

Art expertise: a study of concepts and conceptual spaces

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Abstract

An aesthetic experience is a complex cognitive process, the nature and outcome of which depend upon the perceiver's concepts and expertise (Leder, Belke, Oeberst, & Augustin, 2004). The present study aimed to find out more about the role of expertise in the experience of contemporary art. By combining a natural grouping task and correspondence analysis we compared a group of art experts with a group of non-experts as to the concepts they applied to a set of contemporary artworks and the general dimensions underlying their perception and interpretation of the works. There were marked parallels between both groups, pointing to general characteristics of aesthetic experiences. Still, the results support the hypothesis that experts process artworks more in relation to style, whereas non-experts refer to criteria such as personal feelings.

Key words: art expertise, art perception, conceptual spaces, perceptual spaces, style-related processing

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In daily life people often refer to aesthetic experiences in terms of pleasure or displeasure, of liking or disliking. Questions regarding aesthetics seem to be answered, if, e.g., a painting is found beautiful or a design object is chosen as new furniture for the living room. Yet, from a psychological point of view, an aesthetic judgment or an aesthetic emotion per se is only part of the story: According to the model of aesthetic appreciation and aesthetic judgments by Leder, Belke, Oeberst, and Augustin (2004) an aesthetic experience is a complex cognitive process that leads from mainly bottom-up based perceptual analyses to processing stages that involve higher-level interpretations of the artwork. Thus, the basis of any aesthetic experience lies in perceptual and interpretative processes. The “outcome” of any aesthetic episode in the sense of pleasure, displeasure or any kind of judgment of an artwork cannot be fully understood without knowledge of the stimulus aspects and the cognitive concepts that were relevant during its processing and interpretation (Kreitler & Kreitler, 1972; Leder et al., 2004; Locher, 2003). One of the most important variables involved in this process of aesthetic processing is a viewer’s art-related expertise (Gaver & Mandler, 1987; Leder et al., 2004; Martindale, 1984).

Expertise: definition and general findings

Expertise, i.e. temporally stable outstanding performance in a particular domain (Ericsson & Smith, 1991) has been a field of extensive study in other domains, such as chess (Chase & Simon, 1973; De Groot, 1978), face processing (Schwaninger, Carbon, & Leder, 2003) or medical problem-solving (see, e.g., Custers, Boshuizen & Schmidt, 1999) and is assumed to be based on extensive specialized knowledge (Glaser, 1994). In this respect, experts presumably develop representations that are more abstract than those of non-experts (Glaser, 1994; Honeck, Firment & Case, 1987). This can, e.g., be examined by means of categorization and sorting tasks. For example, Shafto and Coley (2003) compared university students and professional fishermen as to the way in which they sorted pictures of different kinds of marine creatures. Whereas the students mostly grouped according to outward appearance, the fish-experts sorted the creatures on the basis of ecological niche. Thus, their sorting behaviour seemed to reflect their deeper knowledge and understanding of the respective ecological reality. Moreover, experts’ knowledge is not only highly interrelated (Glaser, 1994) but probably also more structured and hierarchical (Honeck et al., 1987). For example, Chatard-Pannetier, Brauer, Chambres, and Niedenthal (2002) report that experts in antique furniture used significantly more levels than a group of librarians to sort pictures of antique furniture.

Expertise and aesthetic processing

Concerning the realm of art a number of differences between art experts and non-experts have been demonstrated with respect to their preference judgments (see, e.g., Hekkert, 1995; Neperud, 1989), but empirical evidence concerning the processes and representations behind is still scarce, even though theories of aesthetics regard knowledge-related processes as a key

to understanding aesthetic experiences (Gaver & Mandler, 1987; Leder et al., 2004; Martindale, 1984). With respect to music, Gaver and Mandler (1987) propose that the nature and intensity of a person's emotional reactions strongly depend upon her "success" in interpretation by means of existing schemata, i.e. knowledge. The model of aesthetic appreciation and aesthetic judgments by Leder et al. (2004), which breaks aesthetic experiences down to different processing stages, claims knowledge and interest to be central variables during relatively late stages of aesthetic processing. Concerning the stage of *explicit classification*, at which viewers are able to name what they see in an artwork, experts are believed to generally classify paintings more with respect to style, whereas non-experts presumably concentrate more on depicted content. Cupchik (1992) offers the explanation that in everyday perception people have to focus on recognizable objects, since this is the most efficient way of orientation. People with little experience in art apply this same kind of processing to artworks, whereas art experts have learned to suppress this "natural" kind of processing in favour of a more style- and aspect-based orientation. A similar tendency is assumed with respect to the subsequent stage in the model by Leder et al. (2004), *cognitive mastering*. It involves higher-order interpretations of the visual input. Experts are assumed to interpret artworks on the basis of art-specific concepts, while non-experts probably draw upon their personal experiences and everyday knowledge. According to Hekkert (1995) experts have developed cognitive models that are art-specific, related to aspects such as style and art-historical significance. These models allow them to interpret artworks according to art-specific criteria. Non-experts, on the other hand, have to draw upon their "everyday repertoire" of concepts, such as personal experiences, feelings and similarity to their personal surroundings. Evidence supporting this assumption was presented by Winston and Cupchik (1992), who compared experts' and non-experts' reactions to high art versus popular art. They found that non-experts often justified preference judgements with reference to personal feelings ("makes me feel happier") whereas experts gave more reasons related to style, such as "more dynamic" (Winston & Cupchik, 1992, p. 1). Moreover, Cupchik and Gebotys (1988) and Nodine, Locher and Krupinski (1993) presented results suggesting that the generation of meaning in artworks seems to be related to degree of realism for non-experts, whereas experts establish a link between meaning and degree of expressiveness or structure and composition.

All in all, these theoretical assumptions and findings are in line with the developmental account of art experience proposed by Parsons (1987), who proposes five developmental stages leading from childhood to an art expert state. While the first two stages involve concentration on personal preference, depicted content and colour, the third stage is characterized by concentration on emotional experiences (see, e.g., the results by Winston & Cupchik, 1992). The fourth and fifth stage require art-specific training and experience (Parsons, 1987) and are characterized by a focus on style and form as well as critical reflection of the art-historical concepts applied.

