

Meaning Making with Art: Expert and Lay Perspectives in Understanding Artworks and Exhibition Concepts

Dissertation

der Mathematisch-Naturwissenschaftlichen Fakultät
der Eberhard Karls Universität Tübingen
zur Erlangung des Grades eines
Doktors der Naturwissenschaften
(Dr. rer. nat.)

vorgelegt von
Dipl.-Psych. Daniela Bauer
aus Regensburg i. d. Opf.

Tübingen
2014

Tag der mündlichen Qualifikation:	17.09.2014
Dekan:	Prof. Dr. Wolfgang Rosenstiel
1. Berichterstatter:	Prof. Dr. Stephan Schwan
2. Berichterstatter:	Prof. Dr. Katharina Scheiter

Acknowledgement

I would like to thank

- my supervisor Stephan Schwan for his constant support, encouragement, and open door.
- my mentor Palmyre Pierroux for her generous care, back up, and for offering me new insights into scientific work.
- my second reviewer Katharina Scheiter for her thorough and helpful comments.
- my student assistants for their good work.
- my colleagues from the IWM-KMRC for their support, help, and friendly chats.
- my workgroup and fellow PhDs for all the opportunities to discuss, laugh, listen, and learn.
- my projectmate Constanze for great teamwork.
- my officemate Silke for sharing everyday ups and downs.
- my friends and my family for always being there for me.

Table of Contents

1. Introduction	8
2. Defining Art.....	15
2.1 The Philosophical Approach	15
2.2 Aesthetic Experience	17
2.3 Meaningfulness and the Intentional Character of Art.....	18
2.4 To Read a Painting.....	19
3. Meaning Making with Art.....	21
3.1 The Mind as individualized Meaning-Making Machine.....	22
3.2 Visual Literacy and Art Expertise	23
3.3 Cognitive Development Models	24
3.4 Erwin Panofsky's Model of Iconography and Iconology.....	28
3.5 Cognitive Information Processing Models	30
3.5.1 Chatterjee's Framework of Aesthetic Processing for Cognitive Neuroscience.....	31
3.5.2 Marković's Functional Model of Aesthetic Experience	32
3.5.3 Leder et al.'s Model of Aesthetic Appreciation and Aesthetic Judgment	34
3.6 Integrating a Prescriptive and Descriptive Model of Meaning Making with Art.....	37
4. Studies about Aesthetic Processing	40
4.1 Composition as the Structural Framework of a Picture.....	41
4.2 Style as the Unique Factor of Art.....	44
4.3 Attention as an Important Aspect of Expert-Lay Comparison	46
4.4 Verbal Data as Source for Investigating Aesthetic Processing on Higher Levels of Meaning	49
4.5 Finding Meaning in Art Exhibitions.....	51
4.6 Summary and Discussion of the Presented Aspects of Aesthetic Processing	55
5. The Present Studies.....	59
5.1 Finding Meaning in Figurative Paintings: From Renaissance to Edvard Munch.....	60
5.2 Experts' Skills and Methods of Meaning Making according to Art Historic Concepts and Frameworks...	62
5.3 Visitors' Strategies of Meaning Making in the Social and Physical Context of an Art Exhibition	63
5.4 Expert-Layman Differences in Meaning Making: Evidence from Gaze and Thinking Aloud	64
5.5 Summary of Aims and Focus of the Present Studies.....	65

6. Study 1: A Focus Group about the Visual Culture of Art Historians.....	66
6.1 Introduction	66
6.2 Method	68
6.2.1 Participants.....	69
6.2.2 Data Collection	69
6.2.3 Data Analysis	70
6.2.4 Limitations	70
6.3 Findings	71
6.3.1 Defining Themselves.....	71
6.3.2 Defining Art.....	72
6.3.3 The System of Art	72
6.3.4 The Expert's Gaze	73
6.3.5 Experts in the Art Museum.....	75
6.3.6 Museum Visitors in the Eyes of Experts	76
6.3.7 Approaching the Needs of Laymen in Art Exhibitions	76
6.4 Discussion	77
7. Study 2: Meaning Making of Student Groups exploring the Munch Gallery in the National Museum of Art, Architecture and Design in Oslo, Norway.....	80
7.1 Introduction	80
7.2 Learning Perspectives on Expertise and Interpretation in Art.....	84
7.2.1 Information Processing Approaches.....	84
7.2.2 Sociocultural Approaches	86
7.2.3 Integrating Approaches	87
7.3 Methods.....	89
7.3.1 Data Corpus	89
7.3.2 Procedure	90
7.3.3 Analytical Approach.....	91
7.4 Results.....	92
7.4.1 Analysis of Expert Data	92
7.4.2 Analysis of Visitor Data	96
7.5 Discussion	103
7.5.1 Physical Context.....	104
7.5.2 Social Context	105
7.6 Conclusion.....	107

8. Study 3: Expert-Layman Comparison of Meaning Making with Renaissance Portraits	110
8.1 Introduction	110
8.2 The Present Study	111
8.3 Method	115
8.3.1 Participants	115
8.3.2 Material	115
8.3.3 Apparatus	119
8.3.4 Procedure	120
8.4 Data Analysis	121
8.4.1 Gaze Data	121
8.4.2 Thinking Aloud Data	122
8.5 Results	124
8.5.1 Affective State and Prior Knowledge in Art	124
8.5.2 Gaze Data	125
8.5.4 Thinking Aloud Data	128
8.5.5 Confidence in Meaning Making	131
8.6 Discussion	132
8.6.1 The Influence of Art Historian Expertise on Inspecting Renaissance Portraits	132
8.6.2 The Influence of Art Historian Expertise on Describing and Interpreting Renaissance Portraits	134
9. General Discussion	138
9.1 Summary of Findings Revisiting the Integrated Model of Aesthetic Processing	139
9.2 Strengths and Limitations	144
9.3 Theoretical Implications	146
9.4 Practical Implications	149
9.5 Future Research	151
Summary	154
Zusammenfassung	157
References	162
List of Figure	185
List of Tables	186
Appendix	187

*"Seeing depends on your knowledge
And knowledge, of course, on your college,
But when you are erudite and wise
What matters is to use your eyes."
- Ernst Gombrich*

1. Introduction

Since the early 1990s, there have been predictions and claims for a “pictorial” (Mitchell, 2003) or “visualistic” turn (Sachs-Hombach, 2003). On the one side, these terms point to the communication practice of the present times: with the growing digital possibilities and the take-over of the internet by social media, spreading knowledge and information via static and dynamic pictures seems to have become more common than to use words. On the other side, these terms point to the scientific practice of using pictures to analyze and answer research questions. Traditionally, pictures have been the matter of art history that tries to systemize them into a world of art through analysis, categorization and discussion. But artwork are only a small part of the present visual practice and there is a need for new methods in art history to be able to assess modern forms of art that go beyond the scope of classical definitions and approaches.

In his preface to “Art and Illusion”, Gombrich (2002) talks about a new subject he wants to pursue and that he calls the “psychology of representation”. With this he means not just to classify and catalogue pictures in the system of art, but to closely study how pictorial features form and interact to embody a specific meaning potential the beholder both is tricked into and consciously processes to comprehend a picture. Since Fechner (1871), there is a long tradition of experimental aesthetics to systematically analyze the power and effect of single visual aspect (e.g. shape) while controlling for the influence of others (e.g. size or color). The consequence of this classic experimental approach is that “present-day psychology of aesthetics is characterized by a mosaic of empirical discoveries” (Jacobsen, 2006, 155). The “whole picture” of the aesthetic processing of art is still a theoretical puzzle with missing bits and links. Following the famous quote “the whole is greater than the sum of its parts”, which is linked back to Aristotle but also plays an important role in the psychology of gestalt

(Wertheimer, 1923; Köhler, 1929; Arnheim, 1949), Jacobsen (2006) argues that results stemming from experiments investigating single pictorial features cannot be assigned to situations when viewers are confronted with an artwork in its entity. He thus calls for a new aesthetic psychology of investigating artworks in their complexity using multiple perspectives and methods.

In the visual sciences, pictures are defined as representations of reality which, in their premise, are intentional and carry a message (Schwan & Zahn, 2006). The knowledge of how aspects of the real world are designed into pictorial meaning is part of our cultural heritage or “concrete mind” (Lang, 1992), but still pictures are easily misunderstood and can deceive the beholder. One aspect of this trickiness of representation gets obvious in the famous painting “The Treachery of Images” (1929) by surrealist René Magritte (Figure 1). We see a pipe, we can describe it in detail and explain where to cram in the tobacco, but we cannot take and smoke it, because it is not real but *just* a picture.



Figure 1. The Treachery of Images (1929) by René Magritte

Thus meaning making with art means to go on a journey of setting what we *see* into relation with what we *know* (Gombrich, 2002) and based on that come up with a conclusion of what an artwork might mean. Communication is the product of coding and decoding (e.g. Bühler, 1934). Apart from that, communication “with” a picture is asymmetrical (Kemp, 1998) because a picture can’t react to or answer questions like a human counterpart in a conversation; how well the intended meaning of the artist and the meaning the beholder makes of a picture resemble depends on diverse factors: On the one side pictures are coded on multiple levels of representation to carry meaning, on the other side the viewer decodes the meaning in dependence to multiple contexts. In his framework for a modern psychology of aesthetics, Jacobsen (2006) describes these diverse perspectives the beholder is influenced by when viewing an artwork: Intrinsic meaning making is influenced by the history of personal experience with art, and the history of making, understanding and evaluating art in society and culture; Extrinsic meaning making is influenced by physical and social aspects of the situation, in which it takes place.

In the situation of a visit to an art museum, all these perspectives, the personal, the social and the physical conflate (Falk & Dierking, 1992) to one museum experience. Previous experience and knowledge of the visitor play a role for meaning making, but often visitors explore an exhibition in company of partners, peers, or family in connection to school visits and weekend activities, so their processing of the exhibits is influenced by each of their personal perspectives brought and transformed in social discourse (Leinhardt, Crowley & Knutson, 2002). The mediating influence of the social dimension on individual meaning making is the fundamental idea of sociocultural learning theories (e.g. Vygotsky, 1978; Wertsch, 1991) stressing, that aspects of experience and learning in a social situation are best to be found in participants’ conversations (Piscitelli & Weier, 2002; Leinhardt & Knutson, 2004, Pierroux, 2006).

Finally, in an exhibition, the challenge of meaning making is not limited to encounters with single artworks, but rather expands to meaning making with a set of exhibits in the physical space (Maxwell & Evans, 2002; Tzortzi 2007; Roppola, 2013). Part of the work of a curator in an art exhibition is to deliberately choose and arrange artworks in connection to each other and to additional information, e.g. labels, placards or multimedia guides, to provide the visitors with a specific perspective and focus on an artwork's meaning implying the exhibition theme. The result is a spacial interdependence of the meaning potential of an artwork, broadened and shifted beyond the understanding of it seen as single stimulus (Krukar & Dalton, 2013; Baxandall, 1991). Thus a museum embodies a different level of visual communication where meaning is coded and highlighted in space, making the exhibition become an artwork of its own (Ziese, 2010).

The deliberate choices and rationales behind an art exhibition are an expression of the expert culture of curators who have an educational background in art history. Inside the museum walls expectations, habits and skills of two different operating groups collide: the curators as experts who produce and provide information, and the visitors as laymen who experience and process exhibition contents. Shimamura (2012) describes that every visitor to an exhibition goes there with a "museum schema" in mind that regulates what to expect and how to behave. The activation of such a schema affects visitors' attention to specific aspects of an exhibition, but also inattention to specific others (Schelske, 1997). Additionally the spread of attention might be biased by the fact that according to their previous knowledge about art, visitors are able to understand some aspects of an exhibition better than others. When Gombrich (2002) refers to *seeing* and *knowing*, he talks about the close connection of perceptual and cognitive

skills in the meaning making with art that are strongly influenced by expertise. Aspects curators know and see when conceptualizing a specific exhibition theme are a product of their expert perspective on art. What visitors see and get out of an exhibition might therefore be something completely different to what the curator had in mind when setting it up.

