ISSN 0081-2463

South African Journal of Psychology, 42(3), 2012, pp. 434-444

# 'Seeing is believing': the effect of viewing and constructing a composite on identification performance

**Kate Kempen and Colin G. Tredoux**
Department of Psychology, University of Cape Town, South Africa
kempen.kate@gmail.com

This experiment investigated the effects of composite construction and viewing on later identification recognition accuracy. A total of 122 participants were exposed to a composite target for five seconds and then randomly assigned to one of three groups: control, view, or construction. Participants in the construction group were required to produce a composite of the original target. Participants in the view group were exposed to a composite created by another participant (a constructor). The control group completed a distractor task. After a delay, all participants returned to select the target from a lineup. Individual lineups were created for each participant. Lineups were constructed by blending the participant's construction with the target face to form a graded lineup of similar faces. The construction group performed significantly more poorly than the control group (51.22% *vs*. 23.26%) and target identifications were also lower for the view group compared to the control group (26.23% *vs*. 51.22%). This study showed similar results to those of previous work, indicating that composite construction decreases identification performance. Furthermore, mere exposure to a composite may also contaminate the memory trace for the original target.

**Keywords:** blends; composites; construction; eyewitness; identification; lineups; morphing; recognition; testimony

Eyewitness identifications are often used to convict a suspect of a crime when there is little or no other evidence available. However, eyewitness' perceptions can be misconstrued and distorted when witnessing an event. Much research has found that increased estimator variables (variables which cannot be manipulated following an event), such as stress (Deffenbacher, Bornstein, Penrod, & McGorty, 2004), number of perpetrators (Clifford & Hollin, 1981), presence of a weapon (Steblay, 1992), and post-event interval before identification (Shapiro & Penrod, 1986), can all lead to decrements in identification recall and accuracy.

At the time of this writing, over 275 prisoners, including 17 inmates on death row, have been exonerated through DNA evidence in the United States (Innocence Project, 2011). Seventy-seven percent of these wrongfully incarcerated individuals were imprisoned because of mistaken eyewitness testimony. A notable case in South African history that may demonstrate some of these problems is that of Norman Afzal Simons, infamously known as 'The Station Strangler'. Simons was convicted in1994 for the murder of a young boy. A nurse had telephoned the police to report that a patient at her clinic resembled the composite of the suspect. Simons was the patient. He was placed in a lineup, where only one eyewitness was able to tentatively select him. He was sentenced to life imprisonment but many question whether or not this conviction was safe. Even after 17 years of incarceration, Simons continues to protest his innocence.

Often, when law enforcement does not have a suspect, a composite of the perpetrator is constructed by eyewitnesses. These composites, or facial likenesses, are used to aid the police and public in apprehending a suspect. The nature of composite systems has developed considerably over the last few decades. In the past, police agencies typically used sketch artists to draw a face based on a witness's verbal description. This method was replaced by mechanical systems, most notably the Identi-Kit and Photofit. These systems consisted of various line drawings of features printed onto acetate, which were then superimposed over one another. With the assistance of an operator, the witness could then sort through these features and create a piecemeal replica of the perpetrator. The advent of personal computers gave rise to computer-developed composite software. This software, such as FACES and Mac-A-Mug, is used throughout police services today. It allows a user to look through categories of thousands of features and assemble them into a whole composite.

One of the concerns with this forensic tool is that witnesses are required to construct a composite using a feature-based approach which is in opposition to the holistic way in which we typically process faces (Tanaka & Farah, 1993). As we do not encode faces in this featural 'manner', this implies that constructing a composite using the current tolls may be an unnatural and difficult task. Indeed, laboratory studies have found that composites rarely resemble the target they are intended to depict. Composites in these studies could only be matched to the target at chance levels of performance (Davies & Valentine, 2006; Frowd et al., 2005; Maskow, Schmidt, Tredoux, & Nunez, 2007). Poor quality composites may contribute to mistaken eyewitness testimony as innocent individuals may be arrested because they resemble the composite. Furthermore, the witness's memory trace may be altered through re-encoding a poor quality composite.

