Exploring the Effect of Copying Incomprehensible Exemplars on Creative Drawings

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Abstract
Although cognitive studies have reported that exemplars negatively influence people’s creativity, they have not focused on the effect of varying the type of exemplar. In this study, we examined how copying incomprehensible exemplars affects students’ creative drawing ability. Participants who had copied these types of picture produced more creative drawings than those who had not copied them. Participants’ cognitive processes were investigated in detail, based on interviews and online protocol data. Copying incomprehensible exemplars seemed to help them to consciously construct a new representation for understanding the exemplars. Our data also indicated that participants who had copied exemplars produced creative drawings by applying their new representations. These findings suggest that exemplars have the potential to facilitate artistic creativity.

Keywords: copying; exemplar; artistic creativity; representational change

Introduction
Copying is one of the most popular activities in art. Since olden times, copying has been considered as an effective learning method to acquire others’ skills. For example, in order to be admitted to the Académie de France, French artists in the nineteenth century acquired techniques of painting and sculpture through copying Italian masterpieces (Duro, 2000). In Japan, art students of the Kano school (the mainstream of Japanese painting in the seventeenth and eighteenth centuries) spent much time copying their master’s exemplars and learning his drawing style (Jordan, 2003).

However, in the long history of art, we can also find cases in which copying led artists to create their own artistic styles. It is well known that Picasso created his own style of drawing thorough copying others’ artworks (Galassi, 1996). This example suggests that copying has the potential to facilitate people’s creativity. If so, it is meaningful to examine the process of how copying makes creation possible. The main goal of this study is to investigate the cognitive process underlying creation through copying.

Constraining Effect of Exemplars on Creation
Although there are few cognitive studies focusing directly on the relation between copying and creation, some researchers have investigated related issues. Smith and his colleagues examined the effect of exemplars on creative cognitive activities such as design and idea generation, and found that people in making their own creations tended to conform to some attributes of the previously presented exemplar (Jansson & Smith, 1991; Smith, Ward, & Schumacher, 1993). Since the participants of their studies used many popular attributes of exemplars when creating new ideas, they concluded that presenting exemplars inhibited people’s creative generation. Marsh and his colleagues explained the mechanism of conformity as follows: When people saw the given exemplars, the common attributes across the exemplars activated their existing conceptual representations. Such activation constrained their search or ability to generate novel attributes (Marsh, Bink, & Hicks, 1999; Marsh, Landau, & Hicks, 1996). Exemplars may thus activate existing knowledge related to them and become a factor to inhibit people’s creativity.

The findings of these previous studies are very useful for understanding the general cognitive characteristics of human beings. However, these studies did not ask the following questions: (1) What sorts of cognitive processes are involved in creativity? And (2) what should people do to produce creative works? In the next two sections, we point out two problems with the previous studies. Then, we try to reveal another type of effect that exemplars have on students’ creative drawing.

Exemplar Comprehensibility
The first point concerns the type of exemplar. The studies that demonstrated the inhibitory effect on creativity regarded exemplars as things that tended to activate people’s existing structured knowledge. When people have a problem to be solved, exemplars usually help them to form a task representation. In other words, exemplars somewhat constrain the problem space search. For example, it is well known that students who received exemplars generally perform better in their academic skills than those who were presented no exemplar (e.g., Sweller & Cooper, 1985). Moreover, the task structure of a creative problem solving is usually ill-defined (Simon, 1973) and people are often required to think divergently to solve problems. When people are given exemplars that they can easily understand, they usually tend to use the information embodied in the exemplars to direct their space search. Therefore, it seems to be natural that such exemplars help people to construct representations that conform to some of their attributes.