Expertise and perceptual spaces: empirical studies

There are some studies that deal with the processes behind aesthetic judgments and also involve aspects of expertise (Berlyne & Ogilvie, 1974; Goude, 1972a, 1972b; O'Hare, 1976). A popular method in this respect has been multidimensional scaling (MDS). Berlyne

and Ogilvie argue that MDS may “reveal which attributes govern judgments of similarity”, and “these may be attributes that predominantly govern behavior in general when such objects are encountered” (1974, p. 182).

For example, O’Hare (1976) examined the perception of landscape paintings. Among other aims, he investigated what a person responds to in a work of art, and whether people with different degrees of training in the visual arts attend to different aspects of the same paintings. He did not find differences between persons with high and with little experience in art as to the nature of the dimensions underlying judgments of similarity, but he reported different loads of the dimensions dependent on subgroup: Whereas the non-experts showed higher weights on a dimension characterized by the attributes *representational* versus *abstract*, the art-experienced persons had higher loads on a dimension labelled *clarity–diffusion*. Moreover, their data fit the resulting model less well. Therefore, experience and knowledge in art might also be related to the use of more idiosyncratic criteria.

Berlyne and Ogilvie (1974) examined reactions to a set of artworks ranging from the Renaissance to mid-twentieth century. Concerning expertise, they did not find any significant effects. Rather, an MDS yielded 3 dimensions: one that seemed to be characterized by aspects such as the reproduction of objects or people, complexity and surface quality, a second one with some relation to the artist’s emotions and a third dimension linked to attributes such as *clear–indefinite* or *disorderly–orderly*. In other studies, in which they employed factor analysis (Berlyne, 1975; Berlyne & Ogilvie, 1974), the researchers repeatedly found support for three other factors: *Hedonic tone*, *Arousal* and *Uncertainty*. While *Hedonic Tone* is related to judgments of beauty or comfort, *Arousal* is characterized by aspects such as interestingness, tension or complexity. *Uncertainty* comprises scales such as *disorderly–orderly*, *clear–indefinite* or *unbalanced–balanced*.

As noted above, the studies just referred to employed MDS. Although a highly accomplished method in psychology, MDS has two disadvantages: First of all, participants are mostly required to make similarity ratings between all possible pairs of stimuli, which can be a very exhausting procedure (Snelders & Stokmans, 1994). Second, because the participants usually give similarity ratings only, the interpretation of the evolving dimensions is left to the researcher alone.

Modern and contemporary art: a special case

Another important aspect of the studies just described and of similar examinations is that they mainly focused either on rather “classical” artworks, as in the case of O’Hare (1976) or Goude (1972 a, 1972b), on artworks from different periods, as in the case of Berlyne and Ogilvie (1974), or even on art from different cultural backgrounds (Berlyne, 1975). Thus, what is lacking so far are studies concerning modern and contemporary art. It is reasonable to assume that this kind of art constitutes a special case for psychology, because concepts such as beauty or harmony that were once standards of art and taste have long lost of importance. Rather, today’s art and design world is characterized by highly individualized styles and an ever-faster creation of new styles due to a striving for novelty and innovativeness (Carbon & Leder, 2005; Grasskamp, 1989; Leder, 2002). As a consequence, the viewer’s expertise is probably of ever growing importance, because it is only through knowledge

about stylistic devices and underlying ideas that a viewer can dissolve the ambiguities an artwork poses (Leder et al., 2004).

The present study

The aim of the present study was to compare art experts and non-experts with respect to the concepts they apply to a set of modern and contemporary artworks and as to the dimensions that might underlie their perception and interpretation of the works. Thus, the study aimed to understand underlying representations of art processing. In terms of an interactive model of aesthetic experience (Crozier & Greenhalgh, 1992; Leder et al., 2004) it was concerned with both stimulus aspects and viewers' concepts. Moreover, we focussed on very modern and contemporary art, because we believe it to trigger specific processes (see above).

Given the methodological considerations presented above, we chose an alternative to MDS and adopted a method used by Snelders and Stokmans (1994): a combination of *natural grouping* (Kuylen & Verhallen, 1988) and *correspondence analysis* (for an introduction see Greenacre, 1993). Natural grouping was originally developed in the realm of market and positioning research. A participant is presented with a set of objects and is asked to split these into two groups, according to whatever criterion he deems relevant. Afterwards he is to explain the reasons or the basis of this split. This procedure continues until the person runs out of further classifications. The most obvious advantage of this method – apart from reduced effort for the participant – is the fact that the qualifications used by the participant can be assumed to be meaningful to her or him, because they are the concepts that he comes up with himself (Kuylen & Verhallen, 1988). We employed a natural grouping task for a set of very modern and contemporary paintings in order to assess the concepts that viewers use to interpret the works.

To analyse the data we employed correspondence analysis (CA), which has been recommended as method of analysis for natural grouping data (Kuylen & Verhallen, 1988; Snelders & Stokmans, 1994). CA is a method to represent cross table data, for example objects and attributes, in a common space to reveal underlying dimensions. Thus, it can be used to construct a “perceptual map” (Snelders & Stokmans, 1994, p. 325), for example in the realm of image measurement. CA outputs have been shown to be similar to MDS solutions (Verhoeven, 1991; cited from Snelders & Stokmans, 1994), but unlike MDS or factor analysis CA is adequate for categorical data.

On the basis of the above-discussed theories and data concerning the impact of expertise on the perception and evaluation of paintings, we predicted that experts would form significantly more groups and would use significantly more levels than non-experts to categorize the pictures. With respect to the meaning of the categories employed, we assumed that experts would more often classify according to style, whereas non-experts would choose more categories related to personal feelings (Winston & Cupchik, 1992), colours (Parsons, 1987) or, in the case of representational art, pictorial content (Cupchik & Gebotys, 1988). In analogy to the findings by Shafto and Coley (2003), we furthermore expected the categories chosen by the experts to reflect their art-historical knowledge by going beyond mere surface qualities of the artworks. The underlying dimensions of the perceptual maps derived from the classification data were expected to emphasize these differences. In line with Cupchik's

(1974) assumptions concerning art of the 20th century, we proposed one dimension that opposes abstract to representational artworks.

Method

Participants

Sixty students of the University of Vienna participated, 30 students of art history (12 males, 18 females, mean age 25.1) and 30 psychology students (3 males, 27 females, mean age 22.4). Four of the psychology students reported to have attended courses in art or art history besides regular school education.³ Twenty-one of the students of art history were graduates. They were paid for participation. The psychology students participated for course credit.

