects witnessed a traffic accident adopting the role of either an observer or one of the actors involved in the accident. Subsequently they were asked to describe what happened either immediately or a week later. Several variables on recall were measured. All statistically significant variables were globally analyzed through High Dimensional Visualization (HDV). The results show that from the perspective of codification and taking into consideration the different degrees of involvement, the accuracy of the statements affects only in the immediate recovery since the subjects who encode the incident from the perspective of one of the players involved in the accident appear to ignore the less relevant information from their own perspective providing more specific and organized statements, although also more emotional and autobiographical and with most self-references and personal comments. The HDV graph representing all significant variables show a clear distinction of memories due to subjects perspective.

**Keywords:** Memory, eyewitness testimony, credibility, accuracy, delay, vantage point, High Dimensional Visualization, multidimensional scaling.

**Resumen**

En el presente trabajo se realizó un experimento para analizar el papel del tiempo de retención (inmediato vs. una semana) y de la implicación de los testigos (observadores o implicados) sobre la exactitud y calidad de los recuerdos sobre un hecho complejo. Para ello 56 sujetos presenciaron un accidente de tráfico asumiendo el punto de vista de un observador o de uno de los actores implicados en el accidente. Posteriormente se les pidió que describieran lo ocurrido de forma inmediata o una semana después. Se midieron distintas características de los recuerdos. Las características significativas estadísticamente fueron analizadas globalmente mediante High Dimensional Visualization (HDV). Los resultados muestran que el punto de vista de codificación, con diferentes grados de implicación, afecta a la exactitud de los relatos de los sujetos solo en la recuperación inmediata, ya que los sujetos que codifican el suceso desde la perspectiva de uno de los actores implicados en el accidente parecen obviar la información menos relevante desde ese punto de vista, proporcionando relatos más concretos y organizados, pero también más emocionales y autobiográficos, con más autorreferencias, juicios y comentarios personales. La visualización conjunta de las variables significativas mediante HDV mostró una clara distinción de los recuerdos en función de la perspectiva.

**Palabras clave:** Memoria, testimonio, declaraciones, implicación, emoción, punto de vista, demora, visualización hiperdimensional, escalado multidimensional.

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## Introduction

Memory of a complex event, such as a traffic crash, is affected by many variables (Diges & Manzanero, 1995). The influence of these factors can be grouped into variables related to information encoding, retention and recovery. Among witness features it is considered: gender, age, ethnic group, training / profession, expectations and beliefs, anxiety and the person role at the time of the event. Regarding the latter one, it does not appear the same to be in the role of victim, bystander or offender. The involvement of each of these actors in the incident will determine, first, the focus of attention so that each one will respond to different details. In addition, it is assumed the different activation levels experienced could also play an important role in their ability to encode information about what happened. For example, the violence of the act could affect in different degrees to victims and bystanders. Finally, the scheme used to encode and retrieve information will vary depending on the type of participation, on event interpretation and on expectations and prior knowledge influence.

Consequently, bystanders and victims tend to provide different information. A study based on real traffic crash, conducted by Diges in 1988 (cited in Diges & Manzanero, 1995), found that protagonist players provided further information on accident location and dynamics compared to bystanders. On the other hand, bystanders provided more information about individuals than protagonists.

In general, although within judicial systems give more priority over victim identifications compared to witnesses' identifications, research shows that victims tend to make more perpetrator identification errors than observer witnesses do. Kassin (1984) conducted a research based on a simulated theft and assault crime where it was found significant differences among victims and bystanders on identification accuracy. 53.3% of bystanders correctly identified the thief, none of the victims was able to do so and there was no difference among identification participants. Kassin states that differences in memory task performance for victims and bystanders do not depend on anxiety level, because in this study anxiety level was similar for all groups. Kassin attribute the observable performance difference to an attention factor. Bystanders gaze towards thief face whereas victims gaze at upper torso. One possible explanation is that when someone is a close possible target of an assault addresses their attention to criminal arms and hands movements. This reaction leads to a narrowing of focus that

might have an adaptive value and be similar to the effect known as the weapon focus factor (Loftus, Loftus, & Messer, 1987; Pickel, Ross, & Truelove, 2006). In crimes where a person is intimidated with a gun, the full attention of the witness is focused on what threatens their lives or the lives of others to the detriment of other details of the event as the robber face (Maas & Köhnken, 1989; Steblay, 1992). Weapon focus factor affects not only on identification accuracy but also on offender description, though more moderately.

The effect of the role played at the event has also been observed in statements accuracy and quality. In a laboratory study Harvey, Yarkin, Lightner and Town (1980) manipulated the involvement of subjects interpreting an event. Throughout four experiments they analysed the effect of personal involvement. Results showed that the conditions that lead to greater involvement produced statements with more personal comments and better memory. For these authors involvement affects attention processes, the amount of information processed, the depth of processing and it also facilitates organization of information.