The present dissertation is concerned with the meaning making process when viewing pictorial artworks and the influence of personal, social and physical aspects on it in an expert-lay perspective. This was motivated by the present lack of a clear description of how meaning making with art is affected by the specific expertise of art historians and how this reflects in discrepancies in aesthetic experiences of experts and laymen of art, especially in the context of an art museum. The present dissertation addresses the need of a new aesthetic psychology (Jacobsen, 2006) that considers the multi-perspectiveness of meaning making processes and investigates entire pictures without manipulation or use of single pictorial features as experimental stimuli. Aspects of the interplay of *seeing* and *knowing* while inquiring a work of art are of further central interest in the present work.

For the conceptualization of this dissertation, three major research questions are:

1. What does meaning making with art look like for art historians and what role does *seeing* and *knowing* play for the art historic practice of analyzing artworks?
2. How and to which extent do lay visitors in an art exhibition understand and use the physical arrangement of artworks of a curator?
3. How do art historians and participants untrained in art use their *seeing* and *knowing* during meaning making with single artworks?

To answer these research questions, I will refer to different fields of research concerned with art and the meaning of it. Providing definitions and concepts of philosophy, art history, educational science, visual sciences and psychology, I center on the meaning in pictorial artworks and how it is made use of by beholders.

To point out the use of specific terms employed in this dissertation, Chapter 2 gives an overview of how art can be defined and what characterizes meaning making with art as aesthetic experience. Reflecting on interdisciplinary approaches towards art it is discussed how meaning is encoded into a painting and how the beholder is expected to decode it.

Chapter 3 deals with psychological approaches towards meaning making with art and the development of aesthetic skills and expertise. Different models of aesthetic processing concerning both its development as well as its general sequence, are presented. Bringing a prescriptive model of art historic meaning making with art into discussion, I present a meaning making model with art that integrates the descriptive cognitive approach of psychology with the prescriptive code of practice of art history that serves as theoretical framework for the present dissertation.

Chapter 4 reviews research in aesthetic psychology that deals with different aspects of the meaning making process with art using entire paintings as stimuli for their empirical studies. These studies differ greatly in the specific aspect of aesthetic processing that are observed and the kind of artworks used for investigation. Most studies present a mixture of painted art, ranging from representational to abstract and modify them according to distinct pictorial aspects, e.g. structural balance, color or orientation. Expert-lay differences in aesthetic processing of art are presented before referring to aspects of visitor experience in the physical space of a museum exhibition.

Chapter 5 focuses on the aims of the present dissertation. Pointing to the fact that most studies in aesthetic psychology describe expert-layman differences in processing using both abstract and representational art as set of stimuli, the specific requirements to make meaning of representational art are discussed.

The three empirical studies of the present dissertation are presented in Chapter 6 to 8 of the dissertation. Study 1 focuses on the meaning making process of art historians while viewing an artwork, highlighting skills and methods used for an art historic analysis of representational pictures. Study 2 deals with the social and physical impact on meaning making with art during the visit of an art exhibition. Study 3 finally analyses the interplay of *seeing* and *knowing* during meaning making with single representational pictures for experts and laymen of art history. In each chapter, methods and results of the respective study are presented and discussed.

Finally, Chapter 9 gives a general discussion of the findings, set in the light of the preliminary explanations. It includes thoughts about theoretical and practical implications of the research and considerations about the studies' generalizability and prospects of future research.

2. Defining Art

“Art is what you can get away with.” - Andy Warhol

What distinguishes an artwork from other visual images? Is it a property of the work itself or an expression of cultural denotation and significance? Or is it art because the curator chose to exhibit it in a museum? There have been many attempts to define the sufficient and necessary conditions that constitute art and as many attempts to justify why any kind of defining art must fail (e.g. Kennick, 1958; Schlesinger, 1979; Davis, 2001). But in order to build a psychological framework of meaning making with art, one at least has to describe art in its matter and limits. I start by giving a short insight in philosophical definitions of art. As a common definition of art is based on the aesthetic experience deriving from an interaction with an artwork, I'll explain what an aesthetic experience is and what components are involved in it. Explaining why a striking characteristic of artworks is that they are intentional, I describe how meaning is captured in artworks. I end the chapter presenting theoretical approaches to how a painting can be decoded by the beholder referring to different levels of meaning.

2.1 The Philosophical Approach

How art is defined depends on what is emphasised as the outstanding aspect or advantage of it concerning society and culture. One way of defining art is to tie it to its function. Schlesinger describes art as something that “provides its recipient with aesthetic experience” (1979, 175). According to this, artworks have in common that they set the beholder in a specific, exceptional state. In Beardsley's view, art is “something produced with the intention of giving it the capacity to satisfy aesthetic interest” (1983, 21). Compared to Schlesinger, Beardsley's

cut off rule for art is weaker, because in his definition pictures merely have to try to but do not categorically need to satisfy aesthetic interest. Moreover, following Beardsley, the beholder has aesthetic needs that can be weaker or stronger before actually being exposed to a picture and thus gives the beholder an important role for identifying art.

In contrast to that, procedural definitions emphasize that art is a status applied to an artifact through agreement (Davis, 2001). Approved expert communities, constituting the “art world”, consent to ways of classification suitable to identify an object as art (Dickie, 1974). The expert communities are artists, art-historians and art-critics that set and discuss art in a social and historical framework. Here, the personal aspects of the single beholder with his/her needs and aesthetic reactions are no reason to doubt a picture’s reputation of being art or brummagem.

Emphasizing artistic heritage and history of style, there are definitions stressing that an artifact is art when its characteristics for interpretation can be related to other artifacts that have been interpreted in similar ways before (Levinson, 1993; Carney, 1994). The style of an artwork denotes a specific schema of how to translate intentions into pictorial features and visual content, to offer meaning to the beholder. Like this all artworks are connected through artistic skills and conventions of depiction dependent on changes in society and time (Davis, 2001; Carroll, 1993). An artwork offers meaning by using conventions, but at the same time leaving out something which Danto (1981) calls “rhetorical ellipsis” to engage the beholder to come up with the missing link. This is the “beholder’s share” (Gombrich, 2002) in the creation of a work of art (Kemp, 1998).

Summing up, an artwork is an intentional visual expression that invites the beholder to engage with its meaning. The outcome of this engagement is aesthetic experience. The meaning is conveyed in specific visual schemata (style, composition) that are part of human cultural

heritage evolving and transforming in the course of time and changes in society. Depending on the art world, a work of art is discussed in an art historical framework that classifies and values it.

2.2 Aesthetic Experience

An experience is aesthetic when perceptual, cognitive and affective processes are concurrently applied and blended (Goldman, 1995; Marković, 2012) while dealing with a specific object in an exclusive way. The single object is the center of attention while surrounding stimuli and impulses get faded out (Cupchik & Winston, 1996). Like this the beholder gains freedom (Beardsley 1981) to indulge in a special kind of relationship with the object (Ognjenović, 1991). Kesner calls this state of being absorbed in exploring a picture “attentive viewing”. In his view, this ability to sustain attention on an object is the key for successful meaning making with an artwork, because it “should lead to a close reading of a work of art, in the sense of a detailed scrutiny, capable of growing differentiation, of taking in and appreciating all details” (2006, 6). Kesner’s approach is comparable to Csíkszentmihályi’s concept of flow (1990), defined as focused, seemingly effortless mental processing accompanied by losing sense of time and absent-mindedness. Thus, aesthetic experience is neither comparable to nor assessable by judgment of preference, but constitutes an exceptional state of mind through engagement with an artifact, and transcending borders of meaning (Goldman, 1995; Cupchik & Winston, 1992; Marković, 2012) that leads to deep satisfaction with one’s own understanding, or how Beardsley puts it: “the exhilarating sense of exercising powers of discovery” (1983, 20). In this context, Koestler (1970) talks about the “Ah effect” happening when contradicting or incongruent information is framed in a new way and integrated. Successful meaning making while looking at a picture can be described as mental pleasure (Russell, 2003). The pleasure derives from a “disinterested interest” or

“liking without wanting” (Chatterjee, 2003) meaning that it is not connected to the achievement of a specific goal but rather unfolds in the aesthetic activity itself (Apter, 1984). Solso states that “it is seeing one’s own mind in a painting” (2003, 258). Thinking about aesthetic processing of an artwork as a cognitive absorption into *seeing* that leads to a self-satisfying feeling of *knowing* it is easy to follow Leder et al. saying, “the challenge of art is mainly driven by a need for understanding” (2004, p. 489).

2.3 Meaningfulness and the Intentional Character of Art

Assuming that artists want to express something, pictures are representations that stand for something else than themselves (e.g. Wittgenstein, 1921/1963). The intentions or thoughts of the artist are represented in specific content, expressed by using and relating particular pictorial features. In this sense, “pictures are materialized thoughts” (Warburg, 1992, 11) that show an abstraction of the artist’s reality (Posner, 1998). Goodman (1976) defines works of art as symbols within a system of visual syntax and semantics. The rationale of that approach would be that one can learn to read a picture as systematically as we learn to read a text, and break it down first to the meaning of single words and then to single letters as basic units of symbolism. An element of pictorial syntax is style, according to Barthes (1977) a code through which the message of an artwork gets transmitted. The term style is used in connection to the specification of techniques or materials used to create a picture, the discrimination of different periods of art in art history, but also the ways of visual expression typical for a specific artist. All these attributes that are represented by style are uniquely subject to art (Leder et al., 2004) making it *the* important factor for aesthetic expression.

According to Arnheim (1974), meaning conception starts on the level of form, assuming that “raw” visual information is perceived in simple but meaningful patterns that can be categorized. In his ecological approach, Gibson (1978) explains this tendency to cluster visual

features to shapes with the need to collect environmental information important for orientation and suitable action. In psychology of gestalt (Wertheimer, 1923; Köhler, 1929; Arnheim, 1949), the main principle is that it is not bits of single visual information, but the order of them that is meaningful, backdating meaning to single information.

Above this level of primary or concrete meaning of content, pictures are place holders for deeper, abstract meaning in the sense that certain objects or events that are depicted function as anecdotes and allegories (Panofsky, 1975). This symbolic meaning is based on conventions, or in other words traditions of representing and depicting cultural acts and intellectual notions in specific objects or events.

In sum these different approaches towards what constitutes meaning in a picture show that a picture in its entity incorporates different levels of meaning (Arnheim, 1980): a picture communicates authentic aspects of reality by using shapes and patterns, it represents reality by composing shapes and patterns into content in specific style, and it expresses individual reality on the level of symbolic meaning (Doelker, 1999). Similarly, Solso (1994) describes three levels of representation: level 1 contains basic visual features like shapes, colors, brightness, and contrast, level 2 contains the concept of the picture, the content or theme, and level 3 contains symbolism. Mitchell (2003) distinguishes between the naturalistic, mimetic meaning achieved by likeness of representation and reality, and the artistic, expressive meaning achieved by abstraction of reality.

2.4 To Read a Painting

Pictures are coded to communicate something. They offer certain visual properties used in a deliberate way to carry meaning on different levels of abstraction. But how do they get encoded when looking at them? Because there are different levels of meaning, a precise reading of the visual message is impossible (Gombrich, 1994; Worth, 1981). Letters have a

clear and definite connotation in our society, but there are no elements in pictures that allow for this kind of symbolic exactness. Considering Danto's notion of "visual ellipses" in art that engage the recipient in a search for the missing link, there is no systematic translation of pictures similar to language. Eisner points out that, because meaning is represented by a vast scope of form, style, and expression, it is "something humans construe rather than discover" (1985, 17). Hall (1980) calls the multiple ways in which a picture can be understood the polisemic character of art. Gombrich (2002, 190) declares that "what we call reading an image may perhaps be better described as testing it for its possibilities, trying out what fits." This testing of an artwork for its meaning both happens on an automatic and on a conscious level of perception. Piecha (2002) describes an internal and external meaning making with pictures. The internal meaning is similar to Mitchell's (2003) naturalistic, mimic meaning of a picture. It is encoded bottom-up according to universal rules of perception framed in psychology of gestalt, and top-down by describing visual feature and content as representations of reality. The external structure is similar to Mitchell's artistic, expressive meaning that gets interpreted by the recipient in relation to personal, social and historical traits. The historical context determines the meaning of interest defined by the different perspective on an artwork caused by the timely distance between production and reception of it (Panofsky, 1975). The social context defines "conventions and rules within and by which, articulatory and interpretative strategies are invoked by producers and interpreters of symbolic form" (Worth, 1981, 165). The personal context depends on the beholder's art specific knowledge, plus all previous knowledge about everything else one has experienced in life (Solo, 1994).

