



# Your kid could not have done that: Even untutored observers can discern intentionality and structure in abstract expressionist art

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## ABSTRACT

Can people with no special knowledge about art detect the skill, intentionality, and expressed meanings in non-representational art? Hawley-Dolan and Winner (2011) showed participants without training in art images of abstract expressionist paintings paired with superficially similar works by children or animals and asked them which they preferred and which was a better work of art. Participants selected the works by artists in response to both questions at a rate above chance. In Study 1, we used the same image pairs but asked a more direct question: which painting is by the artist rather than the child or animal? Individuals with no familiarity with abstract expressionism correctly identified the artists' works at a rate significantly above chance. In Study 2 participants saw each image singly and were asked whether it was by an artist or a child or animal. Participants unfamiliar with abstract expressionism again correctly identified the source of the works at a rate above chance. Study 3 demonstrated that this discrimination is made on the basis of perceived intentionality and perceived structure. People see more than they think they do in abstract art. These findings tell us something about the nature of non-figurative art. They also tell us something about the human tendency to ferret out intentionality.

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The disparaging comment, “My kid could have done that” can often be overheard in a museum when spectators confront works by abstract artists such as Jackson Pollock, Willem de Kooning, Joan Miró, or Ellsworth Kelly. Often these works have no trace of representation; they lack recognizable objects or scenes. Much of the public seem puzzled or even outraged by canvases that are entirely non-representational and think that such works are a hoax because they have no meaning and require no skill. In the catalog for an exhibition by the artist Ellsworth Kelly at the Museum of Modern Art in New York, curator Ann Temkin

wrote that she once said to Kelly that his paintings looked like they required no skill to make. To which Kelly drily replied, “Which takes skill” (Temkin & Kelly, 2013).

This tension can even be seen among the most highly regarded art historians. Gombrich (1950) focused on representational art as a signal human achievement, and disparaged abstract art as a display of the artist's personality rather than skill (1950, p. 380). In sharp contrast, Kirk Varnedoe (2006) argued that abstract art, which he referred to as “pictures of nothing,” is a signal human achievement created in a new language and filled with symbolic meaning. The “mind-boggling range of drips, stains, blobs, blocks, bricks, and blank canvases” (pp. 40–1) seen in museums of modern art are not random spills, he wrote. Rather, like all works of art, they are “vessels of human intention” (p. 31) and they “generate

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meaning ahead of naming” (p. 34). They represent a series of deliberate choices by the artist; they involve invention, and they express non-representational meanings – e.g., energy, space, depth, repetition, serenity, discord.

Varnedoe (2006) also stressed how abstract artists were a community commenting (in images as well as in language) on one another's works. He argued that understanding of abstract art required familiarity with this conversation. While learning certainly deepens our understanding of any art form, we asked here whether those outside the community – the uninitiated – see and understand more in abstract art than they may believe they do. In short, can people with no special knowledge about art detect the intentionality (and thereby the skill and expressed meanings) in non-representational art?

The perception of intentionality has been shown to be critical to how we classify both aesthetic and non-aesthetic artifacts (Bloom, 1996, 1998). According to Bloom's intentional-historical proposition, the intention behind the creation of an artifact is an essential property of that artifact, and we categorize artifacts according to what we believe to be their essence (Gelman & Bloom, 2000; Guetheil, Bloom, Valderrama, & Freedman, 2004). There is some disagreement about the centrality of perceived intentionality in how we classify artifacts. Malt and her colleagues have noted that even though people may believe that the intention behind the creation of an artifact is an essential property of that object (Malt, 1990), these beliefs do not always determine how that object is named (Malt & Sloman, 2007). However, as Bloom (2007) argues, naming of objects is distinct from classification of objects, and we often deliberately misname objects whose classification we know full well in order to make a point or to serve a particular communicative function.

Intentionality may play a very important role in our response to art. To begin with, intentionality has been claimed to be paramount in determining when to apply the label “art” to an object. According to some aestheticians, if an object is intended as a work of art, then it is a work of art, whether or not we think it is any good (Goodman, 1976; Levinson, 2004). Intentionality has also been shown to be central not only to how we classify but also to how we value works of art (Newman & Bloom, 2012). An original work of art is valued over a very similar (or identical) work that is a copy of the original: the intention behind the two works (which tells us about the mind behind the two works) matters (Newman & Bloom, 2012). The same has been found for non-art objects: for example, a lost ring that someone intended to give you is far more valuable to you than a duplicate ring (Hood & Bloom, 2008; Newman & Bloom, 2012).

Finally, intentionality has been shown to determine our *interpretation* of aesthetic artifacts: we use intentionality to decide what a drawing represents. If you know that a circle was drawn to represent an apple, you will refer to this circle as an apple. Even three-year olds recognize the role of intention in how a representational image is named: they name their representational drawings on the basis of what they had intended to draw, rather than on what the drawing actually looks like (Bloom & Markson, 1998).

And when two-year-olds are asked to name a representational drawing by an adult, they give it the name of the object the adult was looking at when drawing (Preissler & Bloom, 2008).

In our research we focused on the ability to classify aesthetic artifacts in terms of their intentional history, asking if people are able to determine whether particular works of art were created by famous artists or by children or non-human animals. We asked first whether the untrained observer is able to do this, and if so, what criteria (including perceived intentionality) are used to make such a classification. Implicitly, we are asking about the criteria we use to *evaluate* works of art, as attributing a work to a “famous artist” rather than a child or animal implies the recognition of greater skill. An answer to this question can help us understand more about the cognitive representation of abstract art and should also reveal whether the importance of intentionality in categorization extends even to the unusual case of entirely non-representational, non-functional aesthetic artifacts.

This question was addressed by Hawley-Dolan and Winner (2011), who tested whether participants could distinguish works by abstract expressionists from superficially similar works by preschool children and animals. Thirty paintings by famous abstract expressionists were paired with paintings by children or animals (apes, monkeys, elephants). The pairings were constructed holistically to look as similar as possible in at least two of the following characteristics: color, line quality, brushstroke, medium, and composition. Participants were asked two questions about each pair: “Which image do you like more?” (preference) and “Which image do you think is the better work of art?” (judgment). Pairs were presented in three labeling conditions: the first ten pairs were presented unlabeled; the next 20 had labels: one was labeled “artist” and the other was labeled either “child,” “monkey,” or “elephant.” Ten of the labeled pairs were correctly labeled, and ten were reverse (wrongly) labeled, with both kinds randomly intermixed.

