Group size, misinformation and unanimity influences on co-witness judgments.

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Abstract

Researchers have typically observed the effects of co-witness influence on eyewitness pairs. However, research suggests that individuals are more likely to witness crimes in larger groups. Additionally, there is an abundance of evidence suggesting that social influence is heavily moderated by group size. Therefore, the present study aimed to gain a more accurate understanding of the risks of co-witness influence in relation to unanimity and group size effects. Participants (*N*=608) viewed and discussed a CCTV footage of a fight breaking out, with co-witnesses, before giving individual statements, where they were asked to identify which person had started the fight; confederates were used to suggest that the wrong man had started the fight. Results indicated that participants were vulnerable to co-witness influence, but only when exposed to misinformation from a majority of co-witnesses. Misinformation presented by an individual confederate did not have a significant influence over the participants' responses. This study was the first to investigate the effects of group size on blame attribution. The findings suggest that the true risks of co-witness influence may not be as high as originally predicted from research on eyewitness pairs.

Keywords

Eyewitness; Social influence; Conformity; Group size; Misinformation effect; Eyewitness confidence.

Introduction

Many crime scenes will often lack DNA-rich biological traces, leaving investigators heavily reliant on eyewitnesses to help identify and convict the correct offender (Kebbell & Milne, 1998; Wells & Olson, 2003). Despite this heightened level of reliance, studies show that eyewitness evidence can be highly unreliable (Liebman et al., 2002; Morgan, Hazlett, Baranoski, Doran, Southwick, & Loftus, 2007; Steblay, Dysart, Fulero, & Lindsay, 2003), with reports suggesting that false eyewitness statements contribute to over 70% of false convictions (Cardozo, 2009; Scheck, Nuefeld, Dwyer, 2003). A large body of research has identified the malleability of human memory as a prominent cause for false eyewitness recollection (Frenda, Nichols, & Loftus, 2001; Loftus, 2005; Skagerberg & Wright, 2008a). Moreover, research has proposed that the suggestibility of eyewitnesses can leave them heavily vulnerable to having their statements contaminated with post-event information (PEI; Davis & Loftus, 2007)

One way in which eyewitnesses can encounter PEI is through discussing the event with other co-witnesses (Gabbert, Memon, & Allan, 2003; Paterson & Kemp, 2006a; Wright, Memon, Skagerberg, & Gabbert, 2009). It is common for eyewitnesses to discuss the event with others around them. A recent survey completed by real eyewitnesses showed that 86% of respondents reported having discussed the event with co-witnesses (Paterson & Kemp, 2006b). When faced with uncertainty, eyewitnesses will often engage in a post-event discussion with co-witnesses as a means of validating their own recollection (Blank, 2009; Williamson, Weber, & Robertson, 2013). The decision to engage in a post-event discussion with co-witnesses can influence eyewitnesses into producing a false recollection of the event (Paterson & Kemp, 2006a). More worryingly, Thorley and Rushton-Woods (2013)

demonstrated that exposure to post-event information (a written statement) from another co-witness could influence eyewitnesses into blaming an innocent bystander for committing the crime, a phenomenon referred to as *blame conformity* (Mojtahedi, Ioannou, & Hammond, 2017; Thorley, 2015). Co-witness discussions can also have a negative impact on eyewitness confidence. Exposure to disconfirmatory information from an interviewer or co-witness can significantly reduce an eyewitness's confidence in their recollection (Allwood, Jonsson, & Granhag, 2005; Luus & Well, 1994; Wright & Skagerberg, 2007), which can consequently weaken the validity of their statements to jurors (Skagerberg & Wright, 2009). Conversely, exposure to confirmatory feedback can evoke overconfidence (Allwood, Knutsson, & Granhad, 2006; Goodwin, Kukucka & Hawks, 2012; Semmler, Brewer, & Wells, 2004).

The causes of co-witness influence can be attributed to two underlying processes. The first is memory distortion, eyewitnesses can misattribute post-event information as witnessed information through source monitoring errors (Cann & Katz, 2005; Schacter, Guerin, & Jacques, 2011; Tousignant, Hall, & Loftus, 1986). Secondly, memory conformity can be induced through informational social influence (Gabbert, Memon, & Allan, 2003; Schwarz & Roebers, 2006), a cognitive process where the eyewitness would accept a co-witness's recollection as reality if they perceived them as being more likely to be correct (French, Garry, & Mori, 2011; Williamson, Weber, & Robertson, 2013). Normative influence, the pressure to conform as a means for gaining approval and acceptance from others, can also be used to explain general memory conformity (Wright, London, & Waechter, 2009). However, if police investigators are trained to collect statements privately (Williamson, Weber, & Robertson, 2013), the level of normative influence amongst co-witnesses could be reduced (Deutsch and Gerard, 1955).

The majority of the research on co-witness influence has typically studied the effects of post-event discussions on eyewitness pairs, where a participant would view and discuss a

criminal event with another participant (usually a confederate who presents false information; e.g French, Garry, & Mori, 2008; Hope, Ost, Gabbert, Healey, Lenton, 2008; Kieckhaefer & Wright, 2014). However, during real criminal events, there will often be more than two eyewitnesses present (Memon, Dalton, Horry, Milne, Wright, 2016; Paterson & Kemp, 2006b; Skagerberg & Wright, 2008b). Failure to study co-witness influence in larger and more realistic group sizes could result in inaccurate inferences being made about the behaviour of real eyewitnesses. This is because traditional theories on social influence suggest that the size of an eyewitness group could have a mediating effect on the risks of co-witness influence. In particular, Bond (2005) highlighted the significance of the unanimity of misinformation and misinformation size in moderating the level of social influence an individual will be subjected to.