3. Meaning Making with Art

“Meanings are not found but made.” - David Bordwell

In the aesthetic of reception, the inquiry of art is conceptualized as *dialogue* (Kemp 1998, Danto, 1981). The artwork as object of inquiry is the point of reference “[...] activating the beholder to take part in the construction of the work of art” (Kemp, 1998, 186). This active role of the beholder when trying to understand an artwork is implied in the term meaning making. In constructivism the term is used to stress that knowledge is not a product the learner can consume, but something developed by the learner in a complex cognitive process influenced by previous knowledge and experience (Jones & Brader-Araje, 2002).

Discussing different levels of meaning that can be identified in films, Bordwell (1991) describes a traditional attempt to differentiate the denotation of *comprehension* from *interpretation* by concluding that “comprehension is concerned with apparent, manifest, or direct meanings, while interpretation is concerned with revealing hidden, nonobvious meanings” (Bordwell, 1991, 2). Meaning making is implied in both terms, but what are the decisive factors inside the meaning making process that one beholder merely comprehends while the other goes on with interpretation? And how does this influence the output of the meaning making: aesthetic experience? In the following chapter, I try to answer these questions beginning with an explanation how individual meaning making is shaped, how expertise in meaning making is achieved and what it means to be visually literate. I proceed with presenting two models of aesthetic development that try to describe five stages of visual literacy by emerging skills, knowledge and abilities. Presenting the prescriptive model of art inquiry by Erwin Panofsky (1975), I show the progressive character of meaning making with

art to be rooted in art history and point to the knowledge and skills expected from an art expert in this field of study. Next, I present three different psychological models that try to conceptualize the cognitive processes involved while engaging with an artwork into a general framework of aesthetic meaning making and the influence expertise has on it. Finally, I show an integrated model of the prescriptive guide to art historic analysis of Panofsky (1975) and the descriptive approach of aesthetic processing by Leder et al. (2004) to further specify the influence of art historic expertise on art specific information processing.

3.1 The Mind as individualized Meaning-Making Machine

Meaning making depends on the personal schema of art, a kind of filter defined by the ways in which the world is represented and anticipated by the mind (Cupchick, 1993; Solo, 1994). Schemas, also known under the term mental models, form in early childhood (Piaget, 1974) through information-processing, and change with every encounter that is made (Neisser, 1979), strengthening, loosening and ramifying connections between represented aspects. Present meaning making is always influenced by the mental history of encounters with art, adds to it and changes it. Bartlett (1932) calls this effort after meaning; Neisser (1979) calls this visual learning. Visual experience is achieved by intensive occupation with visual objects and artifacts (Piecha, 2002). The greater the experience and the refinement of the mental model about art, the greater the influence on the processing of new visual information and aesthetic meaning making (Bruner, 1970; Neisser, 1979). In this sense, an experienced viewer has more freedom of *seeing* because he/she can use his/her *knowing* effectively to make meaning of visual information. Top-down processes question bottom-up impressions and make it less probable to be tricked into illusion. That is how through experience and learning, the gaze becomes an *instrument of thinking* (Mackworth & Bruner, 1970).

3.2 Visual Literacy and Art Expertise

Following these thoughts, the meaning making of two people engaging with the same work of art will never be the same, because everyone has a different kind of visual history captured in their personalized mental model, influencing the way they process and understand a picture and their “freedom of gaze” defined by the interplay of bottom-up and top-down processing. Nevertheless, there are similarities, because visual experiences are always made in context with more dimensions than just the personal (Gombrich, 1982; Cupchick, 1993). For example, everyone is embedded in the social and cultural context of society. Specific communities are interested in art in unique ways and focus on distinct aspects of pictures they conceptualize and document, building the heritage of practical and theoretical knowledge. Artists focus on aspects that are relevant for the production of art, while art historians have the aim to classify and discuss art in the perspective of history and time.

Visual literacy describes the ability to actively decode a visual message through analysis and interpretation of a perceived stimulus with subsequent evaluation of understanding (Brill et al., 2007). Expertise in art is a special form of visual literacy because it implies training and knowledge of domain specific rules and habits to encode and decode visual meaning within relevant frameworks of the community. Expertise can be defined as “exceptional performance” in a specific field (Ericsson, 1991), accomplished through training and measurable by analysing behavior. The starting point for exceptional performance in understanding art is the ability to control ones attention on an artwork in order to gain information and to focus on specific aspects important for interpretation (Zembylas, 2003; Kesner, 2006). Another aspect of art- expertise in Kesner’s view is the ability to evaluate

artistic style in reasonable judgment. So to use it as *instrument of thinking about art*, the gaze has to be transformed in a way that relevant visual information with meaning potential can be distinguished from irrelevant aspects that are less important for interpretation (Haider & French, 1999).

Differences in knowledge, cognition, and language entail that experts and laymen deal with the same visual information from quite distinct perspectives (Rambow, 2000). Taking into account that these differences form through discourse in communities “that shape the social practice of vision” (Walker, 2004, 75), these different perspectives on art can be described as different *visual cultures* (Ludes, 2001). Here, Fish (1980) talks about *interpretative communities* that use certain or typical strategies for their meaning making with art. Being part of their specific visual culture, artists create meaning in pictures and art historians extract meaning from pictures, leaving untrained viewers with a task that they are unlikely to accomplish. Tyler (1999) therefore declares that looking at art is problem-solving.

3.3 Cognitive Development Models

When it comes to cognitive development, a dominant model that deals with how knowledge is gradually acquired, represented and used is Piaget’s model of five stages of cognitive development (Wadsworth, 1996). Thus, to describe aesthetic development, various psychologists and social scientists have taken Piaget’s stages as a basis for their models (e.g. Machotka, 1966; Coffey, 1968; Brunner, 1975; Parsons, 1987; Housen, 1999). Aesthetic development on the one hand refers to making progress in aesthetic expression, like the production of a picture, and on the other hand to refine and sharpen the ability to think, analyze, understand and respond to art. In this thesis, I refer to two models that deal with the second, namely meaning making with art, and that have a developmental perspective modeled into stages in matters of skills, rather than in matters of age.

Parsons (1987) argues that all young children basically show the same form of meaning making with pictures. This initial processing changes and evolves by looking at and thinking about artworks, reframing mental aesthetic schemata. Parsons' model is based on the assumption that this developments show in specific strategies or "clusters of ideas" a person uses to understand a picture that can be described as stages. Each stage stands for a progress in the ability of understanding the meaning of an artwork. Interviewing people of all ages about what they saw and understood when looking at eight artworks, Parsons (1987) describes five stages of aesthetic development based on the responses of his participants, referring to subject matter, expression, form and style, and judgment about an artwork.

Following Piaget (e.g. Wadsworth, 1996) and Vygotsky (1978), Housen (1999) stresses the environmental or contextual aspects that influence cognitive development. Therefore, with what she calls "stream-of-consciousness interviews", Housen (1999) wanted to achieve a natural, moment-to-moment acquisition of people's meaning making with art in the museum setting. In various inquiries in the 70s and 80s, she asked participants to think aloud while looking at different works of art. Making qualitative analysis of the transcripts of these thoughts, she also came up with five stages of aesthetic development. In the stages of her model she describes participants as viewers that show their experience in specific ways of looking at a picture.

Table 1 gives an overview of the two models and the described five stages of aesthetic development. As stages overlap, I give a parallel description of Parsons' and Housen's model, indicating when there are differences in their frameworks.

Table 1. The five stages of aesthetic development as described in the model by Parsons (1987) and the model by Housen (1999)

Stage	Parsons (1987)	Housen (1999)
1	Favoritism <i>Spontaneous, associative responses referring to personal experiences</i>	Accountive <i>Narrative descriptions of content and perceived emotions</i>
2	Beauty and realism <i>A picture is perceived as representation of something, painted in specific style</i>	Constructive <i>Representational features are used to judge and compare them to the real world</i>
3	Expressiveness <i>Refers to the specific ways in which an artist represents individual ideas</i>	Classifying <i>Analytical approach of gathering information to identify a picture</i>
4	Style and Form <i>Integrating different perspectives on the meaning in social context</i>	Interpretative <i>Making meaning by comparing and interpreting visual features in a picture</i>
5	Autonomy <i>Judging the meaning in the context of one's own history of experience with art</i>	Re-creative <i>Relating the meaning in the context of one's own history of experience with art</i>

The first stage in Parsons' model is favoritism. It is characterized by spontaneous and associative responses. Emotional reactions and remarks on the subject refer to personal matters rather than to the visual message in the picture. In Housen's stage of accountive viewers, she identifies storylines, meaning that remarks on the subject matter and the emotional impression of the picture are brought into narrative order.

In Parsons' model this is followed by a change from responding to matters of personal significance to commenting on the representational aspects of a picture. Style becomes a category that is discussed; artistic skill and emotional expression are in focus. This is also true for Housen's second stage. Additionally here, viewers use the description of the representational features of a picture as a logical framework that leads them to a first aesthetic judgment, e.g. remarking if something is represented in a weird or extraordinary way.

Parsons describes this ability to notice ambiguous and outstanding aspects in stage three, where participants' responses refer to the expressiveness of a picture. Expressiveness refers to the artist's way of bringing aspects of his own personal thoughts and feelings into the picture. In Housen's third stage expressiveness is just one analytical strategy to classify a picture. In her model this stage is also characterized by the search for additional information like labels, typical for a museum setting, with the aim to further determine art historical facts like the name of the artist, circumstances and time of production.

Stage four in both models is about interpretation of symbolism. Housen argues that the viewer employs critical skills in order to make meaning of symbolic elements of a picture. These critical skills are vaguely described and imply use of previous knowledge and comparisons of different visual features inside the picture. Parsons brings in the social context that offers new insights and ways of interpretations through discourse with others.

The last stages of both models have in common that they ask for a kind of re-thinking of one's own interpretation and understanding by relating it to the personal history of art experience (Housen) and by judging the personal experience according to a social and cultural context that asks for a measuring of the success of meaning making according to general ways of understanding (Parsons).

Both models have in common that they try to give a description of dynamic changes in meaning making as stages of aesthetic development by closely looking at participant's talk. Beginning with understanding on a personal level, both models add a different context in every stage that changes the meaning making. Regarding a picture as representation, considering the artist in the role of the producer and communicator, and referring to social and

cultural influences are different perspectives that are applied for understanding a picture. The critical aspect is how the different elements of meaning making are understood, labeled and coded in participants' verbal data and sorted into the stages.

The two models give a first impression about the characteristics of the meaning making activity when looking at a work of art. The different layers of meaning coded in a picture that were described earlier get addressed in different stages in both models. Yet it is unclear what role these different types of meaning in a picture play in the cognitive process of meaning making applied every time when looking at a painting, regardless of stage of development.

3.4 Erwin Panofsky's Model of Iconography and Iconology

According to the presented developmental models of aesthetic processing, a visual literate person is characterized by critically analyzing a picture accounting for multiple perspectives, interpreting the meaning of pictorial elements including the level of symbolism and the ability to judge one's own meaning making performance. To understand in which ways these skills and abilities are characteristic for art historic inquiry of pictorial art, it is worth looking at a renowned model of meaning making with art proposed by Erwin Panofsky (1975) in connection to the art of Antiquity and Renaissance. In his model of iconography and iconology Panofsky describes how to inquire into an artwork in three analytical stages (Table 2) leading to a significant interpretation in accordance to the art historic community.

