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Are children less reliable at making visual identifications than adults? A review

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The current paper reviews research that has investigated developmental differences in lineup identification. A wealth of studies have shown that children can be as accurate as adults when making a correct identification from a target present lineup (TP), however children are more inclined to choose and thereby make a false identification from a target absent (TA) lineup, as compared to adults. The literature reviewed, suggests that the disparity between children's and adult's performances on TA lineups is due to children being unable to resist the social demands to choose someone from a lineup and/or the need to give a positive response. Employing a silhouette within a lineup, that can be chosen if the target is not recognised, appears to be the most successful technique for reducing false identifications made by child witnesses. Including a silhouette as a part of a lineup, along with the lineup administrator being attired in casual clothing, rather than a uniform, are two simple measures that could make child witness identification evidence more reliable.

Keywords: child eyewitness; child witnesses; children's memory; eyewitness identification; lineup instructions; literature review

Eyewitness identification plays an important role in criminal justice for investigations, and can form key evidence in trials. In many investigations the only witnesses to crimes are children (Memon, Havard, Clifford, Gabbert, & Watt, 2011; Pike, Brace, & Kynan, 2002; Pozzulo, 2007). Although no official records are kept, a recent survey of video lineups conducted in Scotland, UK, for the whole of 2008, found that a third of witnesses were under the age of 16 (Memon et al., 2011). As children's identification evidence can be so important, a large body of research has focused on children's identification accuracy from lineups. The aim of this paper is to review eyewitness research that has investigated developmental differences in lineup identification, and explanations for why children may not perform as well as adults, when a culprit is not present in a lineup. Studies that have tried to improve children's identification decisions to target absent lineups will be reviewed, and some recommendations will be offered for increasing the reliability of children's identification evidence.

Children's eyewitness performance

Eyewitness research reports that when witnesses are presented with a target present (TP) lineup, where the culprit is within the lineup, children over the age of 5 years can

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be as accurate as adults (over 18 years of age) at making a correct identification (Lindsay, Pozzulo, Craig, Lee, & Corber, 1997; Parker & Ryan, 1993; Pozzulo & Balfour, 2006; Pozzulo & Lindsay, 1998, please see Table 1). Furthermore, research that has investigated developmental differences in identification, has often found little variation in correct identifications between different age groups. Lindsay et al. (1997) found no differences in correct identifications for children aged 8–10 years to children aged 11–15 years (Experiment 1). Beresford and Blades (2006) found no differences in correct identifications for 6–7 year olds and 9–10 year olds. Havard, Memon, Clifford, and Gabbert (2010) found no differences in correct identifications for children aged 7–9 years of age and adolescents aged 13–15 years and Havard and Memon (2013) found no differences in correct identifications for children aged 5–7 and 8–11 years of age.

The majority of research has reported little differences in correct identification from target present lineups as a function of age, however, there are some studies that have found older children, or adults can be more accurate than younger children. Lindsay et al. (1997; Experiment 2) found preschool children (aged 3–6 years) were not as accurate at making correct identifications as adults. Humphries, Holliday, and Flowe (2012) also found that adults made more correct identifications, as compared to children aged 5–6 years and 9–10 years, but only with sequential lineups and not with elimination, or simultaneous lineups. Whilst Karageorge and Zajac (2011) reported that children aged 5–7 were less accurate than those aged 8–11 years of age. The majority of studies that have found developmental differences in performance for target present lineups have used a sample aged between 3–6 years, and this suggests that there may be some developmental differences within this age group when it comes to making a correct identification.

Although the majority of research with child witnesses has shown that they can be as accurate as adults at making a correct identification from a target present (TP) lineup, the pattern of responses is the contrary for target absent (TA) lineups. When it comes to correctly rejecting a TA lineup, that is, correctly stating the *'person is not there'*, the majority of eyewitness research reports that children are significantly more likely than adults to falsely identify someone from a lineup (Dekle, Beal, & Honeycutt, 1996; Humphries et al., 2012; Lindsay et al., 1997; Parker & Ryan, 1993; Pozzulo & Balfour, 2006; Pozzulo & Warren, 2003, Expt 1, see Table 1). Although there are a couple of studies that have found that older children aged 12–14 years can perform like adults on TA lineups (Pozzulo & Lindsay, 1997; Pozzulo & Warren, 2003, Expt 2), or more accurately than younger children (Havard et al., 2010), it has not been consistently confirmed at what age older children and adolescents behave like adults with TA lineups.

