The Value of Making It By Hand

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Abstract

We compared 71 8-12 year olds’ experience of making a drawing by hand vs. on the computer. After inducing a sad mood, we randomly assigned children to: Draw Something Important, Draw a Design, or Play Solitaire. Each activity was completed once by hand and once on the computer. Children rated their mood before and after the activity and rated their enjoyment and perceived competence. After completing both activities, they were asked which one they preferred, and, for the two drawing conditions, which picture they valued more. Enjoyment was rated higher for the Important condition when drawing by hand and for the Design condition when drawing on the computer. Children preferred drawing by hand when drawing something important to them.

Keywords: computers; digital; enjoyment; drawing; mood regulation.

Introduction

Computer technology has invaded the arts and children’s experience of the arts is in many ways very different from the experience of those a generation earlier. The impact of digital technology has transformed the activity of drawing, painting, and photography. Computer drawing programs are typically advertised as ways to create drawings quickly, and without the mess of paints. We can scan in drawings made by hand and alter them in Photoshop; and we can make drawings directly on the computer. Has the digitalization of the arts affected children’s valuation of the drawing product?

Drawings by hand vs. on the computer differ substantially in the final product. A drawing done by hand is unique, whereas each digital print-out of a computer-made drawing is identical, and thus there is no “original” drawing. Given that in the art world, limited editions of etchings and lithographs are valued more than unlimited ones, it is reasonable to suppose that digital print-outs of drawings are not valued as much as are unique originals.

We know from the work of Newman and Bloom (2011) that adults value original artworks by an artist more than exact duplicates made by someone else. These evaluations seem to be influenced by the amount of physical contact that the artist has with his or her work. Works of art for which there was a high amount of physical contact between artist and artwork were rated as more valuable than those for which there was a low amount of physical contact. Thus, people may believe that a work of art has a special quality because the artist touched it. This suggests that children should value handmade drawings over printouts of digital drawings.

Such a hypothesis would be consistent with research showing that children are sensitive to the effects of positive contagion. When presented with a special object, such as their own security blanket, young children prefer the original blanket to a duplicate (Hood & Bloom, 2008). This finding extends to objects that did not belong to the child: children placed a higher value on a goblet said to have been owned by Queen Elizabeth than a duplicate goblet said to have been owned by an ordinary person (Hood & Bloom, 2008).

We asked children to compare the experiences of drawing by hand on paper vs. creating a drawing on a computer screen using a mouse. Our question was which experience and which product children would value more. We examined this question with two very different kinds of drawings: one in which children drew something important to them, and one in which they drew a design. We chose these two kinds of drawings with the hypothesis that it is particularly for drawings that are personally important to children that the medium will matter. We expected drawing by hand to be a more positive experience (greater enjoyment and perceived competence) when the image created was a personally important one.

Previous research has shown that after a negative mood induction, drawing improves short-term mood for both adults and children (Dalebroux, Goldstein, & Winner, 2008; DePettrillo & Winner, 2005; Drake, Coleman, & Winner, 2011; Drake & Winner, 2012; 2013; Pizarro, 2004), and we wondered whether drawing by hand would have a more positive mood effect than creating a digital drawing. And if so, would this be explainable by -- or independent of -- a more positive affective experience.
We included a control condition in which children were asked not to draw but to play a card game, either by hand or on the computer. The inclusion of a non-art activity allowed us to determine whether a more positive outcome for either or both of the drawing activities (hand vs. computer) was specific to art-making.

**Methods**

**Participants**
Participants were 71 children (42 girls) ranging in age from 8.7 to 12.3 years ($M = 10.7$ years, $SD = 1.0$) recruited from after-school art classes, summer camps, and online advertisements. The majority of the children were Caucasian. Children received a $20 gift card to amazon.com and Faber-Castell water color pencils for participating.

**Materials & Procedure**

**Conditions.** Children were randomly assigned to one of three conditions: Important ($n = 25$), Design ($n = 23$), or Card Game ($n = 23$). There were no differences in gender distribution across conditions, ($X^2 = 1.628, p = 0.450$).