Table 2. The three stages of Panofsky's model of Iconography and Iconology

Object of interpretation	Act of interpretation	Equipment for interpretation	Corrective principle of interpretation (History of tradition)
1 <i>the world of artistic motifs</i>	Pre-iconographical description	Practical experience <i>Familiarity with objects and events</i>	History of style <i>How objects and events were expressed by forms</i>
2 <i>the world of images, stories and allegories</i>	Iconographical analysis	Knowledge of literary sources <i>Familiarity with specific themes and concepts</i>	History of types <i>How themes or concepts were expressed by objects and events</i>
3 <i>the world of symbolical values</i>	Iconological interpretation	Synthetic intuition <i>Familiarity with the essential tendencies of the human mind, personal psychology and "Weltanschauung"</i>	History of cultural symptoms or symbols <i>How ideas were expressed by specific themes</i>

Important for an art historic inquiry is the consideration of the historic dimension of all observations, starting from the point of the picture's production and ending with the point of its present perception. That means in every attempt to describe, analyze or interpret a picture in the present moment, one has to consider all past moments that mark changes in artistic expression, skill and common ground of symbolism that come along with changes in society and culture. So time and changes that come with it are the rational basis of all stages of art inquiry described by Panofsky.

The first stage of pre-iconographic description advises to describe content and themes of an artwork. To accomplish this, the viewer needs experience in how objects and events get expressed visually and the expert knowledge of history of style (how the visual expression of objects and events has changed over time). On the second stage of iconographic analysis the viewer is instructed to interpret the meaning potential of objects and events depicted in an

artwork. This expects the knowledge of relevant historic sources that discuss specific content with its meaning in connection to the artist and the expertise in history of types (how certain ideas and themes got expressed in objects and events over time). The third stage of iconological interpretation implies a synthetic conflation of the made interpretations that reflects the depth or significance of an artwork's meaning, measured in the greater art-historical context, implying the expertise in the history of symbols and cultural symptoms (knowledge how certain attitudes and mentalities got expressed by specific ideas or themes over time).

So according to Panofsky, an art historian meaning making is structured: first of all it implies thorough descriptions of everything that is depicted, second it is characterized by a close attention to objects that seem promising for symbolic meaning, and finally it includes a great deal of interpretations that indicate a measuring, adding and merging of meanings for a sound aesthetic experience. And all these structured steps of analysis, of course, are embedded in a vast previous knowledge of the classification and significance of specific artworks in the greater, systematic framework of art historic tradition.

3.5 Cognitive Information Processing Models

The developmental models of aesthetic processing provide an idea of how aesthetic learning shows and which general skills the learner has to gain to be able to analyze a picture on its multiple levels of meaning. Panofsky's guide to art inquiry presents the analytical depth of art historic meaning making that enfolds in a structured step-by-step process, including looking at specific elements repeatedly with differing analytical focus. Another way of conceptualizing aesthetic processing therefore must be to describe a current encounter with a work of art as cognitive process in stages that is influenced by experience and expertise in specific ways.

In the following, I am going to present three different approaches describing general aesthetic processing in models that put perceptual, cognitive and affective shares into an interdependent sequence. All models have in common that they comprehend aesthetic experience as a process of multiple stages with a central role of the cognitive activities. Exposure to art is the starting point or input of the models, and processing ends with aesthetic experience characterized as judgment about one's own meaning making activity and aesthetic emotion that unfold and evolve during meaning making. For all three models I provide a translation of the different processing stages in a graphical representation, including the direction of progression, and the marking of automatic and deliberate as well as emotional shares.

3.5.1 Chatterjee's Framework of Aesthetic Processing for Cognitive Neuroscience

Chatterjee (2003) proposes a framework of aesthetic processing for cognitive neuroscience. He develops the framework by presenting three steps of visual processing as discussed in cognitive psychology, and pinning findings of neuronal studies to it, that describe aesthetic abilities and the loss of them observed for people with specific brain damage. Figure 2 shows the model with its components and connection.

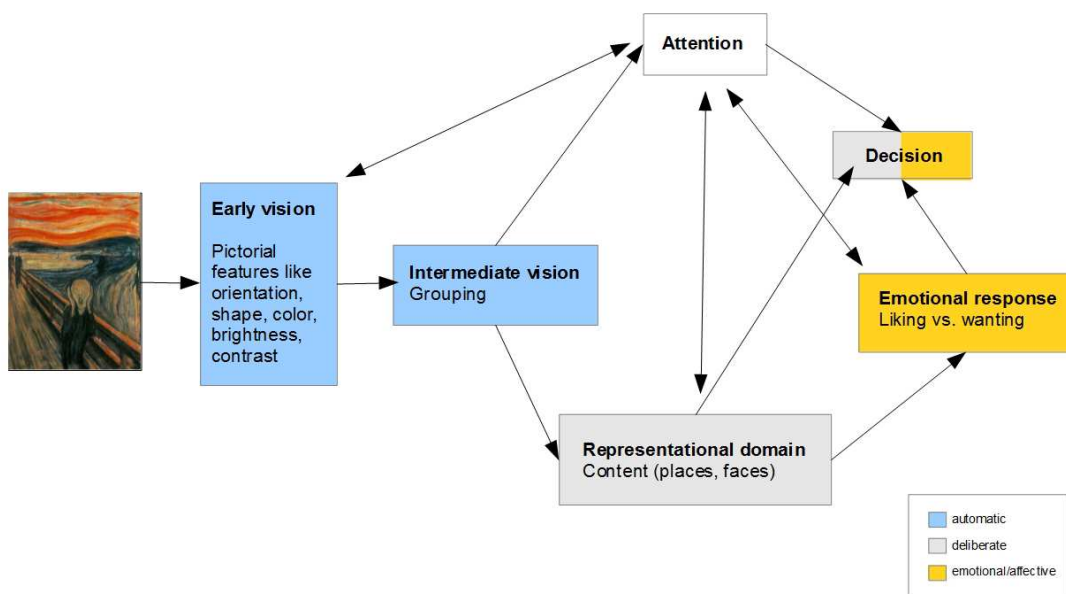


Figure 2. A Reproduction of Chatterjee's Framework of Aesthetic Processing (2003)

The hierarchical and parallel processes during vision of an artwork can be structured in early, intermediate and late stages (Marr, 1982) that relate to the three levels of meaning in a picture discussed earlier (see 2.1.3). In early vision, pictorial features like color, shape, brightness and contrast are processed. During intermediate vision this information gets clustered and separated to form coherent fields of sight. Chatterjee supposes that both, early and intermediate vision, are bottom-up driven and therefore happen automatically and without effort, while late vision is formed top-down. Special to aesthetic processing of an object is that specific attributes of an object trigger emotional processes that generate and sustain attention. Specific combinations of visual features (e.g. effects of symmetry, balance and good composition), processed in early and late vision, underlie the activation of this “feed-forward system” of attention (Chatterjee, 2003). Another important factor of aesthetic processing for Chatterjee is the emotional response of “wanting” in contrast to “liking”. Instead of liking, that is to judge the quality of an artwork, he explains that aesthetic processing leads to wanting: the self-rewarding character of aesthetic experiences bound to the degree of satisfaction with own meaning making.

3.5.2 Marković’s Functional Model of Aesthetic Experience

Marković proposes two stages of aesthetic processing that lead to an aesthetic experience he defines as “exceptional state of mind” (2012, 6). The perceptual stage concerns the processing of pictorial properties like complexity, familiarity and symmetry that lead to a feeling of excitement and increase attention. The narrative stage concerns the processing of complex aspects of composition and symbolism. This processing is self-rewarding and leads to increased attention that Marković calls fascination. Figure 3 shows the two stages integrated in a model of information processing.

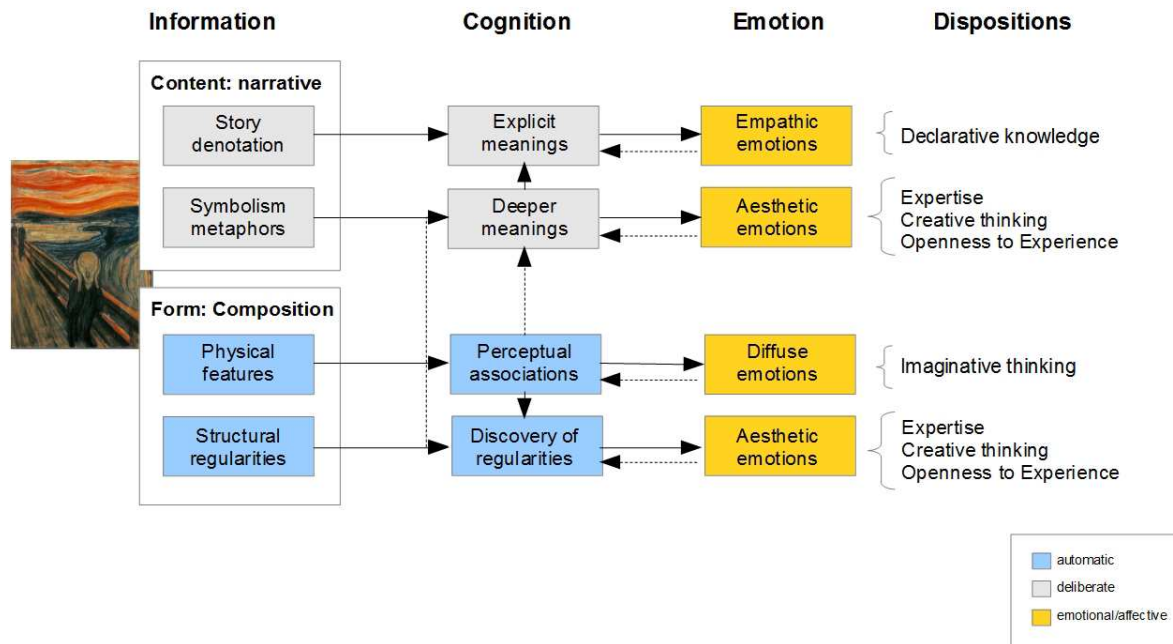


Figure 3. A Reproduction of the Model of Aesthetic Experience of Marković (2013)

In his model Marković doesn't explicitly distinguish between top-down and bottom-up, but he separates the processing of physical and structural features for the perception of composition, and the level of story and symbolism as narrative aspects to discover deeper meaning. He stresses the importance of personal traits like imagination for perceptual processing, and creativity and openness for both, discovery of structural regularities and interpretation of deeper meaning. Additionally Marković provides first ideas about the influence of expertise on aesthetic meaning making. In his view, expertise does not affect the perception of physical features and the ability to denote the meaning of depicted content, but it is important when it comes to “see” complex regularities in an artwork's structure and to interpret the artist's intention.

3.5.3 Leder et al.'s Model of Aesthetic Appreciation and Aesthetic Judgment

Leder et al. (2004) describe aesthetic meaning making as a sequence of five stages, influenced by specific cognitive and contextual characteristics and a continuing affective evaluation. The cognitive factors, e.g. previous experience, domain specific knowledge and also personal interest and taste in art, are sensitive to specific training and learning. The processing stages are explained by means of influence of expertise. Figure 4 shows the five stages of aesthetic processing and the possible influencing factors expertise as well as social and physical context.