Theoretical models of group size and social influence

Misinformation size.

The risk of informational influence has been shown to be positively correlated with the size of the information source (Bond, 2005; Gardikiotis, Martin, & Hewstone, 2005; Mannes, 2009). Early research on social conformity demonstrated that social influence was significantly greater when participants were exposed to misinformation from three sources than from one (Asch, 1955; Campbell & Fairey, 1989; Gerard, Wilhelmy, & Conolley, 1968; Rosenberg, 1961; Stang, 1976). Later research suggested that the level of social influence would continue to increase when more than three sources of information were present (Gerard et al., 1968; Latané & Wolf, 1981; Nordholm, 1975; Stang, 1976). However, such studies were based on simplistic tasks (i.e. line judgement; see Asch, 1955), where the task difficulty was very low and the level of informational influence would subsequently have been lower (Festinger, 1954). More relevant to co-witness influence, Walther et al., (2002)

investigated the relationship between group size (five versus ten) and memory conformity. Their results suggested that misinformation was more influential when presented by the larger groups (ten); however, this difference was only observed when the task difficulty was low. When the task difficulty was increased (consequently increasing uncertainty), both group sizes had the same level of influence on participants' responses.

Multiple psychological theories have been presented to explain the relationship between misinformation size and social influence. Asch (1955) suggested that an increase in misinformation size would mean that the targets would be less likely to perceive the misinformation as being an idiosyncratic judgement and would therefore be more likely to accept it as being correct information about reality. Mullen's (1983) theory on self-attention and conformity can also be used to explain the relationship between group size and informational influence; self-attention theory is concerned with self-regulation processes that control the direction of an individual's behaviour. When there is high self-focus, self-attention evokes a matching to standard process, where individuals will interpret the behaviour of the majority as the norm and attempt to conform to it (Carver & Scheier, 1981); thus, larger groups will have more influence on individuals through eliciting a greater level of self-focus onto the target.

An increase in group size can also influence an individual through increased memory distortion. The retrieval-strategy disruption (RTD) hypothesis (Basden & Basden, 1995; Basden, Basden, Bryner, & Thomas, 1997; Dahlström, Danielsson, Emilsson, & Andersson, 2010) suggests that exposure to conflicting information during memory recall can disrupt the memory retrieval process and consequently result in poorer memory recall. With inter-group conflict being more prevalent in larger groups (Curral, Forrester, Dawson, & West, 2010), it may be the case that eyewitnesses within larger groups could therefore face greater uncertainty when recalling the event - which may consequently increase their vulnerability to

co-witness influence (Walther et al., 2002). In support of this proposition, Thorley and Dewhurst (2009) demonstrated that the error rates in collaborative memory recall were higher and more similar within groups of four participants, relative to individual or two-person groups.

Unanimity of misinformation.

Theories on informational influence suggest that for misinformation to have a significant influence on the target, it must also be unanimously held by the group (Asch, 1955; Baron, Vandello & Brunsman, 1996). If not, the presence of a dissenter will break the chain of consensus and consequently reduce the level of influence the majority group will have on the target (Asch, 1951; Morris & Miller, 1975). Walther et al. (2002) demonstrated this effect in relation to memory recall, they found that misinformation presented by a majority group was significantly less influential on eyewitnesses when there were additional dissenters present. Mori and Mori (2008) produced similar findings: using the MORI technique, the researchers examined the effects of co-witness influence in one-versus-two situations - where a participant would discuss the event with two misleading co-witnesses, and in two-versus-two situations - where a participant would discuss the event with two misleading co-witnesses and one supporting co-witness. The study found that participants in the one-versus-two conditions were more likely to conform to the majority, whereas the participants in the two-versus-two conditions were more likely to stick to their own judgements. This is because for informational influence to be effective, the target must believe that the information source is more likely to be correct than them (French, Garry, & Mori, 2011; Williamson, Weber, & Robertson, 2013). Walther and colleagues suggested that a dissenter would provide the individual with an independent view of the event, which could resultantly increase the individual's own confidence in their recollection and reduce their susceptibility to informational influence. Additionally, research suggests that individuals will

favour supporting information from group members over contradicting information (Jonas, Schulz-Hardt, Frey, & Thelen, 2001). Therefore, it can be suggested that exposure to confirmatory information from an individual source may have more influence on an eyewitness than exposure to contradicting information from multiple sources. The relationship between unanimity and group influence can also be explained by the frequency-validity principle, which submits that the consistent repetition of a statement can increase its perceived validity (Fiedler, 2000; Hertwig, Gigerenzer, & Hoffrage, 1997). In relation to co-witness influence, the theory would suggest that eyewitnesses would be more likely to accept post-event information from a co-witness, if the information was consistently suggested by the group. In contrast, a break in the unanimity of the misinformation would evoke an increase in doubt over the reliability of the statement (Festinger, 1945), which may resultantly encourage the target to reject the misinformation.