Experiments that test the effects of composite construction on later recognition typically consist of three phases: encoding, interference, and recognition. In the encoding phase, participants are exposed to the target stimulus for a variable length of time; in the interference phase, participants are required to construct, or merely view, a composite of the target face; and in the recognition phase, participants attempt to select the target from a lineup. Three groups of studies conducted on the effect of composite production have found equivocal results. One class of studies suggests that composite production may facilitate correct identifications in a lineup (Mauldin & Laughery, 1981; Wogalter, Laughery, & Thompson, 1986) while a second group of studies found composite construction to have no effect on identification performance (Davies, Ellis, & Shepherd, 1978). However, a third class of experiments has found composite construction to negatively impact lineup decisions (Comish, 1987; Wells, Charman, & Olson, 2005; Wogalter et al., 1986; Yu & Geiselman, 1993). Comish (1987) suggested that interference occurs because composites rarely resemble the target they are intended to portray. Yu and Geiselman (1993) found that participants who constructed a composite showed increased reluctance to make any selection. However, a meta-analysis found composite construction to have a small yet significant increase on recognition accuracy (Meissner & Brigham, 2001). Participants who constructed a composite were 1.56 times more likely than a control group to correctly select the target from a lineup.

However, this meta-analysis predates a more recent study by Wells et al. (2005) who found large detrimental effects on later recognition after construction of a composite. In this experiment, participants in the construction condition were only able to correctly identify the target at 10% accuracy, compared to a control group who obtained 84%. This was a strong finding in light of the equivocal state of the literature. Wells et al.'s (2005) study also contained a 'view' group, in which some participants were exposed to a composite created by another individual. In this way, they were able to separate out any effect caused by exposure to a composite and not from the construction itself. Unusually, Wells et al. (2005) used a 180-second exposure time to present their target face. This is in contrast to the average time of 16 seconds that is typically implemented (Maskow et al., 2007). Indeed, previous research has shown that increased exposure time facilitates identification performance (Shapiro & Penrod, 1986). Wells et al. (2005) offer reasons for why the composite may have contaminated the original memory trace for the target in their study. They suggest that either the original memory for the target face and/or the composite remains, or competes, in memory. Alternatively, they propose that a new memory blend may be formed. This would support a finding by Loftus (1977) of a shift in memory to form a 'blend' of previous experience and false information. In Loftus's (1977) experiment, participants were exposed to an image of a green car and were later informed that the car was blue. In a subsequent colour recognition test, participants had to indicate the colour of the car on a colour strip. Participants exposed to this misinformation were more likely to select a colour in the direction of the false colour. Thus, post-event information may blend to form part of the original memory. It should be noted that it is unclear whether memories for faces can be blended together in the same way that colours may be blended together, as shown in the Loftus (1977) experiment. It seems unlikely that features could be morphed together to form a thin-fat nose, for example. Instead, features may be shared between the two face memories. Indeed, one study found that participants who were exposed to a misleading composite after encoding a target were more likely to mis-remember features for the original target (Jenkins & Davies, 1985). When given a description task, participants described the original target with the contaminating features from the composite.

In response to the surprising findings in the Wells et al. (2005) study, two further studies have attempted to replicate their result (*cf.* Dumbell, 2008; Maskow et al., 2007). The first study, conducted by Maskow et al. (2007) found ceiling effects as a result of the 180-second exposure time. That is, all groups correctly selected the target. A ceiling effect was still obtained even when the exposure time was decreased to 16 seconds. A second replication by Dumbell (2008) found no decrease in accuracy as a result of composite construction, even with an exposure time of two seconds.

The ambivalent nature of the literature surrounding composite production indicates that this forensic technique requires further investigation. Composites are frequently published in the media however if a composite shares similar features with an innocent individual, this person could be wrongfully incarcerated. If producing a likeness of a face may be detrimental to memory, then this finding needs to be established or negated through replication. If the findings by Wells et al. (2005) are accurate, then current forensic practice may be placing innocent individuals at risk. If, however, the Wells et al. (2005) results are not replicable, a null finding may help to strengthen another aspect of the composite contamination debate. This experiment aimed to replicate Wells et al.'s (2005) findings. If composite construction does result in a decrease in identification performance, this study will investigate whether participants remember either the target or the composite, or whether a blend of the faces appears to be mentally created and then selected.

## METHOD

### Design

A randomised, between-subjects design included the factors 'Condition' (control, view, and construction), 'Target Number' (1–6), and 'Lineup Position' (2 or 5). Participants were randomly assigned to one of these groups.

Five computers were used in each testing session, which took place in a quiet computer laboratory in the Psychology Department at the University of Cape Town.

### Participants

A total of 122 participants were used in this study. Participants were undergraduate Psychology students of 18 years and older. Participation was obtained through an extra credit sign-up programme. Participants were not initially informed of the purpose of the study to prevent them from being primed to remember the target. Demographic information indicated that 24 participants (19.67%) were male and 98 (80.33%) were female. Participants' ages ranged from 18 years of age to 43 years of age ($M = 19.67$, $SD = 3.39$). As the stimuli used were of white, female faces, the race distribution of participants was also recorded. A total of 52 (42.62%) participants identified themselves as 'White', and 70 (57.38%) participants identified themselves as 'Black' or 'Coloured'.