The disparity between adults and children's performance on TA lineups has also been confirmed by a meta-analysis. Pozzulo and Lindsay (1998) examined the data from 51 studies with child and adult participants, and found that children were more likely to make a false identification from a TA lineup, as compared to adults. Pre-schoolers (0.39) in particular were significantly less likely to make a correct rejection as compared to adults (0.98), older children (0.41) were also less likely than adults (0.70) to correctly reject a lineup, and even adolescents (0.48) were less likely to make a correct rejection as compared to adults (0.70). There have been several speculations for children's poorer performance on target absent lineups, and they will be described below.

Table 1. The proportion of correct responses for identification studies that have compared child and adult witnesses, using standard lineups and techniques to reduce false identifications.

Reference	Age groups	Lineup type	TP correct	TA correct
Standard eye witness studies				
Dekle et al. (1996)	5–6	Simultaneous	0.11	0.07
	Adults	Simultaneous	0.20	0.27
Havard et al. (2010)	7–9	Serial photo	0.45	0.36
		Video	0.71	0.28
	13–15	Serial photo	0.73	0.48
		Video	0.64	0.76
Havard et al. (2011)	6–8	Video child target	0.74	0.59
		Video adult target	0.40	0.20
	Adults	Video child target	0.77	0.54
		Video adult target	0.44	0.63
Lindsay et al. (1997)	Ex1.	Simultaneous,	0.71	0.28
	8–10	Item sequential	0.65	0.21
	11–15	Simultaneous,	0.80	0.33
		Item sequential	0.71	0.20
	Adults	Simultaneous,	0.55	0.66
		Item sequential	0.62	0.75
	Ex 2	Simultaneous,	0.53	N/A
	3–6	Item sequential	0.26	N/A
	Adults	Simultaneous,	0.80	N/A
		item sequential	0.45	N/A
Pozzulo and Warren (2003)	Ex 1. 10–14	Simultaneous	0.65	0.55
	Adults	Simultaneous	0.80	0.87
	Ex 2. 10–14	Simultaneous	0.65	0.83
	Adults	Simultaneous	0.68	0.93
Studies that have used techniques to reduce false identification				
Beal et al. (1995)	Ex1 5–7	Simultaneous	0.56	0.06
		Not here option	0.50	0.44
	Ex2 5–7	Simultaneous	0.45	0.50
	Ex3 5–7	1 view simultaneous	0.62	0.38
		2 view simultaneous	0.56	0.38
Brewer et al. (2010)[a]	9–14	Simultaneous	0.39	0.49
		Simultaneous – not sure option	0.45	0.39
		Simultaneous – motivation	0.40	0.49
Beresford and Blades (2006)	6–7	Photo	0.57	0.33
		Photo modified	0.43	0.52
		Photo elimination	0.43	0.57
		Video	0.48	0.25
		Video modified	0.52	0.67
		Video elimination	0.43	0.62
	9–10	Photo	0.36	0.18
		Photo modified	0.55	0.50
		Photo elimination	0.46	0.68
		Video	0.52	0.33

Table 1 (*Continued*)

Reference	Age groups	Lineup type	TP correct	TA correct
		Video modified	0.38	0.48
		Video elimination	0.24	0.38
Dunlevy and Cherryman (2013)	6–7	Simultaneous - control	0.86	0.24
		Simultaneous – tree option	0.81	0.67
Davies, Tarrant, and Flin (1989)	6–7	Simultaneous-control	0.50	0.63
		Simultaneous – Mr Nobody	0.44	0.94
	10–11	Simultaneous – control	0.75	0.75
		Simultaneous – Mr Nobody	0.69	0.88
Goodman et al. (1991)	3–7	Simultaneous – no practice	N/A	0.44
		Simultaneous – practice	N/A	0.75
Havard and Memon (2013)	5–7	Video lineup – control	0.46	0.29
		Video lineup – Mystery Man	0.63	0.68
	8–11	Video lineup – control	0.53	0.22
		Video lineup – Mystery Man	0.64	0.51
Humphries et al. (2012)	5–6	Simultaneous video	0.60	0.37
		Elimination video	0.57	0.33
		Sequential video	0.30	0.27
	9–10	Simultaneous video	0.73	0.60
		Elimination video	0.63	0.57
		Sequential video	0.47	0.50
	Adults	Simultaneous video	0.70	0.60
		Elimination video	0.63	0.80
		Sequential video	0.83	0.73
Karageorge and Zajac (2011)	5–7	Simultaneous – control	0.57	0.29
		Simultaneous – wildcard	0.56	0.84
	8–11	Simultaneous – control	0.82	0.30
		Simultaneous – wildcard	0.71	0.83
Parker and Ryan (1993)	8–11	Simultaneous - control	0.42	0.17
		Sequential – control	0.25	0.33
		Simultaneous – practice	0.42	0.50