Materials

The stimuli consisted of reproductions of ten paintings by modern and contemporary artists, including David Hockney, Jasper Johns, Anselm Kiefer, Martin Kippenberger, Brice Marden, Sigmar Polke, Robert Rauschenberg, Gerhard Richter, Bridget Riley and Emil Schumacher. Four main criteria guided our choice of artworks: As we were particularly interested in the processing of contemporary art, we employed paintings from the past 40 years only. Moreover, we chose works by artists well accomplished in the realm of art, because we wanted personal styles to be detectable. In terms of our research question this would allow experts to employ their knowledge in the full range. Due to the assumed differential importance of the degree of abstraction the set of stimuli included both representational and abstract paintings. Furthermore, the pictures were selected to form a sample of very diverse painting styles. The stimuli were printed out as high-quality colour prints and were laminated. The size of all paintings was approximately 300 cm². A detailed list of stimuli can be found in the Appendix.

Procedure

The study was conducted at the Faculty of Psychology of the University of Vienna. Participants were tested individually. After welcoming, the persons saw the 10 paintings, which were arranged randomly (all in upright position) on a table. They were asked to shortly look at the pictures to get familiarized with them. They were informed that they would later on have the opportunity to deal with the paintings in detail. After this first encounter with the stimuli, the participants read a written instruction which explained exactly how the natural grouping task worked. First they were asked to split the paintings into two groups (of what-

³ The reason why we did not exclude these from the sample is that we were foremost interested in expertise in terms of intensive formal and scientific instruction with respect to styles. To our knowledge the classes the non-experts had attended had focused more on practical painting skills.

ever size) and to label each of the groups with an attribute that they found most adequate. Afterwards, each of the two groups could be split again into two, but every split had to be based on the group structure on the higher level. This procedure continued until the participants considered the task to be completed. The instruction emphasized that there were no right or wrong answers in terms of groupings or labels, but that the best solution would always be the one that made most sense to the persons themselves. Labels were asked for orally. If participants had difficulties in naming the groups, they were not forced but neutrally encouraged to decide upon a personal label. If they named more than one label, they were asked which of the aspects was the most important. The experimenter recorded all categorizations and labels in a form especially designed for this purpose.

At the end the experimenter asked for further explanations of labels that were not entirely clear. Furthermore, the participants were asked whether they had known any of the paintings pre-experimentally and how easy or difficult they found the task. We also interviewed the group of non-experts with respect to their interest in art, the frequency of visits to art museums and to whether they had attended any classes in art or art history. On average the natural grouping procedure took about 15 minutes.

Categorization of the attributes

Four raters, one of whom was the first author, classified the data of both groups in order to create two final systems of categorizations.⁴ Two of the raters (not including the first author) worked together as a team. The raters were asked to aggregate the single labels into categories according to what they found most adequate for the data. They were to treat the data of both groups of participants as independent, which meant that they could be given different or same or similar categories. The most important criterion was to find the most adequate solution for each group.

In order to decide upon final categories for the analyses, we integrated the three resulting systems of categorizations (two independent raters, one team) according to the following criteria: If there was accordance among all four or among three of the judges, we chose the respective solution. In cases where the categorizations by the two independent judges were in accordance but differed from the one suggested by the team, the former solution was chosen, because it was thought not to rely on compromises. In the few cases where all three systems of categorizations differed, we chose either the solution by the team or, in cases of doubt, put labels into the open category, i.e. a category labelled *other*. As a consequence, none of the categories or categorizations used for the analyses relied upon the opinion of one single rater only. As to the data of the experts, some very small categories were taken together to avoid fragmentation of data. Furthermore, we eliminated one small category (3 Items), *stylistic*, because it differed from the other categories in representing a totally different level of abstraction. The labels were subsumed under the *other* category. We chose the

⁴ The reason why the first author participated as a rater was that she had tested many of the participants and was thus familiar with many details of the participants' explanation. Even though all of these details were recorded thoroughly and given to the other raters, the personal interaction with the participants seemed to be an important advantage with respect to the analysis of the exact meanings of labels. All other three raters worked independently of the first author.

procedure outlined above in order to create final systems of categories that were as objective and as adequate as possible without missing much of the data.

Results

Analyses of frequencies

The psychology students formed 202 groups of paintings in sum ($n = 30$, $M = 6.73$, *sum of ranks* = 682), while the students of art history formed 308 ($n = 30$, $M = 10.27$, *sum of ranks* = 1148). A Mann-Whitney U test showed mean ranks to differ significantly between the groups, $U = 217$, $p < .01$. To test our assumption that the experts would show a stronger hierarchy in their classifications we contrasted the number of levels used for the splits. The students of art history broke down their classifications to significantly more levels than the psychology students (*sum of ranks* 1112 and 718 and, respectively), $U = 253$, $p < .01$.

Following the procedure outlined above, the classifications chosen by the raters were integrated to form a final system of categories for each of the two groups. In the case of the psychology students this resulted in 16 categories of labels, in the case of the students of art

Table 1:
Frequencies of paintings falling under attribute categories in the Non-Expert Group.

Attribute Category	Painting										Total
	Hockney	Johns	Kiefer	Kippenberger	Marden	Polke	Rauschenberg	Richter	Riley	Schumacher	
abstract	0	12	4	1	13	7	2	13	11	12	75
representational	19	0	16	17	1	12	18	5	1	3	92
spontaneous/free	0	1	2	2	5	2	0	5	1	4	22
structure/patterns	6	11	2	4	2	0	4	6	11	2	48
unstructured	1	5	1	2	8	0	2	3	1	7	30
lines	0	7	0	0	5	0	0	0	7	2	21
colours/colourful	5	5	1	4	2	3	5	6	5	2	38
dark/dull colours	0	2	8	1	2	6	0	3	2	5	29
positive	8	9	5	6	5	7	6	6	7	8	67
negative	7	4	12	8	8	12	6	9	5	6	77
photo	2	0	0	0	0	0	3	0	0	0	5
modern	3	0	0	3	0	1	4	0	0	0	11
landscape	0	0	4	0	1	2	0	0	0	1	8
daily life	5	0	3	3	0	3	5	2	0	1	22
fantasy	0	2	0	1	2	1	0	2	2	3	13
other	6	5	3	11	6	7	9	6	6	6	65
Total	62	63	61	63	60	63	64	66	59	62	623

history in 26 categories. As a basis for further analysis, for each of the groups we counted the number of times that a picture fell under a certain category. If – which was mostly the case with respect to the labels *abstract* and *representational* – persons further differentiated a certain label on a subsequent split, we proceeded in the following way: For example, if a person used the attribute *abstract* as one of the labels of the first split and then, on the second level, split this group into a *more abstract* and a *less abstract* group, the pictures in the *more abstract* group were all in all counted as falling twice under the category *abstract*, whereas the pictures in the *less abstract* group were counted both as *abstract* and as *representational*. We chose this procedure, because it captured the logic of the data best. Tables 1 and 2 exhibit the attribute categories and the number of times each of the pictures fell under a certain category, for the non-expert and the expert group, respectively.

