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Can Undergraduate Artists with No Training in Forensic Art Produce Accurate Age Progressions?

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Abstract

When children go missing and remain missing for long periods of time, authorities sometimes retain forensic artists to age progress the last known picture to provide an estimate of the current appearance. In the present research, undergraduate artists with no training in forensic art were asked to age progress images of children to an adult appearance. Similarity of age progressions produced by undergraduate artists were as similar to the corresponding targets as were age progressions produced by practicing forensic artists. However, age progressions produced by undergraduate artists were rated as being more similar to description matched foils than were the age progressions produced by professional forensic artists, suggesting that professionally produced age progressions might be more useful. Results suggest that untrained individual have sufficient knowledge of facial growth to produce age progressions that are somewhat similar to their corresponding targets.

Keywords: Age Progression; Face Recognition; Forensic Art; Missing Children; Missing Persons; Craniofacial Growth

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Missing children represent an important societal concern. Data from the National Crime Information Center NCIC (2014) indicates that there are close to 85,000 active missing persons investigations in the United States at any given time, with approximately half of those cases involving juveniles. Figures from the International Centre for Missing and Exploited Children (ICMEC, 2011) indicate that approximately 230,000 children are reported missing every year in the United Kingdom, 100,000 in Germany, 50,000 in Canada, 45,000 in Mexico, 40,000 in Brazil, 39,000 in France, 20,000 in Spain. Annual incidence is estimated to be more than 8 million reported missing child cases per year world-wide. When children go missing, they are at risk of physical harm, psychological harm, sexual abuse, and even death (Armsworth & Holaday, 1993; Asdigian et al., 1995; Brown, 2007; Finkelhor et al., 1991; Finkelhor et al., 2002; Schetky & Haller, 1983, Senior, Gladstone, & Nurcombe, 1982). Families of missing children can also suffer considerable psychological harm (DeYoung & Buzzi, 2003; Greif & Hegar, 1991). And while most missing child cases are resolved relatively quickly (Finkelhor, Hammer, & Sedlak, 2002; Hammer, Finkelhor, & Sedlak, 2002; Plass, Finkelhor, & Hotaling, 1997; Sedlak, Finkelhor, & Hammer, 2005), in an important subset of cases, a child may go missing and remain missing for an extended period of time (Allen, 1990). Such cases frustrate law enforcement and the families of the missing child (McQueen, 1989).

When children remain missing for an extended period, it presents challenges for law enforcement because the child's current appearance will diverge from the appearance of the child in the last available photograph (Feik & Glover, 1998; Patterson et al., 2007a; Premkumar, 2011). To address this problem, authorities sometimes utilize forensic age progression in an

attempt to obtain an idea of what the missing person may currently look like. Techniques used to create age progressions can vary, but typically involve applying knowledge of mean craniofacial growth patterns to photographs of the target individual in order to predict current appearance (Taylor, 2001). Age progressions typically also make use of photographs of biological relatives at both the target age and the age the child went missing on the assumption that the missing person may look similar to his or her biological relatives. Age progressions can be produced by forensic artists, or by computer software that digitally ages faces (Patterson et al., 2007b). However, in most actual cases age progressions are produced by trained forensic artists (Taylor, 2001), and it is this approach that is the focus of the current research.

Although approximately one third of cases listed with the National Center for Missing and Exploited Children in the United States makes use of age progression (Lampinen, Arnal, Courtney, & Adams, 2009), relatively little research has examined the degree to which age progressions are an effective or reliable technique. In one of the few peer-reviewed studies examining this topic, Lampinen et al. (2012a) had participants study mock missing child posters. Some of the posters showed children at age 7 (outdated photograph), some of the posters showed children at age 12 (current photograph) and some showed an outdated photograph alongside an age progression produced by a professional forensic artist. The age progressions were based on photographs of the target children at age 7 and showed their estimated appearance at age 12. Participants then engaged in a task in which they were shown a large number of photographs of 12-year-old children and were asked to press the ‘h’ key if they saw one of the ‘missing’ children. Although, recognition in all three conditions significantly exceeded chance, recognition in the age progression condition did not significantly exceed recognition in the outdated

photograph condition. Similar results have been reported by Charman and Carol (2012) and by Lampinen et al. (2012b).