The Current Research

It is suggested that the prevalence of co-witness influence measured through traditional two-person paradigms may provide an unrealistic estimation of the true risk of co-witness influence within real-life criminal investigations. Research indicates that there are often more than two eyewitnesses present during a criminal event (Paterson & Kemp, 2006b). Theories on social influence suggest that the risk of co-witness influence may be significantly greater when the misinformation is presented by such larger groups (Asch, 1955; Bond, 2005). Additionally, research indicates that if the misinformation is not unanimously held by all co-witnesses, the risk of co-witness influence is significantly reduced (Walther et al., 2002). However, these inferences were based on general models of social psychology, more direct observation is needed to determine the impact that group characteristics have on co-witness influence. Despite more recent research investigating the relationship between group size and memory recall (see Thorley & Dewhurst, 2009; Walther et al., 2002), no work has

attempted to directly measure the effects of group size on blame conformity. Therefore, the main aim of the present study was to identify if the risk of co-witness influence on blame attribution was significantly mediated by group size and group unanimity.

Another measure for co-witness influence, which has been neglected by the majority of previous research, is the confidence of eyewitnesses in their recollections. Despite suggestions that eyewitness confidence can be influenced through co-witness discussions (see Allwood et al., 2006), no existing research has investigated the relationship between group size and eyewitness confidence. Thus, the present study also focused on the confidence of eyewitnesses, as a second measure of co-witness influence.

On the basis of the research findings discussed, it was hypothesised that:

(H1) An increase in misinformation size (0 to 5) would increase the risk of blame conformity.

(H2) The absence of a unanimous majority would significantly reduce the rates of blame conformity.

(H3) There would be a negative correlation between misinformation size and eyewitness confidence in participants who produced correct responses.

(H4) There would be a positive correlation between misinformation size and eyewitness confidence in participants who produced an incorrect response.

Methods

Participants

Eight hundred and sixty participants (409 males; 451 females) of mixed ages (18-82 years; $M = 28.33$, $SD = 12.64$) were recruited through opportunistic sampling. Of these, 252

participants (121 males; 131 females) were randomly selected to play the role of a confederate. As a result, their answers were not included in the data analysed; leaving an experimental sample of 608 true participants (288 males; 320 females) of mixed ages (18–82 years; M = 28.95, SD = 13.04). A request for participation was advertised through online media, as well as through the circulation of flyers and posters within multiple cities centres in the UK. Participation was voluntary and participants did not receive payment for their participation. Preliminary measures were undertaken to ensure that no participants had any serious visual impairments that might affect their ability to watch the crime footage on a screen. Participants were randomly assigned to one of six experimental conditions, with a relatively even distribution of male and female participants across the experimental groups. Additional descriptive tests were conducted to ensure that there was a relatively equal distribution of age within all conditions (See Table 1).

Note: Efforts were made to ensure comparable sample sizes in each of the conditions. However, there were some disparities in sample sizes due to the time allocation of trials for some of the conditions. Despite this, all experimental groups were of a sufficient size for statistical comparisons to be made (in accordance with Stevens, 2009)

Confederates

The study used confederates to expose the true participants to co-witness misinformation. Prior to starting the experiment, all participants within each eyewitness group were handed individual instruction sheets. Despite being told by the experimenter that the instruction sheets were identical, participants were handed one of two copies: The participants would either get a standard instruction sheet, which contained basic information about the researchers and the institution (given to true participants), or they would receive a confederate instruction sheet, which informed the participant that they had been chosen to be

a confederate and provided further instructions on their role. Due to the study including different confederates between each trial, confederates were given specific information to state during the experimental process (see below), to avoid any individual differences in responses from having an extraneous effect on the true participants. In order to generate a larger sample of true participants, some confederates were re-used in additional trials with new participants.

All of the confederates were instructed to falsely suggest that the man in the yellow t-shirt had thrown the first hit during the discussion (when in reality, another man had thrown the first hit). They were given the option to provide the post-event information when they deemed it appropriate, to allow their responses to seem less pre-meditated. They were advised to either present it before the participants (i.e. 'I remember seeing the man in the yellow top throw the first hit.'); after another participant had provided a correct report (i.e. 'No, I remember the man in the yellow top throwing the first hit.'); or after another participant had also provided the same incorrect report (i.e. 'Yes, I agree. I also remember seeing the man in the yellow top throwing the first hit.'). The latter was more frequently used by confederates in the conditions that contained a majority group of confederates. The confederates were explicitly instructed not to add any other details to the discussion. If they were questioned about their report, the confederates were instructed to say 'well, that's what I remember seeing from the video'. In conditions where multiple confederates were used within a trial they were instructed not to provide an identical response to the other group members (in order to prevent arousing the participant's suspicions) and were permitted to adjust their response accordingly (i.e. 'I remember seeing that from the video too'). The confederates were instructed to provide all of their statements in a confident manner, but were advised not to be assertive or to try to be purposefully persuasive. The discussion scripts

were designed in accordance with the scripts used by Paterson and Kemp (2006a) in a similarly designed study.