Table 2:
Frequencies of paintings falling under attribute categories in the Expert Group.

Attribute category	Painting										
	Hockney	Johns	Kiefer	Kippenberger	Marden	Polke	Rauschenberg	Richter	Riley	Schumacher	Total
abstract	0	26	1	1	29	8	2	28	26	24	145
representational	31	0	27	29	1	24	26	1	0	4	143
spontaneous/expressive	0	1	3	1	16	3	3	14	1	19	61
planned/conceptual	0	3	1	1	3	1	2	0	2	1	14
structure/patterns	2	16	3	1	4	0	2	3	17	2	50
unstructured	0	2	1	0	8	2	1	5	1	5	25
lines	1	5	2	0	9	1	0	4	6	6	34
fields	2	1	0	2	1	1	1	4	1	1	14
spatial	0	0	3	0	0	4	0	1	1	1	10
reduced/decorative	4	2	0	2	0	0	2	0	2	0	12
dynamic	0	2	2	1	1	2	0	1	2	2	13
undynamic	2	3	0	1	1	1	2	2	0	0	12
colours	3	2	0	3	1	1	3	2	2	2	19
dark	0	0	3	0	0	2	0	0	0	1	6
painted classically	6	1	7	7	1	0	0	1	0	1	24
other artistic techniques	1	0	0	2	0	7	12	0	1	0	23
positive	2	0	0	0	0	1	1	1	0	1	6
negative	0	1	4	1	1	1	0	0	1	1	10
fine	0	0	0	0	1	0	0	0	1	0	2
thick	0	1	0	0	0	0	1	1	0	2	5
landscape	2	0	10	0	0	7	1	0	0	0	20
daily life	8	0	1	5	0	0	9	0	0	0	23
man	0	0	0	4	0	0	0	0	0	0	4
critical/multilayered	1	0	1	4	0	3	1	0	0	0	10
mood	1	0	1	1	0	1	0	1	0	0	5
other	13	7	6	12	4	8	9	9	4	5	77
Total	79	73	76	78	81	78	78	78	68	78	767

With respect to our hypotheses concerning the nature and frequency of certain attributes in both groups, we first focussed on the categories that seemed to be the same or very similar in both groups and compared their frequencies of choice. Second, we analysed the meanings of some of those categories that the raters had identified as group-specific. Third, we had a look at the frequencies of choice of certain distinctions as first-level splits.

Categories that signified more or less the same in both groups were *abstract*, *representational*, *structure/patterns*, *unstructured*, *lines*, *landscape* and *daily life*. As to *positive* and *negative* it was hard to establish a direct analogy between the two groups, because these categories were very small in the case of the expert group. Among the categories that bore similarities between the groups were *spontaneous/expressive* and *spontaneous/free*, respectively. Both covered labels such as *free* or *randomly done*. Yet, on the part of the expert group, this category was also very much characterized by the aspects of expression, expressivity and expressionism. As to *colours* and *colours/colourful*, respectively, the category for the non-expert group covered both the aspect of bright colours and of nice colours, whereas in the case of the experts it referred to bright colours only. The respective is true of the category *dark*.

In order to contrast the frequencies of choice of these categories, we conducted Mann-Whitney U tests. As the general numbers of categorizations differed between the groups, we transformed the absolute scores for every person into percentages of choice. Table 3 shows the mean percentages of choice and sums of ranks for both groups. Given the occurrence of signed ranks, the exact test was chosen. The alpha level was Bonferroni-adjusted.

There were significant differences between the groups concerning the attributes *positive* ($U = 291.50, p < .0042$) and *negative* ($U = 259.00, p < .0042$). Both applied significantly more often to the data of the psychology students than to the data of the art history students. Moreover there were trends towards effects for *abstract* ($U = 305.50, p < .05$), *spontaneous* ($U = 309.50, p < .05$) and *dark* ($U = 336.00, p < .05$), but due to the alpha level correction none of these differences reached significance. The categories *abstract* and *spontaneous* tended to occur more often in the case of the experts, while for *dark* it was the other way around.

As to categories that were group-specific many of the labels supplied by the experts could be subsumed under the categories *painted classically* and *alternative techniques*. The latter comprised labels such as *mixed media*, *silk screen painting*, *collage*, *photo* or *resembles a computer print* and could thus be regarded a very broad category. Two categories that were related to the ones just mentioned were *fine* and *thick*, which referred to the mode in which paint had been applied onto the canvas. Another category that the raters formed for the expert group only was *critical/multilayered*, which covered labels such as *reflection about art*, *multilayered* or *political*.

Finally, we had a look at the first-level splits. In 21 cases (70 %) the experts chose the distinction *abstract–representational* as the first categorization. In the case of the non-experts this distinction made up only 9 (30 %) of the first level splits. Another 20 % of the first level splits in the non-expert group fell onto *positive–negative* (a split that only one of the experts used as first-level distinction) and another 10 % onto *colours–dark*. In both groups, the other first-level splits involved different combinations of attributes.

Table 3:
Mean percentages of choice and sums of ranks for common or similar attribute categories for the Non-Expert and the Expert Group, respectively.

