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Some witnesses are better than others

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ABSTRACT

This paper reports a single study in which individual differences in visual processing were assessed in comparison with participants' ability to identify a culprit from a lineup. There were two parts to the study, separated by several weeks. In the first part, participants were asked to report on the global and local aspects of stimuli (first used by Navon (1977)) comprising large letters made up of small individual letters. Measures were taken of the degree of interference caused when the letters conflicted (e.g. a large letter P composed of small letter Ss). In the second part of the study, participants viewed a video of a crime, and subsequently attempted to identify the culprit from a lineup. We found that there was an association between the interference caused by conflicting global information when participants were reporting local letters, and identification performance. Those participants that were most susceptible to global interference identified the culprit more often than those who were the least susceptible to conflicting global information. These results establish a relationship between an individual differences measure of global/local processing and eyewitness recognition performance, suggesting that participants with a relative global processing bias might make better eyewitnesses.

1. Introduction

Eyewitnesses to crimes are often asked to identify perpetrators as part of criminal investigations or judicial procedures. The principal method by which legally robust evidence of a positive discrimination can be obtained is the identification lineup, where a witness attempts to recognise a culprit embedded among innocent foils. There are, however, problems associated with relying on lineup identifications. Eyewitnesses frequently pick known foils in police lineups (Valentine, Pickering, & Darling, 2003; Wright & McDaid, 1996) and select members of experimental lineups when no culprit is present (e.g., Darling, Valentine, & Memon, 2008; Wells, 1993). Whilst such problems can be induced by external factors such as the composition of the lineup or through misleading interactions with witnesses (Steblay, 1997; Wells & Bradfield, 1999), recent research suggests that the accuracy of lineup identification is also dependent on individual differences in characteristics possessed by the eyewitness (e.g., Searcy, Bartlett, & Memon, 1999; Valentine et al., 2003). Given the importance of eyewitness testimony in the apprehension and conviction of criminals, understanding the impact of witness based individual differences is of paramount importance. To this end, the current research examined how individual differences in perceptual processing style impact the accuracy of lineup identification.

Some biologically determined individual differences are known to impact the quality of eyewitness identification. For example, same-race identification performance is superior to other race identification (Bothwell, Brigham, & Malpass, 1989; Chiroro & Valentine, 1995; Shapiro & Penrod, 1986; Valentine & Endo, 1992; for a review, see Meissner & Brigham, 2001), indicating that the race of the witness, in interaction with that of the culprit, can influence the effectiveness of identification procedures. Age and sex of witnesses are also known to impact the accuracy of lineup identifications. For example, Valentine et al. (2003) demonstrated that in real life lineup situations the age and sex of eyewitnesses can impact identifications, with older witnesses less inclined to make identifications[1] than younger ones and male witnesses less likely to incorrectly identify a foil than female witnesses. In a laboratory study, Searcy et al. (1999) found that older adults made more incorrect identifications in culprit absent lineups. Given the demonstrable effect of biological factors on eyewitness testimony, it is possible that individual differences in cognitive processing may also

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[1] Because these were operational lineups, it is not possible to be fully confident that a suspect identification was a correct identification of a culprit. However, any identification of a known foil must be an error.

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influence lineup identification performance. There is some evidence to support this claim. For example, Megreya and Burton (2006) identified correlations between perceptual speed, visually presented short term memory tasks and figure matching and aspects of performance on a face matching task that was similar to a lineup task, and Searcy, Bartlett, and Memon (2000) found that higher rates of false identification on a culprit present lineup were associated with increased perseveration in card sorting.

Manipulating global or local perceptual processing orientation using Navon stimuli (Navon, 1977) influences eyewitness identification (e.g. Macrae & Lewis, 2002; Perfect, 2003). Navon stimuli (see Fig. 1) comprise large letters, each composed of a number of smaller letters: for example, a large letter H may be formed of smaller letter C stimuli. The first demonstration of the influence of Navon tasks on identification was reported by Macrae and Lewis (2002), who presented participants with a videotape of a crime. Subsequently, these authors asked participants to view a sequence of Navon figures and either consistently report the global letter or the local letter in each figure, or take part in a control (reading) task. The idea behind this manipulation was that the repeated orientation of processing to local or to global features would cause the perceptual system to remain in a global or local 'mode', after the Navon stimuli had ended. Significant differences in identification were reported, with participants in the global condition making more correct identifications than control participants: those in the local condition made fewer correct identifications than controls. These findings have since been replicated (Perfect, 2003; Perfect, Dennis, & Snell, 2007; Perfect, Weston, Dennis, & Snell, 2008), though recent work suggests that the beneficial effects of global orientation may only appear in limited circumstances (Lawson, 2007; Weston, Perfect, Schooler, & Dennis, 2008). Macrae and Lewis explained their findings by arguing that face processing is best facilitated when faces are processed in a holistic or global manner (Tanaka & Farah, 1993), and therefore that the global Navon task oriented processing in ways that were beneficial for face perception, whilst the local task oriented processing in ways that were harmful for face perception.