Design

A between-subjects design was employed, with participants being randomly allocated to one of six independent conditions. The conditions varied in relation to the number of true participants and confederates included within each trial (see Table 1). The conditions were used to allow the researchers to assess the impact of the two independent variables, majority size and unanimity of misinformation. Majority size was assessed through manipulating the number of confederates present within conditions which had one true participant per group. The majority sizes used within the conditions were *none* (control group/ 1-0 condition), *one* (1-1 condition), *two* (1-2 condition), and *five* (1-5 condition). The second independent variable, unanimity of misinformation, was also manipulated between the experimental conditions. With the exception of the control group, participants were either exposed to misinformation from a unanimous majority group of confederates (1-2 condition and 1-5 condition); one confederate with multiple true participants present (2-1 condition and 5-1 condition); or from one confederate with no other participants present (1-1 condition). The variables of participant age and gender were also controlled for throughout the analysis.

Table 1.

Experimental conditions (*N*=608)

Condition	True participants	Confederates	Total	Age	
				M	*Std Dev.*
1-0 (Control) (*N*=174)	1	0	1	35.06	17.58
1-1 (*N*=38)	1	1	2	20.92	2.69
1-2 (*N*=94)	1	2	3	24.66	7.7
1-5 (*N*=76)	1	5	6	26.91	10.29
2-1 (*N*=56)	2	1	3	26.64	8.94
5-1 (*N*= 170)	5	1	6	28.52	10.98

Two dependent variables were used to measure co-witness influence. The first dependent variable was the blame attribution of the participants: Participants were asked to identify which man had thrown the first hit within a witnessed crime, out of the two possible suspects; alternatively, participants were given the option to state that they were unsure. The second dependent variable used to measure co-witness influence was the confidence of participants in their responses.

Materials

The study used a real-life closed-circuit television (CCTV) footage of a bar fight erupting between two individuals. The footage lasted approximately one minute and thirty seconds and did not have an audio output. The footage depicted two men in distinctively different clothing (one wearing a yellow t-shirt, the other wearing a dark green t-shirt) engaging in a conversation within a bar. Shortly after, one of the men (dark green t-shirt) attacked the other (light yellow t-shirt), causing a fight to start between both men. The fighting lasted for forty seconds before the two men were separated by multiple bystanders. The participants would later be asked by the interviewer to identify which man had thrown

the first hit. The footage was explicitly used due to it being ambiguous about who had started the fight; the heightened level of task difficulty would increase the participants need to validate their judgement; thus, encouraging them to interact with their co-witnesses (Blank, 2009; Williamson, Weber, & Robertson, 2013).

Procedure

Participants took part in the study either in groups or individually, depending on their experimental condition. Due to the ethical implications of exposing participants to violent footage, participants were informed that they would be viewing a CCTV footage that contained violence; however, details with regards to the aims of the experiment were kept to a minimum. Participants watched the footage simultaneously in their groups on a monitor screen. With the exception of condition 1-0 (control), participants were given one minute to discuss in their groups, who they believed had thrown the first hit. Confederates were used to expose the participants to co-witness misinformation by suggesting that the wrong man (in the yellow t-shirt) had started the fight. The experimenter left the room during the group discussion to prevent their presence from having an effect on the participant's behaviour. Within condition 1-0, participants were not permitted to discuss the footage with co-witnesses; instead, they were asked to sit silently until they were called to for questioning. The final experimental phase was the eyewitness questioning process, participants were individually taken into a private room and asked to identify who they believed had thrown the first hit (or to state that they were unsure). The interviewer advised all participants to only report information that they remembered seeing. All participants produced one of three responses: Correct response (blamed the man in the dark top), incorrect response (blamed the man in the yellow top), or 'unsure' (they were unable to determine who had thrown the first hit). Participants were also asked to indicate how confident they were in their response on a five-point scale (with five meaning maximum confidence); participants who answered

'unsure' were not asked to give a confidence rating due to their inability to identify an offender. After the experiment had finished, all participants were debriefed and thanked for their participation. In a post-test manipulation check, participants were asked if they had been suspicious as to the authenticity of their co-witnesses. None of the participants indicated that they had been aware of the confederates' roles.

Confederates were also questioned after the experiment to determine whether they were able to correctly present the participants with misinformation — all confederates indicated that they had carried out their instructions correctly. A limitation of the procedure used in the present studies was that the group discussions of the participants were not recorded for inspection afterwards. This meant that the studies could not reliably guarantee that all confederates performed correctly and that all participants from the control conditions abstained from discussing the incident. However, the decision to not record the participant's discussions can be justified. Due to the ethical implications of recording individuals without their consent, the experimenter will have had to inform participants that they would be getting recorded during the experiment. The participants' awareness of being monitored may have influenced their behaviours and subsequent responses as a result.

Analysis

A series of multinomial logistic regressions were performed to analyse the relationships between majority size and group unanimity with eyewitness blame attribution (whilst controlling for the age and gender of the participants). A two-way between groups analysis of variance was used to analyse the relationships between majority size and group unanimity with eyewitness confidence.

Results

General descriptive data

In the control group (1-0 condition) 44.8% of participants produced a correct response, 34.5% produced an incorrect response, and 20.7% were uncertain, with this variance in responses suggesting the experimental task to be ambiguous. The mean confidence scores across all conditions ranged from 2.98 to 3.5, suggesting that a large proportion of eyewitnesses faced some level of uncertainty when making their judgements. The high number of 'unsure' responses suggests that the participants will have been less likely to attribute blame through guessing. Means and standard deviations for all variables are presented in Table 2 and 3, and the correlations between continuous variables are presented in Table 4.