However, it is not necessarily the case that an exemplar always successfully elicits an existing knowledge structure (e.g., imagine a situation in which someone can not understand why an exemplar was presented). It is possible to assume that different types of exemplar work differently. As the previous studies did not consider the type of exemplar presented to the participants, the effect of the exemplar type should also be examined. In this study, we choose incom-
prehensible exemplars as another type. Since such exemplars do not fit in with a person’s existing knowledge, that person ought to spend much effort in trying to understand them. We call the exemplars presented in the previous research comprehensible because they are supposed to fit in with a person’s existing knowledge and to facilitate their problem solving ability. Generally, the former type of exemplar may be inadequate in the context of learning because they do not seem to help learners. However, in the context of creativity, we might expect them to work differently, in particular, to facilitate creativity. In this study, we examine whether incomprehensible exemplars affect artistic creativity when novice undergraduates copy them.

Ways of Judging Creativity

The second problem with the previous studies is related to how creativity is defined. It was thought that conforming to the attributes of the exemplars decreases the overall creativity of the final product. However, even if the product shares certain attributes with the exemplars, it should not necessarily be regarded as a boring one. For example, French artists such as Claude Monet conformed to elements of Japanese prints in the trend of Japonism in the nineteenth century. Consequently, they created a new style of painting that was different from either the original Japanese style or the French Academic style at that time. This creation was one of the key factors in the advent of modern art in Europe. Thus, conformity has played an important role in art history.

As the above example suggests, the product may be a creative one even if it contained certain elements conforming to exemplars. Therefore, we should remember that conformity does not always inhibit creativity. To examine the effect of exemplars in relation to creativity, we employed a criterion of judging whether or not actually creative products emerge.

In addition, although generative cognitive tasks, which mainly ask people to devise novel creatures, seem to be suitable in such experimental settings they seem rather distant from the activities in actual creative settings. For this study, we chose creative drawing in order to focus on artistic creativity, one of the most important forms of creativity, and sought to reveal realistic features of creativity.

Overview of Current Study

In this paper, we first try to determine whether or not copying facilitates participants’ creative drawing ability through ratings given by two artists. Then, participants’ interview data and online verbal protocols are analyzed in order to clarify how copying incomprehensible exemplars affects their cognitive process, especially their mental representations to create drawings.

Modern art has many styles that reflect artists’ expressive thoughts. Therefore, when we encounter new artwork, imagining the artist’s thought process and intention must be an important activity in appreciating such work. It is supposed that this effort of imagining something incomprehensible would force people to construct a new representation by which they could interpret the artwork. If so, we also predict that they come to create a new style of drawings by applying the new representation to their own drawing.

What types of drawing are incomprehensible for ordinary people? Some studies on artistic preference or stylistic evaluation suggest that lay people prefer a realistic style to an abstract one (Cupchik & Gebotys, 1988; O’Hare, 1976; Schmidt, McLaughlin, & Leighten, 1989). Therefore, we used abstract paintings as incomprehensible exemplars and asked the participants of the experiments to copy them and thereby interact with the pictures intensively.

The data were obtained from the same participants of the experiment reported in Ishibashi and Okada (2004). While the previous study mainly investigated the constraint relaxation effect of copying, this study focuses on the process of applying new representations constructed by the participants. Furthermore, the previous study mostly focused on the analysis of questionnaire data and free descriptions written by the participants. The current study examines their online protocols and interview data, so the data of this study are different from the previous data.

Method

Participants. Thirty undergraduates participated in this study. They were randomly grouped according to three conditions: experimental condition (EC), control condition (CC), and reproduction condition (RC). Each group consisted of 10 participants. None of them had had special training in drawing since middle school or before.

Experimental Design. One group pretest-posttest design with one control group was conducted. EC and CC participants were required to create an original drawing both in the pre- and post-test. In the treatment session, presentation of an artist’s paintings to participants was controlled: EC participants were asked to copy two pieces of a professional artist, whereas those in CC were not exposed to others’ pictures but asked to continue to create two own original drawings. Using this design, we tried to determine whether copying affected the participants’ drawing creativity in the post-test.

However, even if we were able to find an effect of copying on the post-test drawing, we should still check a major alternative hypothesis before making conclusion. The hypothesis is as follows: EC participants merely adopt the style of the artist’s pictures so that they could produce a more creative one in the post-test. To check this possibility, we added another condition, RC. The tasks of RC were the same as those of EC in the pre-test and treatment, although the task in the post-test was different. That is, RC participants were asked to reproduce the style of the artist using other materials rather than to create their drawings. So, if the post-test drawings of EC were rated more creative than those of RC, we can say that EC participants did not adopt the style of the artist’s drawing but created their own style of drawing.