More recently, Lampinen, Erickson, Frowd and Mahoney (2015) provided 8 trained forensic artists with photographs of 8 target individuals. Each artist age progressed half of the target individuals from age 12-20 and half of the target individuals from age 5-12 and 5-20. Age progressions were presented alongside actual photographs of the volunteers at the target ages and alongside description matched foils at the target ages. Participants rated the similarity of the age progressions to the targets or description matched foils. Four major findings resulted from this research. First, age progressions were rated as being significantly more similar to targets than to foils, indicating some ability of age progressions to capture identity. Second, although age progressions were rated as being more similar to targets than to foils, the absolute level of similarity was not impressive, just barely exceeding the midpoint of the similarity scale on average. Third, age progressions were more similar to targets in the shorter age ranges, 5-12 and 12-20, than in the longer age range, 5-20. Fourth, there was a great deal of inter-artist variability (Erickson et al., 2017). Some artist's age progressions were more similar to their respective targets than were other artist's age progressions.

Other research has shown that people have some ability to intuit the likely appearance of a target individual at a later age. For instance, Seamon (1982, Experiment 3) had participants study pictures of adults taken in 1966 and then later take an old/new recognition test with photographs taken in 1974. Seamon measured accuracy using *d'*, a statistical score that controls for response bias (e.g., subjects' idiosyncratic tendencies to respond "yes" more often than "no" in decision-making tasks; Macmillan & Creelman, 2004). Mean *d'* scores were respectable (*d'* = 1.14) indicating some ability to recognize individuals across an age range of 8 years. In another

experiment (Experiment 5), participants were given photographs of 13 individuals with each individual represented by pictures from four different age ranges: infant (0 to 2 years), childhood (6 to 8 years), adolescent (12 to 14 years), and young adult (18 to 20 years) and were asked to sort the photographs into stacks of four images depicting the same identity. Accuracy was determined by whether the pictures at each of the younger age ranges was correctly sorted into the same identity stack as the young adult picture. Sorting was significantly more accurate when pairing the adolescent with the young adult photos than for pairing the childhood or infant photos with the young adult photos, but even for these youngest ages sorting accuracy significantly exceeded chance.

These results suggest that lay people have a naïve conception of the process of facial aging, even without the kind of specific training in cranio-facial growth patterns that forensic artists receive. There is a long tradition in cognitive psychology that recognizes that people have naïve theories or folk theories in a number of different domains such as physics, psychology, biology, and economics (Gelman & Legare, 2011; Peng & Knowles, 2003). Because folk theories are derived from experience and culture, they often have some correspondence with scientific theories but may also differ from scientific theories in their details. It is not a stretch then to think that people may also have folk theories of the aging process that they can use to make estimates of a person's future appearance. If this is true, then it might be possible that any trained portraiture artist, even an artist with no training in age progressions per se, might be able to produce age progressions that capture the appearance of the target individual to some degree, although perhaps not as well as artists with specialized training. To test this hypothesis, we obtained a sample of four undergraduate artists, recommended to us based on their ability as portrait artists, and asked those artists to produce age progressions.

Experiment 1

The questions we wished to answer in Experiment 1 were straightforward: Can undergraduate artists who are skilled at portraiture, but without any specialized training in facial aging, produce age progressions that capture an individual's current appearance to some degree, and how do those age progressions compare to the age progressions produced by trained forensic artists. To examine this, we recruited undergraduate art students to produce age-progressed images of adolescents to age 20. Participants then rated the similarity of these images to the actual targets at age 20 and also to similar foils of the same age. For comparison purposes, we used the 12-20 age progressions produced by our trained forensic artists in Lampinen et al., (2015). In Lampinen et al., the age progressions covered a wider range of ages (5-12, 5-20, 12-20). We had originally asked our undergraduate artists to produce age progressions covering all of those age ranges. However, the artists balked after having to produce that many images and we did not have sufficient financial resources to hire additional artists. We thus focused on the 12-20 age range because the most common ranges for age progressions in actual cases are from early adolescence to adulthood.

Method

Participants. Forty-two university undergraduates (females = 33) participated in this study in exchange for credit toward a research participation requirement in their introductory psychology classes. Participants were 19 to 36 years of age (M = 22.10, SD = 3.37). The ethnic makeup was as follows: 81% identified as Caucasian, 12% as Hispanic, 2% as African American, 2% as Asian, and 2% as Native American. Although 47 participants initially participated, three were removed from analyses because they failed to respond to every survey

question in the similarity rating task, and two were removed because they indicated that they were familiar with individuals shown in the stimulus images.