Attribute category	<i>M</i> (Percentage of choice)		<i>Sum of ranks</i>	
	Non-Experts (<i>n</i> = 30)	Experts (<i>n</i> = 30)	Non-Experts (<i>n</i> = 30)	Experts (<i>n</i> = 30)
abstract	11.47	19.29	770.50	1059.50
representational	14.75	19.06	837.50	992.50
positive	11.84	.67	1073.50	756.50
negative	13.25	1.14	1106.00	724.00
spontaneous	3.59	7.60	774.50	1055.50
unstructured	4.18	2.97	949.00	881.00
structure/patterns	7.46	6.54	872.50	957.50
lines	3.35	4.48	893.50	936.50
colours	5.64	2.88	973.50	856.50
dark	4.34	.73	1029.00	801.00
landscape	1.21	2.72	845.00	985.00
daily life	3.29	3.42	854.00	976.00

Correspondence analyses

For each of the two groups of participants, we conducted a separate CA with pictures in the rows and attribute categories in the columns. In both cases, we decided upon a symmetrical solution, because we were foremost interested in the nature of the dimensions evolving and less so in comparing single paintings or attributes. The first correspondence analyses, conducted on the basis of the data displayed in Tables 1 and 2, revealed a very ambivalent role of the Kiefer painting. For this reason, the painting was excluded from further analyses and we conducted the correspondence analyses again. This resulted in much clearer dimensional structures, bundling the same information within less dimensions. For this reason the following section is restricted to the description of the results without the Kiefer painting.⁵

Data of the Non-Expert Group

In the case of the group of psychology students there were 562 categorizations of the paintings under the attribute categories. The total inertia added up to .498. *Chi Square* was 280.01, $p < .01$. We chose a two-dimensional solution, which together accounted for 83.3 % of the total inertia. Dimension 1 accounted for 62.5 % of the variation in the data. Dimension 2 explained 20.8 % , while all other dimensions accounted for less than 8 % of the inertia. Table 4 presents the coordinates and contributions of the nine pictures and 16 attribute categories to the two dimensions. Figure 1 shows the corresponding graphical display of Dimensions 1 and 2.

⁵ The interested reader is invited to redo and compare the analyses including this stimulus on the basis of the data presented in Tables 1 and 2.

Table 4:
Correspondence analysis without the Kiefer painting: coordinates and contributions of dimensions 1 and 2 in the Non-Expert Group.

Painting/Attribute category	Coordinates		Contributions	
	Dimensions			
	1	2	1	2
Hockney	1.053	-.377	.219	.049
Johns	-.804	-.762	.130	.202
Kippenberger	.725	.068	.106	.002
Marden	-.814	.412	.127	.056
Polke	.284	.876	.016	.268
Rauschenberg	1.051	-.295	.226	.031
Richter	-.292	.266	.018	.026
Riley	-.698	-.847	.092	.234
Schumacher	-.583	.621	.067	.132
abstract	-.855	.150	.166	.009
representational	1.178	.079	.336	.003
spontaneous/free	-.659	.957	.028	.101
structure/patterns	-.298	-1.163	.013	.344
unstructured	-.716	.316	.047	.016
lines	-1.344	-1.178	.121	.161
colours/colourful	.107	-.407	.001	.034
dark/dull colours	-.512	1.012	.018	.119
positive	-.045	-.121	.000	.005
negative	.097	.420	.002	.063
photo	1.885	-1.020	.057	.029
modern	1.600	-.348	.090	.007
landscape	-.372	2.164	.002	.104
daily life	1.168	.102	.083	.001
fantasy	-.821	.226	.028	.004
other	.214	.043	.009	.001

Dimension 1. Pictures that had a high score on this dimension were Rauschenberg, Hockney, Johns, Marden and Kippenberger, explaining 22.6 %, 21.9 %, 13.0 %, 12.7 % and 10.6 % of the inertia falling onto this dimension, respectively. As is revealed by Figure 1, Rauschenberg, Hockney and Kippenberger, all more or less representational paintings, lay on the positive side of this dimension, while the abstract works by Johns and Marden characterized the negative side. Inspection of the contributions and coordinates of the attributes revealed a similar picture: The two attribute categories contributing most to this dimension were *representational*, on the positive side, and *abstract*, on the negative side of the dimension, which accounted for 33.6 % and 16.6 % of the variation on this dimension. Another 12.1 % were made up by the category *lines*. The importance of this attribute category might be due to the fact that it was often associated with *abstract* (see Table 1). In sum, dimension 1 may be best labelled *abstract–representational*.

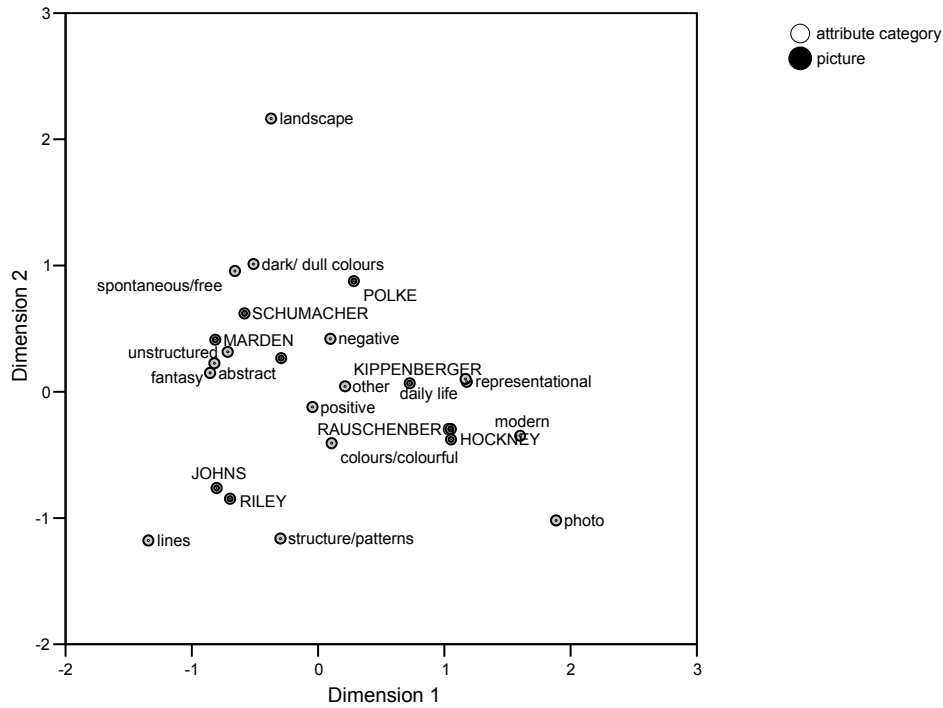


Figure 1:

Coordinates of paintings and attribute categories on dimensions 1 and 2 in the Non-Expert Group.