### Materials

Target stimuli. The target faces used at encoding were six different composites created by the experimenter. These composites were constructed based on a selection of six photographs of white females, with an average age of 20 years. These greyscale composites were constructed with the original photographs in view. All encoding images were shown in the frontal position and were standardised to 17.61 cm in height and 15.14 cm in width.

Composite construction software. Participants in the construction condition used FACES 4.0 (Cote, 2005) to construct their composites. FACES 4.0 is a composite software programme with thousands of features, including "440 hairstyles, 221 head shapes, 831 sets of eyebrows, 934 pairs of eyes, 1154 noses, 915 lips, 927 jaws, 855 beards, 122 chins, 63 hats, 161 glasses, 106 moles, 3 scars, 6 piercings, 8 earrings and 9 tattoos" (Maskow et al., 2007, p. 14). The programme contains a panel of features and a workspace interface. The user begins by selecting the appropriate face shape, and then selects the various features to embed within the face. Features are selected by clicking on the appropriate feature. The size and position of the features can be adjusted. This software was also used to construct the target composites for encoding.

Lineup construction. An individual composite lineup was created for each participant for the second session of the experiment. These lineups were created using the construction groups' composites. The lineup contained six members: the original composite target (created by the experimenter), the participant's construction, and another four composites which showed a 'blend' or 'morph' from one face to the other. This was done using the features that the participant had selected when constructing their composite. These features were added to the original target composite in a stepwise progression, until the final 'product' was the participant's construction (see Figure 1). In this lineup, "A" was the correct original target selection and the participant created face "F". Features from the constructed composite were added to the original target sequentially. Thus, the first face in the lineup was the original target and the last face in the lineup was the participant's composite. The second face was the original target, with the participant's selected facial lines and head shape. The third face included all of the features of the second face, but also included the participant's selected mouth and eyebrows. The fourth face was the third face with the participant's selected hairstyle. The fifth face included the participant's selected eyes and nose. The sixth face was the participant's composite construction. Thus, the original target was gradually 'morphed' by featural incorporation until the participant's composite was achieved.

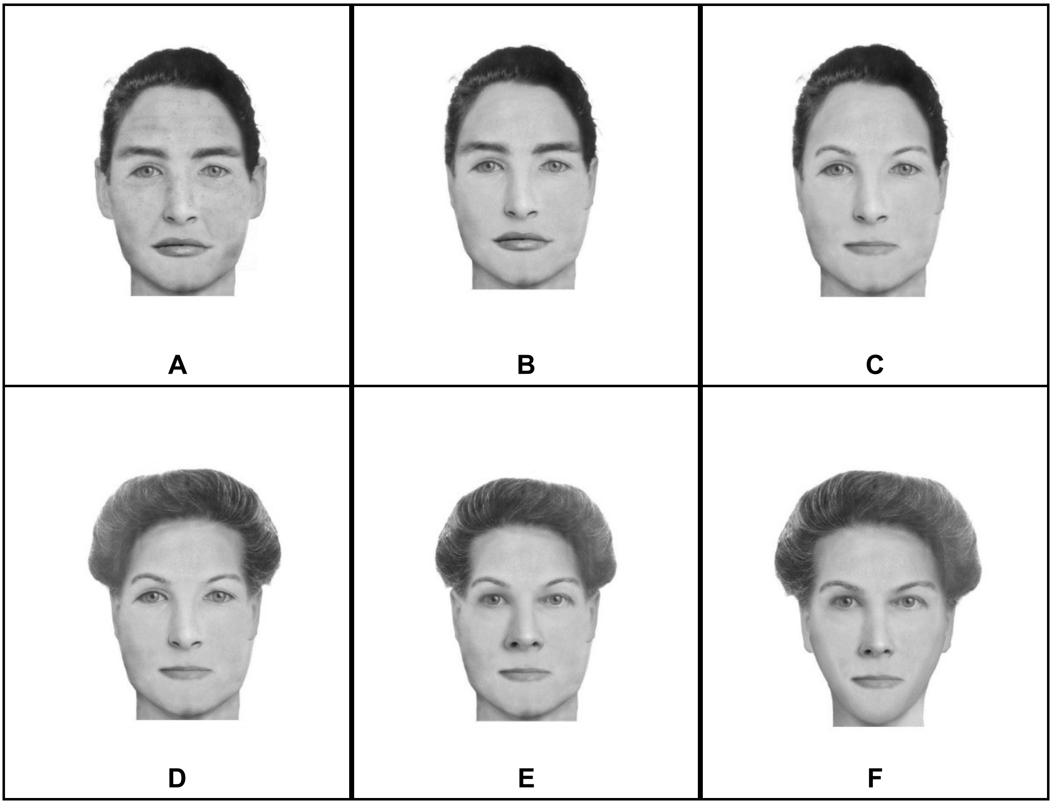


**Figure 1.** Lineup of composite, target, and varying degrees of 'morph' between target and composite. Target is A. Composite is F. Filler B contains the composite head shape, minus face lines. Filler C contains composite mouth and eyebrows. Filler D contains composite hair. Filler E contains composite nose and eyes. Images in the lineup were shown in a random order, with the target at position 2 or 5.

