

The Effects of Verbal Descriptions on Eyewitness Memory: Implications for the Real-World

Abstract

The criminal justice system depends on verbal accounts of crimes. Can the act of reporting a crime harm eyewitness memory for the perpetrator of that crime? The answer is yes according the *verbal overshadowing effect*. The verbal overshadowing effect describes the finding that memory is adversely affected after verbally describing a previously presented item (e.g., face). Often in studies of the verbal overshadowing effect, participants watch a video of a mock crime, describe the perpetrator (verbal condition) or engage in another task (control condition). In many of these studies, including the original (Schooler & Engstler-Schooler, 1990) and replication studies (Alogna et al., 2014), memory for a perpetrator is tested on target-present lineups, and, if described, the perpetrator is less often identified. However, it is unknown whether or not the lower identification rate is due to reduced discriminability or due to more conservative responding after providing a description. The verbal overshadowing effect ought to be defined as a reduction in discriminability, which is measured by taking both the correct ID rates (from target-present lineups) and false ID rates (from target-absent lineups) into consideration. Another important and independent measure is the reliability of identifications (i.e., the positive predictive value of a suspect identification made with a given level of confidence). As matters stand, the take-home message is this: Too little information currently exists to allow for an assessment of the effects of verbal descriptions on discriminability and reliability; thus, the field is not yet in a position to offer clear guidance for practice in the criminal justice system.

Keywords: eyewitness memory, verbal overshadowing, discriminability,

1. Introduction

1.1. Reporting Crimes and Making Identifications

From a criminal offence to completion of the ensuing court case, the criminal justice system follows a linear process. The entire process usually takes at least several months, and as shown in Figure 1 may include the: crime, report, investigation (if deemed worthy by the police), eyewitness identification (ID) procedure administration, formal charge against the suspect, and court case. The timescale in Figure 1 represents averages of indicted cases in the UK (UK Ministry of Justice, 2011). Reporting a crime to the authorities inevitably involves describing details of the crime and the perpetrator(s). Emergency services call dispatchers and investigating officers are trained to ask questions about the crime in such a way that as much accurate information as possible is gathered in a non-suggestive way (Technical Working Group for Eyewitness Evidence, 1999), and online self-report forms follow a similar structure (College of Policing, 2013). To answer questions about the perpetrator, eyewitnesses are asked to describe the individual. If needed, eyewitnesses are prompted to consider the perpetrator's age, gender, ethnicity, height, build, distinguishing characteristics, etc. (Association of Chief Police Officers, 2016). If police later identify a suspect, as part of the investigation, a lineup procedure may be administered to eyewitnesses.

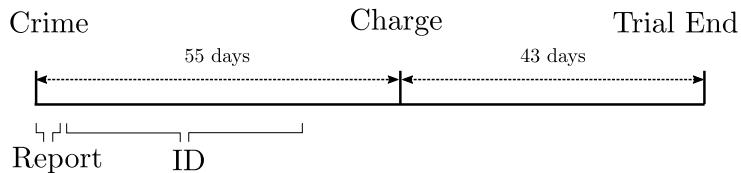


Figure 1: Criminal justice system case progression

A lineup consists of the police suspect (who may or may not be the perpetrator) and several other individuals who physically resemble the perpetrator, called “fillers”. The lineup members are all presented via photos or videos, and the witness attempts to identify the perpetrator (ID in Figure 1). What if the 25 task of verbally describing the perpetrator has a detrimental effect on memory for that very perpetrator?

1.2. The Verbal overshadowing Effect

That is the implication of a finding first reported nearly 30 years ago (Schooler & Engstler-Schooler, 1990). In a set of experiments, participants viewed a video 30 of a mock robbery during the study phase, and either described the perpetrator (verbal condition) or engaged in a control task (control condition). Memory for the perpetrator, or target, was tested on an 8-person simultaneous target-present lineup. Surprisingly, participants in the verbal condition were less able to correctly identify the target than those who were not asked to verbally describe 35 the perpetrator. This counterintuitive finding, termed the *verbal overshadowing effect*, inspired much followup research with mixed results (e.g., Smith & Flowe (2014); Nakabayashi et al. (2012); Wickham & Swift (2006); Kitagami et al. (2002); Dodson et al. (1997); Finger (2002); Finger & Pezdek (1999)). Because of this, and because a meta-analysis revealed a much smaller effect 40 than the original experiments (Meissner & Brigham, 2001), two of the original experiments were the object of a large direct replication effort (Alogna et al., 2014).