Dimension 2. The pictures that contributed most dominantly to dimension 2 were Polke and Riley, followed by Johns and Schumacher. The respective contributions were 26.8 %, 23.4 %, 20.2 % and 13.2 % of the inertia. While Polke and Schumacher lay on the positive side of the dimension, Johns and Riley were on the negative side. The Polke is a fairly dark silk screen painting and may be interpreted as depicting a kind of rock and some persons. The Riley and the Johns are colourful and are characterized by repetition of geometric patterns. The Schumacher is again of fairly dark colours and rather unstructured in nature. For further interpretation of this dimension we turned to the attribute categories: The category with the highest contribution was *structure/patterns*, accounting for 34.4 % of the variation. Of further importance were *lines* (16.1 %), *dark/dull colours* (11.9 %), *landscape* (10.4 %) and *spontaneous/free* (10.1 %), with *structure/patterns* and *lines* characterizing the negative side of the dimension and the other three characterizing the positive side. Concerning the inertia, the most important aspects bundled in this dimension seemed to be structure and geometry: Very structured or geometric paintings were opposed to less structured and/or dark ones.

Data of the Expert Group

The data of the students of art history comprised 691 classifications of pictures into the respective categories. The total inertia added up to 1.03. *Chi Square* was 711.14, $p < .01$. For this group of participants we chose a three-dimensional solution, which accounted for 83.1 % of the total inertia and thus clarified about as much of the variation as did the two dimensions in the case of the non-experts.

The first dimension accounted for 54.2 % of the total inertia, while the second and third explained 16.5 % and 12.4 %, respectively. All other dimensions accounted for less than 8 % of the total inertia and were not taken into consideration. Table 5 shows the coordinates and contributions of all paintings and attribute categories on the dimensions, and Figure 2 provides the corresponding graphical display of Dimensions 1 and 2.

Dimension 1. The paintings that contributed most to this dimension were Hockney, Kippenberger, Rauschenberg and Marden, accounting for 17.7 %, 17.4 %, 13.8 % and 13.1 % of the inertia, respectively. While Hockney and Kippenberger were located on the positive side of the dimension, Marden and Richter lay on the negative side. Inspection of the attributes dominating this dimension revealed a fairly clear picture: The two attributes contributing most to this dimension were *representational* (on the positive side) and *abstract* (on the negative side), which accounted for 30.2 % and 22.0 % of the variation within the dimension. Therefore, in analogy to the results for the non-expert group, we labelled this dimension *abstract–representational*.

Dimension 2. The pictures with the most dominant weights on this dimension were Riley and Johns (accounting for 25.3 % and 24.1 % of the inertia), followed by Polke and Hockney, which accounted for 17.7 % and 16.1 % of the variation. Johns and Riley were positioned on the negative side of the dimension, the other two on the positive side. Thus, in analogy to the non-expert group we found two dark and less structured paintings on the one side, opposed to much more colourful and structured pictures on the other side. Concerning the attributes, there were clearly two dominating categories: *structure/patterns* (on the negative side) and *spontaneous/expressive* (on the positive side). They accounted for 38.1 % and 27.5 % of the variation, respectively, and thus bundled more than 60 % of the variation on this dimension.

Dimension 3. Dimension 3 was dominated by the paintings by Polke (44.7 %) and Kippenberger (21.5 %), with Kippenberger lying on the positive side of the dimension and Polke lying on the negative side. Both paintings are representational in nature. While the Kippenberger painting is a “classical”, portrait-like painting, oil on canvas, the Polke is a silk screen painting that employs the print grid technique (*Rastertechnik*) – a trademark of Polke’s style. The attribute categories relevant for Dimension 3 were *landscape*, which accounted for 19.7 %, and *other artistic techniques* and *painted classically*, which accounted for 17.6 % and 15.2 % of the dimension’s inertia, respectively. Thus, one aspect of this dimension seemed to be the differentiation between pictures produced by classical painting techniques and pictures produced by alternative techniques. Yet, there was an important influence of the attribute category *landscape*, which was perhaps related to the high weight of the Polke painting.

Table 5:
Correspondence analysis without the Kiefer painting: coordinates and contributions of
dimensions 1, 2 and 3 in the Expert Group

Painting/Attribute category	Coordinates			Contributions		
	Dimensions					
	1	2	3	1	2	3
Hockney	1.075	-.327	.409	.177	.030	.054
Johns	-.743	-.969	-.295	.078	.241	.026
Kippenberger	1.073	-.340	.824	.174	.032	.215
Marden	-.914	.415	.339	.131	.049	.038
Polke	.649	.803	-1.189	.064	.177	.447
Rauschenberg	.954	.015	-.369	.138	.000	.043
Richter	-.677	.458	.389	.069	.058	.048
Riley	-.846	-1.029	-.573	.094	.253	.090
Schumacher	-.706	.767	.354	.075	.161	.040
abstract	-.888	-.043	-.054	.220	.001	.002
representational	1.159	.076	.015	.302	.002	.000
spontaneous/expressive	-.767	1.162	.622	.066	.275	.091
planned/conceptual	-.385	-.459	-.380	.004	.010	.008
structure/patterns	-.804	-1.518	-.615	.059	.381	.072
unstructured	-.798	.820	.293	.030	.057	.008
lines	-.930	-.028	.091	.054	.000	.001
fields	-.002	.087	.458	.000	.000	.012
spatial	.070	1.183	-1.836	.000	.034	.096
reduced/decorative	.578	-1.205	.190	.008	.061	.002
dynamic	-.464	-.071	-.472	.005	.000	.010
undynamic	.143	-.351	-.012	.000	.005	.000
colour	.218	-.292	.220	.002	.006	.004
dark	.264	1.921	-1.891	.000	.039	.044
painted classically	.860	-.525	1.486	.024	.016	.152
other artistic techniques	1.069	.398	-1.373	.051	.013	.176
positive	.529	.563	.001	.003	.007	.000
negative	-.332	-.143	-.252	.001	.000	.002
fine	-1.178	-.746	-.328	.005	.004	.001
thick	-.503	.505	.242	.002	.004	.001
landscape	1.023	1.210	-2.206	.020	.051	.197
daily life	1.372	-.461	.519	.080	.016	.024
man	1.436	-.826	2.311	.016	.010	.087
critical/multilayered	1.230	.199	-.071	.026	.001	.000
mood	.709	.361	.304	.004	.002	.001
other	.354	-.104	.183	.017	.003	.010