Table 2.

Descriptive statistics for participants (*N*=608)

Condition	True participants	Confederates	Total	Blame attribution			*Mean Confidence* (*SD*)	
				Dark Top	Yellow Top	Uncertain	Dark Top	Yellow Top
1-0 (Control) (*N*=174)	1	0	1	78 (44.8%)	60 (34.5%)	36 (20.7%)	3.01 (1.12)	2.98 (1.07)
1-1 (*N*=38)	1	1	2	14 (36.8%)	16 (42.1%)	8 (21.1%)	3.43(.94)	3.31 (1.08)
1-2 (*N*=94)	1	2	3	19 (20.2%)	61 (64.9%)	14 (14.9%)	3.47 (.97)	3.37 (.97)
1-5 (*N*=76)	1	5	6	6 (7.9%)	61 (80.3%)	9 (11.8%)	3.17 (.75)	3.41 (.96)
2-1 (*N*=56)	2	1	3	26 (46.4%)	20 (35.7%)	10 (17.9%)	3.5 (1.03)	3.05 (1)
5-1 (*N*= 170)	5	1	6	80 (47.1%)	61 (35.9%)	29 (17.1%)	3.4 (1.11)	2.92 (1.11)

Table 3.

Descriptive statistics for participants in relation to the number of confederates present during the trial (*N*=608).

Confederate Size	Blame attribution			*Mean Confidence* (*SD*)	
	Dark Top	Yellow Top	Uncertain	Dark Top	Yellow Top
0	78 (44.8%)	60 (34.5%)	36 (20.7%)	3.03 (1.11)	2.98 (1.07)
1	14 (36.8%)	16 (42.1%)	8 (21.1%)	3.43 (.94)	3.31 (1.08)
2	19 (20.2%)	61 (64.9%)	14 (14.9%)	3.47 (.97)	3.24 (.92)
5	6 (7.9%)	61 (80.3%)	9 (11.8%)	3.17 (.75)	3.41 (.96)

Table 4

Descriptive statistics, reliability, and correlations for all continuous variables (N =608)

Variables	Confidence [a]	Confederate Size	Age
Confidence [a]	1	.09	.04
Confederate size (CS)	.09	1	-.17***
Age	.05	-.17***	1
Means	3.22	1.37	28.95
Standard Deviations	.96	1.52	13.04
Range	1-5	0-5	18-82

Note. . a= missing data for 'unsure' participants were replaced by confidence average score. Statistical significance: *p < .05; **p < .01; ***p < .001

The effects of confederate size and unanimity on blame conformity.

A Multinomial Logistic Regression was used to analyse predictors for an unordered group classification of eyewitness responses: a correct response, an incorrect response, and a response of 'unsure'. Due to the dependent variable consisting of three outcomes, two regressions were conducted: one with incorrect response as the reference category, and one

with the correct response as the reference category. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, and homoscedasticity.

The analysis shows that the model fit is significant, χ^2 (14) = 82.59, $p < .001$, indicating that the full models predicted significantly better, or more accurately, than the null model.

The first column in Table 5 has the outcome of 'correct response' compared to 'incorrect response' (reference category). The results suggest that the age and gender of the participants had no significant effect on their response. With respect to the group conditions; participants from the 1-2 condition (*OR*=.24) and 1-5 condition (*OR*=.08), compared to participants in the 1-0 condition (control), were significantly more likely to produce an incorrect response than a correct response. The measures of association were medium to very large, in accordance with Cohen (1988). The effect sizes, calculated using Cohen's *d*, were -.79 and -1.39, respectively.

The second column in Table 5 has the outcome of 'unsure' compared to 'incorrect response' (reference category). The results suggest that the age and gender of the participants had no significant effect on their response. With respect to the group conditions, participants from the 1-2 condition (*OR*=.45) and 1-5 condition (*OR*=.28), compared to participants in the 1-0 condition (control), were significantly more likely to produce an incorrect response than an 'uncertain' response. The measures of association were small to medium, in accordance with Cohen (1988). The effect sizes, calculated using Cohen's *d*, were -.44 and -.7, respectively.

The third column in Table 5 has the outcome of 'unsure' compared to 'correct response' (reference category). The results suggest that the age and gender of the participants had no significant effect on their statements. With respect to the group conditions,

participants from the 1-5 condition (*OR*=3.75), compared to participants in the 1-0 condition (control), were over three times more likely produce an 'uncertain' response than a correct response. The measure of association was medium, in accordance with Cohen (1988). The effect size, calculated using Cohen's *d*, was .73. Fig.1 illustrates the distribution in participant responses in relation to the number of confederates present.

Table 5.

Multinomial logistic regression predicting eyewitness response accuracy.