Materials. Participants were asked to draw pictures using natural materials such as an orange and a seashell as subject matter. The combination patterns of stimuli were counterbalanced between the pre- and post-test sessions. The participants drew on a piece of A4-sized Kent paper and used a black ballpoint pen. The pictures copied by the EC and RC participants were two abstract paintings by a Japanese modern artist.

Procedure. Each participant participated individually in the three-day experiment (one session per day, each lasting...
about 90 minutes). In the pre- and post-test, participants in EC and CC were told, “Draw your own original picture using these materials as subject matter.” In the treatment phase, CC participants were told to perform the same task as in the pre-test, only that they should draw two original pictures. In contrast, EC participants were told in the treatment phase that “An artist drew this picture using this material as subject matter. Please copy the picture onto a blank piece of paper while imagining the artist’s intention.”

The RC participants received the same instruction as those of EC in the pre-test and treatment phases. However, they were told in the post-test phase to “Recall the previous day’s experience of copying an artist’s pictures and then draw a picture with these materials in the artist’s style. How would you represent the subject matter if you were the artist?”

We asked the participants to talk aloud while drawing, and we recorded their verbal protocols and behavior with three videocassette recorders. Except for this procedure, we placed as few restrictions as possible upon the participants’ activities in order to promote maximum spontaneity (e.g., They were not explicitly told that there was a time limit on completing their drawings.).

Just after the post-test drawing, each participant was interviewed about that drawing.

Results

Creativity Judgment

Although it is hard to define what type of artwork is creative, researchers have developed criteria or dimensions involved in the judgment of artistic creativity (e.g., Amabile, 1982; Getzels & Csikszentmihalyi, 1976). According to Amabile (1982), raters can detect creative aspects of artworks by discriminating from their technical goodness. In this study, we constructed new scales to measure these two criteria: Three items for creativity (e.g., “novelty of the theme or concept”) and four items for technical goodness (e.g., “techniques to represent elements overlapped, or to express materials’ volume or mass”). All items were ranged from 1 to 5. Two professional modern artists (they were also faculty members of a fine arts department at a Japanese university) separately rated participants’ pre- and post-test drawings using these items. They were not informed of which drawings belonged to which condition. Then, we calculated the simple sums of the three and four items as the creativity and technical goodness scores for each drawing (Chronbach’s ōs = .86 and .96).

A four-way ANOVA was performed on each score. The experimental conditions (three levels of EC, CC, and RC) and order of counterbalanced stimuli presentation to the participants (two levels) were designed as between subject factors. The rest of the factors, timing (two levels of pre-test and post-test) and rater (two levels), were within subject factors. A significant interaction of timing by condition was found in the creativity score, $F(2, 24) = 3.57, p < .05$. Further analysis revealed that there was no difference among the three conditions’ creativity scores in the pre-test, and that only the score of EC increased in the post-test phase, $F(2, 48) = 1.77, ns; F(1, 24) = 13.49, p < .01$. In the technical goodness score, in contrast, the interaction of timing by condition didn’t reach a significant level, $F(2, 24) = 1.96, ns$. These results support our hypothesis that copying other’s incomprehensible exemplars facilitated the students’ artistic creativity.

Changes in the Participants’ Representations

Since the results of creativity judgment indicated that EC participants did not merely adopt the style of the picture that they copied, we were able to discard the alternative hypothesis described above. In the rest of this paper, we analyzed the participants’ drawing process in detail by comparing only the EC and CC conditions.

We first examined the types of drawing that the participants in each group tried to produce in their post-test session. To do so, we used the following procedure. Just after her/his post-test drawing, each participant was shown videotape of her/his post-test drawing process. As s/he watched the video, s/he was asked to report what s/he was thinking as s/he drew each part (e.g., Suwa & Tversky, 1997). Each participant’s interview was transcribed after the experiment. We then analyzed the contents of protocols to generate categories.