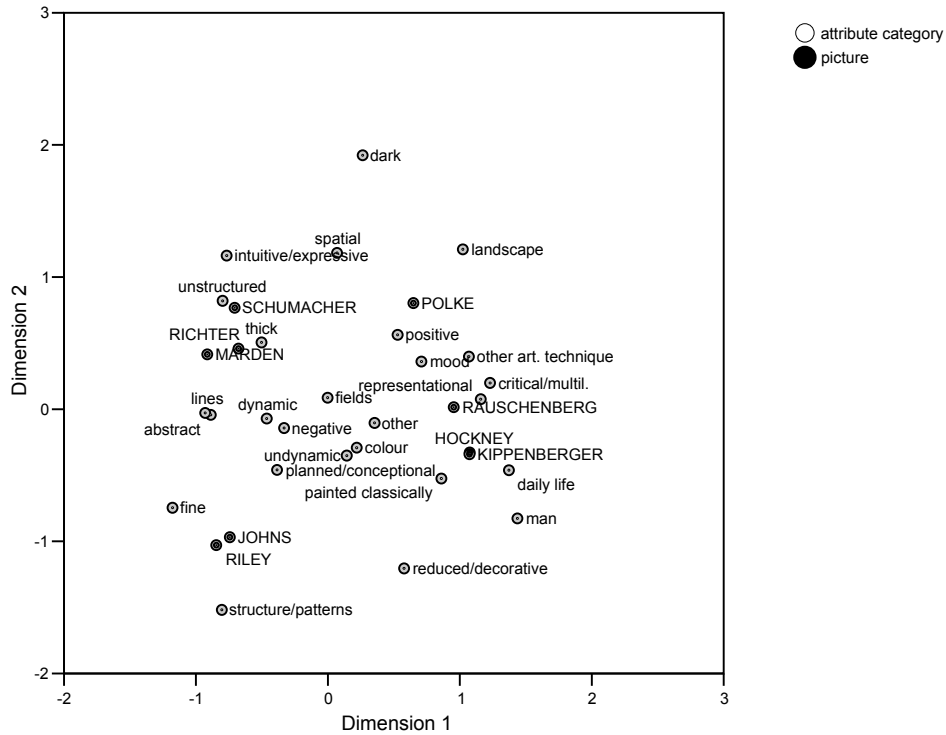


Figure 2:

Coordinates of paintings and attribute categories on dimensions 1 and 2 in the Expert Group.

General discussion

Our study aimed to compare persons with little experience in the arts and art-experienced persons as to the concepts they apply to a set of contemporary artworks and as to the dimensions that might underlie their perception and interpretation of the works. To examine these questions we chose the method of natural grouping (Kuylén & Verhallen, 1988) and combined mere comparisons of the nature and frequency of certain concepts with correspondence analyses.

In line with the literature on expertise (see, e.g., Chatard-Pannetier et al., 2002) and our most general hypothesis the students of art history formed significantly more groups and used more levels to categorize the paintings than did the students of psychology. Moreover, the CA solution that seemed most adequate for the psychology students was of lower dimensionality than that for the students of art history, while accounting for about the same amount of variation. These results can be interpreted in terms of a more differentiated category structure in experts (Rambow & Bromme, 1995).

Concerning the nature and importance of the attribute categories, we found evidence for the assumption that the experts would categorize and interpret on the basis of style, while the

non-experts would refer more often to personal experiences in terms of feelings. Yet, contrary to our assumptions, there were no differences between both groups concerning the frequencies of attributes related to concrete content and just a trend concerning the use of colour-related attributes.

According to the classifications by the raters, the students of art history often opposed paintings that had been painted classically to works that had been produced by means of other artistic techniques, including collage, silk-screen painting or computer-aided production. Neither *painted classically* nor *other artistic techniques* appeared as a category of its own concerning the labels of the non-experts. The same is true of *fine* and *thick*, which are also style-related attributes, as well as *dynamic* and *undynamic*. More important, still, is the fact that these differences were also reflected in the results of the correspondence analyses: For the data of the students of art history the CA yielded a dimension that differentiated between pictures painted classically and paintings produced by other techniques. What has to be kept in mind is that the dimension is mainly determined by two paintings – Kippenberger as a classical painting oil on canvas and Polke as a work produced by print grid technique – and also shows a strong influence of content in terms of the attribute category *landscape*. Still, its existence can be regarded one of the most important results of the present study, although the dimension *clarity–diffusion* reported by O’Hare (1976) for the realm of landscape painting can perhaps be interpreted in a similar manner. Our results support the notion that expertise is accompanied by a development of style-related processing (Leder et al., 2004) and that this kind of processing is of importance as to encounters with modern and contemporary art (Leder, 2002).

Concerning further influences of expertise, Shafto and Coley (2003) suggested that “properties that are essentially blank for non-experts might serve to activate domain-specific knowledge for experts in a given area and thereby override general taxonomic similarity” (p. 641). The categories *critical/multilayered* and *planned/conceptual* on the part of the expert group, which refer to critical or political messages conveyed by the paintings and conceptual backgrounds, may be interpreted as reflecting background knowledge. Yet, since both categories were rather small, most of the labels employed seemed to refer to surface qualities rather than underlying artistic concepts.

An important finding that is in line with the model by Leder et al. (2004) and the developmental approach by Parsons (1987) concerns the categories *positive* and *negative*. These applied significantly more often to the data of the psychology students and included labels such as *pleasant* or *not threatening* versus *negative feelings* or *threatening*. Thus, these categories refer to feelings attributed to the paintings or the viewer’s personal judgment. In Parson’s approach, it is especially the third stage of aesthetic development during which viewers focus on emotions in a painting, while the reference to personal judgment (“I like it”) is assumed to be already present at the first stage. An interesting trend in the data suggests that the students of art history classified paintings more often in terms of *spontaneous/expressive*, using labels such as *expressive*, *gesture*, *intuitive*. It might be reasonable to infer that for experts emotions are more important with respect to the artist and the act of creation of the work, but since the effect did not reach significance, one must be very careful with any interpretation.