The striking finding: in all three labeling conditions, participants selected the works by the artists significantly more often than those by children and animals for both the preference and judgment questions (Hawley-Dolan & Winner, 2011). Evidently people are able to distinguish works by masters vs. superficially similar ones by unskilled makers. In addition, participants gave more mentalistic justifications when they chose works by artists, claiming that these works showed more intentionality, planning, and skill.

Here we report a series of studies using the stimuli from Hawley-Dolan and Winner (2011) in which we first replicate their findings using two different methodologies and then investigate the possible bases on which participants make the discrimination between works by artists and those by children and animals. In Study 1, we presented the images in the same pairs as in Hawley-Dolan and Winner and asked participants to identify the work by the artist rather than the child or animal. Because presenting the images in pairs may have rendered the task easier by making the contrasts between the skilled and unskilled work salient, in Study 2, we presented the images individually,

in randomized order so that images previously paired did not follow one another sequentially. Using a signal detection analysis, we tested whether participants made the correct identification at a rate significantly above chance. In Study 3 we investigated the role of perceived intentionality along with five other criteria in allowing observers to distinguish works by masters from superficially similar but more random works by children and animals.

## 1. Study 1

### 1.1. Method

#### 1.1.1. Participants

We recruited 103 participants ranging in age from 19 to 76 ( $M = 34$  years, 49 males, 54 females) using Amazon Mechanical Turk ([www.mturk.com](http://www.mturk.com)). Participants received \$1.50 in payment.

#### 1.1.2. Materials and procedure

The 30 paired images from [Hawley-Dolan and Winner \(2011\)](#) were used. Each pair consisted of a painting by a famous abstract expressionist and a painting by a child or an animal (see [Fig. 1](#); for a complete list, see [Appendix A](#)). An online survey was created through Qualtrics. Participants completed an IRB-approved consenting process, viewing an online consent document and indicating their consent by a mouse click before proceeding to the task. Participants read the following instructions:

You are going to see 30 pairs of paintings. In each pair, one painting was by a famous abstract artist and the other was by a child or animal (elephant, chimp, gorilla, or monkey). For each pair, please choose the painting by the famous artist. If you are not sure, please use your best judgment to make your choice.

Each image pair was presented one at a time, and the order was randomized across participants. The instructions were displayed above each pair. Participants could view the images for as long as they wanted, advancing to the next pair when they were ready.

A “catch question” was included at the end of the image presentation that asked participants to describe the last painting they saw in terms of color, composition, and style. The purpose of this question was to ensure that all participants were paying attention to the task. All participants succeeded at this question.

After viewing the images, participants indicated their age, sex, education level (some high school, high school diploma, some college, Associate degree, Bachelor's degree, Master's degree, or Ph.D. or equivalent) and familiarity with abstract expressionist artwork (very familiar, a little familiar, or not at all familiar).

### 1.2. Results

Participants spent an average of 8 min on this task. Familiarity with abstract expressionism ranged as follows: very familiar ( $n = 1$ ), a little familiar ( $n = 25$ ), and not at all familiar ( $n = 77$ ). Education levels ranged as follows: 1: some high school ( $n = 1$ ); 2: high school diploma ( $n = 15$ ); 3: some college ( $n = 21$ ); 4: Associate degree ( $n = 12$ ); 5: Bachelor's degree ( $n = 41$ ); 6: Master's degree ( $n = 11$ ); 7: Ph.D. or equivalent degree ( $n = 2$ ).

Participants received a score for the number of times they chose the image by the artist. Scores could range from 0 to 30. The mean correct score was 19.24 (3.753). A one sample  $t$ -test comparing correct scores to chance performance (set at 15) revealed performance to be significantly above chance  $t(102) = 11.472$ ,  $p < 0.001$ ,  $d = 1.13$ , thus replicating the findings of [Hawley-Dolan and Winner \(2011\)](#) using a more direct question. This is illustrated in [Fig. 2](#).

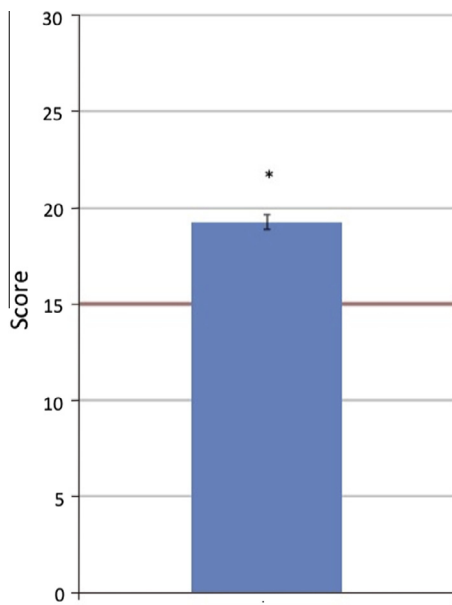
To investigate whether this above chance performance was carried by participants who were familiar with abstract art and/or who were highly educated, we regressed familiarity with abstract art and education level (along with age and sex) onto correct scores. No factors proved significant.

### 1.3. Discussion

These results demonstrate that people who are unfamiliar with abstract expressionism, and who are not highly



**Fig. 1.** Sample pair used in Study 1. Left: “Laburnum” by Hans Hofmann, © 2015 The Renate, Hans & Maria Hofmann Trust/Artists Rights Society (ARS), New York. Right: Painting by Jack Pezanosky, age 4, reprinted with permission of the parents of Jack Pezanosky.



**Fig. 2.** Mean correct score out of 30, significantly above chance (set at 15),  $p < 0.001$ , Study 1.

educated, are able to detect the hand of the master: they detect greater skill in a painting by an established abstract expressionist than in a superficially similar painting by an untrained hand. The notion that abstract art does not display skill, and could have been made by a child or a chimpanzee, is not supported.

Why then do museum visitors scoff at abstract art, insisting that a child could have done as well? One possibility is that by presenting images in contrasting pairs, we gave participants an advantage they would not have had in a museum. Perhaps if museumgoers viewed abstract art paired with works by children or animals they would recognize the difference. To determine whether people can still discern whether an abstract painting is by a master without the clue of a contrasting paired image, we next presented each image individually and asked a similar question.