	Correct response [a] (*N*=223)		Unsure [a] (*N*=106)		Unsure [b] (*N*=106)	
Variable	*SE*	*OR (95% CI)*	*SE*	*OR (95% CI)*	*SE*	*OR (95% CI)*
Age	.01	1 (.98/1.01)	.01	1.01(.99/1.03)	.02	1.02(1/1.03)
Gender						
Female		1		1		1
Male	.19	1.01 (.7/1.47)	.27	1.33 (.78/2.27)	.24	1 (.63/1.6)
Condition						
1-0 (Control)		1		1		1
1-1	.42	.66 (.29/1.49)	.5	1.04 (.39/2.79)	.51	1.58 (.59/4.28)
1-2	.32	.24 (.13/.44)***	.38	.45 (.21/.95)*	.42	1.92 (.84/4.37)
1-5	.47	.08 (.03/.19)***	.42	.28 (.12/.64)**	.57	3.75 (1.22/11.48)*
2-1	.35	.99 (.5/1.95)	.45	.95 (.39/2.3)	.24	1 (.63/1.6)
5-1	.25	1 (.62/1.62)	.32	.88 (.47/1.64)	.31	.88 (.49/1.6)

Note. a= Reference group: 'incorrect response' (*N*=279); b= Reference group: 'correct response' (*N*=223). *OR* = Odds Ratio. *SE* = Standard Error. *95% CI* = Confidence Interval. * $p<.05$. ** $p<0.005$. *** $p<0.001$

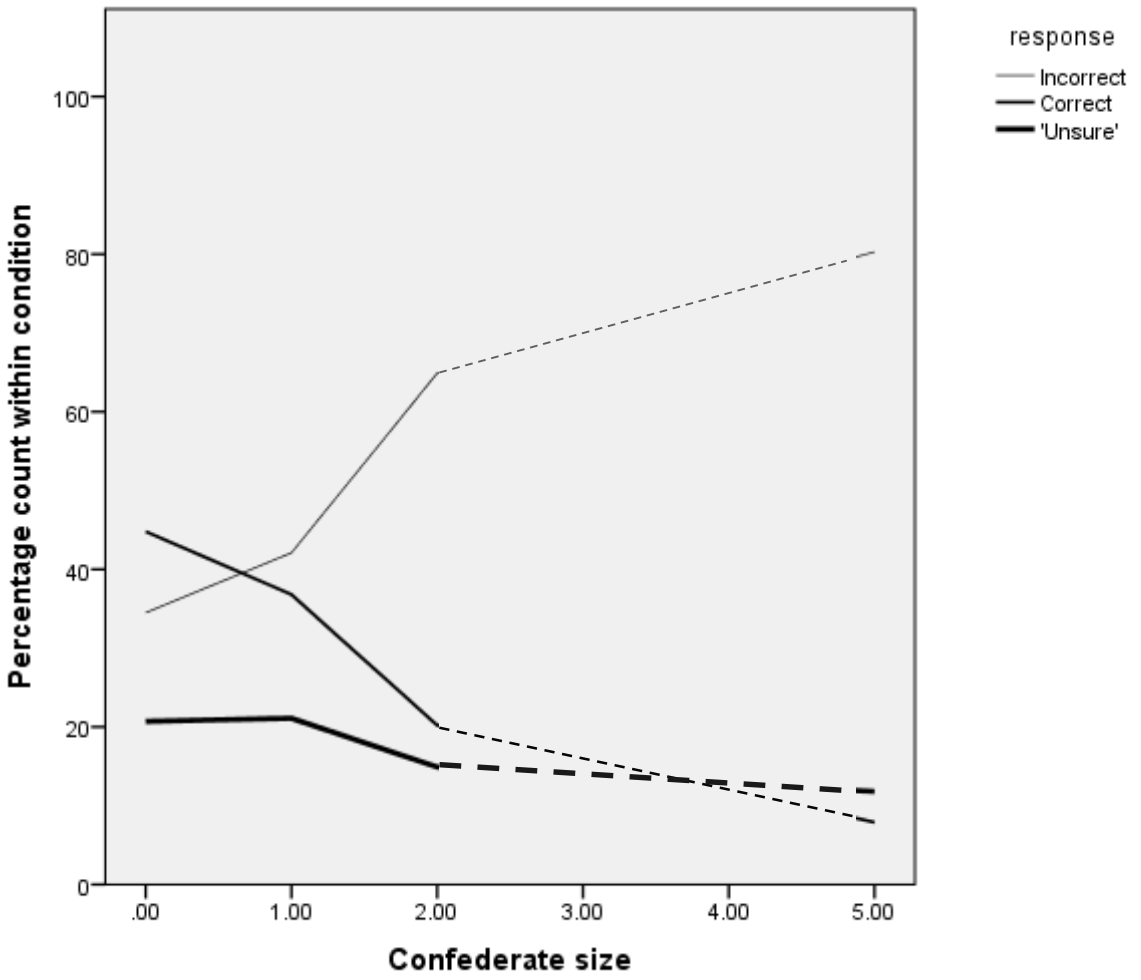

Fig.1. Percentage count of participant responses between confederate sizes (*N*=608*)*.[1]

The percentage of correct, incorrect and uncertain responses (dependent variable) for participants who were exposed to misinformation from two and five confederates (independent variable) were compared to determine whether the change in misinformation size influenced response accuracy. A 2 (two or five confederates) X 3 (correct, incorrect or 'unsure' response) chi-square analysis was performed. A weak, significant association was found between the two different groups and eyewitness response accuracy $\chi 2$ (2, N = 170) =

[1] Dotted lines represent extrapolated data as there were no corresponding trials with confederate sizes of three and four

6.01, $p < .05$, $\varphi c = .19$. However, an examination of the standardized residuals revealed that the critical values did not correspond to an alpha of 0.05, suggesting that the difference in responses between the conditions was small.