Table 1 (*Continued*)

Reference	Age groups	Lineup type	TP correct	TA correct
		Sequential – practice	0.33	0.25
	Adults	Simultaneous - control	0.42	0.42
		Sequential – control	0.08	0.75
		Simultaneous – practice	0.33	0.75
		Sequential – practice	0.50	0.58
Pozzulo and Balfour (2006)	8–13	Simultaneous -no change	0.50	0.17
		Simultaneous – appearance change	0.20	0.50
		Elimination – no change	0.45	0.48
		Elimination – appearance change	0.10	0.57
	Adults	Simultaneous – no change	0.70	0.44
		Simultaneous – appearance change	0.33	0.80
		Elimination – no change	0.58	0.77
		Elimination – appearance change	0.11	0.64
Pozzulo, Dempsey, and Cresini (2009)	3–6	Simultaneous	0.44	0.52
		Elimination	0.68	0.80
Pozzulo and Lindsay (1999)	10–14	Simultaneous	0.65	0.56
		Fast elimination	0.51	0.73
		Slow elimination	0.62	0.68
		Modified simultaneous	0.56	0.68
		Fast modified elimination	0.55	0.85
		Slow modified elimination	0.54	0.73
	Adult	Simultaneous	0.80	0.87
		Fast elimination	0.48	0.94
		Slow elimination	0.62	0.87
Zajac and Karageorge (2009)	8–11	Simultaneous – control	0.75	0.46
		Simultaneous – wildcard	0.76	0.71

Note: If not stated otherwise all lineups will comprise of static photographs.
[a]These data were collapsed across four lineups.

Why do children perform more poorly than adults on target absent lineups?

One theory for why children may perform more poorly on TA lineups as compared to adults is that they may have a weaker memory trace. The weaker memory trace may result in a lower matching criterion for faces in the lineup, which is fine if the source of the memory is in the lineup (TP), but when the lineup does not contain the memory source (TA), there is a higher likelihood of a false identification (Pozzulo & Lindsay, 1998). However, it has also been suggested that children's difficulties on target-absent lineups may relate to the social and task demands (Pozzulo & Lindsay, 1997). It has been proposed that, when presented with a lineup, witnesses assume that the perpetrator must be within the group (Gross & Hayne, 1996), exerting an implicit pressure to select that adults have greater capacity to resist than children (Beal, Schmitt & Dekle, 1995; Ceci, Ross, & Toglia, 1987). Children may also be more likely to choose from a lineup, and therefore, they may be more likely to guess and use a more liberal decision criterion, as compared to adults (Parker & Carranza 1989).

One study that has illustrated the social influence a child faces when presented with a lineup, examined the effect of the lineup administrator wearing a uniform. Lowenstein, Blank, and Sauer (2010) presented witnesses (aged 9–10 years of age) with either TP or TA lineups where the administrator wore a police-like uniform, or casual clothes. Lowenstein and colleagues found that when the lineup administrator wore a uniform it did not influence correct identifications for TP lineups, as compared to wearing casual clothing (60% vs. 67%), but it did significantly increase false identifications for TA lineups (53% vs. 87%). Child witnesses also had higher state anxiety scores in the uniform condition as compared to the control condition. Lowenstein et al.'s (2010) study illustrates how important the social factors are when a child is faced with a lineup and the task demands that face a witness. However, it is unlikely that the researchers conducting eyewitness studies with children would wear police-like uniforms, and so these findings do not fully explain why the majority of eyewitness research with children has found that they make more false identifications on TA lineups.

Another issue that may influence identification accuracy is that the responses for making a correct identification and a correct rejection are very different. One involves recognising a previously seen face, whereas the other involves recalling a face and determining that the face is not present in the lineup. When making a correct identification, often the witness just points to the lineup member saying 'that's him or her', whereas when making a rejection the witness has to say 'I don't think the person is there'. Therefore, when making a correct identification for a lineup the response is positive, whereas when making a correct rejection the response is negative. It has been suggested that children view positive responses as being more favourable than giving a negative response (Zajac & Karageorge, 2009), and that giving an answer is preferable to not giving any answer (Waterman, Blades, & Spencer, 2000).