## 2. Study 2

Study 2 tested the hypothesis that when abstract expressionist paintings and superficially similar paintings by children and animals are presented in random order, one by one, people will still be able to detect which ones are by the famous artists.

### 2.1. Method

#### 2.1.1. Participants

We recruited 101 participants (ages 19–69,  $M = 37$  years, 42 males, 58 females) using Amazon Mechanical Turk ([www.mturk.com](http://www.mturk.com)). Participants received \$1.50 in payment.

#### 2.1.2. Materials and procedure

The 60 images used by Hawley-Dolan and Winner (2011) were again used, 30 by famous abstract expressionists and 30 by a child or an animal.

An online survey was created through Qualtrics. Participants completed an IRB-approved consenting process, viewed an online consent document and indicated their consent by a mouse click before proceeding to the task. Images were presented singly and the order was randomized across participants. Participants first viewed the following instructions:

You are going to see 60 images, one at time. Each painting was made either by a famous abstract artist, or by a child or animal (elephant, chimp, gorilla, or monkey). For each painting, please choose whether you think it was made by an artist or by a child or animal.

Above each image the final line of the instructions was repeated: “Please choose whether you think it was made by an artist or by a child or animal.” Participants could view the images for as long as they wanted and advance to the next image when they were ready. The same catch question as in Study 1 was included at the end to make sure participants were paying attention to the task. As in Study 1, all participants succeeded at this question.

After viewing the images, participants indicated their age, sex, education level (some high school, high school diploma, some college, Associate degree, Bachelor’s degree, Master’s degree, or Ph.D. or equivalent) and familiarity with abstract expressionist artwork (very familiar, a little familiar, or not at all familiar).

### 2.2. Results

Participants spent an average of 9 min on this task. Familiarity with abstract expressionism ranged as follows: very familiar ( $n = 1$ ), a little familiar ( $n = 29$ ), and not at all familiar ( $n = 71$ ). Education levels ranged as follows: 1: some high school ( $n = 2$ ); 2: high school diploma ( $n = 14$ ); 3: some college ( $n = 25$ ); 4: Associate degree ( $n = 12$ ); 5: Bachelor’s degree ( $n = 34$ ); 6: Master’s degree ( $n = 14$ ); 7: Ph.D. or equivalent degree ( $n = 0$ ).

One point was granted for each correct identification of a painting by an artist as by an artist. Scores could range from 0 to 30. Since participants could receive a perfect score by identifying every image as by an artist, we performed a signal detection analysis, with signal defined as presence of an artist, and noise as presence of a non-artist (child or animal). Participants were given a score for the number of hits (classifying artists as artists) and a score for the number of false alarms (classifying non-artists as artists). A  $d$ -prime score was calculated for each participant. One participant was excluded from analysis due to having a hit rate of 1.0 (and thus a  $d$ -prime score of infinity). This was the one participant who was “very familiar” with abstract expressionism. A single sample  $t$ -test tested  $d$ -prime scores against zero. This analysis yielded a highly significant effect,  $t(99) = 16.891$ ,  $p < 0.001$ ,  $d = 1.689$ , indicating that participants could detect the hand of the master even when paintings were presented individually.



To determine whether above chance performance was carried by participants who were “a little” familiar with abstract art and/or who were highly educated, we regressed familiarity with abstract art and education level (along with age and sex) onto *d*-prime scores. The overall regression was significant,  $F(4, 99) = 3.049$ ,  $p = 0.021$ . However, the only significant predictor of *d*-prime was familiarity with abstract expressionism,  $t = 2.459$ ,  $p = .016$ , Beta = 2.39, CI = .348–.037. A *t* test showed that those who reported being “a little” familiar had significantly higher *d* prime scores,  $M = .769(.319)$  than those who reported no familiarity,  $M = .559(.369)$ ,  $t(98) = 2.681$ ,  $p = .009$ ,  $d = .608$ .

In order to determine whether the overall significant *d*-prime effect was carried by those who were somewhat familiar with abstract expressionism, we reanalyzed the data using only the 71 participants who reported being unfamiliar with this style of art. The *d*-prime scores of these participants remained significantly different from zero,  $t(70) = 12.739$ ,  $p < 0.001$ ,  $d = 1.512$ .

### 2.3. Discussion

Study 2 shows that even when these artworks are presented singly, those who are unfamiliar with abstract expressionism can still accurately distinguish the two classes of work. Thus, when museumgoers look at paintings and believe that they are indistinguishable from paintings by children, they are wrong. They see more than they believe they see.

However, when we examined the images individually to determine whether participants in Study 2 were above chance on all images, we found a large variability across images. Scores ranged from 12% to 94% for the artist images ( $M = 64.2\%$ ) and from 29% to 91% for the child/animal images ( $M = 58.17\%$ ). [Appendix A](#) includes mean correctness ratings for each image. In Study 3 we make use of this variability to zero in on the bases on which the discrimination between artist and child/animal is made.

## 3. Study 3

What is it that tells those with no training in looking at abstract expressionism that they are in the presence of a work by an artist rather than a work by a child or animal? Clearly the clues cannot be low-level perceptual cues such as more vs. less color, more vs. less symmetry, or more vs. less spattered. One can easily find examples of works by artists, children, and animals that would be characterized by any of these perceptual characteristics. Thus it would not be fruitful at this point to operationalize differences between the artist and child/animal works in any objective, quantifiable way. The basis for discrimination must be at a higher, more abstract level.

Art historian Claude [Cernuschi \(1997\)](#) has analyzed works of abstract expressionist painters in terms of their structure, their expressed (metaphorical) meanings, and the effect they have on viewers who take the time to study

them. Based on Cernuschi's analysis, we hypothesized that in addition to intentionality, five other higher level characteristics might differentiate works by artists from works by children and animals: degree of visual structure; relative importance of the negative space (i.e., the negative space is not just what is left over but space that seems important in its own right); a sense of either conflict or harmony conveyed (we called this metaphorical meaning); degree to which the work inspires and elevates the viewer; and extent to which viewers feel that the work communicates with them. We considered the expression of conflict or of harmony to be a form of metaphorical meaning, consistent with [Varnedoe's \(2006\)](#) view discussed above. An abstract work of art, like music, is by definition non-representational. Nothing in the work stands for, or denotes, anything in the world. Nonetheless, abstract art, like music, conveys meanings (e.g., softness, loudness, harshness, struggle, resolution). Such meanings are conveyed through color, line, texture, composition, etc. Clashing colors do not represent harshness, but they can express harshness. (For philosophical treatment of the nature of this kind of non-representational symbolism in the arts, see [Goodman, 1976](#) and [Langer, 1957](#).)