The order of lineup images was randomised. In the lineup task, the participant was shown these six pictures sequentially and had to make a decision about whether each face was the original target before advancing to the next face in the lineup. This method prevented the participant from examining all the faces together and making a relative judgement by comparing all the members of the lineup. Research suggests that showing faces sequentially induces participants to use an absolute judgement strategy to decide on each face, as opposed to a relative judgement strategy (Lindsay & Wells, 1985). However, later research has found no sequential lineup superiority effect (Malpass, Tredoux, & McQuiston-Surrett, 2009).

Each constructor was yoked to a participant in the viewing group, and was also yoked to a participant in the control group. One participant in the control and one participant in the viewing group saw a specific construction participant's lineup. Thus, one participant from all three groups saw the same lineup.

The images were all standardised to 17.61 cm in height and 15.14 cm in width and were all shown in the frontal view. The original target image was always present in the lineup and was placed at either position two or position five.

Presentation and answering materials. All the instructions and target stimuli were presented to the participants using a Microsoft® PowerPoint 2007 slideshow. This was used to minimise experimenter effects and to standardise the experimental procedure. An instruction warned the participant to pay attention to the upcoming face. In the lineup task, participants were required to circle a letter (A – F) on paper which corresponded with the target's position in the lineup. If they thought the target was not present in the lineup, they could circle another option on the paper, the letter "*N*". A further instruction forced them to make a selection.

## Procedure

### First session

**Encoding phase, all groups.** All participants were seated at a computer in the laboratory. Each workstation contained a computer, printed answer sheet, and consent form. Participants were required to fill in their demographic information and sign the consent form.

A slideshow was opened, and the instructions warned the participants that they needed to pay attention to an upcoming face. Participants were shown one of the six target composites for five seconds. Following this exposure, participants were required to complete a trait-encoding, rating task used by Wells et al. (2005). This task requires participants to rate the face on ten adjectives, e.g. attractiveness, aggression, warmth. All participants then had to play a distracter game for ten minutes.

**Construction group, composite construction.** After the distracter task, participants in the composite construction condition were trained on how to use FACES 4.0. They were then instructed to reconstruct the target face seen earlier, such that someone else would be able to identify that person. No participant took longer than 20 minutes to construct a composite.

**Viewing composite group, yoked-composite group.** At the end of the composite construction phase, participants in the viewing group were shown a composite produced by a participant in the construction group. Participants were told that another group had attempted to reconstruct the target face seen earlier.

**Control group.** After the distracter task, participants in the control group were given an unrelated task to complete, to compensate for the extra time spent by the viewing group and the construction group.

### Second session

**Recognition phase, all groups.** Participants returned to the computer laboratory two days later to complete the lineup task. Seven participants failed to return for their second session, resulting in slightly unequal sample sizes between groups. A slideshow was opened which explained that the participant would be required to look through a lineup of six faces and select the original target face they saw in their previous session. A further instruction emphasised that the target *may* or *may not* be present. The sequential lineup was shown with the six faces in frontal view. There were no time restrictions on the slideshow, and participants could move through the faces at their own pace. Participants were required to circle a corresponding letter (A – F) on paper to indicate their selection. If they thought the original target was not present, they circled "*N*" on the paper. Non-selectors were then *forced* to make a selection from the lineup. Once participants had completed the lineup task, they were debriefed and told the purpose of the experiment.

## RESULTS

Participants' responses were recorded as correct if participants accurately selected the original target. For the initial analyses, if participants chose a filler (a blended face or a participant composite construction), or indicated "*N*" (target was not present), these responses were recorded as incorrect. Table 1 depicts the frequencies and percentages of participants who selected the correct target, those who selected a filler, and those who made no selection in all three of the conditions with non-selections coded as incorrect.