Instructions for the Important condition were: “I want you to draw something that is important to you.” Instructions for the Design condition were: “I want you to draw a design – don’t make a picture of something, just make a design. A design is a picture with a pattern of lines, colors, shapes, but it is not a picture of any kind of object in the world.” Instructions for the Card Game condition were: “I want you to play Solitaire using the cards (or mouse in the computer activity).”

Children in the drawing conditions completed the activity once by hand (using water color pencils) and once digitally (using Sumo Paint on a laptop), with order counterbalanced. Children were given up to a half hour to complete each task and the time that they spent was recorded as a measure of their persistence. Figure 1 shows a drawing by a 10-year-old of something important done by hand and on the computer; Figure 2 shows a design by an 11-year old done by hand and on the computer.

![Figure 1: A 10-year old’s drawing of something important by hand (a) and on the computer (b)](image)

![Figure 2: A 11-year old’s drawing of a design by hand (a) and on the computer (b)](image)

**Positive and Negative Affect Schedule-Child (PANAS-C).** In order to assess mood changes, we administered the Positive and Negative Affect Schedule-Child (PANAS-C) (Laurent, Catanzaro, Joiner, Rudolph, & Potter, 1999). The PANAS-C contains 30 words that describe different feelings and emotions. For each word, children were asked the extent to which they were feeling that emotion on a five-point scale ranging from 1 (very slightly or not at all) to 5 (extremely). The PANAS-C yields a global score for positive affect and negative affect.

**Mood Induction.** To induce a negative mood, we showed children a five-minute clip from either The Lion King or Bambi (order counterbalanced between sessions). After watching the film clip children were instructed: “Now close your eyes and think about something that has happened to you that made you feel really sad.” Children were given 30 seconds to think of the event. They were then asked to recall the event to the experimenter.

**Enjoyment and Competence.** After each activity, children were asked to rate on a 5-point scale “How much did you enjoy doing this?” from really didn’t like it to really liked it and “How well did you think you did on this?” from very bad to very good.

**Preference and Valuation of Final Drawing.** After children completed both the hand and computer activities, they were asked two preference questions: “Which way did you like best, by hand or on the computer?” “If you got the chance to do it again, would you do it by hand or on the computer?” Children in the two drawing conditions were also asked one more question that assessed which product they valued more. They were asked: “Which picture would you like to hang in your room?”

**Procedure**
At the beginning of each testing session, children completed a training session using the relevant materials: the water color pencils, the computer drawing software, the card game, or the computer card game software. Then they completed the PANAS-C (Time 1). Next they watched the mood induction film clip (The Lion King or Bambi with the order counterbalanced by session), were asked to recall a time
when they were sad, and completed the PANAS-C a second
time (Time 2). Children then carried out their assigned
activity. After the activity, children were given the PANAS-
C a third time and were asked to indicate how they were
feeling (Time 3). Finally, they were asked questions about
their preference and valuation of their final drawings.

Children participated in two testing sessions that lasted
between 30 to 45 minutes each, with order counterbalanced.
One session was with the computer while the other session
was the same activity by hand. The two sessions were
scheduled on average one week apart.

Results

Preliminary Results
To determine whether positive and negative affect differed at
Time 1, a MANOVA with order (computer/hand,
hand/computer) and condition (3) as the fixed factors and
Time 1 positive and negative affect as the dependent
variables (4) was performed. There was no effect of order ($p
> 0.05$) and no interaction of order by condition, ($p > 0.05$).
There was no effect of condition ($p > 0.05$) with the
exception of negative affect for the first session. A bonferroni
post hoc test revealed that the Game condition was associated
with a higher negative affect than the Design condition
during the first session.

A paired samples t-test showed that the two mood inducions
were both effective in inducing a negative mood. After the
Lion King clip and the personal memory recall, children’s
negative affect increased from Time 1 to Time 2 and their
positive affect decreased from Time 1 to Time 2, (all $p$
values < 0.001). The same was true for the Bambi clip, (all $p$
values < 0.001).