The effects of confederate size and unanimity on eyewitness confidence.

The confidence judgements of participants who answered correctly and incorrectly were analysed in order to determine whether the group condition influenced the level of confidence that participants placed in their responses. A two-way between groups analysis of variance was conducted to explore the impact of group condition (6) and the participant's response (2) on their confidence. The interaction between group conditions and response accuracy was not found to be statistically significant; F (5, 490) = 1.14, $p > .05$. There was no statistically significant main effect for group condition; F (5, 490) = 1.04, $p > .05$. The main effect for participant response did not reach statistical significance; F (1, 490) = 1.09, $p > .05$. The results therefore suggest that neither the group condition nor response had any mediating effects on the level of confidence participants placed in their responses.

Discussion

The primary aim of the present research was to identify if the risk of co-witness influence on blame attribution was significantly mediated by majority size and group unanimity. Although the study was not the first to examine the effects of group processes on memory recall (Thorley & Dewhurst, 2007; Walther et al., 2002), very little research had attempted to measure this relationship within a forensic setting. Moreover, the study sought to determine whether the risks of blame conformity were dependent on the misinformation size and majority consensus, an un-researched area within the eyewitness literature.

Previous research on social influence indicated that participants would be significantly more vulnerable to being influenced by a majority size of three or more than by a single individual (Asch, 1955; Bond, 2005; Campbell & Fairey, 1989; Gardikiotis, et al., 2005; Gerard et al., 1968; Mannes, 2009; Rosenberg, 1961; Stang, 1976), suggesting a positive relationship between majority size and social influence. In relation to memory recall, Walther et al. (2002) found that a majority size of five was as influential as a majority size of ten, when the task was ambiguous. Findings suggested that the relationship between majority size and co-witness influence would plateau after a majority size of five was reached. Based on these findings, it was hypothesised in the present study that an increase in misinformation size (0 to 5) would increase the risk of blame conformity to the confederates (H1).

Additionally, the literature on social influence identified the unanimity of misinformation as a mediating factor for social influence (Asch, 1955; Bond, 2005; Vandello & Brunsma, 1996). Moreover, Walther et al., (2002) also demonstrated that an individual's vulnerability to memory conformity was significantly reduced when the misinformation was not unanimously held by the group. Based on these findings, the present study predicted that the absence of a unanimous majority would significantly reduce the rate of blame conformity to the confederates (H2).

The present study found that an increase in majority size supplemented an increase in the rate of false responses and a decrease in the rate of correct responses, supporting the first hypothesis. More specifically, the results indicated that participants who were exposed to misinformation from a majority size of two or five confederates were significantly more likely to produce an incorrect response than a correct or 'unsure' response, in comparison to participants in the control group (see Table 3). It was also found that participants who were exposed to misinformation from a majority size of five confederates were over three times more likely to give an uncertain response than a correct response; suggesting that some

participants were influenced by the confederates, despite not fully conforming to them. The results concur with earlier research on social influence (C.F. Asch, 1955; Campbell & Fairey, 1989; Gerard et al., 1968; Rosenberg, 1961; Stang, 1976), which showed a greater effect of social influence when the number of confederates was increased. These observations can be best explained through the frequency-validity principle, which proposes that eyewitnesses who are repeatedly exposed to misinformation from multiple co-witnesses may be more inclined to believe that the information is valid (Fiedler, 2000; Hertwig et al., 1997).

The results also suggested that the rate of false responses was higher when participants were exposed to misinformation from five confederates than by two; however, additional analysis indicated that this difference was small (φc = .19). This suggests that the relationship between majority size and blame conformity would start to plateau before reaching a majority size of five (see Fig. 1). This corresponds with the findings of Walther and colleagues, who showed that when uncertainty was high, an increase in majority size beyond five sources had no additional impact on co-witness influence (Walther et al., 2000). This relationship can be attributed to the way in which the participants perceive majority groups; Asch (1952) proposed that after the addition of a third information source, the target would view the group as a collective source of information rather than as individual sources; subsequently the impact of any additional sources would be made redundant.

Within three of the experimental conditions, participants were exposed to misinformation from an individual confederate; in the 1-1 condition, participants were grouped with one confederate; in the 2-1 condition, participants were grouped with one confederate and another participant; and in the 5-1 condition, participants were grouped with one confederate and four other participants. The groups were used to assess the level of influence one confederate had on participants, as either the sole information source or a group minority. Results indicated that in all three conditions the confederate had no effect on the

participants' responses, suggesting that the misinformation was only influential when presented by a majority group. It is suggested that participants will have been more likely to perceive misinformation from an individual source as an erroneous observation; however, when presented with misinformation from a unanimous group of co-witnesses, participants would have been less likely to deem the information as being idiosyncratic and would have been more likely to consider the misinformation as being correct (Asch, 1955). Self-attention theory (Carver, 1979; Carver & Scheier, 1981) can be used to explain the insignificant level of influence from an individual confederate; Mullen (1987) suggested that the more self-attention was focused on the self, the more an individual would attempt to match their attitudes with majority consensus. However, self-attention would only be evoked when the individual was against a majority norm, thus misinformation from an individual confederate may have failed to evoke enough self-focus to influence the participant into conforming. These findings contradict Thorley and Rushton-Woods' (2013) suggestion that participants could be influenced by an individual co-witness when attributing blame to the correct suspect. This may be due to the latter study using a mock statement from an eyewitness who was present during the actual event, rather than from another participant/confederate. Firstly, participants who would have encountered co-witness misinformation through a written statement will not have been able to evaluate the validity of the co-witness through a direct discussion. It could also be suggested that participants may have been more inclined to assume that the co-witness statement was correct due to it supposedly coming from someone who had witnessed the crime first-hand.