Materials and Procedures. In Lampinen et al. (2015), 8 individuals (4 female) provided images of themselves at ages 5, 12, and 20 and images of their parents at these ages. A group of eight trained forensic artists had already provided age progressions of these individuals across the age ranges 5-12, 5-20, and 12. In the present study we only used the 12-20 age progressions produced by these artists. Each professional forensic artist had at least four years of professional experience and 40 hours 14 of training in forensic art. This training varied depending on institution, but always included a mixture of fine arts courses and courses instructing basic anatomy and physiology and facial aging. The FBI facial image course had been taken by 5 of the forensic artists. This course involves 80 hours of training in forensic art including coverage of age-related appearance changes. The age progression course offered by the National Center for Missing and Exploited Children was taken by three artists. The course involves 40 hours of training in facial growth and the production of age progressions. All artists had also taken courses with the International Association for Identification and the International Association for Cranio-facial Identification. Most of the artists (n=7) had also taken coursework on forensic art at academic institutions and four have graduate degrees focusing on forensic art. Two of the artists have Ph.D.'s focusing on forensic art. All of the forensic artists regularly attend workshops and tutorials in forensic art.

The second group of artists comprised four undergraduate art majors referred to us by faculty members in a university fine arts department. These undergraduates were recommended by art faculty for their portraiture skills and had all at least taken a basic portraiture course. Artists were female junior and senior level art majors who had taken at least ten major courses

including training in portraiture and were between 22 and 32 years old (M = 26.25, SD = 4.35). All had featured their work in exhibitions ranging from university to national level competitions and had made five portraits during their time as students. None of the artists reported any experience with forensic art or age progressions, although one indicated that she had experimented with graphic novel-style illustration of older versions of comic book characters. All report the same basic sequence of developing a portrait, starting with a basic outline of overall shape and filling in internal features before applying shading and texture.

Each undergraduate artist performed age progressions for 4 of the 8 volunteers from age 12-20 (two male and two female). They were provided with the age 12 photographs of the targets as wells as photographs of the biological parents of the targets at both age 12 and 20. They were not given the targets' age 20 images. We then instructed the artists to age-progress the age 12 images to age 20 using any techniques they wished. They were asked to rely on their own intuitions, and they signed an agreement not to consult any reference materials on facial aging or on techniques used for producing age progressions. After producing the age progressions, artists were monetarily compensated and shown targets' actual age 20 images upon request.

Participants took this study online using Qualtrics survey software. They were shown an example of the Likert scale they were to use, where the left-most (first) option is "extremely dissimilar", the middle (fourth) option is "neither similar nor dissimilar", and the right-most (seventh) option is "extremely similar". They were also informed not to deliberate too long and to just go with their first instinct when making decisions. They were also told not to concern themselves when hairstyle, facial hair, and presence of glasses differ between images.

In Lampinen et al., (2015), the professional forensic artists provided age progressions for all eight volunteers, however, for half of the volunteers the age progressions were based on

pictures of the volunteers at age 5 and for half of the volunteers the age progressions were based on pictures of the volunteers at age 12. We had originally intended to ask our student artists to also age progression across multiple age ranges, however, given the class schedules the student artists balked at having to create that many portraits in a semester. We thus opted to limit the students to four age progressions so that they could focus on quality work rather than rushing through the work and producing suboptimal portraits.