Mood Improvement
To determine whether positive and negative affect differed as
a result of the film clip children watched first or activity they
performed first, a MANOVA with order (computer/hand,
hand/computer) and film clip (2) as the fixed factors and
Time 2 positive and negative affect as the dependent
variables (4) was performed. There was no effect of order ($p
> 0.05$), no effect of film clip, ($p > 0.05$), and no interaction
of order by film clip, ($p > 0.05$). Thus, in subsequent
analyses, order of activity and order of film clip were not
included as factors. We next computed change scores (Time
3 minus Time 2) for negative and positive affect for each
activity when carried out by hand and when carried out on
the computer.

Negative Affect. Figure 3 presents mean negative affect
change scores by condition and activity (hand/computer). A
mixed design ANOVA with condition (3) as the between
subjects factor and activity (hand, computer) as the repeated
measures was performed on the negative affect change score.
There was no effect of condition [$F = (2, 68) = 0.911, p =
0.407$, $n^2 = 0.026$], no effect of activity [$F = (1, 68) = 0.108$,
$MSE = 24.896, p = 0.743, n^2 = 0.002$], and no interaction of

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condition by activity, [$F = (2, 68) = 2.362, p = 0.102, n^2 =
0.065$].

Figure 3: Negative Affect Change by Condition and
Activity

Positive Affect. Figure 4 presents mean positive affect
change scores by condition and activity (hand/computer). A
mixed design ANOVA with condition (3) as the between
subjects factor and activity (hand, computer) as the repeated
measures was performed on positive affect change scores.
There was no effect of condition [$F = (2, 68) = 0.563, p =
0.572, n^2 = 0.016$], no effect of activity [$F = (1, 68) = 0.509$,
$MSE = 71.547, p = 0.478, n^2 = 0.007$], and no interaction
of condition by activity, [$F = (2, 68) = 2.529, p = 0.065, n^2 =
0.001$].

Figure 4: Positive Affect Change by Condition and
Activity

Enjoyment
A mixed design ANOVA with condition (3) as the between
subjects factor and activity (2) as the repeated measures was
performed on enjoyment. There was an effect of condition [$F
= (2, 68) = 11.334, p < 0.001, n^2 = 0.250$]. Bonferroni post
hoc tests revealed that children in the Important condition
enjoyed their task more than children in the Card Game
condition, ($p < 0.001$); and children in the Design condition
enjoyed their task more than children in the Card Game
condition, \( p = 0.001 \). There was no difference in enjoyment between the Important and Design conditions, \( p = 1.0 \). There was no effect of activity, \( F = (1, 68) = 0.704, MSE = 0.297, p = 0.404, n_p^2 = 0.010 \).

Most importantly for our hypotheses, condition interacted with activity, \( F = (2, 68) = 7.195, p < 0.001, n_p^2 = 0.175 \), as shown in Figure 5. Paired sample \( t \)-tests revealed that in the Important condition, children enjoyed the hand \( (M = 4.48) \) more than the computer activity \( (M = 4.08) \), \( t(24) = 2.449, p = 0.022 \). In the Design condition, children enjoyed the computer \( (M = 4.57) \) more than the hand activity \( (M = 4.17) \), \( t(22) = 2.859, p = 0.009 \). In the Card Game condition, there was no difference between enjoyment of hand \( (M = 3.54) \) vs. computer activity \( (M = 3.78) \), \( t(22) = -1.392, p = 0.178 \).

![Figure 5: Children’s Enjoyment by Condition and Activity](image)

**Perceived Competence**
A mixed design ANOVA with condition (3) as the between subjects factor and activity (2) as the repeated measures was performed on perceived competence. There was an effect of condition, \( F = (2, 68) = 3.376, p = 0.040, n_p^2 = 0.090 \). Bonferroni post hoc tests revealed that children in the Design condition had greater perceived competence than children in the Card Game condition, \( p = 0.044 \). There was no difference in perceived competence between the Important and Design conditions, \( p = 1.0 \) or between the Important and Card Game conditions, \( p = 0.193 \). There was no effect of activity, \( F = (1, 68) = .023, MSE = 3.156, p = 0.880, n_p^2 = 0.00 \).