Previously, Anderson and Pichert (1978) conducted a study where they handled the interpretation of the event by asking subjects to describe a previously read story from the perspective of a person who was visiting a house to either buy or steal it. The data showed that subjects remembered different things from each perspective. From these results Pichert and Anderson concluded that possessing a specific schema affects not only coding but also recovery and consider the existence of an important criterion that leads to make some items accessible whereas others remain inaccessible even when both are available in memory.

From these results, Wyer, Srull, Gordon and Hartwick (1982) conducted a study on information processing being read in which the subject goals were manipulated, using a methodology similar to that of Anderson and Pichert (1978). The results show how the coding perspective, when presented previously to the text, affects the appearance of relevant and irrelevant information, increasing both in comparison with the absence of perspective. However, no effects occur when the perspective is established immediately after codification. According to Wyer et al. the approach taken in the encoding and retrieval lead to a focus on the relevant items in relation to the current perspective.

Later, Nigro and Neisser (1983) conducted four experiments to study the point of view influence on autobiographical memories. They compared a vantage point of an observer, when subjects were taking an external perspective regarding the incident, and a field perspective, when subjects were taking their own perspective. The data from this study led them to conclude that both perspectives with several degrees of involvement are in the memory. The use of one perspective or another in the memory depends largely on the retention interval, as the subjects tend to use a field perspective when recovering recent events.

McIsaac and Eich (2002) studied the effect of vantage point on memories asking subjects to undertake a series of manual tasks and later to recall their experiences while doing so from either a field or an observer vantage point. In the former case, subjects mentally reinstated the original task environment as if they were seeing it again through their own eyes. In the latter condition, the original task environment was envisioned from the perspective of a detached spectator. Results showed marked differences in the contents of field and observer memories. Whereas field memories afforded richer accounts of the affective reactions, physical sensations and psychological states that the subjects experienced as they performed the tasks, observer memories included more information about how the subjects looked, what they did or where things were.

Changes form one perspective to the other may have an asymmetrical effect. Berntsen and Rubin (2006) conducted an experiment to study the relation between field and observer perspectives in memory for ten different emotional states, including both positive and negative emotions and emotions associated with high vs. low intensity. Results lead to conclude that observer perspective was associated with reduced sensorial and emotional reliving across all emotions. This effect was observed from a naturally occurring memory perspective and when participants were instructed to change their perspective from field to observer but not when participants were instructed to change their perspective from observer to field.

Emotional aspects of event processing may be one of the main factors to explain differences between vantage points. McIsaac and Eich (2004) replicate their former study taking into consideration memories about traumatic events. Data showed that field memories afforded richer accounts of affective reactions, somatic sensations and psychological states that participants experienced during the focal trauma. Observer memories contained more information about participant physical appearance and

actions and the spatial layout of the traumatic scene. Observer trauma memories were also experienced as less emotional and anxiety provoking than field trauma memories.

In summary, field and observer memories are accompanied by different subjective experiences. Evidence on this effect was first reported by Robinson and Swanson (1993) who asked subjects to recollect autobiographical events from various times in their lives. The students classified each event as either a field or an observer memory and rated their original and current emotional intensity (i.e., how the event made them feel when it took place vs. how they felt about it at the time of the experimental session). One week later, students recalled the same events a second time (either from the original vantage point or from the alternative perspective) and again rated their past and present emotional intensity. Though there was little change in rated emotionality (either original or current) when the vantage point remained constant or when it shifted from observer to field, switching from field to observer produced a marked decrease in both measures. As Schacter (1996) has remarked these results suggest that emotional intensity of an event depends on how one goes about remembering it, but also, the emotions attributed to the past sometimes arise from the way in which memories are retrieved in the present.

Most authors (e.g., Tversky & Marsh, 2000) who have researched on perspective effect on report refer to the schematic memory model (Alba & Hasher, 1983) to explain the data found. According to the theory of schemas, the information coded and stored in memory is determined by a pattern or a conceptual framework that selects and actively modifies the experience to result in a coherent, unified and consistent with prior knowledge representation confirming the expectations. Only those pieces of information that are relevant to the activated scheme will be coded. Only those pieces of information being consistent with the pattern used for coding will be recovered whereas information pieces not being consistent will not be coded or the coding will be less developed compared to coherent pieces of information. The absence of an appropriate context can prevent, under certain circumstances, from activating the necessary schema in the recovery process (Alba & Hasher, 1983). Finally, the perspective adopted by subjects during information processing determines the schema do the correct selection of relevant information, provide the correct inference of missing information or not codified and, in general, facilitate the reconstruction of the original facts.