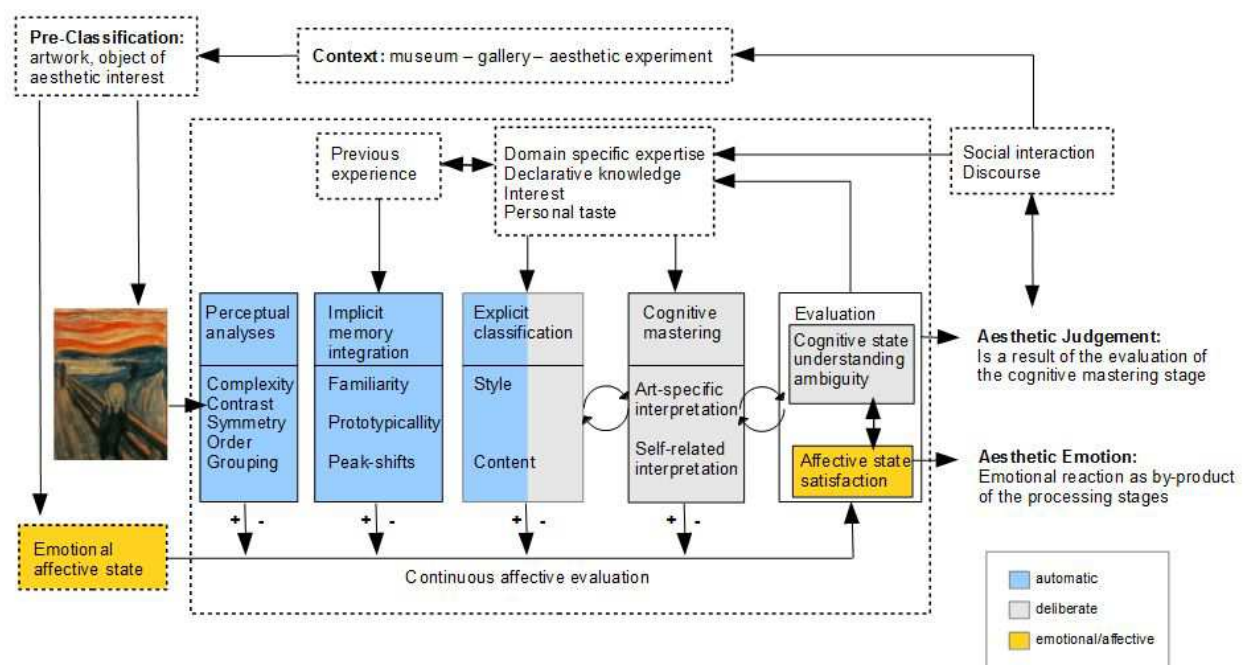


Figure 4. A Reproduction of Leder et al.'s Model of Aesthetic Appreciation and Aesthetic Judgment

Aesthetic processing starts with perceptual analyses of the stimulus on a preconscious level. It concerns visual features such as color, shape, brightness and contrast but also structural aspects like symmetry or grouping effects. This quick, rather effortless analysis is followed by implicit memory integration. Processing on this stage relates to effects like familiarity, prototypicality and peak-shift, transitioning to conscious processes that are influenced by expertise.

On the third stage of explicit classification, expertise reflects in specific concepts of content experts use to describe and name what is seen. Thus, while laymen merely use terms and emotions familiar to them from everyday experiences (Cupchik, 1992; Augustin & Leder, 2006), experts relate artworks according to style and other aspects of frameworks significant to their associated community (artists, art-historians).

The interpretation of a work of art, according to Leder et al. (2004), happens on two intertwined stages: cognitive mastering (stage 4) and evaluation (stage 5): information processed so far gets integrated and tested for ambiguity that triggers search for new aspects of the artwork that get integrated and evaluated again until the viewer is satisfied with his/her understanding. In the end, the output of this meaning making process is an aesthetic emotion and judgment of the artwork.

Leder et al. assume that expertise affects the quality of the cyclic interplay of the last two stages, in line with the form versus content conceptualization of experts and laymen differences in the aesthetic perception of art. How expertise changes the shape and quantity of the cyclic relationship between cognitive mastering and evaluation is not further addressed. Also, how social interaction or the difference of viewing an artwork in a laboratory in comparison to viewing it while visiting a museum is not further discussed, but presented as important influential factors on aesthetic processing.

In sum, all three models have in common that they try to structure the cognitive processes during meaning making with a present artwork into different stages brought in a specific order indicating the course of time and the level of meaning that gets processed.

On the one hand, the models expect aspects of good composition and good gestalt to be regulating attention on an automatic level with a “feed-forward-system”. This means that composition can have an influence on how intensively pictures are being looked at. In this way, *seeing* influences how deep the beholder engages into the relationship with an artwork where *knowing* can be tested and applied.

On the other hand, it can be argued that the quality of aesthetic experience is influenced by expertise, because the ability to interpret and to evaluate the understanding resulting from meaning making is critical for “wanting”, the final aesthetic emotion. The extent to which the beholder is able to interpret different aspects of a picture is an expression of cognitive mastering. Evaluation happens by integrating the interpretations to a congruent meaning, incongruency triggers the search for new information. The role of top-down processes that are strongly influenced by specific knowledge of experts is emphasized. *Knowing* plays an important role to judge and integrate *seeing*.

Thus, referring to the quote of Gombrich at the beginning of this thesis, the more you *know* the more you *see*, and the more you *see* the more you can apply what you *know* – but it all depends on what knowledge you have to apply and refer to.

3.6 Integrating a Prescriptive and Descriptive Model of Meaning Making with Art

So what does the knowledge of art historians do to the meaning making process with art? To study the differences in the shape and structure of the aesthetic process between art historians and untrained viewers, I integrate the model of aesthetic processing by Leder et al. (2004) with the model of iconography and iconology by Panofsky (1975), shown in Figure 5.

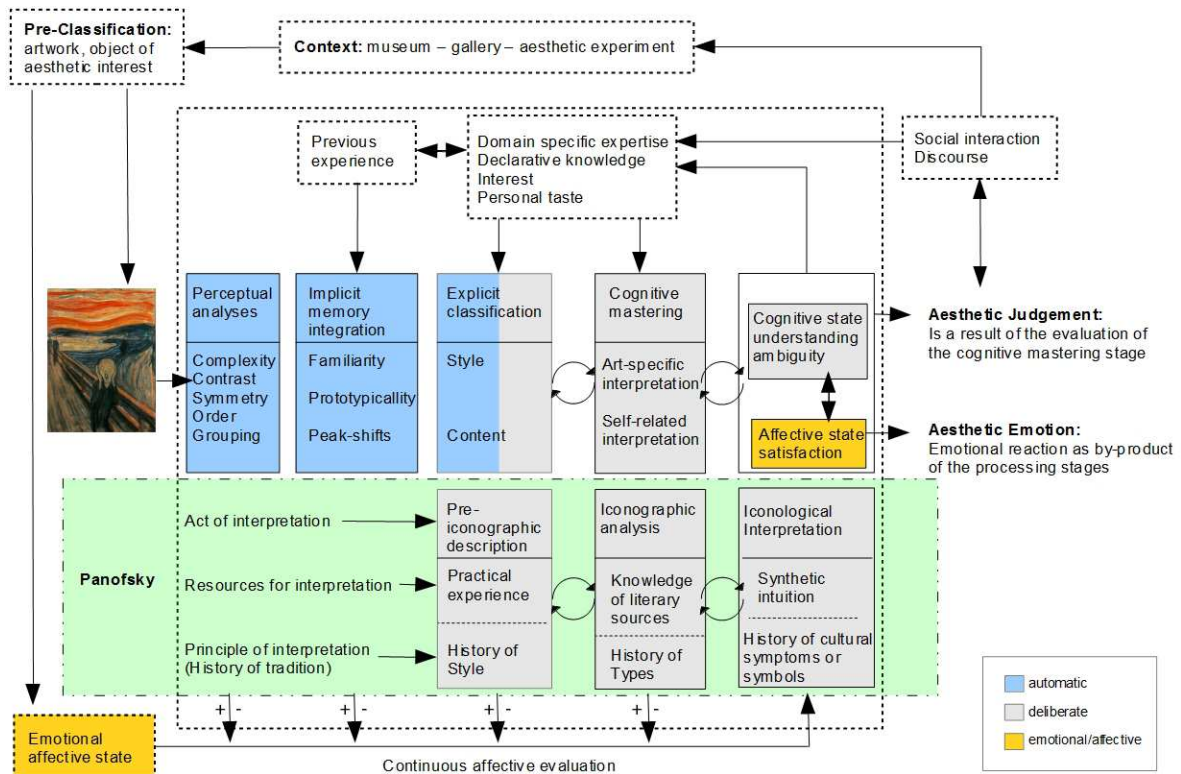


Figure 5. Integrated model of Leder et al.'s five stages of aesthetic processing and Panofsky's three stages of iconographical and iconological meaning making with paintings

Leder et al.'s model offers a theoretical framework towards general aesthetic processing in five stages, including automatic and deliberate cognition constantly accompanied by emotional processes. Panofsky's model offers an instruction to go about aesthetic processing of specific art in three deliberate stages of analysis. Combining the two makes it possible to anticipate the influence of art historical expertise on higher order processing of art.

The integration of the models starts on the level of explicit classification, on which according to Leder et al. (2004) experts use domain specific concepts in order to describe and classify a picture. This is equivalent to the first stage in Panofsky's model, pre-iconographic description: art historians are advised to closely describe content and style of a picture, using their experience and their knowledge about how objects and events get expressed in paintings considering the historical dimension of art production and significance.

Cognitive mastering implies interpretation in relation to domain specific knowledge and personal experience. Regarding the expertise of art historians, apart from being familiar to specific knowledge sources and art historic literature, this level of iconographic analysis implies the knowledge of the symbolic meaning of depicted objects and events, again of course considering the shifts and changes of symbolic meaning in society over time.

In order to make an iconological interpretation of a picture, all iconographic interpretations have to be considered and integrated to a conclusion about the artwork's meaning. In Leder et al.'s model, this stage is evaluation, including the feedback-loop to cognitive mastering that implies the selective search for new information needed for a fitting conclusion according to art historic concepts and frameworks.

Following this integrated, theoretical framework, differences between experts and laymen of art history get apparent in *seeing* in the way that the art historic gaze is used to find specific information they can apply to iconographical and iconological interpretation. The differences should also get apparent in the *knowing* in the way that experts' meaning making and final understanding of an artwork should include interpretation of higher levels of meaning, such as symbolic meaning of single objects or events and a classification of theme and significance of the artwork deriving from these meanings.

Keeping these thoughts about the effects of *seeing* vs. *knowing* for the meaning making with art in mind, I am next going to present findings and results of empirical studies in the psychology of aesthetics that focus on specific aspects of aesthetic processing to reveal the perceptual, cognitive and emotional impact of specific pictorial aspects in a picture. These findings shall help to give an overview of the “mosaic of empirical discoveries” (Jacobsen, 2006, 155) that builds the basic evidence for the structure of aesthetic processing of art at present times.

4. Studies about Aesthetic Processing

“Most of the power of painting comes through the manipulation of space...but I don't understand that.” - Jasper Johns

In cognitive psychology, there has been a lot of research on aesthetic processing. In this thesis, I concentrate on studies that used original or reproductions of paintings to address specifically the processing of complex but naturalistic aesthetic stimuli with high ecologic value. I am providing findings beginning with lower levels of aesthetic processing towards studies that are occupied with higher-order processing of meaning of art. Furthermore, I present studies that indicate the influence of expertise and findings that show a different processing of representational in contrast to abstract art.

An important aspect of aesthetic experience is that it is self-rewarding. The feeling of having understood a painting is assumed to be closely connected to a feeling of pleasure or satisfaction (Beardsley, 1983; Solso, 2003; Russell, 2003). In some aesthetic studies this feeling of pleasure seems to be misunderstood and measured by ratings of liking a painting. A reason for this might be rooted in the history of aesthetic psychology, where preference ratings played a paramount role (e.g. Fechner, 1871). Likert-scale ratings are also used for other dimensions of aesthetic processing, e.g. the extent to which participants understand a picture, meaningfulness, or expressiveness and complexity of presented stimuli. Further methods used for analyzing cognitive processes in meaning making with art are card-sortings or “subjective classifications” (Bruner, Goodnow, & Austin, 1956), used to generate comparative data suitable for investigating underlying concepts that characterize participants’ specific mental models of art. Brain scanning offers insights into aesthetic processing by

analyzing neuronal activity while looking at specific works of art. Eye-movements show how attention is led bottom-up by saliency of art-intrinsic features, but also reflects meaning making on higher levels of aesthetic processing when using data to analyze how attention is distributed on informative and non-informative areas of a painting.