As with enjoyment, condition interacted with activity for perceived competence, \( F = (2, 68) = 3.156, p = 0.049, n_p^2 = 0.085 \), as shown in Figure 6. Paired sample \( t \)-tests revealed that in the Important condition children rated perceived competence marginally higher in the hand \( (M = 4.06) \) than the computer activity \( (M = 3.72) \), \( t(24) = 1.893, p = 0.071 \). In the Design condition, there was no difference in children’s perceived competence of the hand \( (M = 4.0) \) vs. computer activity \( (M = 4.04) \), \( t(22) = -0.272, p = 0.788 \). In the Card Game condition, there was no difference in children’s perceived competence of the hand \( (M = 3.35) \) vs. computer activity \( (M = 3.70) \), \( t(22) = -1.447, p = 0.162 \).

![Figure 6: Children’s Perceived Competence by Condition and Activity](image)

**Persistence**
A mixed design ANOVA with condition (3) as the between subjects factor and activity (2) as the repeated measures was performed on time spent on the activity. There was an effect of condition \[ F = (2, 56) = 3.567, p = 0.035, n_p^2 = 0.113 \]. Bonferroni post hoc tests revealed that children in the Important condition spent more time on the task than children in the Design \( p = 0.013 \) condition. There was no difference in time spent on the Important vs. Card game conditions \( p = 0.158 \) or Design vs. Card Game conditions \( p = 1.0 \). There was no effect of activity \[ F = (1, 56) = .107, MSE = 99508.419, p = 0.745, n_p^2 = 0.002 \], and no interaction between condition and activity, \[ F = (2, 56) = 2.514, p = 0.090, n_p^2 = 0.082 \].

**Preferred Activity**
Binomial tests were run to determine whether children showed a preference for one activity and which activity they were more likely to repeat. For preference, children were just as likely to prefer the activity by hand as on the computer. This was true for the Important \( (0.67 \text{ vs. } 0.33, p = 0.152) \), Design \( (0.50 \text{ vs. } 0.50, p = 1.00) \), and Game conditions \( (0.43 \text{ vs. } 0.57, p = 0.678) \). In terms of which activity children were more likely to repeat, children were just as likely to say they would repeat the drawing or game activity by hand as on the computer. This was true for the Important \( (0.54 \text{ vs. } 0.46, p = 0.839) \), Design \( (0.55 \text{ vs. } 0.45, p = 0.832) \), and Game conditions \( (0.43 \text{ vs. } 0.57, p = 0.678) \).

**Most Valued Final Product**
Finally, a binomial test was run to determine whether children valued the hand or the computer activity more. For the Important condition, children said they would prefer to hang the hand-made rather than the computer-made drawing, \( 0.80 \text{ vs. } 0.10, p = 0.012 \). We also coded children’s reasons. The majority of children felt that the hand-made drawing looked better than the computer drawing (82%); the remainder said either that they enjoyed drawing by hand more or felt that the hand-made drawing was special because it was done all by themselves without the assistance of the
computer (18%). In contrast to the Important drawing, there was no difference in the percentage of children who preferred to hang the design drawing made by hand over the design drawing made on the computer, 0.60 vs. 0.40, p = 0.503.

Discussion

Electronic media are ubiquitous: they surround both children and adults. From an early age, children are exposed to television, computers, video games, and cell phones. Children are texting, e-mailing, chatting on the internet, and joining social networks. Children are spending more and more time on the computer and this includes creating digital art. The blank sheet of paper has replaced by a computer screen; color pencils by a computerized drawing tablet.

Many studies have examined whether the digital world is harmful or beneficial for children's development. On the positive side, it has been shown that video games can improve spatial skills in children (Subrahmanyan & Greenfield, 1996) and more time spent on the computer is associated with higher academic performance independent of children's socio-economic status (Fish et al., 2008; Rocheleau, 1995). However, disturbing trends have also been noted (Gardner & Davis, 2013; Turkle, 2011). Gardner and Davis found that children often become "app dependent." And Turkle observed that children now prefer robotic to live pets. She also reported that children today do not value authenticity; they prefer relationships to robots over relationships to people.