In order to deepen the knowledge about perspective involvement effect on witness statements quality and accuracy the following experiment, which also analysed the differences between bystanders or neutral witnesses compared to involved witnesses in the course of time, was performed: What kind of differences are between the statements of neutral observers and the subjects involved in the fact witnessed? Would the substantive differences that may be found immediately after the incident that happened a week later be the same? In case of statements differences are found, are they expressing a consistent, coordinated set of cognitive processes or a set of discrepant, different isolated processes?

It is expected that neutral perspective elicits a greater autobiographical distance in relation to the event and in this sense it would produce a less episodic and more semantic recovery of information than the involved perspective. The more involved in the incident the individuals, the more significant the memory traces should be. Information processed from a neutral observer perspective, much more passive, would lead to a more superficial processing, and thus create more perceptive memories. The deeper processing due to an involved perspective would lead to more significant memory traces. This implies descriptions of memory given by the subjects containing more self-references and personal comments on the incident. The descriptions should also contain more references to cognitive processes as a result of an increased number of inferences being necessary to interpret information, making it consistent with the subject role. Memories of those who played a role of neutral witnesses are more likely to appear as a succession of more disjointed sensorial elements.

On the other hand, it would be expected that information coded as an involved person will give rise to shorter descriptions with less complete information both accurate and distorted due to subjects processing information consistent with their role on a priority basis. Incongruous and irrelevant information to subject perspective will show lesser processing (Anderson & Pichert, 1978; Tversky & Marsh, 2000).

Additionally, it is expected that all relevant variables will distinguish memory traces in a consistent way. All variables will represent different traits of a whole cognitive process with respect to subject perspective. In case data corroborates this hypothesis, an HDV graph will permit to view all statistically significant variables at the same time. It should be still possible to see a clear differentiation pattern formed by all significant variables together. In case this hypothesis is not corroborated, the HDV graph will serve as a counterfactual (Popper, 1960, 1969).

Finally, the manipulation of the retention interval would lead to deterioration in memory traces and hence to a lower efficiency (less accurate information and more distortions) the more time has elapsed from the incident to the recovery task. In addition, it is hypothesised that due to the effect of the time elapsed, memory descriptions will contain less sensorial information, less information from of the event internal context and more references to cognitive processes.

## Method

### Participants

Participants were 56 Psychology students (42 females and 14 males) between 17 and 28 years old with an average age of 18.85 (SD= 2.25).

### Procedure and design

Subjects were assigned randomly to two different groups. One of the groups was asked to carefully observe a television monitor where they were going to be able to witness a traffic accident. The other group, before witnessing the filmed event, was instructed to try to put themselves in the place of one of the incident protagonists, specifically, a blue car that appears in the sequence from the beginning of the recording (they had not been warned that was one of the cars involved in the incident). Immediately after, all subjects performed a filling task with duration of 10 minutes, which involved describing an itinerary on the university campus. Subsequently, half of the subjects in each group were asked to perform a free recall task. The other half of each group were told that they should return a week later. After this time they were asked to perform a memory task. Each group was reminded of the perspective adopted during the coding in the task instructions. No limit of time to describe the event was imposed to groups.

| | Neutral | Involved |
|---|---|---|
| **Immediate Recall** | N= 16 | N= 14 |
| **Delayed Recall (1 week)** | N= 14 | N= 12 |

A complex event was the material to be remembered. It was presented in a video 29 seconds long and without any sound depicting a traffic crash where two cars collide at an intersection between two streets. The scene starts with an introduction where it is possible to see one of the cars involved in the accident along with other vehicles circulating on a street that runs through a park. Then, this car arrives at a crossroads, it stops and starts marching again colliding at a low speed with another car that was coming perpendicular to it. The outcome of the incident shows the consequences of the collision, where one can see that the vehicle that appears in the early scenes is moved by the second car until it eventually stops beyond the intersection with numerous damages.

In all cases subjects were previously informed about the nature of the event, its brevity and the absence of sound. All subjects saw the movie on a TV at a university classroom. The recovery tasks were conducted in the same classroom. In addition, a response analysis protocol was used to measure the accuracy of descriptions provided by the study subjects. This protocol describes the event through propositions. This protocol is useful in accuracy assessment; avoiding bias and easing the score, as shown in several previous studies (see Diges & Manzanero, 1995).

**Measures**

To assess the effects of witness involvement degree and retention interval, different types of measurements were done. On the one hand, in order to measure accuracy, accurate and distortions were considered. When witnesses were interrogated, the aim is to get as much accurate information as possible about what happened. On the other hand, measurements on statements quality were also done, according to the Reality Monitoring (RM) model (Johnson & Raye, 1981; Johnson, Hastroudi, & Lindsay, 1993). Phenomenological characteristics of witnesses' stories were proposed to assess credibility from intuitive knowledge (Lindsay & Wells, 1983) and from expert procedures, using different techniques such as CBCA (Steller & Köhnken, 1989) or

those based on RM (Granhag, Strömwall, & Landström, 2006; Steller, 1997; Vrij, Akehurst, Soukara, & Bull, 2004). Furthermore, from a theoretical point of view, the phenomenological characteristics are the measures that may provide more information about the processes underlying these effects (Johnson, 1988, 2005).