Contrary to our assumptions, there were no significant differences between the experts and the non-experts concerning the frequency with which they employed attributes related to colour, even though there was a respective trend for the category *dark*. Neither did we find a

difference with respect to categories describing concrete content, i.e. *landscape* and *daily life*. The category *man* was even formed for the expert group only. One possible explanation might be that the style-specific processing that we assume for experts does not suppress reference to content, but rather develops as a parallel mode of processing. Further research is necessary to find out more about the exact relations of style- and content-based processing in art perception.

As to the results of the correspondence analyses, the first and most obvious outcome is the striking similarity between the perceptual and conceptual spaces of the expert and non-expert group. This is in line with the results reported by Berlyne and Ogilvie (1974) and O'Hare (1976). For both groups of participants, the most important dimension, i.e. the dimension explaining most of the variance in the data, clearly differentiated abstract paintings from representational ones. As stated above, this dimension can probably be regarded a characteristic of approaches to 20th century and contemporary art (Cupchik, 1974), because it is only since the upcoming of modernity that artists have started to depart from representational modes of painting. What yet might seem astonishing at first sight is the fact that this first dimension seems to be equally important in both groups. Our descriptive data also suggest a higher frequency of *abstract-representational* splits on the first level on the part of the expert group, and there's a trend for the experts to employ the category *abstract* significantly more often than the non-experts. This is contrary to the results of O'Hare (1976), who reports higher weights of non-art students on an *abstract-representational* dimension and to studies reporting a higher relation of non-experts' preference judgments to the level of abstraction of artworks (Hekkert, 1995). Yet, our results can be explained in light of existing theory: The natural grouping task did not ask for any judgments of preference. Rather, in terms of the categorizations we asked for, abstractness can be regarded as being related both to the question of content and of style, because the very nature of a style in the history of art is inevitably linked with the way it treats content and depiction (Leder, 2002; Winston & Cupchik, 1992). As stated above, this question becomes most relevant for modern and contemporary art.

In both groups of participants, the second dimension of the CA solutions was closely related to the concept of structure and patterns. Even though there was an influence of colour (*dark*) and content (*landscape*) in the case of the non-expert group, this dimension seemed to generally differentiate structured paintings from less structured ones or works produced in a more spontaneous manner. Again, this finding is in line with the literature on aesthetics: Berlyne and Ogilvie (1974) regarded a factor labelled *Uncertainty*, which is related to scales such as *unbalanced-balanced* and *disorderly-orderly*, to be central to the experience of artworks. Similarly, the second dimension reported by O'Hare (1976) is significantly related to both *clear-indefinite* and *symmetrical-asymmetrical* scales and thus refers not only to style but also to structure.

All in all, in analogy to the findings reported for other kinds of art (Berlyne & Ogilvie, 1974; O'Hare, 1976), the results of the correspondence analyses suggest that the perception and interpretation of modern and contemporary artworks is characterized by general dimensions that are relevant independently of the viewer's level of expertise. At the same time, experts have developed art-specific approaches, which are particularly based on concepts related to style (Leder et al., 2004) – as is reflected in Dimension 3 of the CA solution for the expert group.

Concerning the strengths and weaknesses of the present study it is important to say that the participants reacted very positively to the natural grouping task and repeatedly reported that they had experienced it as a pleasing or interesting experience. Although this might seem a marginal result, it is very important with a view to the study of aesthetic experiences. By encouraging participants to approach the works in a very reflected and intense way, natural grouping probably comes fairly close to “natural” encounters with artworks and may thus overcome the restrictions to aesthetic reactions that many experimental situations impose (Crozier & Greenalgh, 1992; Leder et al. 2004). On the other hand it cannot be excluded that differences in categorization may not also partly be based on social desirability or differences in art-related vocabulary. Some of the psychology students used labels such as *modern* or *photo*, which might be interpreted in terms of a non-expert description of style. With this in mind, we conducted a re-analysis of the data. While there were no differences in size of style-related categories then, the style-related dimension as a result of the CA did remain a characteristic of the group of art history students, suggesting that differences in art-related vocabulary are not sufficient to explain the results reported above.

A second important point is that expertise in our study was defined rather frankly, since – even though we predominantly worked with graduates in art history – not all of our participants fulfilled the criterion of ten years of intensive involvement that can be found in the literature on expertise (Ericsson & Smith, 1991). Apart from the interpretations offered, this could be another reason why we found fewer differences between both groups of participants than expected.

Third, it is important to note that the stimulus set used in this study was small. Although selected carefully, it cannot constitute a perfect randomization of all possible aspects of influence. This becomes most obvious in the ambivalent role of the Kiefer painting, which was excluded from the correspondence analyses. The reasons for the ambivalent role of the painting can only be speculated upon here and will have to be examined empirically. Yet, as a consequence, one important aim of future studies may be to apply the methods of natural grouping and CA to large sets of artworks in order to be able to derive more general conclusions. In this respect, the findings reported here might also be of help in future selection of stimuli. Moreover, and perhaps more important, they may constitute an important basis for other studies in the realm of aesthetics that employ rating scales or pair-wise comparisons. Since the participants in our study came up with categorizations themselves, one can infer that the respective concepts were meaningful to them. Therefore, instead of simply applying standard scales such as *pleasure–displeasure* or *like–dislike* it might be interesting to integrate some of the concepts found in this study, such as “expressiveness”, in order to approach real aesthetic experiences as closely as possible. By integrating such scales into experimental designs, it will be possible to subject the findings reported here to experimental scrutiny.

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Author note

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Appendix: Paintings employed in the study

Index	Painter	Title	Year	Additional Information
Hockney	Hockney, David	A Bigger Splash	1967	
Johns	Johns, Jasper	Untitled	1980	Acryl on plastic, over canvas
Kiefer	Kiefer, Anselm	Unternehmen Hagenbewegung	1975	Oil on burlap
Kippenberger	Kippenberger, Martin	Untitled. From the series "Hand-painted pictures"	1992	Oil on canvas
Marden	Marden, Brice	11 (to léger)	1987-88	
Polke	Polke, Sigmar	Fungus Rock	1992	Plastic seal and varnish on synthetic resin base on printed polyester fabric
Rauschenberg	Rauschenberg, Robert	In Trance (Urban Bourbon)	1993	Acryl on enamelled aluminium
Richter	Richter, Gerhard	Fuji	1996	Oil on alucobond
Riley	Riley, Bridget	Andante	1980/81	
Schumacher	Schumacher, Emil	Acco	1999	Oil on canvas