**Table 1.** Percentages and frequencies of correct and incorrect choices in Lineup Morph Task: Unforced decisions

| Condition | Unforced choice | | | Total |
|---|---|---|---|---|
| | Correct | Incorrect | | |
| | | Filler | "*N*" Not present | |
| Control | 51.22% (21) | 31.71% (13) | 17.07% (7) | 100% (41) |
| View | 26.32% (10) | 39.47% (15) | 34.21% (13) | 100% (38) |
| Construct | 23.26% (10) | 39.53% (17) | 37.21% (16) | 100% (43) |
| Total | 33.61% (41) | 36.89% (45) | 29.51% (36) | 100% (122) |

### Descriptive statistics

Initial examination of the percentages between groups indicated that the control group performed better than the view and construction groups (51.22%, 26.32%, and 23.26%, respectively). The view and construction groups both performed poorly. This does not mirror the Wells et al. (2005) finding, where the control group obtained 84% accuracy compared to 10% accuracy for the construction group. The accuracies between groups in this study are displayed graphically in Figure 2.

### Contingency testing

Upon initial inspection, it appeared that composite construction (and perhaps viewing a composite) did harm face recognition. A contingency test on the accuracies between all the groups was conducted, indicating an overall significant difference between the three conditions ($\chi^2_{(2,\ N = 122)} = 8.67$; $p = 0.013$). Pairwise comparisons showed a significant difference between the control and viewing group ($\chi^2_{(1,\ N = 79)} = 5.13$; $p = 0.012$), and the control and construction group ($\chi^2_{(1,\ N = 84)} = 7.05$; $p = 0.004$), but no significant difference between the viewing and construction group, $\chi^2_{(1,\ N = 81)} = 0.34$, $p = 0.56$.

### Forced Decisions

Of the 81 participants who answered incorrectly, 36 indicated that the target was 'not present', which was initially coded as being incorrect. When the forced choice answers were analysed along with the initial correct and incorrect responses, there was no longer an overall significant difference between conditions ($\chi^2_{(2,\ N = 122)} = 5.75$; $p = 0.056$), although the results showed a marginally significant difference between the groups. However, when significance tests were conducted between group proportions, there was still a significant difference between the control and construction groups

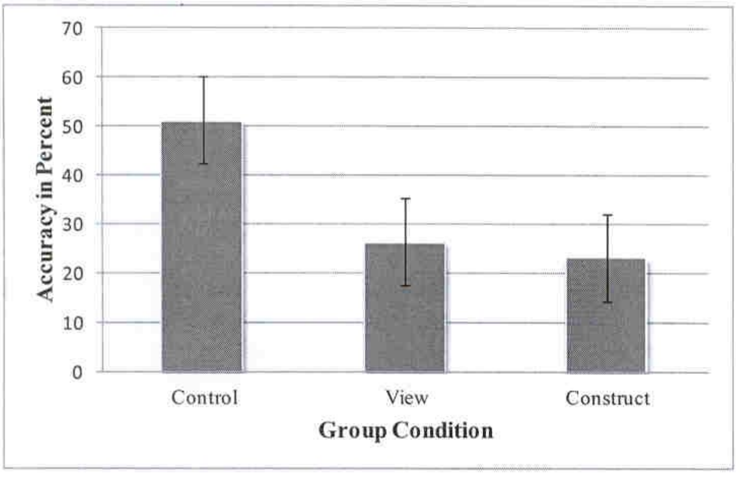


**Figure 2.** Percentage accuracy choices per group in the lineup task. I-bars are 95% confidence intervals

($\chi^2_{(1,\ N = 84)} = 5.73$; $p = 0.008$). Although Wells et al. (2005) did not use morphed faces, this result supports their finding that composite construction may contaminate memory.

### Forced Choice morphed gradient selections

The forced choice responses, as well as the initial correct and incorrect responses, were further analysed to investigate *which faces* participants were incorrectly selecting. The 'morphed' filler composites were given a score of difference from the original target ranging from 0% (the original target composite) to 100% (the participant's composite construction). The percentages of participants' responses are displayed in Figure 3.