The fact that it is possible to make (presumably) temporary changes in individuals' processing orientation, which can have effects on face recognition tasks, raises the question of whether individuals vary in their basic predisposition towards global or local processing, and, if so, whether such individual differences may have implications for eyewitness identification. Recent research addresses the first of these questions: Martin and Macrae (in press) found that participants who were more easily distracted by global information (in other words, people with a relative bias *towards* global processing) showed a much stronger face inversion effect (FIE). The FIE refers to the frequently reported finding (first described by Yin (1969)) that faces are better recognised in an upright rather than an inverted orientation, and that the discrepancy between upright and inverted faces is greater than it is for other stimuli. Martin and Macrae's findings thus indicated that an individual difference measure of global – local processing orientation was related to aspects of face perception.

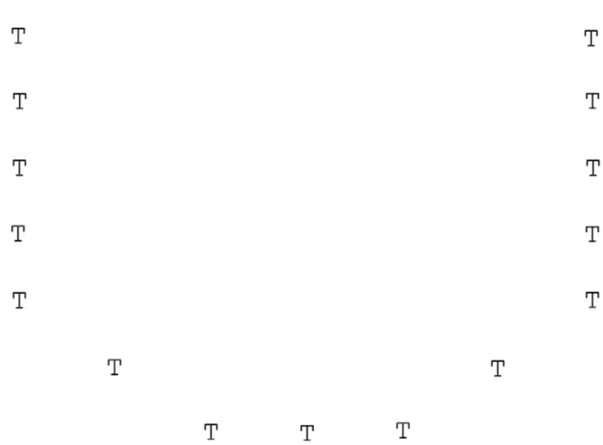

Fig. 1. An example of a conflicting Navon stimulus: a global letter U composed of local letter Ts.

The current research attempted to address the second of the questions identified above, namely to see if individual differences in global – local orientation are related to eyewitness identification performance. Participants completed a Navon-letter discrimination task which yielded a measure of global precedence (i.e., the degree to which global stimuli were more distracting than local stimuli). On the basis on their performance on the Navon task, participants could thus be classified as possessing strong global precedence (SGP) or weak global precedence (WGP). Following a delay of some weeks, the same participants took part in an apparently unrelated study, which comprised viewing a video of a simulated crime followed by a standard culprit present lineup. It was predicted that those individuals classified in the SGP group would be more accurate at correctly identifying the culprit than those individuals in the WGP group.

2. Method

2.1. Participants and design

Ninety-nine participants (12 males) took part in this study. Mean age was 19.9 years (SD = 4.8). All were undergraduate students of the University of Aberdeen, who took part in return for course credit. All participants gave informed consent for participation, and the research was approved by the Psychology Ethics Committee at the University of Aberdeen.

Participation in the study occurred across two test sessions separated by approximately 6 weeks. During the first testing session participants completed a letter identification task in which their global score was computed (see procedure section below). In the second testing session, the same cohort of participants was recruited to take part in an apparently unrelated eyewitness identification study.

2.2. Materials and procedure

2.2.1. Letter identification task

In the letter identification task, participants were shown stimuli similar to those used by Navon (1977), in which a global letter was comprised of a number of local component letters. Depending on the condition, participants were required to report the global or local identity as quickly and accurately as possible via a key press.