Pozzulo and Lindsay (1998) offer an alternative explanation for why children make more false identifications for target absent lineups as compared to adults. They suggest that children and adults may use different face processing strategies. Pozzulo and Lindsay (1998) propose that adults use configural and holistic processing when identifying faces, encoding the faces as a whole, including the spatial relationships

amongst the features; whilst children, may rely more on featural information for identification, encoding the face as a set of separate features, and not necessarily the spatial relationships between the features. Featural information can be very useful in target present lineups, for example, matching the hairstyle and facial features of the target from the lineup with an image held in memory. However, when a target is absent from a lineup, featural information may be less useful, and holistic information may be needed to make a correct decision and reject the lineup. If a featural strategy is used for a TA lineup decision, the witness may choose the foil having the most similar hair to the target, rather than processing the whole face and determining that the configuration is not the same. Findings from early face recognition studies do seem to support the different processing strategies employed by children and adults (Carey & Diamond, 1994; Diamond & Carey, 1977); however, more recent research has suggested that holistic processing can be present from as early as 4 years of age (de Heering, Houthuys, & Rossion, 2007). For a review of developmental face recognition literature and the debate on whether children and adults process faces in a qualitatively or quantitatively different way, please see Cookes and McKone (2009).

There is also one additional factor that might influence how well children perform on TA lineups, and that is, the majority of the experimental stimuli that have been used in eyewitness research have been adult targets. Research with children identifying young adults is worthwhile, as there is evidence that most suspects placed in lineups are aged 16–34 years of age (Havard, Memon, Chaudhry, Clifford, & Gabbert, 2008). However, there is an own age bias in face identification, where people are better at recognising faces that are a similar age to themselves (for a recent review and meta-analysis please see Rhodes & Anastasi, 2012). Therefore, as most studies have used a young adult target in their mid-20s (Beresford & Blades, 2006; Dekle et al., 1996; Parker & Carranza, 1989; Parker & Ryan, 1993; Zajac & Karageorge, 2009) this immediately puts children at a slight disadvantage, when it comes to making an identification. One study that looked at the own age bias with child witnesses (aged 6–8 years) found that correct rejection rates were higher for the similar aged child target (59%), as compared to the adult target (20%), and these rates were more comparable to correct rejection rates made by adult witnesses (Havard, Memon, Laybourn, & Cunningham, 2012).

Making a false identification or positive response to a lineup that does not contain a culprit has important real world implications. Memon et al. (2011) found that on average children (under 16 years of age) chose a foil from a lineup, one third of the time. False positives are not problematic if the police know that the foil chosen is innocent, the problem arises when the suspect is chosen, and the suspect is not actually the culprit. Misidentifications from lineups account for a great number of wrongful convictions (The Innocence Project, 2012), and therefore, anything that can be employed to make identification more accurate and prevent wrongful imprisonment is a worthy area of research. If children's poor performance is due to social demands and a feeling that they must choose from a lineup, then it may be possible to try and reduce these demands and/or allow children to correctly reject the lineup. There have been a number of studies that have developed procedures to try to reduce false identifications for children, and they will now be reviewed.

Methods to increase accuracy for target absent lineups

A number of techniques have been investigated by researchers in an attempt to reduce false identifications for child witnesses they include; sequential lineups (Lindsay et al., 1997; Parker & Ryan, 1993; Pozzulo & Lindsay, 1998), elimination lineups (Humphries et al., 2012; Pozzulo & Balfour, 2006; Pozzulo, Dempsey, & Gascoigne, 2009; Pozzulo & Lindsay, 1999), practice lineups (Goodman, Bottoms, Schwarz-Kenney, & Rudy, 1991; Parker & Ryan, 1993), and providing an additional response (Beal et al., 1995; Davies, Tarrant, & Flin, 1989; Dunlevy & Cherryman, 2013; Havard & Memon, 2013; Karageorge & Zajac, 2011; Zajac & Karageorge, 2009). The various methods will now be described in more detail below.

Pozzulo and Lindsay (1999) suggested that one of the reasons that children make more false identifications from target absent lineups is that, they are more likely to make a relative judgement and choose the person who looks most like the target, whether the target is present or not. Previous research with adults had found that one way to reduce relative judgements, and encourage absolute judgements, was to use a sequential lineup, as compared to a simultaneous lineup, where all the lineup members are presented in an array (Lindsay & Wells, 1985). In the sequential lineup a witness is not told how many lineup members they will see, and is shown one person at a time and then has to decide if the person currently shown is the culprit, before seeing the next person. The lineup stops when the witness identifies someone, or they have seen each lineup member, once they have identified someone they cannot see that person again. Although the sequential lineup procedure has been found to reduce false identifications made from TA lineups for adult witnesses (Kneller, Memon, & Stevenage, 2001; Sporer, 1993), it has not been found to reduce false identifications made by children from target absent lineups (Lindsay et al., 1997; Parker & Ryan, 1993; Pozzulo & Lindsay, 1998).