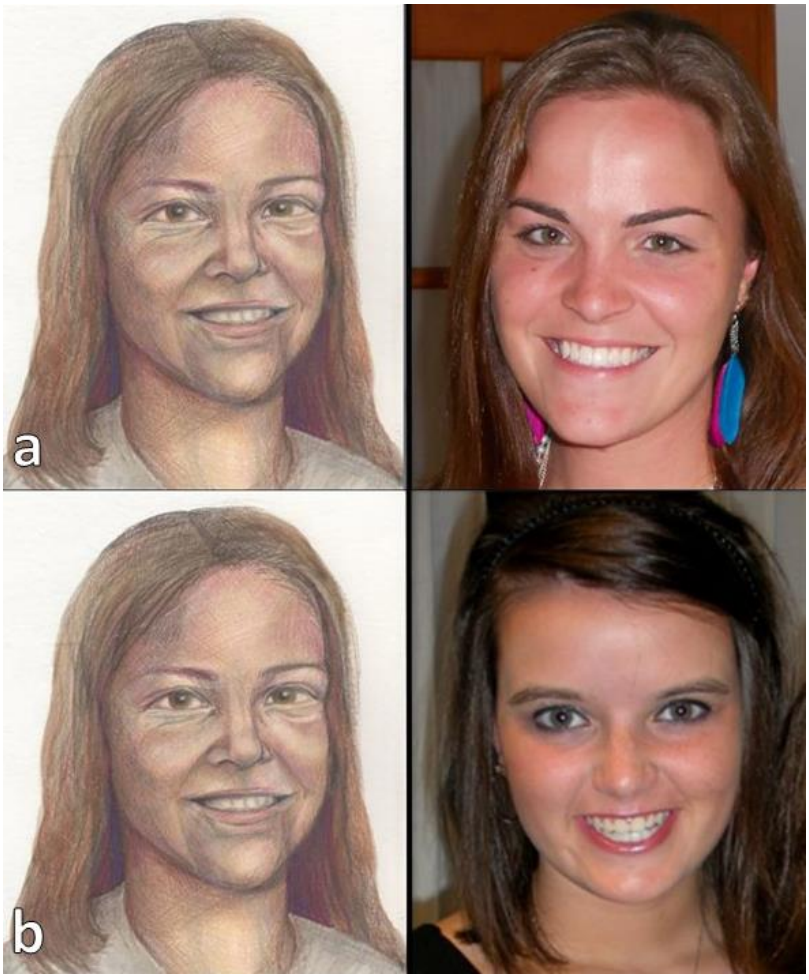


Figure 1. Example of stimuli from Experiment 1: student-generated age-progressed image alongside its target (a) and description-matched foil (b).

Participants then rated similarities of 96 image pairs presented in a unique random order for each participant, each within the same JPG image file sized 600x450 pixels. Half of these showed a target's age progression alongside his or her actual age 20 photo (see Figure 1a), and half showed the age progression alongside a description-matched foil (see Figure 1b). No indication was provided to participants as to the type of artist (i.e., student vs. professional) nor were students even told that this variable was being examined in the study. Foils were chosen in a two-part pilot test where 10 participants were briefly shown targets' age 20 photos and afterward told to describe them as fully as possible. The five most common terms from the ten descriptions were then retained to create a "master description" for each target. Then, we showed these descriptions to a group of 25 research participants and asked them to pick the individual from an array of three photos who best matches the description. Those potential foils chosen most often for each description were retained for our similarity rating study. Image pairs appeared onscreen above the rating scale. After rating similarities for all 96 images pairs, participants were debriefed and assigned research credit.

Results

Professional Artist Ratings. Figure 2 shows a graphical representation of similarity ratings for both artist types and both comparison types. Our first analysis determined if professional artists' age-progressions differed in similarity to targets and foils2. We conducted a paired-samples t-test to compare professional images' target similarities and foil similarities. There was a significant difference in the ratings for target ($M = 4.30$, $SD = .79$) and foil ($M = 3.17$, $SD = .84$), $t(41) = 14.99$, $p < .001$.