So far there is little research occupied with aesthetic processing that touches upon symbolic meaning and requires cognitive mastering and evaluation of one's own understanding (Leder, 2013). Aesthetic processing concerning higher levels of meaning is addressed in different attempts to frame models of constructing meaning (Machotka & Spiegel, 1979) and aesthetic development (Parsons, 1987; Housen, 1999; described in Chapter 3). These studies have in common that they analyze participants' verbalizations to paintings while viewing them. Studies that indirectly deal with deeper levels of understanding art are providing different kinds of additional information to the beholder while viewing art. These findings are presented in connection to the physical dimension of an art museum situation.

4.1 Composition as the Structural Framework of a Picture

Since Fechner (1871) who confirmed in empirical studies that specific proportions, e.g. the "Golden Section", are clearly preferred to others, composition principles in paintings have been a focus in aesthetic research. The "Compositional Pyramid" (Berger, 1963; Puttfarken, 2000) is another principle that is based upon the assumption that certain distributions of pictorial features (e.g. specific forms, lines, color and brightness) in a painting lead to the perception of structural balance. That is to say, effects of grouping on an automatic level of perception are influenced by deliberate artistic skill. For example Tyler (2006) showed by analyzing 170 portraits, each of a different artist from 15th to 19th century, that artists tend to

place one eye in the center of the painting. So there are rules of good composition that artists revert to when creating a picture, and influence the aesthetic processing of its beholder in specific ways. This stands in line with an artist's aim to constitute meaning in an artwork by means of visual expression.

The power of different pictorial features to direct gaze in a picture is often referred to as saliency (Nothdurft, 2000) associated with bottom-up processes of visual perception. The saliency of different visual features in a picture can be computed in saliency-map-models predicting eye-movements to specific pictures (Itti, 2005). The tendency of participants to look at human features has been predicted by several saliency-map models. Showing natural scenes containing frontal shots of people, Itti and Koch (2001) found that faces were fixated within the first few fixations, whether subjects had to grade an image on interest value or search it for a specific non-face target. Cerf et al. (2008) found the tendency to look at human features to be stronger than the saliency-influence of other intrinsic image features such as color, organisation, intensity, flicker or motion.

In connection with saliency one might also mention the impact of detail on eye-movements on a painting. Using altered versions of 5 portraits of Rembrandt, Di Paola et al. (2013) showed that gaze can be directed by making specific areas of a picture especially salient using different ways of alternation, e.g. sharpening or highlighting. This is especially interesting, regarding specific schools in art like Mannerism, emerging in late Italian Renaissance, associated to emphasizing details by experimenting with proportion and perspective.

Locher et al. (1996) altered the structural balance of representational and abstract paintings and asked art-trained and untrained participants to indicate their center of balance. While representational art offers orientation on denotative details, the balance in abstract art is a matter of structure and visual regularities. The balance point was explained to participants as

the point where attention is naturally led. The results indicate a shift of perceived balance in original reprints and altered versions with high agreement between participants. Also, studies show that around 40% of the balance judgments are assigned to pictorial elements in the central area of a painting, for both trained and untrained participants (Locher et al., 1996; McManus, 1985). There are several explanations for this central bias. One theory, called the photographer bias, is trying to explain the central tendency in referring to picture-production: photographers tend to place objects or actors of interest near the center of their composition and enhance their focus and size relative to the background (Parkhurst & Niebur, 2003; Tatler, 2007). But the central bias can also be explained as a viewing strategy: Parkhurst et al. (2002) found out, that viewers reorient at a greater frequency to the center of a scene relative to other locations, if they expect highly salient or interesting objects there.

Visual weight and balance point are both synonyms for areas that get immediate or most attention (Arnheim, 1974; Locher et al., 1996; McManus & Kitson, 1995). Pictures look heavier on the right (Arnheim, 1974) and are inspected left to right, which is often explained with reading direction (Freimuth & Wapner, 1979), thus likely to be sensitive to culture (Chokon & De Agostini, 2000). Regarding emotional impact of composition, Heller (1994) showed that both adults and children place figures more to the left when painting sad pictures. Also, orientation changes the expressiveness of paintings. Balancing left-right effects, Bennett et al. (2010) found that the characters of animals in drawings by Thomas Bewick were rated less extreme when shown with orientation reverse to original. In sum, the presented studies indicate that composition influences meaning making on perceptual and emotional level by leading the eye and thus changing the distribution of attention to specific areas in a picture. A first selection of information in aesthetic processing is thus made due to automatic, bottom-up processes of perception.

Concerning aspects of good composition, studies also show that shapes can be more or less meaningful to the beholder, as proposed by gestalt psychology (e.g. Wertheimer, 1923; Köhler, 1929; Arnheim, 1949) and Gibson's ecological approach to perception (1978). In the tradition of Berlyne (e.g. 1966), Shigeto and Nittono (2010) used a set of polygons to analyze the influence of complexity and meaningfulness on aesthetic experience. While complexity was expressed in the number of sides of the polygons, meaningfulness was rated prior to testing by asking 94 people to rate on a 7-point scale if the polygons looked like a namable object, but without naming the object. Complexity had an influence on how long participants looked at the polygons no matter how meaningful they were. Meaningful polygons were easier to recognize when rotated no matter how complex they were. Additionally, participants rated meaningful polygons as more interesting, in positive correlation with complexity. These findings show that it is not only structural properties of composition triggering certain emotions that entail attention (Chatterjee, 2003), but also cognitive associations (Marković, 2013) that sustain it.

4.2 Style as the Unique Factor of Art

Style is a unique aspect of art (Leder et al., 2004), closely connected to the individual artist's way and power of expression, but also different techniques of depiction and art historical genres can be characterized by style. Yamamura et al. (2009) distinguished paintings by Dali and Picasso using computed parameters derived from fMRI outputs of experts and laymen in art, looking at paintings by the two artists. In a training phase participants received the artist's name as label on 30 works of each artist in original and masked version (original painting digitally fractioned into squares and randomly put together again). In several experimental runs participants then had to indicate the artist's name after looking at original and masked images. Training a decoder system according to fMRI results on some of these runs, the

system could later detect an artist by the specific fMRI output of a participant above chance for the original, but not for the masked images. Experts' fMRI representations of the two styles lead to higher detecting accuracy than laymen's, while both groups were equally good when asked to name the painter.

Leder (2013) describes that the processing of style is marking the point where the question of "what is depicted" changes to "how it is depicted". In a study occupied with the chronology of aesthetic processing, Augustin et al. (2007) found that the processing of style follows content. They presented pairs of artworks for 10, 50, 202 and 300ms, varying in style and content, and asked untrained participants to rate their similarity. Participants noticed dissimilarity of content under all time-conditions, while effects of style were traceable after 50ms. Assuming that the first term used for recognition of an object constitutes the entry-point of the processing of meaning (Rosch, 1975; Jolicoeur et al., 1984), Belke et al. (2010) asked students of art history to name pictures of art and non-art with the first noun coming to their mind. They found that the artist's name was the most frequent used category, arguing that this is connected to the recognition of individual artistic style.

Using signal detection theory, Cela-Conde et al. (2002) found that looking at high art, participants discriminated representational art better from distractors than abstract art, distractors being another artwork from the same artist and similar genre. The difference in the ability of discrimination was diminished for participants with training in art history. The authors assumed that because abstract art is not related to a specific theme, it has to be processed according to style, which is not considered an easy task for untrained viewers. This sensitivity of art experts to style is also reflected in judgments of art, with studies showing that the preference of figurative over abstract art vanishes with rising expertise (Hekkert & van Wieringen, 1996; Phiko et al., 2011).

Style is an aspect especially considered by art experts when describing and classifying works of art. Augustin and Leder (2006) showed a set of modern and contemporary art to students of art history and students without explicit training in art. Using the card-sorting technique of natural grouping, participants classified artworks through splitting and labeling them according to dimensions underlying the groups' perception and interpretation of art. Results show that trained participants used art-specific concepts, especially those considering style, to classify the study material, while untrained participants referred to content, personal experience and feelings. Similarly Putko (1989) showed that when asked to interpret well-known paintings of different genre, artists referred to use of color compared to contrast or form, while untrained participants noted the paintings emotional impact. These findings are coherent to discussions in aesthetic psychology that formulate form versus content as an outstanding difference between experts and laymen of art (Parsons, 1987; Winston & Cupchick, 1992; Hekkert, 1995). While experts are concerned with compositional features and formal relations, laymen are occupied with denotative aspects and resemblance between representation and reality (Cupchik & Gebotys, 1988; Belke et al., 2010; Augustin & Leder, 2006).

4.3 Attention as an Important Aspect of Expert-Lay Comparison

As described before, "freedom of gaze" or the ability to control ones attention is an important attribute of art experts, because it enables the beholder to focus on meaningful information for the interpretation of a picture (Kesner, 2006; Zembylas, 2003; Mackworth & Bruner, 1970). This is why in experimental aesthetics eye-tracking is a method often used to compare experts and laymen in art. It is assumed that eye-movements are linked to attention and thus reflect cognitive processing (eg. Buswell, 1935; Massaro et al., 2012) not only bottom-up but also top-down, e.g. through instruction, training or expertise (Yarbus, 1967; Antes & Kristjanson,

1991; Jarodzka et al., 2010). Top-down driven gaze is associated with image aspects of higher order such as style, semantics and context (Cerf et al., 2008). Areas that are especially looked at are referred to as relevant. To predict eye-movements according to relevance, areas of interest are defined in a picture by making assumptions in close connection to task.

A pioneer in eye-tracking, Yarbus (1967), found that participants, rather than randomly scanning a picture, frequently fixate specific parts of a painting that carry meaning. With the help of an art educator, Kristjanson and Antes (1989) defined centers of interest in nine representational paintings as areas that provide important information for meaning making. 15 Artists and 15 non-artists, who viewed these paintings for 20s, had a greater density and duration of fixations on centers of interest compared to other areas. Using the same data Antes and Kristjanson (1991) discriminated artists from non-artists analyzing fixation density on non-informative areas of the paintings. Concerning the group of artists it was interesting, that areas with little information for meaning making were more frequently looked at when paintings were unfamiliar. When they knew a painting, they were looking less at non-informative areas and thus were more effective in analyzing the painting for meaning making.

Nodine et al. (1993) manipulated the balance of six paintings ranging from representational to abstract art and showed the original and manipulated version for 12s each in randomized order to seven participants trained and seven untrained in art. Fixation durations on the paintings were clustered and aggregated according to specific areas in the paintings. Art-trained participants made longer fixations on the original, balanced versions than on the altered, unbalanced versions of the paintings. For non-artists it was the opposite. Interpreting short fixations as a sign for global exploration and long fixations as a sign for local

exploration, the authors assume that experts are sensitive to composition and use the structure in original paintings as “skeleton” that leads their attention and helps them analyzing the painting intensively on areas that are informative for meaning making. Laymen on the other hand cannot make use of a painting’s structure for meaning making, so their gaze is lost in information.

Presenting a set of 35 paintings belonging to five categories in a continuum from representational to abstract art in two sessions for 10 and 30s, Phiko et al. (2011) recorded the eye-movements of 20 art historians and 20 students of no art related studies. Defining the sum of all saccade durations as length of the scanpath the eye of a participant made over a painting, they found that with rising abstraction of a painting the length of the scanpath and the number of fixations increased, while the mean duration of fixations decreased for all participants. Thus the gaze patterns of both experts and laymen for abstract art are characterized by short fixations with global scanning and for representational art by longer fixations with local scanning.

Zangemeister et al. (1995) presented five paintings of different genres to six participants without art training, four participants interested in art and four artists. In contrast to Phiko et al. (2011) here eye movements showed that artists scanned the paintings more globally, especially abstract art, while non-artists’ scanpaths of representational and abstract paintings showed no significant difference. But it has to be said that the measurement of scanpath for Zangemeister et al. (1995) was defined differently, namely the ratio of global and local saccades, split by their amplitude lower or above $1,6^\circ$. Also, the number of stimuli as well as participants is quite small in this study and may have led to an overestimation of found differences.