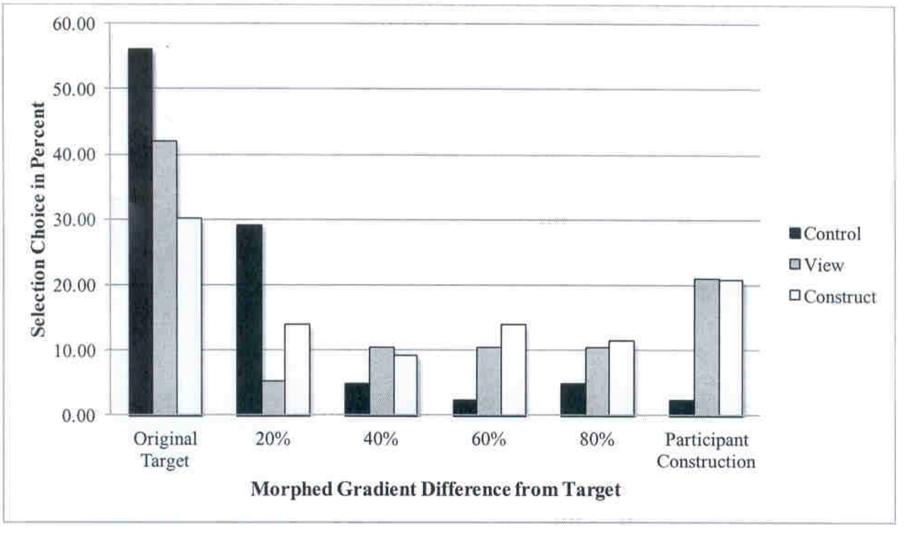


**Figure 3.** Comparison of morphed composite selection between conditions (forced choice). Error bars are not shown in order to reduce figure complexity.

As can be seen in the graph, the control group had the highest accuracy in selecting the original target (56.10%) and selected the participant's construction least often (2.44%). The control group also selected the composite at 20% difference from the original at 29.27%. Thus, the control group was more likely to keep the original target image in their memory, as the percentages begin to decrease as morphed difference increased away from the target to the composite construction.

Both the view and construction group performed poorly. A contingency test conducted without the original target selection (to compare between incorrect answers) found a significant difference between all the morphed composites and the participant construction ($\chi^2_{(8,\ N = 70)} = 19.21$; $p = 0.014$). However, it could be possible that the control group's accuracy at the 20% position may have skewed the results. In order to see how exposure to a composite affected incorrect selection, the control group was removed from the analyses. Thus, a test run without the control group on only the incorrect answers (everything excluding the original target) found no significant difference in incorrect selection between the view group and construction group ($\chi^2_{(4,\ N = 52)} = 1.37$; $p = 0.849$). Participants were equally likely to choose one of the morphed composites as well as the participant construction.

## DISCUSSION

This experiment investigated participants' selections in a lineup to determine if composite construction interferes with memory. The initial results of this experiment confirm those of Wells et al. (2005), namely that building a composite face can hamper memory for recognising the original face in a later task. In this experiment, participants who constructed a composite performed significantly worse than the control group. Moreover, participants who were exposed to a contaminating composite also performed more poorly than the control group. Interestingly, there was no significant difference in accuracy between the view group and the construction group (26.23% vs. 23.26%). This suggests that it may be *exposure* to a misleading face or composite that contaminates memory, and that this decrease in accuracy is not due to the *construction* of the composite. This contradicts the Wells et al. (2005) finding in which correct identifications were higher in the viewing group than in the construction group (44% *vs*. 10%). The significant difference between Wells et al.'s (2005) viewing and construction groups led them to suggest that exposure to a composite may contaminate memory to *some* extent, but that construction resulted in the greatest decrease in recognition.

The results in this paper also corroborate Comish's (1987) findings that exposure to a composite may decrease recognition performance and findings by Brown, Deffenbacher, and Sturgill (1977) in which participants exposed to misleading photographs were more likely to select fillers in a recognition test. Participants may have remembered the misleading information about the composite as being correct. In a study on post-event misinformation, Loftus and Greene (1980) exposed participants to misleading information about a face. In a later recognition test, participants incorporated the contaminating information into their selection. This post-event misinformation effect (Loftus & Greene, 1980) would support disruption of the memory trace due to composite exposure, and not necessarily due to construction of a composite.

When the forced choice "*N*" responses in the current study were analysed, the viewing group no longer differed significantly from the control group. Filler identifications were still more likely for the construction group even under forced choice conditions. This mirrors Wells et al.'s (2005) forced choice results. The viewing group incorrectly rejected the lineup, saying the target was not present. However, when forced to choose, they actually *did* know the correct answer. Being exposed to a composite appeared to make participants more conservative and less likely to make any selection. This supports an earlier study which suggests that composite construction leads participants to become more reluctant to make a decision (Yu & Geiselman, 1993).

Constructors were only able to select the target with 23.26% accuracy. This is barely above chance levels. If a participant had no knowledge of the target in the lineup, and made a random selection, there would be a 16.67% chance of correctly selecting the target. A binomial test indicated that participants were not able to select the target above expected levels, $p < 0.078$.