We hypothesized that ratings on each of these scales given to paintings by artists would be higher than those given to paintings by children and animals, and we investigated whether this would be true even for participants who reported no familiarity with abstract expressionism. We also exploited the variability in image classification accuracy found in Study 2. Paintings by artists that are *easy* to distinguish from child/animal works should receive higher ratings on each of these scales than those that are hard to identify. The reverse should also hold: paintings by children and animals that are *hard* to distinguish from works by artists should receive higher ratings on these scales than paintings by children and animals that are easy to identify correctly.

### 3.1. Method

#### 3.1.1. Participants

We recruited 180 participants through Amazon Mechanical Turk. Participants were paid \$1.50. Seven participants who reported that they were very familiar with abstract expressionism were excluded from all analyses. The final sample consisted of 173 participants who were either a little familiar ( $n = 77$ ) or not at all ( $n = 96$ ) familiar with abstract expressionism: 80 males and 93 females, ranging from 19 to 62 years of age ( $M = 34.88$ ,  $SD = 10.22$ ).

#### 3.1.2. Materials and procedure

An online survey was created through Qualtrics using the 60 paintings from [Hawley-Dolan and Winner \(2011\)](#). Participants read an IRB-approved online consent document and indicated their consent by a mouse click. The paintings were presented one at a time in a random order across participants. The paintings were not labeled as painted by artists, children, or animals; therefore, participants were blind to the true producer of the paintings. In fact, unlike in Studies 1 and 2, participants had no way of

knowing that the images consisted of two kinds of paintings, some by professional artists and some by children or animals.

Participants were randomly assigned to one of six rating scale conditions, with 30 assigned to each condition. Participants viewed all 60 images and rated each one using one of the rating scales listed below. Each scale was a 7-point scale ranging from 1 (not at all) to 7 (very much). Wording of the rating scales was as follows:

*Intentionality:* As I interact with this painting, I start to see the artist's intentionality: it looks like it was composed very intentionally.

*Structure:* As I interact with this painting, I start to see a structure emerging.

*Negative space:* As I interact with this painting, I begin to notice that the negative space is as important as the positive space.

*Metaphorical meaning:* This scale consisted of two sub-scales: (1) As I interact with this painting, I can grasp a metaphorical meaning. The painting conveys tension and opposition. (2) As I interact with this painting, I can grasp a metaphorical meaning. The painting conveys balance and equilibrium.

*Communication:* As I interact with this painting, I feel that it is communicating with me.

*Inspiration:* As I interact with this painting, I feel inspired and elevated.

The rating scale appeared below each painting. Participants were not allowed to proceed to the next painting before seven seconds had elapsed. The catch question used in Studies 1 and 2 was included at the end, and all participants responded correctly to this question.

After rating the final image, participants indicated their familiarity with abstract expressionism and their level of education. The task took an average of 25 min to complete. Educational attainment ranged as follows: 1: some high school ( $n = 0$ ); 2: high school diploma ( $n = 23$ ); 3: some college ( $n = 46$ ); 4: Associate degree ( $n = 22$ ); 5: Bachelor's degree ( $n = 64$ ); 6: Master's degree ( $n = 13$ ); 7: Ph.D. or equivalent degree ( $n = 5$ ).

### 3.2. Results

We first performed a repeated measures ANOVA with rating scale as the between-subjects factor (intentionality, structure, negative space, metaphorical meaning, communication, inspiration) and producer (artist, child/animal) as the within-subjects factor. There was a main effect of rating scale,  $F(5, 167) = 16.557$ ,  $p < .001$ ,  $\eta_p^2 = 0.331$ , and a main effect of producer,  $F(1, 167) = 52.299$ ,  $p < .001$ ,  $\eta_p^2 = 0.238$ . Scale interacted with producer,  $F(5, 167) = 8.379$ ,  $p < .001$ ,  $\eta_p^2 = 0.238$ . Therefore separate paired-sample  $t$ -tests were conducted to compare the mean scores for artist and child/animal paintings on each rating scale. Because a total of 8 paired sample  $t$ -tests were conducted (6 when the sample was all participants, and 2 just for those unfamiliar with abstract expressionism, as explained below), a Bonferroni-adjusted significance level of .006 was used.

*Intentionality:* Ratings of intentionality were significantly higher for works by artists ( $M = 4.25$ ,  $SD = 1.14$ ) than for works by children and animals ( $M = 3.73$ ,  $SD = 1.19$ ),  $t(28) = 5.152$ ,  $p < 0.001$ ,  $d = 0.957$ .

*Structure:* Ratings of structure were significantly higher for works by artists ( $M = 3.50$ ,  $SD = 0.94$ ) than for works by children and animals ( $M = 2.92$ ,  $SD = 0.96$ ),  $t(29) = 6.92$ ,  $p < 0.001$ ,  $d = 1.263$ .

*Negative space:* After the Bonferroni correction, ratings of importance of negative space were not significantly higher for works by artists ( $M = 4.53$ ,  $SD = 0.72$ ) than for works by children and animals ( $M = 4.32$ ,  $SD = 0.71$ ),  $t(26) = 2.318$ ,  $p = 0.029$ ,  $d = 0.446$ .

*Metaphorical meaning:* The metaphorical meaning scale consisted of two sub-scales: tension/opposition and balance/equilibrium. The focus of this study was not to differentiate works that reveal tension from those that reveal balance, but rather to differentiate works by artists vs. children or animals in terms of whether were seen to convey either of these two broad kinds of expressed meaning. Therefore, for each participant, the higher score given to either of the two sub-scales was used. Ratings of