The number of EC participants who articulated the contents in each category was compared with the number of CC participants who did the same. Table 1 lists the categories, their definitions, and examples. The percentage of participants for each condition who referred to the content as well as the results of Fisher’s exact test comparing EC and CC is also listed. Most of the EC participants referred to “subjective impressions and comments on the materials” and half of them were interested in the “forms of the materials.” In contrast, the CC participants tended to “draw understandable pictures” and failed to refer to “what they thought during the post-test session.” These results suggest that the CC participants had representations by which they would produce pictures whose content could be easily understood by anyone. This finding is consistent with previous studies that indicate artistically lay people tend to prefer realistic styles of drawing. Students seemed to appreciate and produce pictures using the same representation, i.e., “what was drawn in them.” This representation seems to be so natural to lay people that they would not be aware of it. Thus, the CC participants were likely to report nothing about their thought process, whereas EC participants had different representations of “focusing on features of the materials and drawing pictures based on their subjective interpretation.” To embody this representation in their drawings, they seem to have paid special attention to “fascinating forms within the materials.” Because the pictures they copied were in the abstract style, the EC participants had to think about the artist’s focus on the form of the materials. Therefore, this result suggests that half of the EC participants used a similar perspective to the one of the artist when they made their own creations.

In summary, copying incomprehensible pictures seemed to change the EC participants’ representation of their drawings. However, their post-test drawings were rated more creative than those of the RC participants (who were asked to reproduce the artist’s style of painting), as described earlier. Considering this fact, the EC participants not only conformed to the concrete rules to draw each element in the artist’s style but also constructed a representation to understand his pictures and used it in their post-test drawings.

While these results are based on the retrospective interview
data, the subsequent sections use online protocol data and examine the question of whether or not the copying during the treatment phase changed the participants’ representations.

**Construction of a New Representation**

To reveal what the EC participants thought about while they were copying the artist’s pictures, we examined the contents of their online verbal protocols in the treatment session. We first segmented the protocols based on the intervals between utterances in the video (i.e., if the participant did not talk for more than three seconds, the next protocol after the interval was coded as another segment). However, when several segments shared the same meaning or topic, they were combined into one segment despite that the interval might be more than three seconds. These segments were divided into four categories: (1) referring to features in the artist’s picture, (2) interpreting the meaning of features or relating the features of the material with the elements in the artist’s drawing, (3) imagining the artist’s thoughts and intention, and (4) other.

The analysis of the third category is very important, because our concern is whether or not an abstract representation was constructed. Nine EC participants (90%) produced protocols that fell into this category (i.e., (3) imagining the artist’s thoughts and intention). These protocols contained various imagining activities about the aspects of the material the artist focused on, about the message he wanted to express through the picture, about the process and the procedure in which he drew the picture, and so forth. In particular, eight of the EC participants (80%) said that the artist focused on certain aspects of the materials and tried to emphasize such features in his picture. Thus, this result suggests that most of the EC participants constructed a new representation for understanding the artist’s pictures while they were copying them.

Did this new representation affect their post-test drawing? If so, how? The findings described above suggest that the EC participants had different types of representation before and after copying. That is, if we regard the findings from the interview data of the CC participants as a representation constructed by ordinary lay people, the EC participants seem to have this representation before copying. In contrast, after copying, they seem to have changed their representation to a new one in which they focused on certain aspects of the materials and tried to emphasize such features in their pictures. In the next section, we examine this interpretation.

**Applying the New Representation to Creation**

To investigate this representational change using the online protocol data in the pre- and post-test sessions, we prepared three categories: (a) objectively focusing on the concrete features of the materials and drawing a picture using the information, (b) referring to the participants’ subjective impressions and imagery about the materials or other elements to draw, (c) labeling the objects or claiming difficulty in drawing the materials as they saw them. We examined the EC participants’ representational change based on combinations of these three indices.