Wells et al. (2005) suggested that either the original memory and/or the composite remained, or competed, in memory, or that a new memory blend was formed. With the exception of the control group, composite constructions were selected at higher frequencies than the rest of the fillers. This could suggest that the misleading composite viewed in the earlier session left some memory trace. Thus, participants selected a face they recognised, and not a new, 'morphed' face. However, there was no overall significant difference between selections for fillers for the view and construction groups, suggesting that participants were equally likely to select the construction or a 'blend' of both faces. Thus it is possible that being exposed to the composite resulted in a memory blend, as participants were unable to distinguish between the incorrect fillers.

Although this experiment may have been unusual in that it exposed participants to a composite target, this method was beneficial in many ways. As it may be difficult to adequately depict a human in composite form, using a composite target gave participants the chance to construct an accurate likeness of the original target. It was necessary to use a composite target as the experiment required the lineups to be blended with the composite construction. This allowed an investigation of selection decisions with a very similar lineup. Most studies typically use a lineup consisting of photographs of humans, which should resemble the suspect on some level. Brigham, Meissner, and Wasserman (1999) suggest that a lineup that is too similar could create negative bias, resulting in the appearance of 'clones'. Thus, it would be a very difficult task to accurately select the target from a lineup with high similarity. However, in this experiment, the lineups were 'morphed', resulting in unnaturally high similarity lineups. The control group was able to accurately select the target. As mentioned earlier, the control group's next highest selection was the filler that looked most similar to the target. Only the groups that had some exposure with a composite appeared to select composite blends.

However, there may have been some problems with this lineup method. A lineup of human photographs offers some natural variation. Even though this experiment used a sequential lineup, participants may have been able to make a relative judgment between the images and distinguish between the faces. The blended fillers all looked similar to each other, and also similar to the original target and the participant composite construction. However, the target and the composite construction did not resemble each other. This may indicate why participants had a higher tendency to make a selection at the 'extremes' of the gradient (as can be seen in Figure 3), regardless of the randomised order of images shown one-at-a-time.

This experiment was able to replicate some of the Wells et al. (2005) findings. In an unforced decision, participants in the viewing and construction group were more likely to make a misidentification than the control group. When the forced selections were analysed, the view group no longer differed significantly to the control group while the construction group still incorrectly selecting fillers. However, this is not a true replication, as this experiment differed from the Wells et al.'s (2005) study in many ways. Firstly, Wells et al. (2005) used a 180-second exposure time. This study decreased the exposure time to five seconds. It is surprising that Wells et al.'s (2005) construction group were only able to accurately select the target at 10%. This is at equal rates with a chance level of selection. Even with this experiment having a shortened exposure time, the construction group obtained 23.26% accuracy. Interestingly, in forced choice analyses, Wells et al.'s (2005) construction group managed 30% accuracy, which is almost exactly the same as the construction group in this experiment (30.23%). Secondly, this study used a sequential lineup, as opposed to the simultaneous lineups used in the Wells et al. (2005) experiment. However, a meta-analysis by Steblay, Dysart, Fulero, and Lindsay (2001) found no significant difference in correct identifications between the lineup types. Thirdly, this appears to be the first experiment that used a featural gradient of blends in a lineup. This featural gradient method was preferred over a 'true' morphing style, where the faces smoothly merge into one another. It was hypothesised that if two face traces are kept in memory, it is unlikely that they will morph the same features. For example, one would not misremember a face with blue eyes and a face with brown eyes as having brownish-blue eyes. Instead, one would either misremember one or the other. Although this distinction was what the current study attempted to achieve, the specific incorporation of features at certain stages may have been incorrect. This would need to be investigated further in a later study.

To summarise, this experiment showed that composite construction may decrease recognition accuracy. It also showed that exposure to a composite can hamper memory. In effect, it made participants more conservative in their selection decision. However, participants who viewed a composite *did* know who the target was – and this was revealed when they were forced to make a selection. Thus, exposure to a composite appears to increase participants' criterion for making any selection at all. In a real-life setting, however, eyewitnesses are allowed to reject the lineup and are not forced to choose. This finding is therefore critical in that it indicates that we need to look at this forensic technique of constructing (and viewing) composites if it results in not convicting guilty perpetrators. Composites are often distributed through the media – on televisions and in newspapers. Potential eyewitnesses exposed to these misleading composites may incorporate the misinformation and become more uncertain about their memory of the original target. This is a Catch-22 situation: it is necessary for composites to be constructed, in order to aid law enforcement in apprehending a suspect. However, this useful forensic tool may be resulting in incorrect lineup decisions. This practice needs further investigation and replication, so that guilty perpetrators are not set free and also to ensure that innocent individuals are not wrongfully convicted.