Each trial comprised the presentation of a fixation cross for 500 ms, followed by a global or local precedence cue for 500 ms (the word "global" or "local", respectively). A Navon figure that was either consistent (e.g., a big *S* composed of small *S*s) or conflicting (e.g., a big *S* composed of small *T*s) then appeared for 100 ms, before being replaced by a complex random noise pattern for 1000 ms. Participants were asked to make their response by pressing a key corresponding to the letter (either global or local) to which their attention had been oriented. Accuracy and response time (RT) were recorded. There was a 1500 ms inter-trial interval. The global stimuli covered an area of approximately 150 mm by 130 mm, with local stimuli presented in size-12 font. Participants completed 192 trials, 96 with a global orientation and 96 with a local orientation. Critically, half of the trials in each orientation were consistent and half were conflicting. The order of trials was randomized for each participant.

2.2.2. Eyewitness identification task

Participants attended the eyewitness identification task in groups of around 25 participants. They sat at desks in a classroom setting and were told to observe a video of a bank robbery presented on a screen at the front of the classroom. The video used was the same one used in Experiments 1, 2, 4 and 5 reported by Schooler and Engstler-Schooler (1990), as well as by Macrae and Lewis (2002), Perfect (2003) and Perfect et al. (2008), and depicted a man approaching a bank counter and demanding money, from the teller's point of view. This video was presented without sound, and the culprit was visible for 30 s.

Following the video, participants carried out an unrelated filler task for approximately ten minutes. They were then asked to identify the culprit that they had seen in the earlier video, from an array of eight still head and shoulder images of people projected on the screen. The culprit was present in the lineup. Participants were asked to indicate whether any member of the array was the culprit, and if so, which one. If they thought the culprit was not in the array, they were told to tick a box marked 'Not Present'. The identification array was also the same as that used in the previous studies described. Finally, participants were asked to indicate how confident they were that they were correct in their decision to the lineup. They indicated their response on a 9-point Likert scale.

3. Results

3.1. Letter identification task

Global precedence score was calculated by subtracting interference on local trials from interference on global trials. Global interference was calculated for trials where the orientation instruction was local, by subtracting RT for correct trials in the consistent condition from RT for correct trials in the conflicting condition. A higher value therefore indicated greater interference of irrelevant global information on a local processing task. Local interference was calculated in a similar way for trials where participants were oriented locally: higher values indicated higher levels of interference by irrelevant local information on a global processing task. Hence, global precedence score = (global conflicting − global consistent) − (local conflicting − local consistent). Higher values of global precedence score indicate participants whose RTs were asymmetrically more impaired by conflicting global information on local trials than they were by conflicting local information on global trials.

Mean global precedence was 77 ms (SD = 147). Global precedence was significantly greater than zero ($t(98) = 5.21$, $p < .001$), indicating that conflicting global information significantly slowed response times compared to conflicting local information.

Because we were interested in looking at relationships between individuals with low and high levels of global precedence and identification, we allocated participants from the lowest quartile and the highest quartile of the global precedence distribution to the weak global precedence (WGP) and strong global precedence (SGP) groups, respectively. There were 25 participants in both the SGP group (4 males), and the WGP group (4 males). Mean global precedence of the WGP group was −85 ms (SD = 85 ms), whilst for the SGP group it was 264 ms (SD = 117 ms). The SGP global precedence scores were significantly greater than zero ($t(24) = 11.27$, $p < .001$), whilst the WGP global precedence scores were significantly lower than zero ($t(24) = -5.05$, $p < .001$). This indicates that the WGP group was significantly more affected by conflicting local information than they were by conflicting global information. The opposite was true for the SGP group.

3.2. Eyewitness identification task

In a culprit present lineup like the one in the current study, it is possible to make three types of response: participants can correctly identify the culprit, they can incorrectly identify a known foil, or they can incorrectly reject the lineup (state that the culprit is not present). In analyzing this study, we combined all incorrect responses into a single category. Overall, 59 participants made incorrect responses (31 incorrect identifications and 28 incorrect rejections), whilst 40 participants correctly identified the suspect.

Focusing just on the SGP and WGP groups, there was a clear difference in the number of participants in these groups correctly identifying the culprit. In the SGP group, 14 people correctly identified the target, whilst 11 made an incorrect response (eight incorrect IDs and three incorrect rejections). However, in the WGP group, only seven people correctly identified the target, with 18 making an error (nine incorrect IDs and nine incorrect rejections). This associative pattern, of more people making correct identifications in the SGP group, and more people making errors in the WGP group, was statistically significant, χ^2 $(1, N = 50) = 4.02$, $p < .05$, $\Phi = .28$.