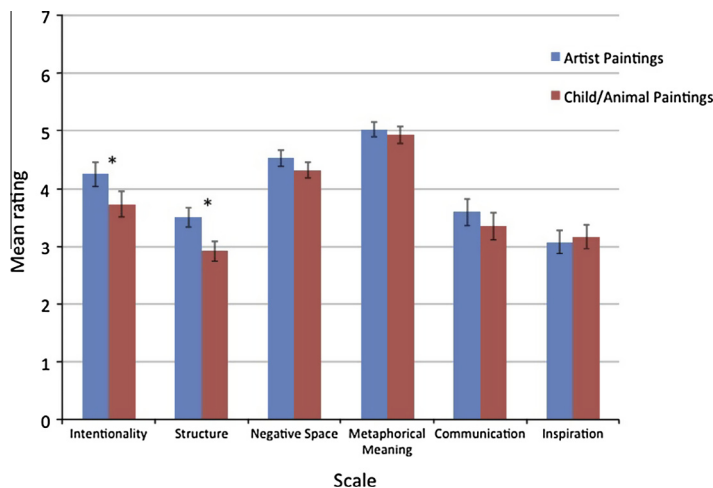
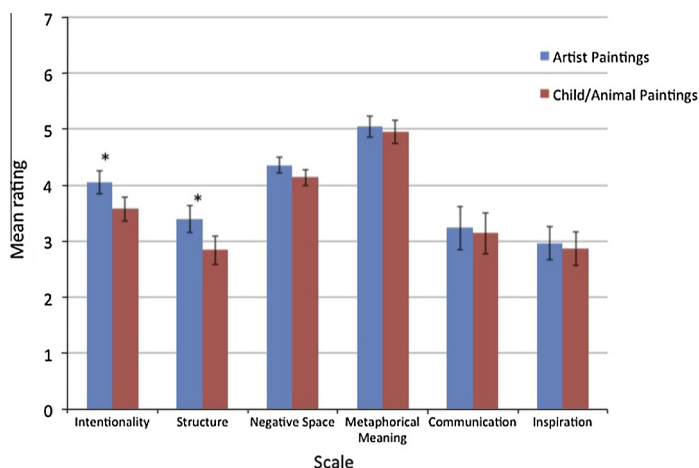


Fig. 3. Mean ratings given to artist and child/animal paintings on six 7-point rating scales. Asterisks indicate  $p < 0.006$ .



**Fig. 4.** Mean ratings given by participants unfamiliar with abstract expressionism to artist and child/animal paintings on six 7-point scales. Asterisks indicate  $p < 0.006$ .

metaphorical meaning were not significantly higher for works by artists ( $M = 5.03$ ,  $SD = 0.73$ ) than for works by children and animals ( $M = 4.93$ ,  $SD = 0.81$ ),  $t(29) = 1.844$ ,  $p = 0.075$ ,  $d = 0.479$ .

**Communication:** After the Bonferroni correction, ratings of communication were not significantly higher for works by artists ( $M = 3.59$ ,  $SD = 1.22$ ) than for works by children and animals ( $M = 3.35$ ,  $SD = 1.22$ ),  $t(27) = 2.207$ ,  $p = 0.036$ ,  $d = 0.417$ .

**Inspiration:** There was no difference in ratings of inspiration for artist paintings ( $M = 3.08$ ,  $SD = 1.11$ ) and works by children and animals ( $M = 3.16$ ,  $SD = 1.12$ ),  $t(28) = -1.047$ ,  $p = 0.304$ ,  $d = 0.195$ .

Thus, participants gave significantly higher scores to the artist paintings on two out of the six rating scales: intentionality and structure (see Fig. 3).

We next examined intentionality and structure ratings using only the 96 participants who reported no familiarity with abstract expressionism. A repeated measures ANOVA with scale (intentionality, structure) as a between-subjects factor and producer (artist, child/animal) as a within-subjects factor revealed a significant effect of scale,  $F(5, 90) = 12.014$ ,  $p < .001$ ,  $\eta_p^2 = 0.400$ , (intentionality ratings were higher than structure ratings) and a main effect of producer,  $F(1, 90) = 32.672$ ,  $p < .001$ ,  $\eta_p^2 = 0.266$  (artist ratings were higher than child/animal ratings). Scale did not interact with producer. Two scales differentiated artist from child/animal works: intentionality,  $t(21) = 5.628$ ,  $p < .001$ ,  $d = 1.2$  and structure,  $t(16) = 5.263$ ,  $p < .001$ ,  $d = 1.277$ , as shown in Fig. 4. Means for intentionality were 4.05 (.981) and 3.57 (.989); means for structure were 3.40 (.992) and 2.84 (.106).

**Table 1**

Number of paintings classified as easy vs. hard to identify by producer in Study 2.

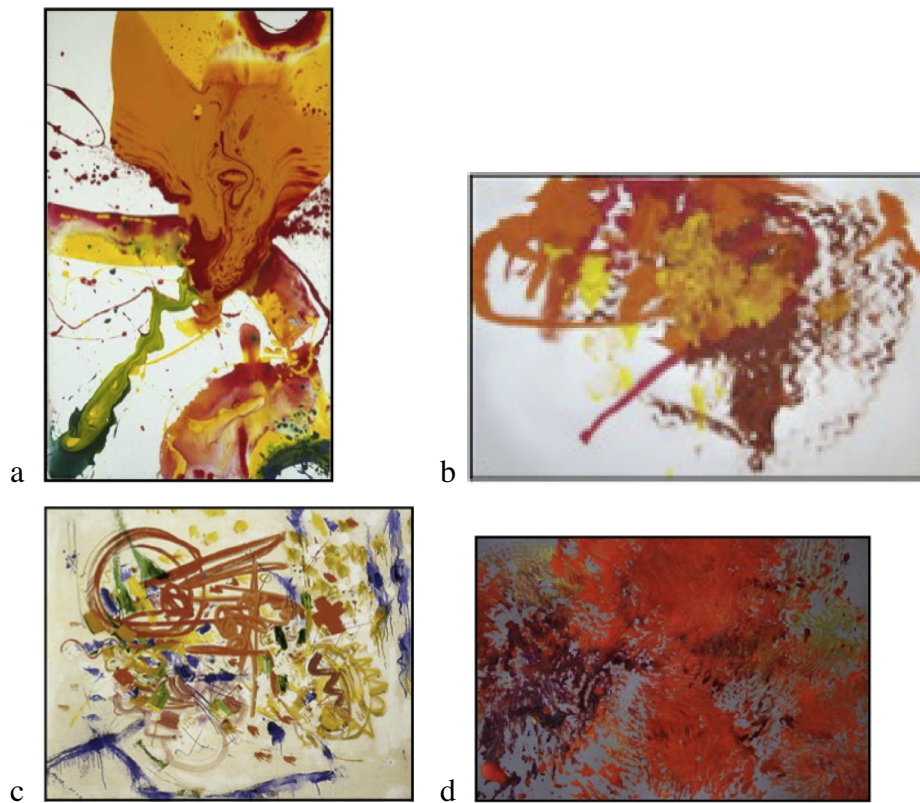
	Artist	Child/animal
Easy (>61.18% correct in Study 2)	18	12
Hard ( $\leq 50\%$ correct in Study 2)	7	13

We next compared ratings on each scale for paintings by artists that in Study 2 were easy vs. hard to identify correctly, and for paintings by children and animals that in Study 2 were easy vs. hard to identify correctly. This analysis served as a partial replication of the findings just reported. Thus, if perceived intentionality and structure ratings are higher in artist than child/animal works, they should also be higher in artist works that are easy to distinguish from child/animal works than in those hard to distinguish from child/animal works. Similarly, intentionality and structure ratings should be higher in child/animal works that are hard to distinguish from artist works than in those easy to distinguish.