The participants’ ordinary representations (i.e., before they changed) were supposed to be related to “drawing understandable pictures.” If they had this type of representation, they were expected to produce two styles of drawing, either (1) a realistic one in which people draw elements to imitate nature or (2) a cartoon style in which people draw a series of prototypical objects to convey a certain story. To draw in such styles, they needed to focus on the concrete features of the materials and also needed to search for and list objects to construct their stories. In addition, they would remark on the difficulty to draw the materials when they could not sketch them well. Thus, if the protocols in category (a) and (c) appeared frequently, then the participants would probably have this representation.

In contrast, the EC participants’ representations that changed as a result of copying would become similar to the artist’s representation. The findings regarding the thought process during copying would suggest that the EC participants not only focused on the concrete features of the materials but also tried to imagine new ways of drawing in the post-test. Thus, if the protocols including category (a) and (b) frequently appeared during the post-test, they would seem to have a new representation.

### Table 1: Interview data categories and the percentage of participants who mentioned them

<table>
<thead>
<tr>
<th>Categories</th>
<th>Definition and example of each category</th>
<th>condition</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjective impressions and comments about materials</td>
<td>Protocols indicating the participants’ subjective impressions and feelings about materials. “This [paprica] looks energetic (ID01)”</td>
<td>80%</td>
<td>30%</td>
<td>&lt; .10</td>
</tr>
<tr>
<td>Interest in form of the materials</td>
<td>Mentioning the participant’s own interest in form of the materials. “I like this form of a pinecone and enjoyed looking it around (ID10)”</td>
<td>50%</td>
<td>0%</td>
<td>&lt; .05</td>
</tr>
<tr>
<td>Drawing understandable figures</td>
<td>Referring to participant’s intention to draw the materials as they see it. “I was drawing the materials to look like the real things (ID17)”</td>
<td>10%</td>
<td>50%</td>
<td>= .14</td>
</tr>
<tr>
<td>Thought nothing while drawing</td>
<td>Protocols indicating that a participant thought nothing while her/his drawing. “I thought nothing...I drew the picture as if my hand made it automatically (ID13)”</td>
<td>20%</td>
<td>70%</td>
<td>&lt; .10</td>
</tr>
</tbody>
</table>

Note. Values of p represent results of Fisher’s exact test.
In summary, we propose the following predictions for the analyses of the pre- and post-test protocols: The percentages of “features of materials” would be the same for each condition and time. However, those of “impressions and imagery” would increase in the post-test of the EC group because their representations became similar to the artist’s. At the same time, the percentages for “labeling and difficulty” would decrease in the EC participants’ post-tests because they would not have the previous representation anymore.

We classified the video segments into the four categories described above (including the “others” category). Since the total number of segments for each participant varied, we calculated percentages, dividing the number of segments in a certain category by the participant’s total number of segments. In the following three subsections, we report the results of ANOVAs with the factors of the condition (EC and CC) and timing (pre and post) in each category.

(a) Features of Materials. The segments objectively referring to the features of the materials belonged to this category (e.g., “This part is black.” “There are dots in the surface of the orange”): Figure 1). Though the mean proportions for the EC group were somewhat higher (8.7% and 3.7%, respectively for the pre- and post-test) than those for the CC group (4.3% and 2.0%), the ANOVA found no significant interaction, $F(1,18) < 1$. This result is consistent with our prediction indicating that participants in both groups focused on the features of the materials.

(b) Impressions and Imagery. We put three segment types into this category: (1) Subjective impressions and evaluation of the materials (e.g., “beautiful red color,” “this spiral [part of the seashell] is interesting”), (2) imagery or impressions about the state or movement of something to draw or something drawn (e.g., “[draw a figure] like running from the center,” “[this figure of a paprica] looks solid”), (3) reference to the state of elements or relations among elements (e.g., “I fill the ground with leaves,” “[an orange peel] turning around and around then becoming a shell [a conch]”).

While the mean proportions were the same for the pre- and post-tests of the CC group (4.5% and 6.9%, respectively; Figure 2), those of the post-test of the EC group increased (from 5.8% to 16.7%); this interaction did not reach a statistically significant level, though, $F(1,18) = 2.79, p = .11$.