The digitalization of writing has some objective negative consequences. Five-year-olds asked to reproduce a letter by copying it showed greater neural activation in areas associated with reading and writing than children who typed the letter on a computer. (James & Engelhardt, 2012). And when elementary school children were asked to compose words by hand or on the computer, those who wrote by hand did so with greater accuracy and more creativity than those who composed the words on the computer. (Berninger et al., 2006).

Little research has examined the subjective experience, for children, of engaging in activities digitally that were performed by hand a generation earlier. The goal of this study was to determine how the experience of drawing on paper using hand held colored pencils differs for children from the experience of creating a drawing by pointing and clicking and watching the drawing emerge on screen. Specifically, we asked about the effects of both drawing activities on mood, persistence, enjoyment, and perceived competence. We also examined which activity children prefer and value more. We included a control, non-art activity (the card game of Solitaire) so that we could determine whether any preference for working by hand rather than digitally holds for a non-art activity as well.

Contrary to our hypothesis we found that mood improvement did not vary as a function of activity. This may have occurred because all three conditions (important, design, and card game) regardless of activity were distracting. Previous research has shown that using drawing as a form of distraction is more beneficial for improving short-term mood than using drawing as a form of venting (DePietro & Winner, 2005; Dalebrous et al., 2008; Drake & Winner, 2012; Drake & Winner, 2013; Pizarro, 2008). It has been theorized that distraction tasks improve mood because they are cognitively demanding and shift our attention away from mood congruent processing (van Dillen & Koole, 2007). Mood improvement may not have varied across the three conditions and between activities because the tasks were cognitively demanding and thus shifted the child's attention away from the negative content of the film clip and the recall of their sad memory.

When asked which activity they would like to repeat, children did not demonstrate a preference. But which activity did children enjoy more? Consistent with our hypothesis, we found that children enjoyed making art by hand more when drawing something personally important. They enjoyed making art on the computer more when drawing a design. It seems plausible to suggest that drawing by hand allows children to express themselves more freely (consistent with Berninger et al., 2006), while the computer program is more constrained, but is particularly good for special effects, and hence for designs. We found no difference in enjoyment for the Card Game condition for hand vs. computer, thus making it all the more striking that when drawing something of personal importance, the old fashioned way is preferred.

We also investigated which activity children felt more competent doing. Consistent with our hypothesis, children felt more competent making a drawing by hand than on the computer -- but only when making a drawing of personal importance. There was no difference in perceived competence between the two activities for the design or card game conditions.

Consistent with our hypothesis we also found that children valued the drawing product more when made by hand than on the computer. Even though previous research suggests that children often prefer technology over human interaction (Turkle, 2011), we show that this is not always true. When it comes to art making, children value creating personally important images by hand more than on the computer.

Why might this be so? It is possible that children view the handmade product as more authentic: a drawing by hand cannot easily be reproduced while a drawing on the computer can be printed many times. Such an explanation would be consistent with research by Bloom and colleagues that demonstrates that children value original objects over duplicates (Hood & Bloom, 2008). It also quite possible that the tactile experience of working with art supplies lends the final product more value. Finally, children may be sensitive to the effects of positive contagion. Just as adults prefer objects touched by celebrities or famous artists (Argo, Dahl, & Morales, 2006; 2008; Newman & Bloom, 2011) children may prefer the drawing with which they had a tactile experience. While the majority of children described their handmade drawing as looking better (80%), a subset did describe the handmade drawing as "unique" or "special." Future research should disentangle whether the greater value
of handmade drawings (when drawing something of personal importance) is due to physical touch or the one-of-a-kind nature of the drawing.

Taken together, this research suggests that creating art by hand has psychological benefits for children. Even though we live in a digital world, there is something special about creating art work by hand that cannot be gained from creating art on the computer. When making images of personal importance, children value the experience more, and value the final product more, when these images are made directly on paper than digitally. These effects cannot be explained by any differences in mood improvement between the activities. Despite the undeniable fact that in today’s culture, digital media are everywhere, when it comes to creating art of personal importance, children turn back to hand held pencils and paper.

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