Paintings (whether by artist or child/animal) correctly identified in Study 2 at the above chance rate of over 61.18% (the overall mean of correctly attributed paintings in Study 2) were classified as easy to identify; those discriminated at the rate of 50% or below were classified as hard to identify. Ten paintings that received scores in Study 2 in between 61.18% and 50% were excluded (five by artists, five by children or animals), as shown in Appendix A. This yielded four categories of works as shown in Table 1 and in Fig. 5.

The following hypotheses were tested: (1) Easy artist paintings should receive higher ratings than hard artist paintings on intentionality and structure. (2) Hard child/animal paintings should receive higher ratings than easy child/animal paintings on intentionality and structure. We tested these hypotheses on the entire sample of participants and then just on those who reported no familiarity with abstract expressionism.

A repeated measures ANOVA was performed for each scale separately, with image category as a within-subjects factor (easy artist, hard artist, easy child/animal, hard child/animal). Post-hoc paired  $t$ -tests were then performed to compare easy vs. hard artist images and easy vs. hard child/animal images. Because 12 ANOVAs were performed, a Bonferroni-adjusted significance level of 0.004 was set for the main effects. And because 10 post hoc paired  $t$ -tests were run, a Bonferroni-adjusted



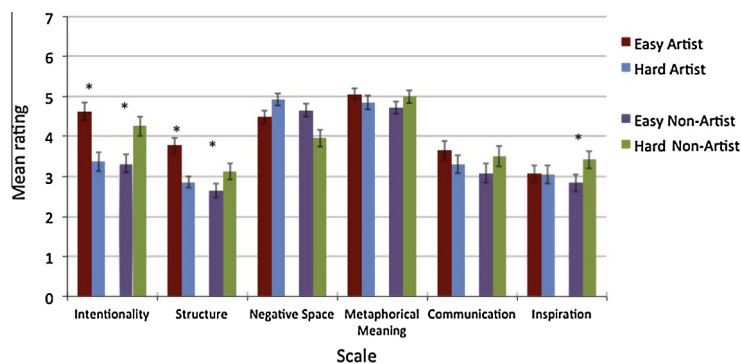
**Fig. 5.** Sample image in each of four categories: (a) Easy Artist: Sam Francis, *Untitled*, 1989, © 2015 Sam Francis Foundation, California Artists Rights Society (ARS), NY. (b) Easy Child: Brice Haedge, Pre-K student, reprinted with permission of the parents of Brice Haedge. (c) Hard Artist: Hans Hofmann, *Laburnum*, 1954, © 2015 The Renate, Hans & Maria Hofmann Trust/Artists Rights Society (ARS), New York. (d) Hard Child: Ronan Scott, Preschool student, reprinted with permission of the parents of Ronan Scott.

significance level of .005 was set for each *t*-test. Results are shown in Fig. 6 (all participants) and Fig. 7 (participants unfamiliar with abstract expressionism).

Two rating scales confirmed the predicted pattern for both artist and child/animal images: intentionality, and visual structure.

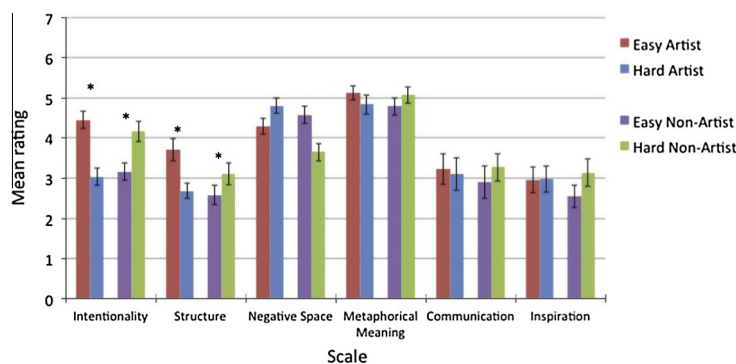
**Intentionality:** There was a main effect of image category on intentionality ratings,  $F(3, 26) = 29.304$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.772$ . Intentionality ratings were higher for easy

( $M = 4.62$ ,  $SD = 1.17$ ) than hard artist paintings ( $M = 3.37$ ,  $SD = 1.31$ ),  $t(28) = 9.231$ ,  $p < 0.001$ ,  $d = 3.698$ , and for hard ( $M = 4.25$ ,  $SD = 1.28$ ) than easy child/animal paintings ( $M = 3.32$ ,  $SD = 1.25$ ),  $t(28) = -6.562$ ,  $p < 0.001$ ,  $d = 2.701$ . When only those unfamiliar with abstract expressionism were included, there was again a main effect of image category,  $F(3, 19) = 30.879$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.83$ . Ratings were higher for easy ( $M = 4.45$ ,  $SD = 1.02$ ) than hard artist paintings ( $M = 3.03$ ,  $SD = 1.04$ ),  $t(21) = 9.883$ ,  $p < 0.001$ ,



**Fig. 6.** Mean ratings from all participants given to four categories of artist and child/animal paintings on six 7-point scales. Asterisks indicate  $p < 0.005$ .





**Fig. 7.** Mean ratings from participants unfamiliar with abstract expressionism given to four categories of artist and child/animal paintings on six 7-point scales. Asterisks indicate  $p < 0.005$ .

$d = 4.359$ , and for hard ( $M = 4.16$ ,  $SD = 1.19$ ) than easy child/animal paintings ( $M = 3.16$ ,  $SD = 1.01$ ),  $t(21) = -5.582$ ,  $p < 0.001$ ,  $d = 2.865$ .