Measures of lineup confidence were assessed on a scale of 1 (not confident at all) to 9 (very confident). The relationship between the confidence of participants and whether they correctly identified the culprit or was not assessed by calculating the point-biserial correlation coefficient (r_{pb}). Overall, there was no correlation between confidence and accuracy ($r_{pb} = .08$, $p > .1$). However, when only those participants who made a choice from the lineup were included (i.e. those who indicated 'not present' were excluded), then a positive correlation was observed ($r_{pb} = .24$, $p = .05$). There was no significant difference in the confidence ratings expressed by participants in the WGP group compared to the SGP group ($t(48) = -.88$, $p > .1$).

4. Discussion

This study demonstrated an association between an individual difference measure of global processing orientation and accuracy in an eyewitness identification task. Specifically, the 25% of participants who showed the greatest global processing bias in non-face (Navon) stimuli were significantly more likely to correctly identify the culprit than the 25% who showed the least global processing bias. This suggests that individual differences in the way people process visual information may make them better or worse at recognising unfamiliar faces, and hence may make them better or worse eyewitnesses. Importantly, the current findings not only highlight the influence global processing has on eyewitness testimony, they also support the general supposition that cognitively based individual differences may impact eyewitness testimony in a broader sense (see Megreya & Burton, 2006 and Searcy et al., 2000).

Macrae and Lewis (2002) identified that experimentally manipulated Navon task orientation affected performance on an identification task: asking people to focus on local stimulus elements caused a decline in identification performance, whilst focusing on global elements caused an increase in performance, compared to a control task. These results have proved to be replicable (Perfect, 2003; Perfect et al., 2007, 2008), if possibly somewhat limited in extent (Lawson, 2007; Weston et al., 2008). What is novel about the current results is that we have shown that individual differences in a measure of visual cognitive processing, obtained during a separate testing session, are also related to performance on a face recognition task. The novelty of the current results is not limited to the eyewitnessing paradigm but extends to face recognition in general: Martin and Macrae (in press) observed a trend, with people showing strong global precedence seeming to perform better at identifying upright faces, but this pattern was not statistically robust. Therefore, the current study is the first to demonstrate clearly that people showing strong global precedence may be better at face recognition.

Macrae and Lewis (2002) explain their findings by arguing that the Navon tasks orient participants towards or away from a holistic-configural processing strategy, which is the optimal strategy for use in face recognition (Tanaka & Farah, 1993). This global-holistic explanation of Navon effects is consistent with the pattern of data in the current study, where face recognition was demonstrably better for participants who showed greater global precedence. However, though the global-holistic explanation may be a plausible approach, other authors who have replicated the pattern seen by Macrae and Lewis consider alternative possible explanations. Weston and Perfect (2005) suggest that identifying global and local aspects of Navon stimuli requires attention to different spatial frequencies, and that attending to different spatial frequencies may also affect face recognition performance.

Recently, Perfect et al. (2008) manipulated the spatial distribution of Navon displays, with one (which they termed local precedence) being broadly spaced, so that the easier dimension to report was the local one, and another (which they termed global precedence), being more compact, so that the easier dimension to report was the global one. Their results indicated that compact stimuli elicited the typical global processing advantage on identification. However, broadly spaced displays elicited the opposite response, showing an advantage for local processing. This pattern is clearly at odds with a simple interpretation relying on a link between global processing and holistic processing.

To explain this pattern, Perfect et al. (2008) speculate that the link between Navon processing and identification is mediated through automaticity. They argue, based on Dunning and Stern (1994) that participants using automatic strategies perform better in lineup tasks, and also that certain arrangements of Navon stimuli promote automatic processing whilst others are more likely to elicit controlled processing. Consequently, they claim, Navon tasks mediate eyewitness identification by influencing automaticity of processing.

Our current data can not and do not discriminate between these competing explanations: we have shown a link between an individual difference measure of global processing and lineup identification. It may or may not be the case that this pattern is related to the well-established short-term effects of processing orientation manipulation with Navon stimuli. Further exploration of this point should be a key goal of future research. We remain open to both the global-holistic or the automatic-holistic explanations, or others that may be advanced in the future, but we note that Martin and Macrae (in press) reported that global precedence (assessed the same way as in the current study) was associated with magnitude of the face inversion effect (FIE). Because spatial frequency is no different in an upright compared to an inverted face image, their data do not fit with a spatial frequency explanation.