To measure descriptions accuracy, absolute values of accurate and distorted information as appeared in the statements were considered. To measure phenomenological features, the procedure was different. The analysis took into account the length of the stories. The raw data were obtained considering the average of information from each of the features for every 100 words. See Table 1 for categories of analysis.

**Table 1.** Description of the accuracy and phenomenological features categories.

| |
|---|
| ACCURACY MEASURES |
| 1. Accuracy details: Amount of correct information provided.. |
| 2. False details: Incorrectly described details or fabrications.. |
| 3. Global information: Overall amount of information provided. |
| PHENOMENOLOGICAL FEATURES |
| 1. Sensorial information: Information relating to sensorial aspects of the event: colours, sizes, ... |
| 2. Contextual information: Information about spatial and temporal aspects of the environment in which the event takes place |
| 3. Mentioning of cognitive processes: Explicit allusion to cognitive operations. |
| 4. Judgements and personal comments: Judgements about some aspect of the event and personal additions. |
| 5. Self-references: Number of first person pronouns or first person verb forms that revealed a pronoun in the deeper structure |
| 6. Length of the narrative: Number of words of the report. |

**Reliability**

The protocols of the free narrative account were submitted to content analysis by two expert encoders who were trained specially for this study with examples taken from each category. The encoders were divided into two groups of two encoders each who jointly evaluated the protocols. Each group encoded 50% of the interviews of each of the experimental conditions. To assess the encodings' reliability for whitin- and

between-coders, the Agreement Index [AI= agreements/ (agreements + disagreements)] was computed. In the all of the variables measured, this was greater than the cut-off .80 (Tversky, 1977). Thus, having contrasted the results i.e., the within and between encoder consistency, we can conclude that our results are reliable (Wicker, 1975).

**Data analysis**

ANOVA were performed to determine experimental variable influence. In order to verify if all significant variables were expressing a consistent, coordinated set of cognitive processes or a set of discrepant, different isolated processes, a HDV technique is used. The main idea was to visualize all measurement of each subject at the same time, drawn as data points. A set of coordinated cognitive processes should show a clear distribution of data points considering all significant variables at a time.

These techniques facilitate data analysis using the power of human vision to detect patterns. This is especially true when data is multidimensional. In case of having more than three significant variables, mathematical techniques to reduce dimensionality are required to allow a graphical representation. In order to reduce dimensionality, multidimentional scaling (Steyvers, 2002; Buja et al., 2004) was used. Each point in the hyper space has a distance to each other point. Multidimentional scaling will search 3D points preserving those distances as much as possible. Distance between points applies a normalized Euclidean distance (Barton & Valdés, 2008) as shown bellow:

$$d_{ij} = \sqrt{(1/p)\sum_{j=1}^{p}\left(x_{ij} - t_{ij}\right)^2}$$

The normalized Euclidean distance is as the same as the regular Euclidean distance but the apparent higher distance due to a high number of dimensions is corrected though normalization (that is, considering *p*, the number of dimensions).

The quality of the transformation is measured with the Sammon Error (Romero, Valdés, & Barton, 2007; Barton & Valdés, 2008). It is calculated as follows:

$$Sammon\ error = \frac{1}{\sum_{i<j}\delta_{ij}} \cdot \frac{\sum_{i<j}\left(\delta_{ij} - \zeta_{ij}\right)^2}{\delta_{ij}}$$

$\delta_{ij}$ is the distance (or dissimilarity) between points i and j in the original space. $\zeta_{ij}$ is the distance in the 3D space where dimensionality has been reduced to enable graphical representation. Therefore, the Sammon error compares the differences between the original distances between points, in the original hyperspace, and the distance of the new representing points in the 3D space.

Finally, the 3D points are represented using VRML (Virtual Reality Modelling Language). VRML can be seen using VRML viewers that allow the graphical rotation and exploration, easing visual data analysis.

## Results

Statements were transcribed and any condition reference was removed. Two independent raters then coded the statements. Results are presented separately for accuracy and quality measures.

### Accuracy mesures

**Table 2**. Means (and standard deviations) for ratings for accuracy measurements of neutral and involved perspectives at immediate and delayed retention intervals.

| **Retention Interval** | **Immediate** | | **Delayed** | |
|---|---|---|---|---|
| **Codification Perspective** | **Neutral** | **Involved** | **Neutral** | **Involved** |
| **Accuracy details** | 12.44 (3.076) | 9.86 (3.009) | 11.07 (3.362) | 11.83(3.129) |
| **Distortion details** | 1.06(1.181) | 0.79 (1.051) | 1.07 (0.997) | 1.08 (0.669) |
| **Global information** | 13.5(2.898) | 10.64(3.392) | 12.14 (3.592) | 12.92(3.204) |

Data analysis (Table 2) found significant effects of codification perspective x retention interval on accuracy details, $F(1,52)= 3.913$, $p<.05$, and global information, $F(1,52)= 4.303$, $p<.05$. No main effects were found of codification perspective and retrieval information on these measurements.