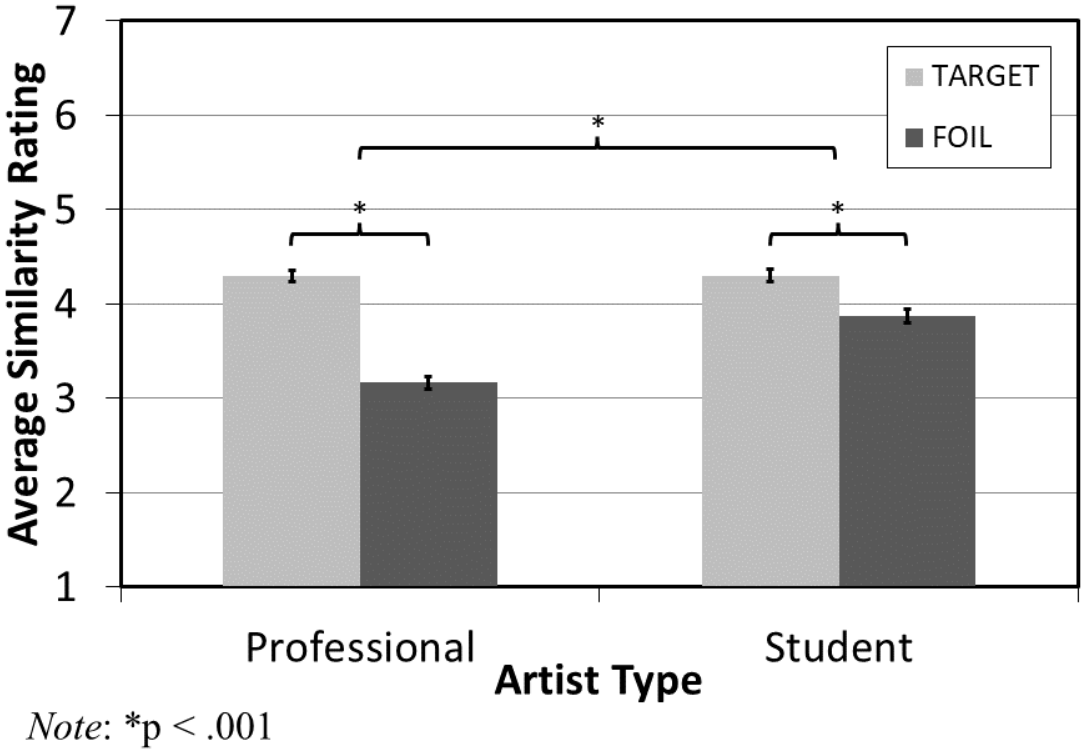


Figure 2. Graph displaying mean similarity ratings with error bars on a 7-point Likert scale for each artist type and image comparison.

A paired-samples t-test on target to foil difference scores determined there were no differences between counterbalanced groups, $t(41) = 1.59$, $p > .1$, so all subsequent analyses collapsed across these groups. Recall that our scale presented a rating of "4" as "neither similar nor dissimilar". For this reason, it was of interest to determine if ratings for targets and foils significantly differed from this midpoint score. A single-sample t-test found that the mean similarity of age progressions to targets was significantly above the midpoint, $t(41) = 2.46$, $p = .018$, while the mean similarity of age progressions to the foils was significantly below the midpoint, $t(41) = -6.42$, $p < .001$.

Student Artist Ratings. We initially conducted an analysis to determine if student artists' age-progressions differed in similarity to targets and foils. We conducted a paired-samples t-test to compare professional images' target similarities and foil similarities. The mean similarity of age progressions to targets ($M = 4.30$, $SD = .83$) was significantly higher than the mean similarity of age progressions to foils ($M = 3.88$, $SD = .93$), $t(41) = 5.73$, $p < .001$.

Again, we ran further analyses to determine if ratings significantly differed from midpoint. A single-sample t-test found that the mean age progression to target similarity was significantly above the midpoint of the scale, $t(41) = 2.32$, $p = .025$, while the mean age progression to foil similarity was not significantly below the midpoint of the scale, $t(41) = -.87$, $p > .3$.

Student artists with no specialized training in facial growth also made images that were judged as more similar to targets than to very similar foils. Also, like professional artists, target similarities were significantly higher than a neutral midpoint. However, unlike professional artists, foil similarities were not significantly below that midpoint.

Comparisons between Professional and Student Images. Our final analyses directly compared similarity ratings for student and professional artists' ratings. We conducted a paired-samples t-test to compare professional and student images' target similarities. There was no significant difference in the target ratings between artists, $t(41) < .001$, $p = 1.00$. However, a second analysis comparing foil similarities did find a significant difference between artist types, $t(41) = -6.52$, $p < .001$. We next calculated and averaged difference scores for each artist type subtracting foil similarities from target similarities. A paired-samples t-test comparing difference scores found that this difference score was significantly higher for professional forensic artists ($M = 1.13$, $SD = .49$) than for student artists ($M = .42$, $SD = .48$) artists, $t(41) = 7.76$, $p < .001$.

Order Effects. To examine for possible order effects as might be expected due to fatigue among participants we conducted separate regression analyses for each participant using that participant's similarity ratings across all items as the dependent variable. Because each pairing was presented in a unique random order to each participant, we first coded each rating in terms of its presentation order and then used presentation order, whether the pairing included a target or a foil, whether the age progression was done by a student artist or professional artist, and all possible interaction terms as predictor variables. Across these 42 separate regression analyses, we then obtained the mean of each of the standardized regression coefficients for each of the predictor variables and compared those mean standardized regression coefficients to zero.

There was no evidence of any order effects. The mean standardized regression coefficient for presentation order did not significantly differ from zero ($M = .03$, $SD = .17$), $t(41) = 1.08$, $p = .29$. The mean standardized regression coefficients for the interaction between presentation order and target vs. foil status also did not significantly differ from zero ($M = -.02$, $SD = .09$), $t(41) = 1.17$, $p = .25$, nor did the mean standardized regression coefficients for the interaction between presentation order and student vs. professional artist, ($M = -.03$, $SD = .13$), $t = 1.55$, $p = .13$, nor did the three way interaction between presentation order, target vs foil status, and

student versus professional artist, ($M = .01$, $SD = .12$), $t(41) = .75$, $p = .46$. Consistent with the original analysis the mean standardized regression coefficient was significant for target vs. foil status ($M = .22$, $SD = .10$), $t(41) = 14.42$, $p < .001$, for student vs professional artist ($M = .09$, $SD = .13$), $t(41) = 4.58$, $p < .001$, and for the interaction between target vs. foil status and student vs. professional artist, ($M = -.099$, $SD = .08$), $t(41) = 8.19$, $p < .001$.