Further research is necessary to identify the precise mechanism behind the link between Navon stimuli and face identification. It is clear from this study that the relationship between Navon tasks and identification is not necessarily restricted only to short-term experimental manipulations. Instead, the current data show that identification performance is related to an individual difference based measure of global processing that can be assessed at a different time and in a different context. We assume that the global precedence measure indexes a relatively stable aspect of processing preference, though it will be necessary to establish this more rigorously in the future.

In this study, we used an extreme groups analysis (EGA) approach, focusing on comparisons between the weakest and strongest quartiles with regard to local and global precedence. This is a useful approach in the case of an eyewitness identification paradigm, because each participant in an eyewitness task carries out only a single trial, so the data in these studies are noisier and more variable than multiple-trial designs. EGA provides evidence that a group of people with the weakest degree of global precedence performed worse on an identification task than those with the strongest degree of global precedence. Whether a strong relationship between global precedence and eyewitness performance can be identified for participants who lie towards the middle of the distribution of global precedence rather than the extremes remains to be addressed by future research.

The current study demonstrates a link between a putative individual difference measure and face identification in an eyewitness context, and allows the conclusion that individual differences in global processing precedence can be predictive of identification performance. However, more detailed understanding of this relationship would be beneficial. One key issue from a practical perspective is to find out what would happen in the case of culprit absent lineups: neither Macrae and Lewis (2002), Perfect (2003) nor Perfect et al. (2008) incorporated culprit absent lineups into their studies of short term manipulation of processing orientation. However, Perfect et al. (2007) did include such a manipulation, which suggested that global orientation was beneficial for both culprit absent and culprit present lineups. Future work should address this issue with regard to individual differences in global precedence, because otherwise it is not possible to fully distinguish improved identification accuracy from changes in the likelihood of participants to make a choice.

Another important issue for future exploration relates to sequential lineups: current practice in many jurisdictions in North America requires that lineup items are presented sequentially, with witnesses being required to make a specific and absolute judgement about each person in the lineup. It is argued that this approach reduces the likelihood of a relative judgement being made (Wells et al., 2000). In the UK, most lineups are now presented in a video format that is sequential in nature, though without the requirement to make an absolute judgement to each face (Valentine, Darling, & Memon, 2007). In the current study, a traditional simultaneous lineup was used: in future it would be appropriate to investigate whether a relationship between global precedence and identification exists when lineup items are presented sequentially. Notwithstanding these recommendations for future work, the current study is noteworthy in showing an association between an individual difference measurement of global precedence and performance of a face identification task.

References

Bothwell, R. K., Brigham, J. C., & Malpass, R. S. (1989). Cross-racial identification of faces. *Personality and Social Psychology Bulletin, 15*, 19–25. doi:10.1177/0146167289151002.

Chiroro, P., & Valentine, T. (1995). An investigation of the contact hypothesis of the own-race bias in face recognition. *Quarterly Journal of Experimental Psychology, 48A*, 879–894. doi:10.1080/14640749508401421.

Darling, S., Valentine, T., & Memon, A. (2008). Selection of lineup foils in operational contexts. *Applied Cognitive Psychology, 22*, 159–169. doi:10.1002/acp.1366.

Dunning, D., & Stern, L. B. (1994). Distinguishing accurate from inaccurate eyewitness identifications via inquiries about decision processes. *Journal of Personality and Social Psychology, 67*, 818–835. doi:10.1037/0022-3514.67.5.818.

Lawson, R. (2007). Local and global processing biases fail to influence face, object, and word recognition. *Visual Cognition, 15*, 710–740. doi:10.1080/13506280601112519.

Macrae, C. N., & Lewis, H. L. (2002). Do I know you? Processing orientation and face recognition. *Psychological Science, 13*, 194–196. doi:10.1111/1467-9280.00436.

Martin, D., & Macrae, C. N. (in press). Processing style and person recognition: Exploring the face inversion effect. *Visual Cognition*.

Megreya, A. M., & Burton, A. M. (2006). Unfamiliar faces are not faces: Evidence from a matching task. *Memory and Cognition, 34*, 865–876.

Meissner, C. A., & Brigham, J. C. (2001). Thirty years of investigating the own-race bias in memory for faces: A meta-analytic review. *Psychology, Public Policy, and Law, 7*, 3–35. doi:10.1037/1076-8971.7.1.3.