**Structure:** There was a main effect of image category on structure ratings,  $F(3, 27) = 27.63$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.754$ . Structure ratings were higher for easy ( $M = 3.77$ ,  $SD = 1.05$ ) than hard artist paintings ( $M = 2.86$ ,  $SD = 0.81$ ),  $t(29) = 6.921$ ,  $p < 0.001$ ,  $d = 3.631$ , and for hard ( $M = 3.12$ ,  $SD = 1.1$ ) than easy child/animal paintings ( $M = 2.64$ ,  $SD = 0.93$ ),  $t(29) = -3.912$ ,  $p = 0.001$ ,  $d = 1.763$ . When only those unfamiliar with abstract expressionism were included, there was again a main effect of image category on structure ratings,  $F(3, 14) = 18.238$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.796$ . Structure ratings were higher for easy ( $M = 3.71$ ,  $SD = 1.17$ ) than hard artist paintings ( $M = 2.68$ ,  $SD = 0.77$ ),  $t(16) = 5.841$ ,  $p < 0.001$ ,  $d = 2.848$ , and higher for hard ( $M = 3.11$ ,  $SD = 1.16$ ) than easy child/animal paintings ( $M = 2.57$ ,  $SD = 1.0$ ),  $t(16) = -4.431$ ,  $p < 0.001$ ,  $d = 1.366$ .

The remaining four rating scales failed to confirm the full pattern of results predicted.

**Communication:** There was a main effect of image category on communication ratings,  $F(3, 25) = 6.846$ ,  $p = 0.002$ ,  $\eta_p^2 = 0.451$ . However, none of the post hoc  $t$ -tests met the Bonferroni adjusted level of significance.

**Metaphorical meaning:** There was a main effect of image category on conflict/harmony ratings,  $F(3, 27) = 6.861$ ,  $p = 0.001$ ,  $\eta_p^2 = 0.433$ . However, none of the post hoc  $t$ -tests met the Bonferroni adjusted level of significance.

**Inspiration:** There was a main effect of image category on inspiration ratings,  $F(3, 26) = 11.175$ ,  $p < .001$ ,  $\eta_p^2 = .563$ . Contrary to prediction, inspiration ratings were no higher for easy ( $M = 3.07$ ,  $SD = 1.14$ ) than hard artist paintings ( $M = 3.05$ ,  $SD = 1.26$ ),  $t(28) = .166$ ,  $p = .869$ ,  $d = 0.061$ . However, as predicted, ratings were higher for hard ( $M = 3.42$ ,  $SD = 1.18$ ) than easy child/animal paintings ( $M = 2.84$ ,  $SD = 1.16$ ),  $t(28) = -5.993$ ,  $p < 0.001$ ,  $d = 1.821$ . When only unfamiliar participants were included, the main effect of image category was not below the alpha set at .004:  $F(3, 11) = 7.845$ ,  $p = .004$ ,  $\eta_p^2 = .681$ . Thus no further analyses were performed.

**Negative space:** The main effect of image category on negative space was not below the alpha level set at .004:  $F(3, 24) = 5.283$ ,  $p = 0.006$ ,  $\eta_p^2 = 0.398$  and no further analyses were performed.

The above analyses dichotomized the images into easy vs. hard to identify, and required omitting 10 of the 30 images because they did not reach our criterion for easy or hard. In our final analysis, therefore, we included all of the images and disregarded whether the images were correctly or incorrectly identified. Instead, using multiple regression, we asked which of the rating scales predicted classifying an image as by an artist, whether or not that classification was correct. With all participants included, only one rating, intentionality, predicted classification of the work as by an artist,  $Beta = .627$ ,  $t = 4.836$ ,  $p = .00001$ . With only those unfamiliar with abstract expressionism included, results remained the same: the one rating that predicted classification of the work as by an artist was intentionality,  $Beta = .436$ ,  $t = 2.879$ ,  $p = .006$ . Clearly, then, perceived intentionality is key.

### 3.3. Discussion

Comparison of the six kinds of ratings for artist vs. child/animal works provided a test of the bases on which works by abstract expressionists can be distinguished from works by children and animals. Comparison of easy vs. hard to classify paintings on these ratings provided a second test. The strongest findings that emerged were for intentionality and visual structure. Paintings by artists that were clearly recognizable as by artists were seen as more intentional and more structured than those easily mistaken for works by children and animals. Similarly, child/animal works that were clearly recognizable as by children or animals were seen as less intentional and less structured than those easily mistaken for works by artists. These findings held not only for the entire participant sample but also for those who declared themselves to have no familiarity with abstract expressionism.

Perhaps most importantly, the key role of perceived intentionality was demonstrated in our final analysis,

regressing ratings from each scale onto classification of a painting as by an artist (whether or not the painting was actually by an artist). Perceived intentionality was the one criterion that guided this classification. This finding lends support to the view that intentionality guides our classification of artifacts, whether aesthetic or non-aesthetic (Bloom, 1996, 1998). Intentionality is the feature that guides our classification of an abstract expressionist painting as a work by an artist rather than by a child or animal, and it does so even for individuals who claim to know nothing about abstract expressionism and who may claim that “my kid could have done that.”

### 3.4. General discussion

We may prize works by children and animals as fresh, spontaneous, and delightful. Artists may even be inspired at times by the markings of children (Fineberg, 1997; Gardner, 1980; Winner, 1982). But even the uninitiated can often distinguish such works from superficially similar works by artists. Three main conclusions can be drawn from the studies reported here. First, in Study 1 we replicated Hawley-Dolan & Winner, 2011's finding that observers can tell the difference between abstract expressionist paintings and superficially similar ones by children and animals. While Hawley-Dolan and Winner demonstrated this phenomenon by showing higher ratings of preference and aesthetic quality for the artists' works, we demonstrated this effect more directly by asking people to decide which painting was by the artist rather than by the child or animal. Participants succeeded on this task at a rate significantly above chance: performance proved unrelated both to education and familiarity with abstract expressionism.

Second, using a signal detection analysis, we showed in Study 2 that even when paintings are presented singly rather than in matched pairs (artist vs. animal/child), people succeed at an above chance rate in classifying the artists' works as by artists rather than by children or animals. Performance was unrelated to education but was related to familiarity with abstract expressionism. Yet even when responses from those unfamiliar with abstract expressionism were analyzed separately, performance remained above chance. Of course, not all abstract expressionist works are equally distinguishable from works by children and animals, and in the next study we exploited this variability to test a set of hypotheses about the bases on which this discrimination is made.