Lindsey et al. (1997) suggest that the reason that sequential lineups are not effective for reducing false identifications for children is that, children are more likely to guess, and that they have a bias to choose, or are unable to resist the social demand to choose from the lineup. Parker and Ryan (1993) also propose that children have more of a lax choice criterion with a greater tendency to guess, and that sequential lineups do not make children's responses more conservative. Pozzulo and Lindsay (1998) also suggest that either the perceived pressure to choose from a lineup is greater for children, or adults' may be more able than children to resist the social demands to pick from a lineup. Therefore, findings from studies that have compared sequential and simultaneous lineups suggest that sequential lineups do not influence children to use a stricter decision criterion, nor do they help children to employ absolute judgements.

There is support for the theory that children do not use a strict decision criterion from a study conducted by Spring, Saltzstein, and Peach (2013). In their study Spring et al. (2013) conducted three eyewitness-type experiments and used signal detection analysis for their results. They found that younger children (aged 6–9 years) used a more liberal response criterion, and older children and adolescents (aged 10–15), used a more conservative response criterion. After conducting the identification phase the children were asked a series of questions about the seriousness of making a misidentification, or failing to identify a culprit. The answers from the questions revealed that younger children perceived failing to

identify a culprit (miss), was less desirable than wrongly identifying an innocent (false identification), whereas older children felt the reverse. It was concluded that younger children do not think about the moral consequences of making a false identification and this could be one of the underlying reasons for the high choosing rates from lineups, leading to higher false identification rates.

In a further attempt to try reduce false identifications from target absent lineups, Pozzulo and Lindsay (1999) developed a two-stage elimination lineup where children were initially asked to make a relative judgement and choose the person who looked most like the target, then an absolute judgement and decide if that person was the target or not. In their study, Pozzulo and Lindsay found that the elimination lineup could help to significantly reduce the number of false identifications for children aged 10–14 from 44% to 27% (fast elimination), without significantly reducing correct identifications for target present lineups. The elimination lineup technique was also successful at reducing false identifications with younger children aged 8–13 years (Pozzulo & Balfour, 2006) and 3–6 year olds (Pozzulo, Dempsey, & Cresini, 2009).

In their earlier study Pozzulo and Lindsay (1999) suggested that the elimination procedure was so successful at reducing false identifications, due to the nature of the two judgements that are made. In the first decision the witness is asked to eliminate the lineup members they know are not the target, and thereby when doing so, the majority or all of lineup foils should be removed. Then the witness has to make an absolute decision and determine if the surviving lineup member is the target. If all the lineup members have been eliminated, it could be that a second decision does not have to be made. Furthermore, by giving the children the option to eliminate lineup members it may reiterate the implicit assumption that that perpetrator might not be in the lineup, and thereby reduce false positive responding. However, more recently Pozzulo et al. (2009), stated that the exact reason why the elimination lineup results in fewer false identifications is unknown, and it could result from a shift in strategy (from relative to absolute), or criterion shift (a higher threshold for a witness to make an identification).

Pozzulo and colleagues' research has tended to use photo lineups where the initial display is presented in a simultaneous array. Whilst this method may be dominant in the USA, in the UK, lineups are now presented using moving video images that are presented one at a time. Elimination procedures that have used video lineups have not always increased accuracy for child witnesses. Beresford and Blades (2006) explored this issue with children aged 6–7 and 9–10 years, with six different types of lineups: the standard photo simultaneous, modified instruction photo simultaneous, modified instruction photo elimination, standard video serial, modified instruction video serial and modified instruction video elimination. For the modified instructions, participants were given an additional caution about making a false identification, and all instructions were based on those used by Pozzulo and Lindsay (1999). Beresford and Blades (2006) found that the cautioning instructions improved accuracy for the target absent lineups, without reducing correct identifications, for both video (25–67%) and photo lineups (33–52%). However, the elimination lineup procedure reduced correct identifications for the target present video lineups.

In another study, Humphries et al. (2012) investigated whether different procedural methods for presenting video lineups influenced child witnesses' identification accuracy. Humphries and colleagues presented children and adults with video lineups, either simultaneously, sequentially, or via the elimination

technique. They found that using the elimination technique could reduce false identifications for adult witnesses, but not children aged 5–6 and 9–10 years of age. They suggested that the reason they did not find a benefit from using elimination lineups, may be due to the methodological differences between their research and that previously conducted, including the use of video lineups with moving images and sequential presentation.