However, the EC participants produced significantly more segments in this category than those of CC in the post-test, $F(1,36) = 7.44, p < .01$. The main effect of timing was also significant in the EC group, $F(1,18) = 9.27, p < .01$. In total, these results indicated that the EC participants’ representations with which they would consider subjective impressions and imagery changed from the pre-test to the post-test.

(c) Labeling and Difficulty. The “labeling and difficulty” category has four types of segment: (1) Picking names of something to draw or something drawn (e.g., “draw chestnuts,” “here is a window”), (2) judging whether the drawn figures look like something prototypical (e.g., “it doesn’t look like a shell,” “draw it to look like a house”), (3) searching for other objects to draw (e.g., “can I hit upon something else to add,” “speaking of fall, what it brings to mind is...”), and (4) feeling that it is difficult to draw the materials (e.g., “it is difficult to draw a shell,” “I cannot draw a pinecone”).

The mean percentages of the segments in this category did not differ according to group in the pre-test (20.6% and 19.3%, for EC and CC, respectively; Figure 3). In the post-test, the percentage for EC decreased, whereas the percentage for CC increased (13.3% and 27.6%). Statistical analysis failed to show a significant level of interaction, $F(1,18) = 1.98, p = .18$. However, further analyses showed that the difference was marginally significant in the post-test, $F(1,36) = 2.95, p < .10$. This result supports our prediction suggesting that EC participants did not use their old representation in the post-test.

Thus, the results of the analyses of the online protocol data in the pre- and post-test were consistent with our predicted patterns. Although the EC participants had similar representations in the pre-test to those of the CC participants, their representations changed into ones that were similar to the artist’s after copying. Therefore, copying incomprehensible exemplars affected the participants’ representations.

Relationship Between Representations and Creativity Score

Did the change of participants’ representation actually contribute to the creativity of their pictures? To clarify this relationship, we investigated the correlations between the rating score and both proportions of “impressions and imagery” and
“labeling and difficulty.” In the pre-test, the creativity score had no correlation with the score of “labeling and difficulty” ($r = .05, ns$) and weakly correlated with the score of “impressions and imagery” ($r = .26, p = .28$). In contrast, there were substantial relationships between the final product’s creativity and “impressions” and “labeling”, $r = .35, p = .13; r = -.47, p < .05$, respectively. These results indicate that the new representation that the EC participants constructed affected the performance of the post-test drawing.

**Discussion**

This study examined how incomprehensible exemplars affect students’ creative drawing ability. In contrast to the previous cognitive studies that showed negative influence of exemplars, we found that copying incomprehensible exemplars facilitated people’s artistic creativity. As the results of our creativity judgment indicated, participants who copied incomprehensible exemplars did not simply apply the rules acquired from the exemplars (i.e., conformity) to their post-test drawings. Online protocol data and interview data suggested that, by copying such exemplars and trying to understand them, the participants constructed a new representation and produced more creative pictures.

The new representation the participants constructed seems to be important for pictorial creativity because the ability to shape new figures and forms is valued as creativity in the arts. Actually, artistic expression has been described as “the effort that shapes what we have within us, forming it into those likenesses, signs and symbols” (Bell, 1999, p.134). The new representation is along this line since it is that of focusing on features of the materials and drawing pictures based on their subjective interpretation. The participants’ cognitive activity of considering the subjective impressions of the material and the contents to draw could help to generate new symbols and signs. Thus, this percentage correlated with the rating score positively. In contrast, the old representation was that of producing pictures whose content anyone could easily understand. Because labeling activity usually indicates the activity of thinking about what to draw without consciously considering how to draw it, the high percentage of this category correlated with the creativity score negatively. In summary, to make artistic creations, it seems that people should consider not only what to draw, but also how to draw it.

**Acknowledgments**

This study was supported by Grants-in-Aid for Scientific Research #14510135 to the second author and #17007583 to the first author from the Japan Society for the Promotion of Science.

We would indeed like to express our gratitude to all participants for having spent so much time during three-day session of this experiment. We gratefully acknowledge the five artists for their generous support and suggestions in planning this research and for their creativity evaluations of the drawings.

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