Experiment 2

Experiment 2 was designed to answer an important question brought to fore by Experiment 1. Specifically, what perceptual quality of professionally made forensic age-progressions makes them less similar to foils than those images made by artists merely trained in portraiture, but makes them no less similar to targets? We recruited participants to answer questionnaires about the age-progressed images themselves and incorporated these responses into a mediational path analysis to determine relationships between artist training, image qualities, and progressions' similarities to targets and foils. We outline our specific methods and results below.

Method

Participants. Twenty-nine undergraduate research assistants (females = 22) from the investigator's Law and Psychology Research Group completed this study as a lab assignment. They were 20 to 29 years old (M = 21.59, SD = 1.86) and the ethnic makeup was as follows: 79% identified as Caucasian, 10% as African American, 3% as Hispanic, 3% as Asian, and 3% as Native American. All participants were unfamiliar with the stimulus images and the individuals portrayed in them.

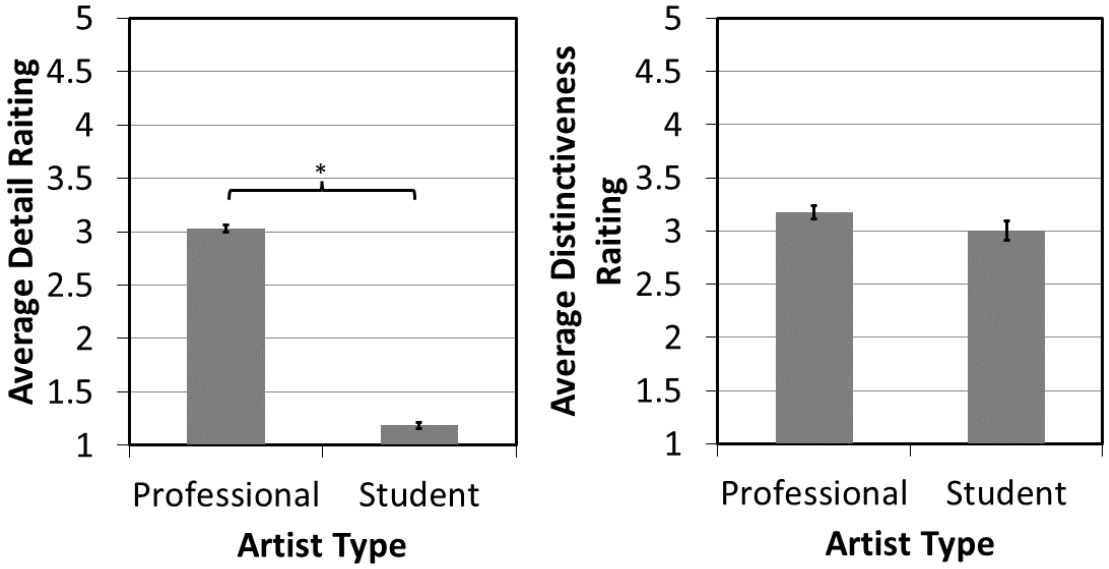
Materials and Procedure. The age progressions created for Experiment 1 were used for this study. Each was resized to be 300 pixels in height with width varying between 330 and 370 pixels, depending on face width. Participants were instructed: "In this assignment we will present you with images of faces. These particular faces are age-progressed images of people based on their childhood images like the ones used in real missing persons investigations. You will see each image alongside questions asking your opinions about their appearance, and your job is to answer these questions".

Participants were then shown the 48 age-progressed images presented in a random order. Beneath each image were questions asking them to rate the images on Likert-type scales. The first question probed for level of detail in the image, asking "How detailed does this face image appear to you? (In other words, how much does it look like a photographic image of a real face?)". This was presented on a four-point scale from 1 (Nothing like a photograph) to 4 (Exactly like a photograph). The second asked, "How distinctive is this face? (In other words, how far from average-looking is it?)". This was presented on a five-point scale from 1 (Very Average-Looking) to 5 (Very Distinctive-Looking), with 3 labelled as "Neither Average Nor Distinctive". The reason we made this a five-point scale is because a facial image may perceptually be neither average nor distinctive, whereas an image must either be photorealistic or not. After answering these questions for each of the 48 images, participants were debriefed, thanked, and given a grade for completing the assignment.