Other studies have employed a different mechanism to try and reduce false identifications, by using practice lineups, with the premise that they might help children resist the social demands of choosing from a lineup. By employing a practice lineup where it is obvious the target is not present, children may realise that sometimes the correct response can be to say the *'person is not there'*. Goodman et al. (1991) showed children aged 3–7 years a TA practice lineup where they were asked to choose their mother, and found that this could reduce false identification for a subsequent TA lineup. However, other studies have failed to find any benefit for using practice trials to reduce false identifications for TA lineups (Davies, Stevenson-Robb, & Flin 1988). Parker and Ryan (1993) found that using a practice lineup could help to reduce false identifications for the subsequent lineup, however, only for simultaneous lineups, and not sequential lineups. For the control condition a benefit was found for the sequential lineup over the simultaneous lineup, with a decrease in false identifications. They concluded that practice lineups were only beneficial for simultaneous lineups, when a lineup was presented using the sequential procedure any benefit of practice was eliminated.

An alternative method has been to employ a technique that aligns the correct rejection decision to making identification by giving the witnesses an additional choice within the lineup. Davies, Tarrant, and Flin (1989) provided children (aged 6–7 and 10–11 years) with a lineup member called *'Mr Nobody'* who was a line drawing cartoon character and asked them to pick *'Mr Nobody'* if they didn't see the person in the lineup. Surprisingly, Davies et al. (1989) results found a very high rate of correct rejections even in the control condition where there was no additional option, therefore the addition of *'Mr Nobody'* did not significantly improve correct rejection rates. In another study, Beal et al. (1995) included the additional option of a *'not here'* card and children aged 5–7 years were asked to point to the card if they did not see the person in the lineup. They found using the *'not here'* card reduced false identifications for the target absent lineups; however, they had used very small sample sizes, so their findings should be treated with caution.

More recently, Brewer, Keast, and Sauer (2010) presented witnesses aged 9–14 years with four films of simulated crimes and after viewing each they were shown a lineup. Each participant saw two target present and two target absent simultaneous lineups. For the lineup instructions there were three conditions: the control condition, the *'not sure'* condition, and the motivation condition. In the *'not sure'* condition witnesses were told that if they were not sure who the thief was, then they could choose the *'not sure'* button. In the motivation condition witnesses were given the *'not sure'* response, but were additionally told they would receive points for being correct and none if they were incorrect. They found that the *'not sure'* response alone did not reduce the false alarm rate, but however, when combined with the motivation instruction overall false identification rates were reduced by 12.2 percent. However, Brewer et al.'s (2010) findings should be treated with caution as the effects did not generalise across the four sets of stimuli; the motivation instruction and *'not sure'*

option were only effective with two sets, and for the other two sets false identification rates were lower in the control condition. There could be a number of reasons why Brewer and colleagues found disparity in responses between their different lineups. Firstly, the staged events that were witnessed were of different durations; 16 secs, 30 secs, 105 secs and 115 secs, and previous research reported that length of exposure to a target influenced identification, with longer exposure resulting in higher accuracy (Memon, Hope, & Bull, 2003). Furthermore, each child was presented with two TP and two TA lineups, and simply being presented with multiple lineups may influence choosing behaviour. Some research that presented two lineups, found that witnesses were more likely to choose on the first lineup as compared to the second lineup, and therefore if the second lineup is a TA lineup then there was a greater chance the response was accurate (Havard & Memon, 2009; Havard et al., 2011). If choosing behaviour can be altered by presenting two lineups one after another, it may be further altered by a witness seeing four lineups in succession. One final issue that may have introduced disparity between the lineups is that Brewer and colleagues do not report whether the lineups were measured for fairness, and therefore, some of the targets may have been more distinctive than others and easier to recognise.

Another study that found a benefit of using an alternative response within a lineup used the photograph of a tree in the experimental condition (Dunlevy & Cherryman, 2013). In this study, children took part in a craft making exercise with a *'special visitor'* and then later were asked to identify the person they had been working with. In the identification phase (one week later) some children were presented with a lineup that had the additional option of the silhouette of a tree and they were told that if they did not see the *'special visitor'* they could point to the tree, as he may be standing behind it. The findings showed that the additional response did appear to reduce false identifications for TA lineups, without reducing correct identifications for TP lineups. Dunlevy and Cherryman (2013) offer an alternative explanation for the high choosing rate by child witnesses, and suggest that it could be due to children's propensity to acquiesce. They point to the dual-process theory of acquiescence (Knowles & Condon, 1999) and suggest that children may not understand the purpose of the lineup and might think that the lineup operator is stating that the person is in the lineup, and therefore, fail to fully consider the warning that *'the person may or may not be there'*. If a child has misunderstood the lineup instructions and thinks that they need to choose from the lineup, then they will acquiesce and pick someone. Dunlevy and Cherryman (2013) suggest that their data are consistent with the theory of acquiescence, as children still chose to select the tree in the TA lineups, instead of verbally rejecting the lineup, and thereby accepted the purpose of the lineup as being to find the target.