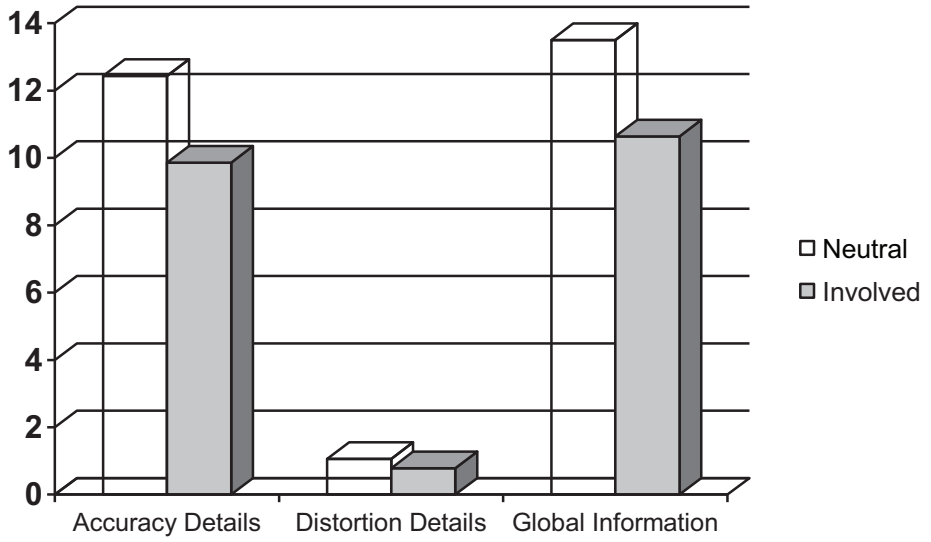


**Figure 1**. Average scores for accuracy measures for neutral and involved perspectives in immediate retention intervals.

ANOVA analysis of single effects showed that codification perspective effects were influenced by retention interval. Codification perspective significantly influenced accuracy details, $F(1,29)= 5.361$, $p<.05$, and global information, $F(1,29)= 6.293$, $p<.01$, only when subjects retrieved the information immediately. In both cases statements from neutral perspective contained more information compared to the involved one.

ANOVA analysis of main effects of retention interval showed no significantly effect on accuracy measurements ($p>0.1$).

**Phenomenological features**

ANOVA analysis of data (see Table 3) showed no effects of codification perspective x retention interval on phenomenological characteristics. Analysis of main effects showed that codification perspective affected the references to cognitive processes, $F(1,52)= 7.314$, $p<.01$; comments, $F(1,52)= 6.214$, $p<.01$; self-references, $F(1,52)= 107.672$, $p<.001$; and length of the narratives, $F(1,52)= 4.146$, $p<.05$. Statements from involved conditions contained more references to cognitive processes, more data about personal implication as comments and self-references are suggested and they are short in comparison with statements from neutral conditions.

**Table 3.** Means (and standard deviations) for ratings of phenomenon features of neutral and involved perspectives at immediate and delayed retention intervals.

| **Retention interval** | **Immediate** | | **Delayed** | |
|---|---|---|---|---|
| **Codification perspective** | **Neutral** | **Involved** | **Neutral** | **Involved** |
| **Sensorial information** | 2.411 (1.098) | 2.542 (1.906) | 2.936 (2.393) | 2.662 (1.284) |
| **Contextual information** | 7.081 (2.574) | 7.808 (2.127) | 4.806 (2.091) | 5.739 (3.372) |
| **Cognitive processes** | 0.05 (0.203) | 1.139 (0.904) | 0.866 (1.677) | 1.455 (1.397) |
| **Comments** | 0.661 (0.899) | 1.212 (1.34) | 0.611 (0.851) | 1.846 (2.08) |
| **Self-references** | 1.940 | 79.255 | 7.437 | 66.210 |
| **Length of the narrative** | 107 (34.035) | 85.5 (26.097) | 110.857 (49.299) | 91.333 (37.284) |

Retention interval only affected contextual information, $F(1,52)= 9.989$, $p<.005$. Delayed statements had less contextual information than immediate ones.