Results

Experiment 2 was conducted to determine if student and professional artists produce age-progressed images that possess different visual qualities – specifically, level of detail (photorealism) and facial distinctiveness of the progression. Next, we present results of analyses designed to determine if there are differences in those qualities in our artists' age progressions.

Level of Detail. We first averaged detail ratings for each artist type within participants (see Figure 3a), and these averages were retained for analysis. We conducted a paired-samples t-test on detail ratings for the two artist types. This yielded a significant difference between professional artists ($M = 3.03$, $SD = .38$) and student artists ($M = 1.19$, $SD = .30$), $t(28) = 24.12$, $p < .001$. This means that trained forensic artists created images that were considered more photorealistic than student artists trained in portraiture alone.



Note: *p < .001

Figure 3. Graphs displaying mean ratings with error bars for age progressions' level of detail (a) and perceived distinctiveness (b).

Facial Distinctiveness. We averaged distinctiveness ratings for each artist type within participants (see Figure 3b), and these averages were retained for analysis. We first conducted a paired-samples t-test on distinctiveness ratings for the two artist types finding no significant difference between professional artists (M = 3.17, SD = .69) and student artists (M = 3.01, SD = 1.00), $t(28) = .60$, $p > .5$. In other words, images produced by students and professionals did not differ in their apparent facial distinctiveness. Likewise, neither type of artist produced images that were significantly different from the midpoint of the distinctiveness scale, which was labeled "neither average nor distinctive", p's > .15.

Mediational Path Analysis. Our primary aim for Experiment 2 was to determine the extent to which the image-level qualities of detail level and distinctiveness were related to

images' similarities to targets and foils. To examine this, we conducted an item analysis that treated each age-progressed image as though it was a participant, and the data we retained for analysis were artist type (students scored as 1 and professionals scored as 2) and both experiments' average ratings of distinctiveness, detail, target similarity, and foil similarity for each image. We then constructed a mediational path model incorporating the latter variables as continuous endogenous variables, with artist type as the dichotomous exogenous variable. Figure 4 shows the final, trimmed model with standardized regression coefficients and significances for each hypothesized direct path3. According to most indices, the model displayed very good fit, $\chi 2(3) = 2.47$, ns, CFI = 1.00, TLI = 1.02, NFI = .978, SRMR = .007, and RMSEA < .001, and AIC = 26.47. Univariate and multivariate assumptions of normality were met. The pertinent individual hypotheses tested by the model are broken down in the following sections.

As can be seen in Figure 4, the direct effect correlations between Artist Type and Detail (b = 1.84, SE = .131, p < .001), and Artist Type and Foil Similarity (b = -1.66, .612, p = .007) were significant, while the correlations between Artist Type and Target Similarity (b = -1.24, SE = .709), Detail and Target Similarity (b = .67, SE = .347), and Detail and Foil Similarity (b = .54, SE = .300) were marginal (i.e., .05 < p < .1) and did not meet the threshold for statistical significance. The relationship between Artist Type and Distinctiveness (b = .04, SE = .097, ns) was not significant. We next investigated indirect effects of Detail on the direct effects between Artist Type and Target and Foil Similarities. We used Sobel's z test for this purpose. The indirect effect of Detail on the relationship between Artist Type and Target Similarity was marginally significant, z = 1.73, as was the indirect effect of Detail on the relationship between Artist Type and Foil Similarity, z = 1.74.