One study that has successfully reduced false identifications using an additional option was conducted by Zajac and Karageorge (2009). They used a simultaneous photo array where a silhouette with a question mark was placed between two rows of three cards. They called this silhouette the *'wildcard'* and asked children (aged 8–11 years) to point to this special photo if they did not see the person in the lineup. Zajac and Karageorge (2009) found in the control condition, correct rejections were made on 46 percent of occasions, however, when there was the option of the wildcard, correct rejections were made 71 percent of the time. Using the wildcard also did not reduce correct identifications when the target was present in the array. Zajac and Karageorge suggest that their findings illustrate that there is a social component

associated with rejecting a lineup, rather than any cognitive factors, such as a memory trace, or memory strength. Furthermore, that using a silhouette in a lineup may highlight the issue that rejecting a lineup is a valid option.

In a further study, Karageorge and Zajac (2011) found that the *'wildcard'* was also effective at reducing false identifications for younger children aged 5–7 years of age, as well as children aged 8–11 years. They suggested that using the silhouette within the lineup could decrease children's expectations that the target was in the lineup. Additionally, using the silhouette may increase children's absolute judgements and thereby increase the correct rejection rates. Karageorge and Zajac (2011) suggest that their data supports the idea of a change in strategy from the control to wildcard condition. In the control TA condition there were more false identifications for the designated target replacement, reflecting a relative strategy (picking the one who looked most like the target), whereas in the wildcard TA condition the fewer false identifications were more evenly distributed across the foils with less identifications of the designated target replacement, suggesting a guessing strategy.

Havard and Memon (2013) investigated whether the benefit of using of a silhouette would transfer from a simultaneous photo lineup, to a video lineup. They presented children aged 5–7 and 8–11 with a video lineup, where each lineup member was presented serially, as a moving image, and for the *Mystery Man* condition children had to either say the number of the culprit, or if they did not see the culprit the number of the *Mystery Man*. Havard and Memon (2013) found that using the silhouette could help to increase the accuracy for TA lineups for both the older and younger children, from 41 percent to 60 percent. They suggested that, giving children the option to choose the silhouette in the lineup aligns the rejection decision more closely to the identification decision, and allows the witness to give in to the social demands to choose someone. Furthermore it allows the witness to make a positive response rather than a negative one, allowing the witness to adhere to perceived desires of the lineup administrator.

Although using a silhouette of a head placed within a lineup appears to be beneficial at reducing false identifications from TA lineups, there are data that have shown that the properties of the silhouette may be important to obtain this increase in accuracy. Jack, Walker, and Zajac (2010) presented witnesses with either a short-haired male target, or a female with mid-length hair. In the lineup phase witnesses were presented with a wildcard that had hair length that was either congruent, or incongruent with the previously seen target. They found that there was only a benefit for a silhouette if it had congruent hair to the target. They concluded that a wildcard would need to be plausible for it to increase accuracy for target absent lineups.

The studies by Zajac and Karageorge (2009), Karageorge and Zajac (2011) and Havard and Memon (2013), appear to show that using an additional lineup member (who is obviously not the target) can in some circumstances reduce false identifications from TA lineups, by allowing children to make a selection from the lineup without falsely identifying someone. Using the additional option of a silhouette in a lineup appears to be effective at reducing false identifications for both simultaneous photo lineups (Karageorge & Zajac, 2011; Zajac & Karageorge, 2009), and sequentially presented video lineups (Havard & Memon, 2013), without effecting accuracy for TP lineups. The studies cited here that implemented a silhouette, have on average shown that correct rejection rates for TA lineups can be

increased from an average of 31 percent to 71 percent (Havard & Memon, 2013; Karageorge & Zajac, 2011; Zajac & Karageorge, 2009), therefore suggesting that if employed, it could significantly reduce the chances of false identifications. Furthermore, using a silhouette can bring children's correction rejection rate closer to that made by adults, of approximately 70 percent (Pozzulo & Lindsay, 1997).

Implications for police practice

Eyewitness research with child witnesses has shown that on the whole, children can be as accurate as adults, when it comes to making a correct identification from a target present lineup. Findings from research suggests that if a suspect is arrested and is guilty of a crime, then a child witness should be just as likely as an adult witness to identify that suspect. However, research with target absent lineups has shown that in the current situation, when an innocent suspect is arrested and the witness is a child, that suspect has a greater chance of being picked, than if the witness is an adult.