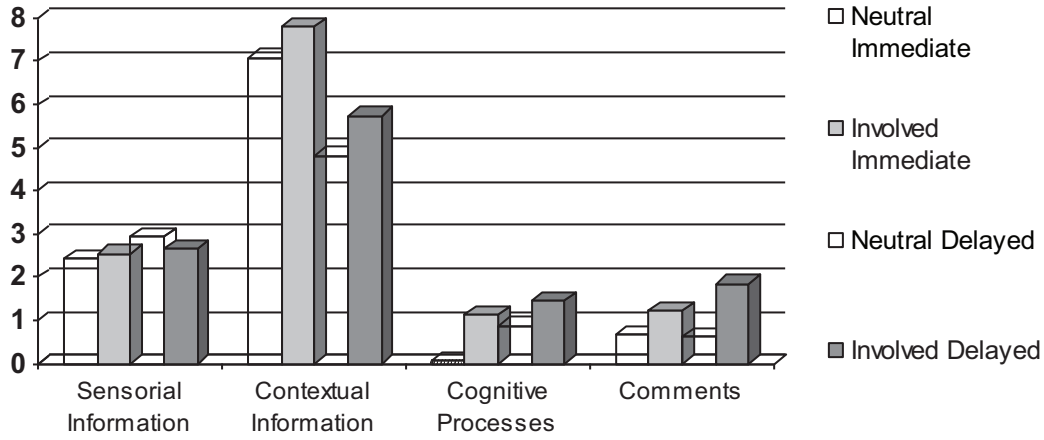


**Figure 2**. Average scores for phenomenological characteristics for neutral and involved perspectives in immediate and delayed retention intervals.

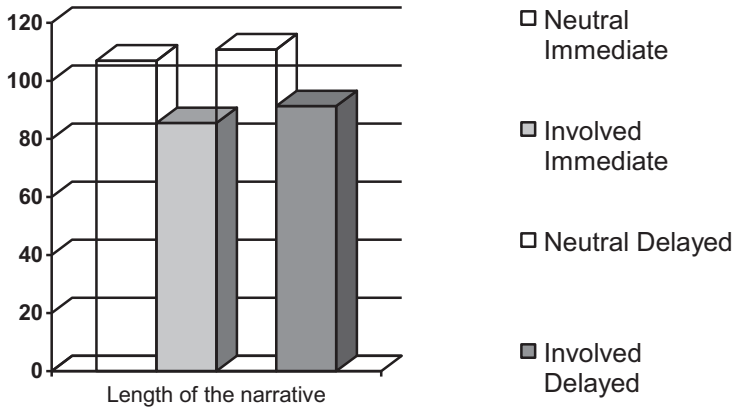


**Figure 3**. Average scores for length of the narratives for neutral and involved perspectives in immediate and delayed retention intervals.

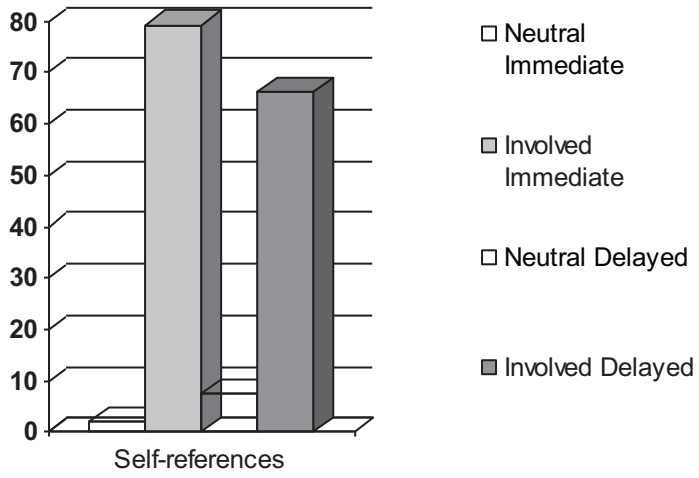


**Figure 4**. Average scores for self-references for neutral and involved perspectives in immediate and delayed retention intervals.

Figure 5 shows 2 sets of points. Almost all light grey points (involved perspective) appear in the upper set. All dark grey points appear in the lower set. Points represent at the same time all 6 significant variables.