Figure 2 shows a schematic of the experimental design of the two replication experiments. In both experiments, the procedure was delineated by the study 45 phase (presentation of the mock crime video) and the test phase (memory tested on an 8-person lineup). The only difference between the experiments was the timing of the experimental manipulation (where participants either verbally described the perpetrator or did not). Clearly, the experimental analog is a much shorter version of the protracted criminal justice system in Figure 1, which 50 is a point discussed later. In Experiment 1, the experimental manipulation

occurred immediately after the study phase (Figure 2A) and in Experiment 2, the experimental manipulation occurred twenty minutes after the study phase (Figure 2B). The effect replicated. In both experiments, the correct ID rate (i.e., the proportion of guilty suspects identified from target-present lineups) was
55 lower in the verbal condition, but markedly lower when the verbal description was given 20 minutes after the study phase and immediately before the test (and the effect sizes were small, especially in Experiment 1).

However, by comparing only correct ID rates, it is unclear whether the difference is due to a difference in discriminability (the ability to distinguish innocent from guilty suspects) or response bias (the likelihood of choosing a lineup member) (Meissner & Brigham, 2001; Clare & Lewandowsky, 2004). To disentangle the two possible explanations for the difference, it is necessary to include target-absent lineups in the experimental design. By doing so, false ID rates (i.e., the proportion of innocent suspects identified from target-absent lineups)
60 can be taken into account and discriminability can be measured separately from
65 response bias (Mickes & Wixted, 2015).

2. Discriminability in Verbal overshadowing: A Matter of Concern for Policymakers

A veridical verbal overshadowing effect ought to be defined by a reduction
70 in discriminability (i.e., lower correct ID rates and higher false ID rates) in the verbal condition than in the control condition. Discriminability cannot be measured by only a reduction in correct ID rates. It follows that the results of the replication studies cannot inform whether or not discriminability is affected after providing a verbal account (Mickes & Wixted, 2015; Rotello et al., 2015).
75 To be informed about discriminability, receiver operating characteristic (ROC) analysis, which measures objective discriminability of lineup data, needs to be conducted (National Research Council, 2014; Gronlund et al., 2014; Wixted & Mickes, 2012).

ROC analysis was recently introduced to measure discriminability in lineup

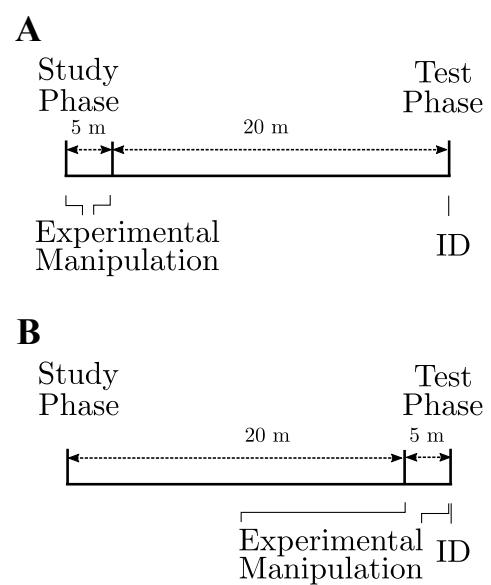


Figure 2: Procedural order of the replication studies for Experiment 1 (**A**) and Experiment 2 (**B**) in (Alogna et al., 2014).

80 data (Wixted & Mickes, 2012), and there is currently some resistance to its
use in the field of eyewitness identification research (Wixted & Mickes, 2015a,b;
Wells et al., 2015). Some researchers continue to support the use of the diag-
nosticity ratio (DR; correct ID rate / false ID rate) to measure discriminability
in preference to ROC analysis, arguing that ROC analysis is not appropriate
85 for lineups (Wells et al., 2015). However, it is not clear how one can successfully
argue that it is acceptable to measure overall correct and false ID rates from
lineups, which are needed to compute the DR, while at the same time arguing
that it is unacceptable to compute all other correct and false ID rates, which
are needed to plot the ROC (e.g., by setting a more conservative standard and
90 not counting any ID made with very low confidence). Moreover, because the
DR confounds response bias and discriminability (Gronlund et al., 2014), it is
not the pure measure of discriminability that ROC analysis is.