Research that has examined the social demands associated with making an identification from a lineup can be extremely beneficial for informing police procedures, when conducting lineups with child witnesses. One study has shown that when the person administering the lineup wears a uniform this can increase not only the child witness's stress, but make them more likely to misidentify someone from a lineup (Lowenstein et al., 2010). However, as this was only one study, with children aged 9–10 years, it may be necessary to confirm that this is the case for children of other age groups. As a precaution, operators who administer lineups to children may find that witnesses may be less anxious, and provide more reliable identification evidence, if the operator is attired in casual clothes, rather than a uniform.

Studies that have used the elimination procedure do appear to help reduce false identifications for child witnesses; however, this benefit is only apparent for simultaneous photo lineups (Pozzulo & Balfour, 2006; Pozzulo et al., 2009; Pozzulo & Lindsay, 1999), and not video lineups (Beresford & Blades, 2006; Humphries et al., 2012). Therefore using the elimination procedure could be useful in countries such as the USA, where the main method of identification is the simultaneous photo lineup, however it might not be beneficial in the UK, where video lineups (with moving images and serial presentation) are the main method of identification.

Research using practice lineups has not produced consistent results with some research showing them to be beneficial (Goodman et al., 1991), whilst others showing no advantage (Parker & Ryan, 1993). Therefore using practice lineups may not be a practical solution to be implemented by police forces.

One technique shown to be successful for reducing false identifications is the use of an additional option in a lineup but what the additional option is, may be vital for this procedure to work. Using a 'don't know' option has produced inconsistent results (Brewer et al., 2010), whilst using a silhouette appears to be beneficial for photo lineups (Karageorge & Zajac, 2011; Zajac & Karageorge, 2009) and video lineups (Havard & Memon, 2013). However, the silhouette may need to be plausible, that is, have similar hair length as the target, to be effective (Jack et al., 2010).

There are a number of explanations for why using a silhouette in a lineup may reduce false identifications. Using a silhouette in a lineup may make the issue salient

that the target might not be in the lineup and make rejecting the lineup a viable option (Zajac & Karageorge, 2009). Choosing a silhouette provides a positive response to reject the lineup (Dunlevy & Cherryman, 2013; Havard & Memon, 2013), whilst allowing the witness to give in to the social demands of choosing from the lineup (Havard & Memon, 2013). Alternatively, using a silhouette may change the decision strategy of the witness, from relative to more absolute judgements (Karageorge & Zajac, 2011). The explanations for the advantage of using a silhouette in a lineup may not be mutually exclusive, but may work in tandem to improve identification accuracy. Therefore, whatever the underlying explanation may be, using the additional option of a silhouette in a lineup could be a simple and effective method by which police forces could reduce the frequency of eyewitness misidentifications made by children.

Although this review has focussed specifically on techniques to make identification evidence more reliable, it should also be noted that there are a number of other issues that can influence child witnesses' memory and could also affect identification. These include biased instructions, where the witness is not told that the *'person may or may not be there',* which has been shown to increase false identifications (Pozzulo & Dempsey, 2006). Also, the mannerisms of the interviewer may influence a child witness's testimony. Children are more frequently influenced by misleading questions if the interviewer appears authoritative (Bull & Corran, 2002; Zajac & Hayne, 2003), and older children have been shown to be less susceptible to suggestion than younger children (Bruck & Ceci, 1999; Ceci & Bruck, 1993; Gordon, Baker-Ward, & Ornstein, 2001). There is also the double blind procedure where the lineup administrator does not know who the suspect is. Some research that has investigated the double blind procedure with adults, has reported that when the administrator knows the suspect (single blind) there were more false identifications for target absent lineups, than when the double blind procedure was employed (Douglas, Smith, & Fraser-Thill, 2005; Phillips, McAuliff, Kovera, & Cutler, 1999).

To conclude, research with child witnesses has shown that children can be as accurate as adults, when it comes to making a correct identification from a target present lineup, and when the appropriate techniques are in place, children's responses can be made more reliable for target absent lineups. The studies cited here have shown that using a silhouette in a lineup is an effective method to reduce false identifications from TA lineups. Using a silhouette may increase accuracy through a number of factors; such as allowing the witness to choose from a lineup whilst making a rejection, changing decision criteria, or making rejection a viable option. Perhaps it is time for psychologists to draw attention to these findings, and to work with the police and the justice system to implement additional measures for child witnesses. On the basis of this review, for the UK this would be the lineup administrator attired in casual clothing, rather than a uniform, and the additional option of a silhouette in the lineup to reduce misidentifications.

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