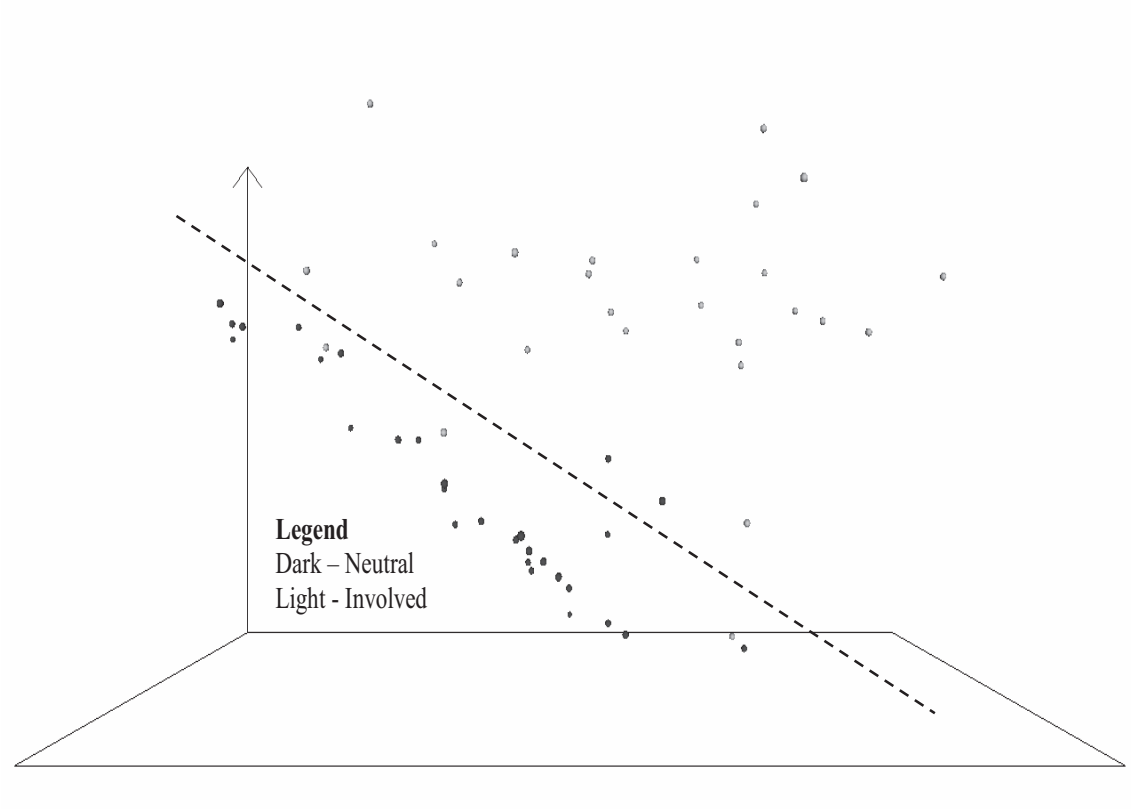


**Figure 5**. HDV 3D Graph of all 6 statistically significant variables.

The variable 'length of the narrative' was normalize with respect of the maximum value among all other significant variables in order to get a simpler graph. The error due to dimension reduction through Multidimensional Scaling is *Sammon error= 0.009*, a very low value. This graphical distribution is consistent with the hypothesized idea of a set of coherent cognitive processes. In case it is a plane is established (represented by the doted line) to separate both types of points it is obtained a 91% correct classification, showing that both groups are distinguishable.

Figure 6 has a 30º x axis rotation in relation to figure 5. It is possible to see that both point groups are approximately around to planes. Shape and structure of both shapes are quite similar. The main source of dissimilarity is then, the subject perspective. This is still correct when considering all significant variables at a time.