## REFERENCES

Brigham, J., Meissner, C., & Wasserman, A. (1999). Applied issues in the construction and expert assessment of photo lineups. *Applied Cognitive Psychology, 13*, 73-92.

Brown, E., Deffenbacher, K., & Sturgill, W. (1977). Memory for faces and the circumstances of encounter. *Journal of Applied Psychology, 62*, 311-318.

Clifford, B., & Hollin, C. (1981). Effects of the type of incident and the number of perpetrators on eyewitness memory. *Journal of Applied Psychology, 66*, 364-370.

Comish, S. (1987). Recognition of facial stimuli following an intervening task involving the Identi-Kit. *Journal of Applied Psychology, 72*, 488-491.

Cote, P. (2005). FACES: The Ultimate Composite Picture (Version 4.0) [Computer software]. Saint Hubert, Quebec, Canada: Interquest.

Davies, G., Ellis, H., & Shepherd, J. (1978). Face identification: The influence of delay upon accuracy of Photofit construction. *Journal of Police Science and Administration, 6*, 35-42.

Davies, G.M., & Valentine, T. (2006). Facial composites: Forensic utility and psychological research. In R. Lindsay, D.F. Ross, J.D. Read, & M.P. Toglia (Eds.), *Handbook of Eyewitness Psychology Vol.2* (pp.59-86). Mahwah, New Jersey: Lawrence Erlbaum and Associates.

Deffenbacher, K., Bornstein, B., Penrod, S., & McGorty, E. (2004). A meta-analytic review of the effects of high stress on eyewitness memory. *Law and Human Behavior, 28*, 687-706.

Dumbell, E. (2008). *Face composite production effects on witness memory: Case not closed*. Unpublished Honours' thesis, University of Cape Town.

Frowd, C. D., Carson, D., Ness, H., Richardson, J., Morrison, L., McIanaghan, S., et al. (2005). A forensically valid comparison of facial composite systems. *Psychology, Crime and Law, 11*, 33-52.

Innocence Project. (2011). *Facts on post-conviction DNA exonerations*. Retrieved October 30, 2011 from http://www.innocenceproject.org/Content/351.php

Jenkins, F., & Davies, G. (1985). Contamination of facial memory through exposure to misleading composite pictures. *Journal of Applied Psychology, 70*, 164-176.

Lindsay, R. C. L., & Wells, G. L. (1985). Improving eyewitness identifications from lineups: Simultaneous versus sequential lineup presentation. *Journal of Applied Psychology, 70*, 556-564.

Loftus, E. F. (1977). Shifting human color memory. *Memory and Cognition, 5*, 696-699.

Loftus, E. F., & Greene, E. (1980). Warning: Even memory for faces may be contagious. *Law and Human Behavior, 13*, 585-589.

Malpass, R., Tredoux, C., & McQuiston-Surrett, D. (2009). Public policy and sequential lineups. *Legal and Criminological Psychology, 14*, 1-12.

Maskow, N., Schmidt, H., Tredoux, C., & Nunez, D. (2007). *Face composite production does not affect eyewitness identification accuracy*. Unpublished manuscript, University of Cape Town.

Mauldin, M. A., & Laughery, K. R. (1981). Composite production effects on subsequent facial recognition. *Journal of Applied Psychology, 66*, 351-357.

Meissner, C. A., & Brigham, J. C. (2001). A meta-analysis of the verbal overshadowing effect in face identification. *Applied Cognitive Psychology, 15*, 603-616.

Shapiro, P., & Penrod, S. (1986). A meta-analysis of facial identification studies. *Psychological Bulletin, 100*, 139-156.

Steblay, N. (1992). A meta-analytic review of the weapon focus effect. *Law and Human Behavior, 16*, 413-424.

Steblay, N., Dysart, J., Fulero, S., & Lindsay, R. C. L. (2001). Eyewitness accuracy rates in sequential and simultaneous lineup presentations: A meta-analytic comparison. *Law and Human Behavior, 25*, 459-473.

Tanaka, J. W., & Farah, M. J. (1993). Parts and wholes in face recognition. *Quarterly Journal of Experimental Psychology: Human Experimental Psychology, 46*, 225-246.

Wells, G., Charman, S., & Olson, E. (2005). Building face composites can harm lineup identification performance. *Journal of Experimental Psychology: Applied, 11*, 147-156.

Wogalter, M. S., Laughery, K. R., & Thompson, B. G. (1986). *Eyewitness identification: Composite construction on subsequent recognition performance*. Unpublished manuscript. University of Richmond.

Yu, C., & Geiselman, R. (1993). Effects of constructing Identi-Kit composites on photospread identification performance. *Criminal Justice and Behavior, 20*, 280-292.