ROC analysis is widely accepted as the preferred measure of discriminabil-
ity in other fields (e.g., diagnostic medicine, experimental psychology, machine
95 learning, physics, etc.), and it was recently deemed superior to the DR by a
prestigious committee of the National Academy of Sciences charged with eval-
uating research methodologies and empirical findings in eyewitness identification
(National Research Council, 2014). Given its widespread use in other fields and
its recent backing by the National Research Council, my own view is that it is
100 only a matter of time before eyewitness identification researchers as a whole ac-
cept ROC analysis as the proper way to measure discriminability. Nevertheless,
for now, it also seems fair to say that others disagree with my position on this
issue. Only time will tell how this debate will ultimately be resolved.

To conduct ROC analysis, correct ID rates are plotted against false ID rates,
105 resulting in ROC curves for each condition. The larger the area under the ROC
curve, the better the discriminability. In other words, the larger the area un-
der the ROC curve, the better the identification procedure is at distinguishing
between innocent and guilty suspects. Thus, for there to be a verbal overshad-
owing effect, the area under the verbal condition ROC curve would need to be
110 smaller than that of the control condition ROC curve.

Though false ID rates, essential for the construction of ROC curves, are not available from the replication studies (because target-absent lineups were not included), hypothetical false ID rates can be used to demonstrate the point about discriminability. Table 1 shows the correct ID rates reported in Alogna et al.
115 (2014) and hypothetical false ID rates. The hypothetical false ID rates are in bold font. A parametric measure of discriminability, d' , and diagnosticity ratio, DR, which are computed using the correct and false ID rates are also shown in bold font. Figure 3 shows four possible ROC outcomes of the replication Experiment 1 (**A** and **B**) and Experiment 2 (**C** and **D**). In both experiments,
120 it is possible, given the available data, that the verbal condition falls on a lower ROC, as shown in Figure 3**A** and **C**. If the data yielded this pattern, then that would be a clear difference in discriminability, and one could then conclude that there is a verbal overshadowing effect.

It is also possible, given the available data, that the verbal condition falls on
125 the same ROC as the control condition, as shown in Figure 3**B** and **D**. If the data yielded this pattern, then there would not be a difference in discriminability, and thus no verbal overshadowing effect, but there would be a difference in response bias between the two conditions. Though this point can be demonstrated by using overall correct and false ID rates, ideally confidence ratings associated
130 with the identifications would be used in the analysis so that the entire locus of ROC operating points per condition can be plotted (Mickes et al., 2012).

When and if differences in discriminability arise after a verbal description is one fact worth knowing, and the ROC results should be used to aid decision-makers (e.g., police chiefs) charged with making procedural endorsements. Although ROC analysis provides essential information to policymakers, it does not provide particularly useful information to triers of fact (judges and juries).
135 Triers of fact are interested in the reliability of an ID, and that information is provided by an altogether different analysis. The different concerns of different decision-makers and the relevant analyses are shown in Table 2.

Table 1: Correct ID rates from Alogna et al. (2014), hypothetical false ID rates, and corresponding d' scores and diagnosticity ratios (DR). The hypothetical values are in bold font.

	Different Discriminability		Equal Discriminability	
	Verbal	Control	Verbal	Control
Experiment 1				
Correct ID Rate	0.51	0.55	0.51	0.55
False ID Rate	0.11	0.02	0.02	0.02
d'	1.27	2.18	2.18	2.18
DR	4.81	27.49	32.48	27.50
Experiment 2				
Correct ID Rate	0.38	0.54	0.38	0.54
False ID Rate	0.06	0.02	0.01	0.02
d'	1.26	2.16	2.15	2.15
DR	6.37	27.18	54.29	27.00

Table 2: Concerns, relevant analyses, and goals for different decision-makers.