Navon, D. (1977). Forest before trees: The precedence of global features in visual perception. *Cognitive Psychology, 9*, 353–383. doi:10.1016/0010-0285(77)90012-3.

Perfect, T. J. (2003). Local processing bias impairs lineup performance. *Psychological Reports, 93*, 393–394. doi:10.2466/PR0.93.6.393-394.

Perfect, T. J., Dennis, I., & Snell, A. (2007). The effects of local and global processing orientation on eyewitness identification performance. *Memory, 15*, 784–798. doi:10.1080/09658210701654627.

Perfect, T. J., Weston, N. J., Dennis, I., & Snell, A. (2008). The effects of precedence on Navon-induced processing bias in face recognition. *Quarterly Journal of Experimental Psychology, 61*, 1479–1486. doi:10.1080/17470210802034678.

Schooler, J. W., & Engstler-Schooler, T. Y. (1990). Verbal overshadowing of visual memories: Some things are better left unsaid. *Cognitive Psychology, 22*, 36–71. doi:10.1016/0010-0285(90)90003-M.

Searcy, J. H., Bartlett, J. C., & Memon, A. (1999). Age differences in accuracy and choosing in eyewitness identification and face recognition. *Memory and Cognition, 27*, 538–552.

Searcy, J., Bartlett, J. C., & Memon, A. (2000). Influence of post-event narratives, lineup conditions and individual differences on false identification by young and older eyewitnesses. *Legal and Criminological Psychology, 5*, 219–235. doi:10.1348/135532500168100.

Shapiro, P. N., & Penrod, S. (1986). Meta-analysis of facial identification studies. *Psychological Bulletin, 100*, 139–156. doi:10.1037/0033-2909.100.2.139.

Steblay, N. M. (1997). Social influence in eyewitness recall: A meta-analytic review of lineup instruction effects. *Law and Human Behavior, 21*, 283–298. doi:10.1023/A:1024890732059.

Tanaka, J. W., & Farah, M. J. (1993). Parts and wholes in face recognition. *Quarterly Journal of Experimental Psychology, 46A*, 225–245. doi:10.1080/14640749308401045.

Valentine, T., Darling, S., & Memon, A. (2007). Do strict rules and moving images increase the reliability of sequential identification procedures? *Applied Cognitive Psychology, 21*, 933–949. doi:10.1002/acp.1306.

Valentine, T., & Endo, M. (1992). Towards an exemplar model of face processing: The effects of race and distinctiveness. *Quarterly Journal of Experimental Psychology, 44A*, 671. doi:10.1080/14640749208401305.

Valentine, T., Pickering, A., & Darling, S. (2003). Characteristics of eyewitness identification that predict the outcome of real lineups. *Applied Cognitive Psychology, 17*, 969–993. doi:10.1002/acp.939.

Wells, G. L. (1993). What do we know about eyewitness identification? *American Psychologist, 48*, 553–571. doi:10.1037/0003-066X.48.5.553.

Wells, G. L., & Bradfield, A. L. (1999). Measuring the goodness of lineups: Parameter estimation, question effects, and limits to the mock witness paradigm. *Applied Cognitive Psychology, 13*, S27–S39. doi:10.1002/(SICI)1099-0720(199911)13:1+<S27::AID-ACP635>3.0.CO;2-M.

Wells, G. L., Malpass, R. S., Lindsay, R. C. L., Fisher, R. P., Turtle, J. W., & Fulero, S. (2000). From the lab to the police station: A successful application of eyewitness research. *American Psychologist, 55*, 581–598. doi:10.1037/0003-066X.55.6.581.

Weston, N. J., & Perfect, T. J. (2005). Effects of processing bias on the recognition of composite face halves. *Psychonomic Bulletin and Review, 12*, 1038–1042.

Weston, N. J., Perfect, T. J., Schooler, J. W., & Dennis, I. (2008). Navon processing and verbalisation: A holistic/featural distinction. *European Journal of Cognitive Psychology, 20*, 587–611. doi:10.1080/09541440701728557.

Wright, D. B., & McDaid, A. T. (1996). Comparing system and estimator variables using data from real lineups. *Applied Cognitive Psychology, 10*, 75–84. doi:10.1002/(SICI)1099-0720(199602)10:1<75::AID-ACP364>3.0.CO;2-E.

Yin, R. K. (1969). Looking at upside-down faces. *Journal of Experimental Psychology, 81*, 141–145. doi:10.1037/h0027474.