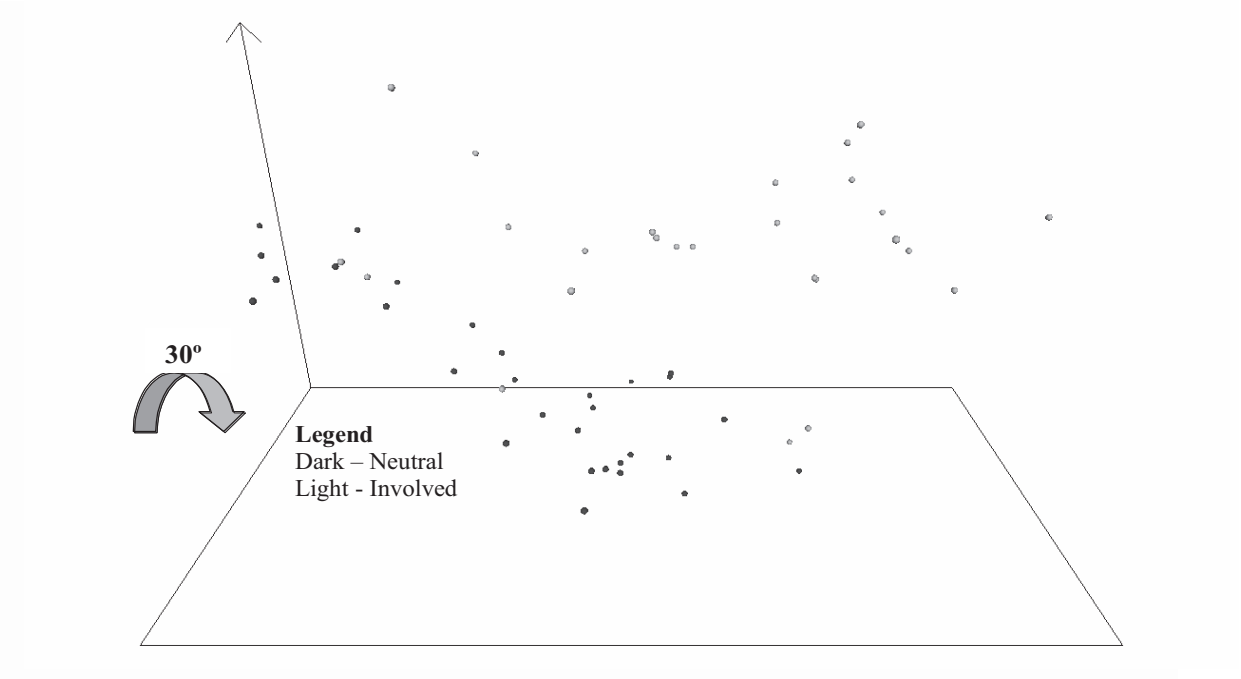


*Figure 6*. HDV 3D Graph of all 6 statistically significant variables. 30º x axis rotation

## Discussion

This study aimed to analyze the main effects of the subject's degree of involvement in the incident and the retention interval. The first conclusion to be drawn from data is that subject involvement affects descriptions accuracy of memory only in terms of immediate recovery. The subjects codifying the event from an involved

perspective provide less complete and accurate information than subjects who do it from a neutral perspective. This effect could be due to the focus that occurs on the relevant aspects from the codification perspective, as suggested by Anderson and Pichert (1978), or Tversky and Marsh (2000). Thus, when recall is asked immediately after the incident was witnessed, the subjects who processed the information from an involved perspective carried out a driven recovery that was more consistent with the context in which it was codified.

The main effects of the subject's involvement, independently of retention interval, happened on statements quality. These effects were consistent with the assumptions made previously. When the subjects codifying the incident from actor's perspective involved in the traffic crash are compared with those who did so as mere observers the stories were shorter, contained more references to cognitive processes, more self-references and more personal comments. No significant effects were found about the subject's perspective in relation to sensorial and contextual information. References to cognitive processes are more frequent in the statements provided from involvement conditions. This confirms the greater internality of the accounts as a result of the effect of rising inferences to fit the original information and interpretation imposed by perspective. The statements were longer in neutral conditions, which is explained by the fact that the information in these accounts seem to be less organized, giving the impression that they are recovering less integrated elements of a defined pattern and need more words to express it; even considering that in these statements appear less internal characteristics such as personal implications and references to cognitive processes. The retention interval significantly affected contextual information in the direction of the expected results in line with previous research also manipulating this variable (e.g. Alonso-Quecuty, 1992; Manzanero, 2006).

In summary, most of the subjects' involvement in the events witnessed produces more concrete and organized memories, as well as more autobiographical. However, this effect was not maintained along the time because the difference disappears one week later. In addition, the delay increases the references to cognitive processes, which could indicate a greater effort for the reconstruction processes in memory, while reducing the richness of details, appearing less contextual information. These data confirm those found by Talarico, LaBar, and Rubin (2004) which suggested that people tend to recover recent events from a field vantage point, while the more

remote facts are recovered from an observer's point of view, i.e. more objective and less autobiographical.

Finally, results show how memories are gradually losing their autobiographical characteristics while deteriorating in terms of its accuracy. These data should be considered when assessing the credibility of a statement in legal contexts. Thus, the time elapsed since the incident took place until the witnesses are interviewed would be one of the variables that difficult the credibility assessment, along with the multiple retrieval and preparation of statements (Alonso-Quecuty & Hernandez-Fernaud, 1997; Manzanero & Diges, 1995; Strömwall, Bengtsson, Leander, & Granhag, 2004; Suengas & Johnson, 1988). In this case, it would be difficult to determine the reality of a statement after a long time in cases where the witness has had to retrieve many times what happened and when statements have been prepared beforehand. Witness role at the event should also be properly valued, given that their event involvement could affect the quality of their stories and thus skew their valuation. In this direction, to the extent that the analysis of the credibility of the statements should be made by comparing the testimony under review and another from some source clearly established it should also be taken into account that the differences could be explained by the differential impact of these variables. To minimize the subjectivity of the assessments of credibility it would be required to conduct more research on the effect of different factors on the accuracy and quality of the statements as well as the procedures to control it (e.g., trained interviewers).

Several variables finally showed their ability to distinguish (those statistically relevant) between groups. The question then is: Are those variable signs of the same underlying process or of different but coordinated processes? Or, on the other hand, are those variables showing the action of independent processes? In case of coordinated processes, the HDV should show an ordered, distinguishable graph. In case of discrepant or independent processes a "disordered" more complex graph is expected. Figures 5 and 6 show an ordered, distinguishable graph, suggesting one underlying process or a set of underlying coordinated processes. The different significant variables are then not differentiating the memories in opposite ways, but in a consistent manner. More research, especially towards theories depicting specifically those cognitive processes is needed.

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