	Policymakers		Courts
Concern	Discriminability		Reliability
Analysis	Receiver operating characteristic		Confidence-accuracy characteristic
Goal	High Discriminability		IDs made with high confidence are highly accurate

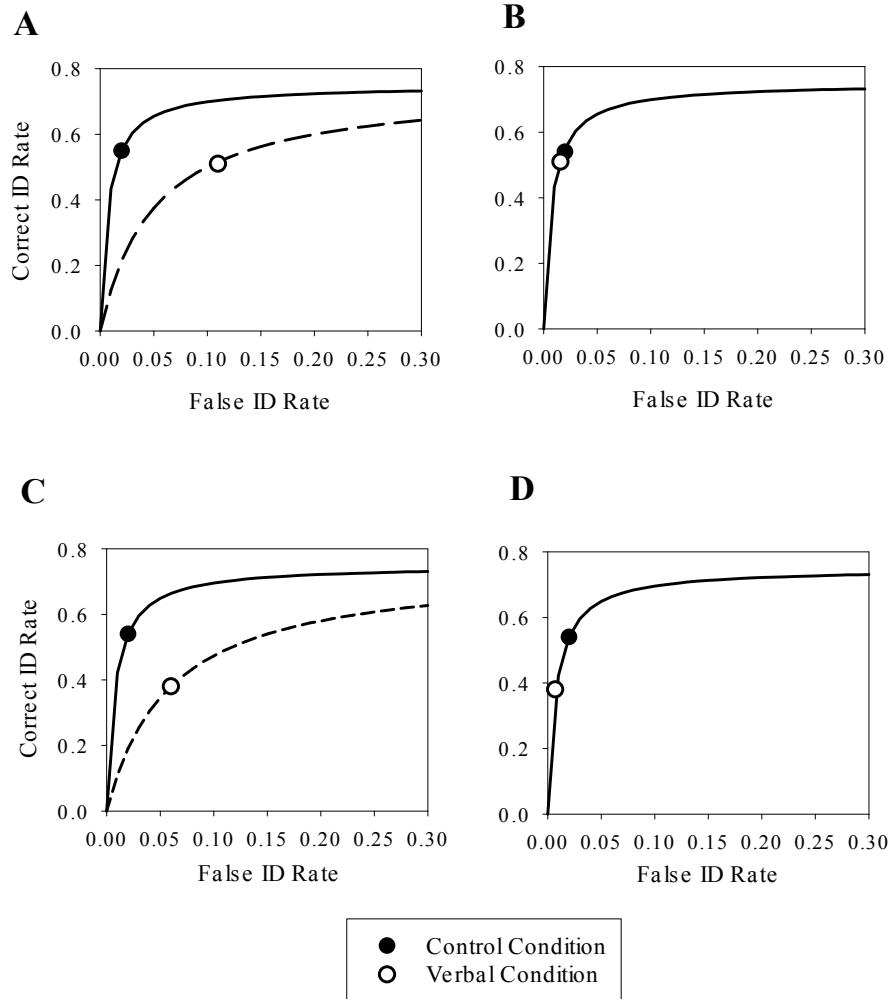


Figure 3: ROC curves constructed with correct ID rates and hypothetical false ID rates for Experiment 1 (**A** and **B**) and Experiment 2 (**C** and **D**) of (Alogna et al., 2014). The ROC curves in **A** and **C** show a clear discriminability advantage for the control condition. The ROC curves in **B** and **D** show no discriminability difference, but more conservative responding for the verbal condition. With the existing data, it is possible to have different or equal discriminability, and which it is remains unknown.

¹⁴⁰ **3. Reliability in Verbal Overshadowing: A Matter of Concern for the Courts**