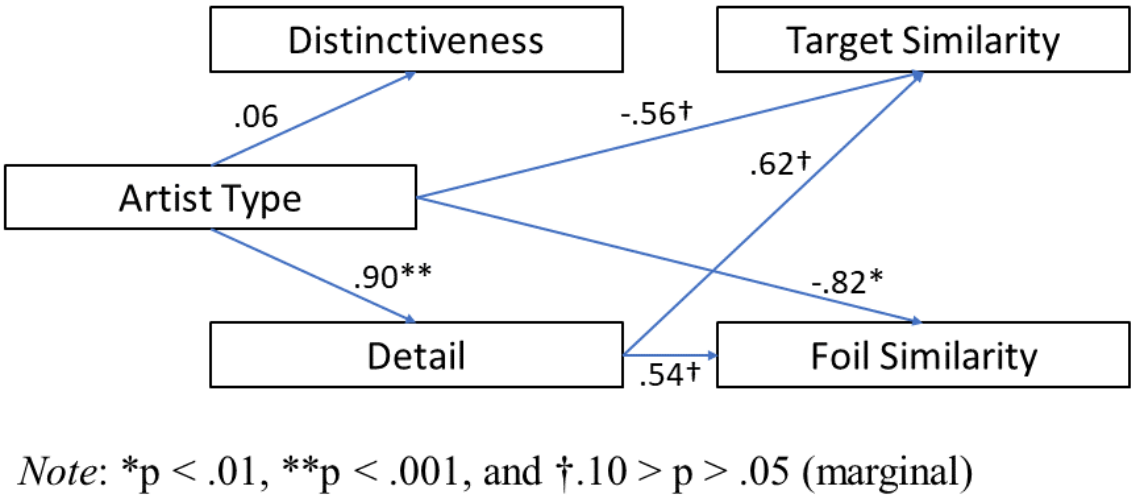


Figure 4. The final trimmed mediational path model with standardized coefficients showing direct relationships among artist type, image level of detail and distinctiveness, and similarities to targets and foils.

The final model was our second. The first included direct paths from distinctiveness to target and foil similarities. Because neither of these was significant and our initial fit indices showed poor model fit, we removed these paths for the second model, which had more degrees of freedom.

Taken together, the path model tells us several important things about the data measured in Experiments 1 and 2 that neither experiment can tell alone. First, relationships between Artist Type and all endogenous variables reiterate what t-test results found previously. Although relationships between Artist Type and similarities to Targets and Foils both revealed negative

Discussion

Forensic age progressions are a commonly used technique in long term missing child cases. Yet evidence for the effectiveness of age progressions is mixed. Age progressions

produced by trained forensic artists are rated as being more similar to the target that they are meant to represent than to description matched foils (Lampinen et al., 2015). Recognition of individuals based on age progressions tend to exceed chance in most studies (Lampinen et al, 2012a, 2012b). Yet, the overall level of similarity between age progressions and targets is often not especially high in absolute terms and peer reviewed studies have not found recognition based on age progressions to exceed recognition based on outdated images (Lampinen et al., 2017).

In the present research, we were interested in whether anybody who is skilled at portraiture could produce reasonable age progressions. This question arose because prior research by Seamon (1982) indicated that people can match images depicting same individuals at different ages above chance. Some of these images depict people across wide age gaps, some spanning entirely different developmental periods (such as from infancy to young adulthood). Despite the wide apparent changes that individual features, their configurations, and even facial shape undergo from childhood into adulthood, people are very accurate at matching faces belonging to the same identity across these age ranges. Therefore, we determined lay people generally may have a naïve conception of the process of aging that is similar to the naïve theories lay people have in domains such as physics, biology and economics. Such naïve theories should allow anyone skilled in portraiture to produce age progressions that capture likeness even if that person has no specific training in facial aging. Our findings indicated that age progressions produced by undergraduate artists, with no specialized training in age progression, were more similar to targets than they were to foils. Also, similarity of age progressions to targets was similar for undergraduate artists and professional forensic artists.

These findings suggest that undergraduate portrait artists, with no specialized training in age progression techniques or facial aging, nonetheless have implicit or explicit knowledge of

facial aging and the ability to translate that knowledge into facial portraits that capture, to some degree, an individual's current appearance. Although the age progressions produced by student artists and professional forensic artists resulted in comparable similarity ratings to targets, age progressions produced by professional forensic artists were superior in that they led to lower similarity ratings to foils. Part of the explanation for this finding may come from the fact that the age progressions produced by the student artists were less detailed than images produced by professional artists. Thus, the findings demonstrate an ability to age images may not be limited to trained forensic artists, but that training and experience do provide some advantage in allowing for the discrimination between targets and foils.

These results may have important implications for the training of forensic artists. In other domains where individuals are likely to already have naïve or folk theories (e.g., naïve physics), the process of education often attempts to focus on taking the student's naïve theories as a starting point and then modifying and challenging those naïve theories where they are in error (Donley & Ashcraft, 1992). Indeed, in the present study we have shown that likenesses produced by skilled portrait artists with not training in forensic art nevertheless capture some aspects of the target person's current appearance. Training programs should thus start with what such individuals already know and to overcome misconceptions inherent in the folk conception of the domain. The mediational analysis suggests that what forensic artists do better is that they provide more distinctive detail that allows individuals to distinguish the age progression from closely related fillers. This may be a teachable skill and efforts should be undertaken to develop those skills in nascent forensic artists.

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