With respect to the literature on group unanimity, the present findings support the propositions of Walther et al., (2002), to an extent. They found that the level of co-witness influence was significantly reduced when there were multiple dissenters present within the eyewitness group. Although the present study did not use dissenters within the experiments,

the results indicated that when multiple true participants were present, misinformation from confederates had no influence on the participants. However, the present study did not measure the effects of co-witness influence from majority groups who were not unanimous (multiple true participants present). Consequently, the present findings cannot determine whether eyewitnesses would be vulnerable to co-witness influence from a majority group if the misinformation was not unanimous. As such, it is suggested that future research is needed in order to fully address the second hypothesis.

The researchers predicted that there would be a negative correlation between misinformation size and eyewitness confidence, in participants who produced correct responses (H3). Additionally, it was anticipated that there would be a positive correlation between misinformation size and eyewitness confidence, in participants who produced an incorrect response (H4). However, the results failed to support either of the hypotheses. Neither group size nor the unanimity of misinformation had a mediating effect on the impact of misinformation to the confidence of participants, contradicting the findings of Allwood et al., (2006). A key difference between the present study and the majority of the previous studies into co-witness influence was that the current study purposely used an ambiguous task, with only 44.8 % of the control group blaming the correct offender and 20.7% answering 'unsure', suggesting that the task was reasonably ambiguous (see Table 2). It is suggested that the ambiguity of the task may have significantly affected the confidence of most participants, resulting in the majority of participants displaying some level of doubt in their responses, regardless of their condition or answer. This can be seen in Table 2, where the mean confidence scores within all conditions ranges from 2.98 to 3.5.

Limitations & directions for future research.

Although the current paper provided some empirical insight into the social and cognitive processes of co-witness influence, the study bore multiple limitations. The unanimity of misinformation was manipulated by varying the number of confederates and participants within each condition. Multiple participants were used in the 2-1 condition and 5-1 condition to cause a divide in judgement during the post-event discussions and break the unanimity of the misinformation. However, based on the response rates in the control condition, there is a small possibility that participants in these conditions may have still been exposed to misinformation from a unanimous group of co-witnesses. The unanimity of misinformation could perhaps have been manipulated more effectively using the experimental design outlined by Walther et al., (2002), who manipulated the unanimity of misinformation using dissenters (confederates used to purposely suggest correct information). Further research is therefore needed to reliably determine the importance of group unanimity on co-witness influence. The study failed to measure the effects of co-witness influence from majority group that were not unanimous (i.e. five confederates and two true participants/dissenters); therefore, the present study cannot determine whether misinformation size would still have a mediating effect on co-witness influence if multiple dissenters were present. Through such observations, future research should seek to determine whether the size or the unanimity of misinformation has a greater moderating effect on co-witness influence.

During the present experiments, confederates were allowed to present their misinformation at any time during the discussion. This was done to create a more naturalistic environment, in order to prevent the participants from questioning the validity of the confederates as true participants. Furthermore, with many of the experimental conditions incorporating multiple confederates, it would have been more difficult to provide each confederate with a specific order for speaking, whilst maintaining the false illusion of a

natural discussion amongst true participants. However, failure to control for the order of discussion could have had an extraneous effect on the results, due to research suggesting that the speaking order of co-witnesses could have a significant effect on conformity rates (Hewitt, Kane, & Garry, 2013). Moreover, Gabbert, Memon, and Wright (2006) demonstrated that the first speaker would have the greatest influence on the rest of the group. Therefore, if a true participant was first to speak, this could produce a significantly different outcome than if a confederate was first to speak. Failure to control for speaking order in the 2-1 and 5-1 condition meant that some participants within these conditions could have been subjected to varying ratios of correct and incorrect information. Future research could provide the participants with instructions for a structured co-witness discussion (i.e. 'please state who you believe threw the first hit in an orderly fashion, starting from the participant on the far right and ending on the participant on the far left').

Summary

Overall, the findings of the present study suggest that the risk of blame conformity amongst eyewitnesses is dependent on the size of the information source. Moreover, results suggest that misinformation from an individual co-witness will most likely be rejected, and that for an eyewitness to be influenced by their co-witnesses the information would have to be presented by the majority of co-witnesses. Based on these observations, it is proposed that the true risks of blame conformity during real criminal investigations may be lower than originally predicted by previous research based on two-person observations. The present study suggests that the risk of possible co-witness contamination is less of a concern if there is clear deviation between the statements of co-witnesses; however, more research is required in order for the risks of co-witness contamination to be accurately predicted.

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