Whether or not discriminability is affected by verbal reports is not a matter for judges and jurors. In the court of law, the concern is about reliability. Reliability is measured by the positive predictive value (PPV) of suspect identifications. The PPV is the probability that a suspect who was identified by a witness is the perpetrator. For the discussion that follows, equal base rates (i.e., half target-present lineups and half target-absent lineups) are assumed for the sake of simplicity. Generally speaking, PPV varies directly with the base rate of target present lineups. The PPV can be measured in several different ways. One way is to compute a DR. Using the data in Table 1 and the corresponding ROC curves in Figure 3B to compute DR values, for the verbal condition DR = 32.5 and for the control condition DR = 27.5. The higher DR scores in the verbal condition would mean that reliability is better in that condition (despite having the same discriminability). A related but more complete way to measure reliability is to conduct confidence-accuracy characteristic (CAC) analysis (Mickes, 2015). Like the DR, CAC analysis uses only correct and incorrect suspect identifications. Thus, the dependent measure, PPV, is defined by

$$\text{PPV} = \frac{S_g}{S_g + S_i}, \quad (1)$$

where S_g is the number of correct IDs (i.e., number of guilty suspects identified from target-present lineups). S_i refers to the number of innocent suspect identified from target-absent lineups. When the base rates are equal, S_g and S_i can be thought of as the correct and false ID rates, respectively. Furthermore, the fact that the results of CAC analysis are easier to understand give it a distinct advantage over the DR. For example, 98% vs 92% accurate makes more sense than DR values of 40 vs. 11.

Using the indicative ROC curves from Figure 3A, three ROC points can be computed for low, medium and high confidence levels for both control and verbal conditions, shown in Figure 4A. The PPV is computed for every level

of confidence and shown in Figure 4**B**. In Figure 4**A**, the ROC is lower for the verbal condition, in Figure 4**B**, the PPV is also lower for the verbal condition and by the same amount. In this case the verbal condition has simultaneously lower discriminability (Figure 4**A**) and lower reliability (Figure 4**B**). Generally higher discriminability is associated with higher reliability, but this is not always the case. This can be seen clearly from Figure 4**C** and **D**, where the same ROC curves are used but the ROC points are shifted towards more liberal responding for the control condition. Discriminability is still lower for the verbal condition (Figure 4**C**), but the PPV is actually higher in the verbal condition (Figure 4**D**).
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The point is that the two analyses answer different questions and, while they likely agree most of the time in practice, they are potentially dissociable (as they are in Figures 4**C** and **D**). Because of this possibility, it is necessary to analyze 180 the data using both ROC and CAC analyses. Furthermore, the fact that the results of CAC analysis are easier to understand give it a distinct advantage over the DR. For example, 98% vs. 92% accurate makes more sense than DR values of 40 vs. 11. Therefore, research shedding light on the reliability of identifications using CAC analysis is needed. Moreover, when and if differences 185 in reliability arise after a verbal description is worth knowing, and the results should be used to aid decision-makers (e.g., judges and jurors) charged with making judgments about culpability (see Table 2).

4. Conclusions

Collecting verbal reports from eyewitnesses of crimes is an inescapable necessity. As the research currently stands, we lack sufficient information about 190 discriminability (a matter of concern for policymakers) and reliability (a matter of concern for judges and jurors) to make recommendations to guide practice. Furthermore, different patterns may arise that are contingent on the intervals between exposure and description and identification. After all, different retention intervals differentially affect correct ID rates (Alogna et al., 2014). Does 195 that finding reflect a difference in discriminability or a difference in response