Nodine et al. (1993) also found that artists looked longer at areas in the background and figures changed by balance-manipulation, while non-artists look longer at foreground and central figures. Having a closer look at the fixations on human features for an inspection time of 30s, assuming that this time is sufficient for coming to an aesthetic judgment Phiko et al. (2011) found that laymen looked longer at human features than experts. Other eye-tracking studies (Vogt, 1999; Vogt & Magnussen, 2007) confirm this finding that untrained viewers prefer looking at human features and objects, while trained participants spent more time on scanning structural and abstract features. Yarbus already observed this greater freedom of experts from boundness to human features in 1967. Vogt and Magnussen (2007) found that artists' gaze is stronger influenced by task instructions. When asked to memorize paintings (12 representational, 4 abstract) experts made local fixations on representative paintings and global fixations on abstract ones. In sum these results point to that experts can adjust their gazing behavior to the information-offer of a painting, traceable in composition and style.

4.4 Verbal Data as Source for Investigating Aesthetic Processing on Higher Levels of Meaning

Meaning on a deeper, abstract level needs interpretation (Bordwell, 1991). Studies trying to investigate how these levels of meaning get processed therefore need to engage with participants' thoughts. Regarding verbal descriptions to a painting as a source to reveal the characteristics of the meaning making process with art, Machotka and Spiegel (1979) interviewed subjects about what they saw in paintings that were shown to them. Gathered data was used to discuss a "model for the construction of meaning" consisting of three higher cognitive processes assumed to happen simultaneously while engaging with an artwork and documented by means of occurrence in the verbal streams. The authors discuss "perceptual strategies" applied by the viewer to define if an object should be viewed as artwork and thus to expect deeper meanings. The second process is characterized by using different "sources of

meaning”, such as additional information to an artwork, the meaning potential of visual components of the artwork as well as previous knowledge and one’s own aesthetic experience. The third process of “schema formation” describes the integration of the outcomes of a present aesthetic encounter into the personal mental history or, in other words, mental representation of art.

Analysing thinking aloud gathered in interviews with participants viewing works of abstract and representational art Parsons (1987) and Housen (1999) both framed a five stage model of aesthetic development based on Piaget’s work (see 3.3, p.22). Here, verbalisations are used to classify participants according to their analytical skills and level of expertise concerning art. For classification, Housen (1999) breaks down participant’s thinking aloud into single thought units. A selection of 15 units then gets categorized according to a manual the author developed on the basis of verbal data from her studies starting in the 1970s. Both Parsons’ and Housen’s model discuss growing art expertise in connection to a turn from content to form focused analysis. High stages of aesthetic development are further characterized by interpreting perceived pictorial components and integrating these interpretations to a personalized understanding of an artwork.

Recording thinking aloud concurrent to eye movements is discussed as a method allowing for clearer descriptions of sequence and evolution of perceptual and cognitive processes than when using both methods separately (Ericsson, 2003; Locher et al., 2007; Holmqvist et al., 2011). Showing eight paintings of abstract and representational art on slides to 15 untrained participants, Locher et al. (2007) used eye tracking with simultaneous thinking aloud to discuss their two-stage model of visual aesthetic, assuming that after the automatic generation of a quick global impression of an artwork it is then analysed top-down local in depth. A painting was shown as long as a participant was talking. In a way that is not further specified, audiotaped thinking aloud was split in chunks of verbalizations and assigned to one of six

response types. These ranged from 1. naming single elements or 2. several elements to 3. referring to realism, 4. beauty, 5. expressiveness or 6. style and form of the painting. Initial reactions (thinking aloud prior to 7s) as well as later reactions after 7s revealed the majority of responses to refer to expressiveness, style and form, and naming of several elements. Defining different areas in each painting using a grid, Locher et al. (2007) describe the frequency and time participants fixated specific areas of a painting during the first 3s and between 3 to 7s discussing the use of response types. Thus, verbal data in connection to the visual analysis of artworks has proven to the potential of being used for getting further insights in course and shape of the perceptual and cognitive processes during meaning making, as well as for the specification of experts' skills and use of knowledge to inquire into an artwork.

4.5 Finding Meaning in Art Exhibitions

Gombrich (1994, 45) argues “the chance of a correct reading of the image is governed by three variables: the code, the caption and the context.” In their model, Leder et al. (2004) emphasize the influence of contextual aspects on meaning making. But so far, there are little studies considering it. Looking at an artwork in the museum setting changes aesthetic processing in diverse respects. First of all, it is more probable to identify an object as artwork (Leder et al., 2004), because the art museum as institution owns authority in deciding what is art and what isn't simply by choosing certain artworks for display and neglecting others. Next, museums are expected to exhibit “the real thing” (Hampp & Schwan, 2014). The aura of the original on aesthetic experience is an aspect of artworks that has been in discussion for a long time (Benjamin, 1977; Korff, 2002). In a study about the influence of presentation format, Locher, Smith and Smith (2001) account for differences in aesthetic experience when seeing artworks on a screen in a laboratory, or in a naturalistic setting of a museum exhibition.

They found that, while perceptual and aesthetic ratings between paintings were quite diverse in general, participants rated original paintings in the museum setting to be more pleasant and interesting.

Apart from the artworks, the museum situation offers other sources of information such as labels, placards or multimedia guides. Russell and Milne (1997) found, that abstract paintings were rated as more meaningful when providing the original title to participants, but found no significant difference in participants' ratings of liking. Using a within-design, Russell (2003) compared participants' ratings of abstract paintings first viewing only the paintings, and second with title and artists. This time, with additional information, the paintings were rated as more meaningful and more pleasing. Accordingly Belke et al. (2010) varied the extent of information available while viewing a painting, using semantically related, unrelated and neutral titles for representational, cubist and abstract artworks. Results of participants' ratings show that paintings presented with the most informative title for meaning making were liked best. Representational paintings achieved the highest ratings, followed by cubist and then abstract art.

Leder et al. (2006) showed participants descriptive and elaborative titles in addition to abstract art with short (1s) and long (10s) presentation time. For each painting, participants rated liking and their understanding of the artist's intention. Between time- and title-conditions there was no difference of liking. Descriptive titles increased the understanding of abstract paintings presented for 1s. Elaborative titles increased meaning making of abstract paintings presented for 10s. Leder et al. (2006) argue that these results show that processes of meaning making are sensitive to time. Short presentation merely suffices for description, while previous and domain specific knowledge is applied and used for interpretation, when one can engage with an artwork's meaning for a longer time.

Smith & Smith (2001) found, that the mean time visitors spent in front of an artwork in an exhibition is 27.5 seconds. In reference to Leder et al. (2006) enough time for elaborative aesthetic analysis of a picture, while Locher et al. (2007) found 32,5s to be the average observation duration participants need in order to come to an aesthetic judgment. If and how long visitors stay in front of an exhibit is influenced by a complex mix of environmental factors (Maxwell & Evans, 2002) in the museum space. For example common findings about movements in an exhibition are that by entering an exhibition visitors tend to turn right and move along the walls rather than to explore central exhibits (e.g. Choi, 1999; Serrell, 1997; Melton, 1972). Also exhibits explored last receive less attention than exhibits seen in the beginning of a visit, a finding that is discussed in connection to the feeling of museum fatigue (Davey, 2005) along with the size of an exhibition and the number of displayed exhibits (Serrell, 1997). Thus, there are plenty of physical aspects decisive for what visitors feel they got out of the museum experience, observable for example by tracing time and track of visitors' movements in the exhibition space (Yalowitz & Bronnenkant, 2009) and measuring physiological parameters like heart rate and skin conductance level (Tschacher et al., 2012).

Meaning making is a strong topic in research about the social context of a museum situation. Causing visitors to sustain, stop or skip the exploration of an exhibit social influence starts with the mere presence of others in a gallery space (Bitgood, 1993). Attracted by their interest or avoiding crowdedness, other visitors thus have an impact on which artworks get selected for further engagement, how much time is investigated in this engagement and which aspects get most attention during aesthetic processing (vom Lehn et al., 2001).

To investigate the role of companions for an art exhibition experience, Debenedetti (2003) conducted semi-directed interviews with 24 art museum visitors. 23 participants reported a visit to an art museum usually to be set in company of family and friends. A negative aspect named by participants about exploring an artwork together was, that aesthetic experience as

“intimate relationship” (Debenedetti, 2003, 58) with an artwork is reduced or hindered by the presence of other people. A positive aspect was that ambiguity and uncertainty of an artwork’s meaning can be discussed and modified by the views of others, so that the individual understanding of an artwork receives enrichment. Leinhardt and Crowley (1998) call this mediating function of talk for learning in the museum setting “explanatory engagement”.

To analyze meaning making in the museum, researchers record the conversations and interactions of specific visitor groups while exploring the objects on display (e.g. Knutson, 2002) and report on aspects of learning and meaning making strategies in reference to specific exhibition spaces. Analyzing video-recordings of visitors’ interaction in a gallery space offers the possibility to show the social organization of a moment-to-moment progress of meaning making for a specific exhibition (vom Lehn, 2010). Hooper-Greenhill and Moussouri (2001) looked at visitors’ interpretative strategies for the meaning making with art in the Nottingham Castle Museum and Art Gallery exploring the exhibition space in company of a researcher and found visitors engaging with perceptual analysis as well as interpretation of higher levels of meaning. Content analysis of recorded talk showed that visitors referred to pictorial features such as color or form and aspects of composition. Visitors also engaged with the artworks’ content by describing what they thought was depicted and happening. Further, visitors were occupied with finding deeper meaning by pointing to religious or political implications and searching for the artist’s message.

4.6 Summary and Discussion of the Presented Aspects of Aesthetic Processing

Summing up the findings of the reviewed experimental aesthetic studies, I use the model of Leder et al. (2004) to show expertise influence on meaning making with art on the different stages of aesthetic processing (see Figure 5, p.34).

The first stage of aesthetic processing in Leder et al.'s model is perceptual analysis which happens on an automatic level of perception. The effects on this stage derive from composition as specific layout of pictorial features based on heritage and skills in artistic production. The distribution of attention on a picture is influenced by effects of highlighting and balancing on a preconscious level that affect experts and laymen in similar ways (DiPaola, Riebe, & Enns, 2013; McManus & Kitson, 1995). Concerning balance, the center of a picture seems to play a special role, both for experts and laymen of art (Locher et al., 1996; Mc Manus, 1985). The composition of basic pictorial elements into form can be more or less meaningful to a beholder and influences emotional valence of a picture (Arnheim, 1974; Heller, 1994; Bennett et al., 2010; Shigeto & Nittono, 2010).

Beside these bottom-up effects of balance and specific pictorial features, composition gives a specific structure to a picture and thus can be used as a grid leading the gaze to certain pictorial areas (Nodine et al., 1993). Referring to the stage of implicit memory integration, these processes are already sensitive to expertise, because experts have a greater previous experience so that effects of familiarity and prototypicality are stronger. This might play a role in the findings that experts in art are better in knowing which elements of a painting carry information for meaning making and can use the structural grid of a picture to effectively search for meaningful information (Nodine et al., 1993; Antes & Kristjanson, 1991).

On the stage of explicit classification, art experts are better in distinguishing different styles in the sense of assigning them to different artists and to different genres (Belke et al., 2010). Regarding representational vs. abstract art, experts can differentiate better between artworks of same style and painter (Cela-Conde et al., 2002) and adjust their gaze to the needs of the exploration of a specific style (Zangemeister et al., 1995), this might be connected to the finding that style is represented more precise in experts' brain-activity (Yamamura et al., 2009).

In contrast, laymen are found to cope best with one specific style genre: representational art. While experts also pay attention to structural and abstract aspects in the background of a picture, laymen look more intensively on human features and central areas (e.g. Yarbus, 1967; Nodine et al., 1993; Vogt, 1999; Vogt & Magnussen, 2007). Also laymen like representational art better than abstract, while experts show no preference for a specific style (Hekkert & van Wieringen, 1996; Phiko et al., 2011). In line with the content vs. form discussion in aesthetic psychology, it has been shown that laymen classify and judge art in connection to the content of a picture while style is a concept strongly associated to experts (Putko, 1989; Augustin & Leder, 2006).