In Study 3, we investigated several bases on which artists' works are discriminated from those by animals and children: perceived intentionality, degree of structure, relative importance of negative space, metaphorically conveyed meaning of either conflict or harmony, the feeling that the work is communicating with the observer, and the feeling of being inspired by the work. Only two of these bases emerged as playing a role: intentionality and structure. Thus, we can reasonably conclude that intentionality and structure are readily perceived in abstract expressionist paintings even by people with no familiarity with such art. It is apparently difficult to avoid discerning the hand of the master.

Further analyses underscored the importance of both perceived intentionality and perceived structure. While many works by artists are not confused with works by children and animals, some are. Study 3 showed that “easy” artist paintings (those easy to distinguish from child/animal works) and “hard” child/animal works (those hard to distinguish from works by artists) were rated higher in both intentionality and structure than their contrasting counterparts, and this finding held both for the entire sample of participants as well as just for those unfamiliar with abstract expressionism. Finally, if we ignore correctness of the classification, we find that only one feature guides classification of a work as by an artist rather than by a child or animal – the degree of intentionality perceived in the work's creation. This finding is consistent with the body of literature showing the critical role of intentionality in classifying artifacts (Bloom, 1996).

It will not surprise art experts to hear that works by great abstract expressionists are not random markings and that they have structure. These two characteristics are undoubtedly related: these works have structure because they are created with planning and forethought and are a result of a series of deliberate choices. However, what is surprising is that people who know nothing about abstract expressionism – and thus may be among those puzzling over whether abstract expressionism is a hoax – can, if asked, discern these two characteristics. People see more than they think they see when looking at non-representational art. Perhaps in the future computer scientists will be able to quantify these two characteristics – intentionality and structure – in an objective manner.

These findings show that abstract expressionist art reveals skill even to the untrained eye. Our findings support Varnedoe's (2006) claim that these “mind-boggling” works are “vessels of human intention.” Contrary to what he might have anticipated, one need not be aware of the philosophies of the abstract art community to perceive how – at least in terms of intentionality and structure – these works stand apart from works by children and animals.

This set of studies shows that people staring, perhaps for the first time, at apparently random blobs and drips can see human intentionality shaping these markings, and can perceive a structure in the whole image. We do not always perceive intentionality and structure in these images. But when we do, we sense at some level that we are in the presence of an artist who has pondered what he or she is trying to achieve, rather than in the presence of a four-year-old or a chimp delighting in making marks without much thought. These findings tell us something about the nature of non-figurative art. They also tell us something about the human tendency to ferret out intentionality.

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**Appendix A. Paintings used, with correctness scores**

Category	Correctness (%)	Painter	Title
<i>Artists</i>			
Easy artist	62	Franz Kline	Untitled, 1958
Easy artist	63	Karel Appel	Untitled, 1960
Easy artist	63	Sam Francis	Tokyo Blue, 1961
Easy artist	65	Elaine de Kooning	On the Way to San Remo, 1967
Easy artist	71	Ralph Rosenborg	Autumn Landscape, 1974
Easy artist	72	Morris Louis	Addition V, 1959
Easy artist	73	James Brooks	Boon, 1957
Easy artist	73	Mark Rothko	Untitled, 1948
Easy artist	75	Mark Rothko	Number 18, 1948
Easy artist	75	Hans Hofmann	The Climb, 1960
Easy artist	76	Kenzo Okada	Points No.19, 1954
Easy artist	80	Sam Francis	Untitled, 1989
Easy artist	81	Ralph Rosenborg	Untitled (Floral Study), 1976
Easy artist	83	Mark Tobey	New World Stage, circa. 1960
Easy artist	87	Joan Mitchell	Hemlock, 1956
Easy artist	87	Clyfford Still	1945-R, 1945
Easy artist	87	Theodoros Stamos	Documenta II, 1959
Easy artist	94	Charles Seliger	Forest Echoes, 1961
Hard artist	12	Joan Mitchell	Pastel, 1990
Hard artist	36	Joan Mitchell	Untitled, 1967
Hard artist	36	Hélène Hurot	D'après Sam Francis, 2007
Hard artist	42	Cy Twombly	Nine Discourses on Commodus Part V, 1963
Hard artist	44	Hans Hofmann	Laburnum, 1954
Hard artist	50	Philip Guston	For M, 1955
Hard artist	50	Hans Hofmann	Astral Nebula, 1961
<i>Non-Artists</i>			
Easy non-artist	64	Child, Pre-K	
Easy non-artist	69	Animal, Monkey	
Easy non-artist	69	Child, Age 2	
Easy non-artist	69	Animal, Elephant	
Easy non-artist	75	Animal, Elephant	
Easy non-artist	79	Animal, Monkey	
Easy non-artist	83	Animal, Elephant	
Easy non-artist	84	Animal, Elephant	
Easy non-artist	85	Animal, Elephant	
Easy non-artist	87	Child, Kindergarten	
Easy non-artist	88	Animal, Elephant	
Easy non-artist	91	Animal	
Hard non-artist	29	Animal	
Hard non-artist	30	Child, Preschool	
Hard non-artist	31	Animal, Elephant	
Hard non-artist	35	Animal, Gorilla	
Hard non-artist	35	Child	
Hard non-artist	41	Animal, Elephant	
Hard non-artist	41	Animal, Gorilla	
Hard non-artist	42	Animal, Elephant	
Hard non-artist	43	Animal, Chimpanzee	
Hard non-artist	46	Child, Age 4	
Hard non-artist	48	Animal, Chimpanzee	
Hard non-artist	49	Animal, Monkey	
Hard non-artist	49	Animal, Elephant	

**Appendix A** (continued)

Category	Correctness (%)	Painter	Title
<i>Excluded in Study 3 Analyses</i>			
Excluded	51	Animal, Elephant	
Excluded	51	Animal, Orangutan	
Excluded	55	Helen Frankenthaler	Before the Caves, 1958
Excluded	57	Sam Francis	Untitled
Excluded	57	Sam Feinstein	Untitled
Excluded	59	Gillian Ayres	Distillation, 1957
Excluded	60	Child, Kindergarten	
Excluded	60	Child, Age 4	
Excluded	61	Animal, Chimpanzee	
Excluded	61	Hans Hofmann	Fiat Lux, 1963

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