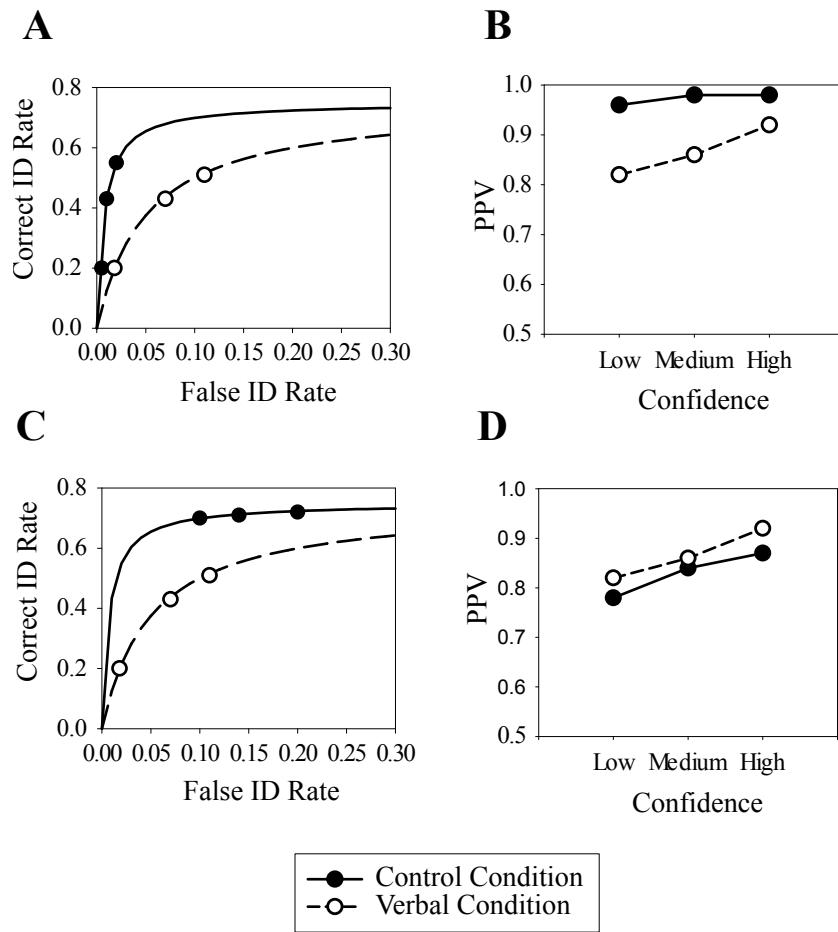


Figure 4: Hypothetical ROC curves and CAC curves. Both ROC curves (**A** and **C**) show lower discriminability for the verbal condition. Higher PPV in the control condition (**B**), and higher PPV in the verbal condition (**B**).

bias?

There was a glimpse in the replication studies that discriminability is lower after time lapses between the crime and the report. In Experiment 1, in which
200 the experimental manipulation occurred immediately after the study phase and 20 minutes before the identification test (see Figure 2A), the correct ID rates and the filler ID rates (i.e., identifications made to fillers in the target-present lineup) were lower in the verbal condition than in the control condition. This pattern suggests a shift in response bias. However, in Experiment 2, in which
205 the experimental manipulation occurred 20 minutes after the study phase and immediately before the lineup test (see Figure 2B), the filler ID rates were no different for the verbal condition vs. the control condition despite the fact that correct ID rates were lower in the former condition. This pattern suggests that there was not a shift in response bias, but lower discriminability. However, ROC
210 analysis is required to definitively answer the question of discriminability and importantly, if the ROC curves are repeatedly lower with longer delays between crime and description, then the police should encourage eyewitnesses to report crimes as soon as possible.

What about reliability? That is what CAC analysis will reveal. If the CAC
215 curves are higher, but the ROC is lower in the verbal condition (a possibility demonstrated in Figures 4C and D), then the conclusion would be that the verbal overshadowing effect is real, but, compared to the control condition, identifications made with high confidence from the verbal condition are more reliable anyway. This scenario may arise because the task of verbally describing
220 the perpetrator is a challenging one. That fact may be appreciated by the participants in that condition who in turn may be more cautious to make an identification with high confidence (Clare & Lewandowsky, 2004). Both hypothetical CAC scenarios in Figure 4 are possible. Another important question is whether the timing of the verbal description and later identification differentially affect reliability (as it might with discriminability). The research has yet
225 to, but needs to, be conducted.

The effects of verbal descriptions on eyewitness memory is worth investigat-

ing using procedures that are more protracted to mimic the experience of real eyewitnesses (i.e., eyewitnesses do not provide a verbal description immediately after seeing the perpetrator, nor would a lineup procedure be administered immediately after describing the perpetrator; Mickes & Wixted (2015)). In addition to extending the procedural timeline, target-absent lineups need to be included, and the appropriate analyses need to be conducted. Confidence should be collected to 1) measure discriminability (with ROC analysis) and to measure reliability (with CAC analysis), and 2) because confidence at first identification is diagnostic of accuracy (e.g., Wixted et al. (2015); Palmer et al. (2013); Horry et al. (2012); Sauer et al. (2009); Brewer & Wells (2006)). Once we have a body of work that replicates and researchers have come to a general consensus about the interpretations of the results, then we can guide practice. But we are not quite there yet.

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