Passing on to the next stage of aesthetic processing, cognitive mastering, we get a problem. There are studies revealing that experts' knowledge of structure (Nodine et al., 1993) and specific pictures (Antes & Kristjanson, 1991) makes them more effective in finding information they can use for meaning making, but not what this meaning making looks like and how it differs between experts and laymen of art.

Studies about visitors' strategies of meaning making with art in specific art exhibitions show that visitors do occupy with meanings of an artwork on higher cognitive levels (e.g. Hooper-Greenhill & Moussouri 2001) but they do not indicate how much these findings might be influenced by the museum situation and to which extent these findings for visitors might differ from art experts' strategies to go about inquiring into artworks in the same exhibitions or in a controlled setting.

The understanding of a picture is the product of the interplay of cognitive mastering and evaluation. The quality of the feedback-loop between these two highest stages of aesthetic processing is assumed to be influenced by expertise in the sense that experts pay more attention to aspects of style while laymen relate to content (Leder et al., 2004). Here Leder et al. refer to Parsons' model of aesthetic development (1987, see 3.3, p.22) that describes participants with a high aesthetic development to consider both style and content of a picture in order to discuss it from multiple meaning perspectives. Similarly Housen (1999) states that thinking aloud of participants assigned to high levels of aesthetic development show consideration and comparison of multiple pictorial features and how they add to style and content of a picture. These descriptions of what people on a high level of aesthetic development do and say when looking at a specific artwork are helpful to determine abilities and skills of art literacy but do not refer to the specific interplay of *knowing* and *seeing* in the meaning making process and how it gets shaped by the special expertise of art historians.

Regarding the understanding of a picture, studies show that extra-pictorial information, like labels with title, name of artist or descriptions, increase the feeling of having understood a picture (Russell & Milne, 1997; Russell, 2003). But there are no studies that show what kind of art-intrinsic information is used and how information leads to a better understanding. Furthermore understanding might not be the same for experts and laymen. Laymen might be

very convinced in their understanding of a painting, because in reference to their knowing there is not much to see that would need interpretation. Experts might be very critical of their own understanding, because in reference to their seeing there is more meaning in a picture than they know of.

When it comes to expert-layman comparisons, the presented studies show a quite diverse definition and use of the word art-expertise. Most studies work with the term trained or untrained in art, giving no hint of a specific expert community behind their participants. Others focus on artists, thus on experts in creating art rather than on experts in making meaning of art. Only a few studies explicitly refer to art-historian (Belke et al., 2010; Phiko et al., 2011). So it is unclear how art historic expertise plays out throughout aesthetic processing.

Most of the presented studies are laboratory studies testing individual processing of single art stimuli presented one by one. But studies set in the art museum show that there are multiple aspects influencing aesthetic processing in this specific setting. Also results are often a product of comparing abstract and representational art looking at expert-layman differences according to the form versus content approach in aesthetic psychology. Thus the role of content is accentuated for representational artworks, but how do experts and laymen differ when looking at this content?

5. The Present Studies

“He drove his kind of realism at me so hard I bounced right into nonobjective painting.” - Jackson Pollock

In the present dissertation I focus on the meaning making of art experts from a specific visual culture, namely art historians. Following earlier explanations, I propose that meaning making of art historians is characterized by the ability to use both style and content of a painting in specific ways to identify, relate and interpret meaningful information. Choosing representational paintings as research material, I want to focus on how art historians differ from untrained art viewers in the use of content for meaning making. Panofsky’s prescriptive model of iconography and iconology (1975) and Leder et al.’s model of aesthetic processing (2004) serve as theoretical basis to discuss the influence of art historian expertise on different levels of perceptual and cognitive analysis and their interplay during meaning making.

The thesis is structured in three studies that focus on art historian expertise from different perspectives. The first study aims to get a better grip on how the specific visual culture of art historians looks like by analyzing their practical skills, communal frameworks and methods of art inquiry gathered in a focus group with four art historians of both curatorial and scientific background. The second study is concerned with the influence of the social and physical context on meaning making by observing interactions of lay students in the company of their peers exploring a set of paintings conceptualized and arranged by an art historian inside and outside the gallery space. The third study has a closer look at how the different use of content of experts and laymen plays out in perception and cognition by relating gaze and thinking aloud to single representational paintings to the different levels of aesthetic processing (Leder et al., 2004). Finally, in the general discussion the findings of the three studies are brought

together revisiting the integrated model of aesthetic meaning making (Panofsky, 1975; Leder et al., 2004) formulated in 3.6, p.33. Before giving a short overview to each of the three studies, I start this chapter by stressing the specific role of content for meaning making with representational art.

5.1 Finding Meaning in Figurative Paintings: From Renaissance to Edvard Munch

Why do you need to be an expert to understand representational art? In contrast to abstract art, representational art has a clear content that can be identified and described by the viewer. But still there are tricky aspects of content that can lead a viewer to a completely different understanding of an artwork. Look at the two paintings in Figure 6. The left is *Madonna* by Edvard Munch from 1884-85, the right is the *Portrait of Gabrielle d'Estrées and Duchess of Villar* by the School of Fontainebleau from 1594. At first glance they have a lot in common: both paintings show nude torsos of women, both can be characterized by the use of red standing out in contrast to the pale skin of the women, and both paintings seem to be framed in some way, may it be by light or curtains.

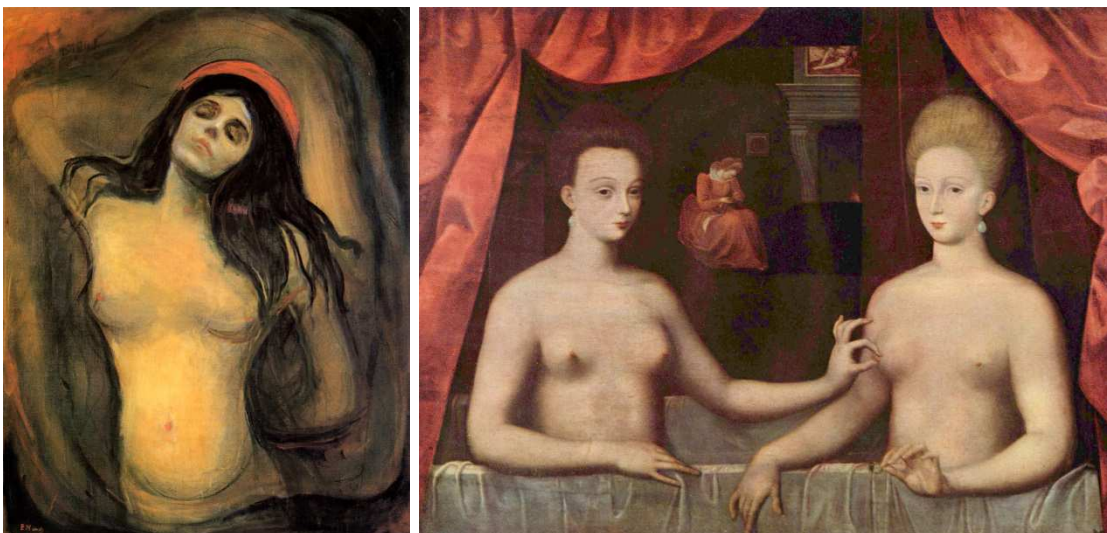


Figure 6. On the left: *Madonna* (1884-85) by Edvard Munch, on the right: *Portrait of Gabrielle d'Estrées and Duchess of Villar* (1594) by the School of Fontainebleau

Nevertheless, an important difference is that the two have been painted in a completely different time. Or in other words: the timely distance between viewing the paintings in the figure above and the time of their production is much greater for *Portrait of Gabrielle d'Estrées and Duchess of Villar* (1594) than for *Madonna* (1884-85). This is important, because the course of time implies changes in ways of coding and encoding paintings: developments in artistic skill, focus and expression but also developments in the “visual focus” in society and culture (e.g. Gombrich, 1994; Berger, 1972).

Edvard Munch is a painter of *Expressionism (late 19th century)*, famous for his series of paintings called *The Frieze of Life*. Paintings of this series are occupied with psychological and emotional difficult events in people’s lives, blows of fate connected to strong feelings (Eggum et al., 1992). Artists of expressionism try to depict how they see and feel the world and negate realism – they explicitly do not refer to the objective reality of things. The meaning of Munch’s art is closely connected to personal experiences and his attitude towards life expressed in symbolic use of depicted details, landscape and reappearing figures. The figures’ face and pose and the emotional impact deriving from them are more important than who is depicted. The correspondence between content and style is essential for interpretation, because the use of specific colors, shades, blurredness and brushstrokes determine the symbolic meaning. An example in *Madonna* is the halo above the woman’s head. A halo is something holy and known from religious paintings. In this way it fits to the title of the painting. The strange thing is that the halo is red, giving the figure and thus the whole painting a sinful touch.

The School of Fontainebleau is a classic example for the era of *Renaissance (in 15th and 16th century)*. Renaissance paintings are usually work orders depicting religious figures or real living people of higher rank and money. The painted person can be identified by specific objects and details in the painting with distinct symbolic meaning. As symbols objects can

stand for the person's social status or profession, refer to a specific person maybe or maybe not depicted in the painting, or point to a specific saint with distinguished qualities or traits. To grasp the meaning potential of a Renaissance painting, one needs knowledge about the historic meaning of objects and how these symbolic meanings refer to the depicted person. An example in the *Portrait of Gabrielle d'Estrées and Duchess of Villar* is the famous pinch of Gabrielle d'Estrées right nipple by her sister. The pinch is a symbol for Gabrielle's pregnancy. Regarding this specific meaning in reference to literary sources documenting that Gabrielle d'Estrées was the mistress of Henry IV, the plain content of pinching is awarded with historical significance.

Contrasting these two paintings it gets clear that, with regard to Bordwell's conceptualization of meaning making (1991, see p.19), representational paintings are easier to comprehend than other paintings, e.g. abstract ones, because they have content that resembles reality in some way and can be described according to personal knowledge about the world. Nevertheless, representational paintings are in no way easier to interpret on deeper levels of meaning. Specific knowledge is needed first of all to consider that there might be a deeper meaning in some of the content, to single out that content and then to engage in extracting the meaning using previous skills and knowledge for a structured analysis of the painting.

5.2 Experts' Skills and Methods of Meaning Making with Representational Art according to Art Historic Concepts and Frameworks

According to the considerations above and Panofsky's model of iconography and iconology (1975), art historian meaning making with representational art is based on skills and methods of art inquiry that help them to focus on meaningful aspects of a painting and provide them with tools of analysis they can use to understand a painting. Before looking at the ways of *seeing* and *knowing* that distinguish art historians from viewers with no specific training in

art, it is necessary to explore these skills and methods further to be able to describe art historian expertise according to its scientific aims, self-concept and frameworks. In order to get to know the scientific community, a focus group with art historians was performed. A focus group is a moderated, non-directive discussion method with stakeholders that serves to reveal and describe their specific concepts to a topic (Crocket et al., 1990; House & Howe, 1999). In this case stakeholders were two curators and two university researchers that were videotaped discussing the characteristics of their community and profession in a 2 hour session lead by a moderator. Questions about the use of content for art inquiry were of special interest. The verbal data was later analyzed identifying topics, documenting them with excerpts of participants' talk. On the basis of these results a general art historian approach towards meaning making with art was formulated.

5.3 Visitors' Strategies of Meaning Making with Representational Art in the Social and Physical Context of an Art Exhibition

Apart from general aspects of design, like the shape and size of exhibition spaces, accessibility, lighting, readability of information, internationality and many more, an outstanding feature of the physical experience of a museum space is the specific choice of exhibits and information set in space in relation to each other. This communication in space is conceptualized and prepared by curators. In art-museums curators are art historians that want to communicate certain aspects of a presented set of artworks. Thus the meaning potential of the single artwork is shaped, changed and multiplied by other artworks hanging next to it and further apart (Krukar & Dalton, 2013; Baxandall, 1991). As visitors usually come with peers and family to an exhibition, the meaningful arrangement of paintings in a gallery space is explored in company. In this social context meaning making with art can be explained as "explanatory engagement" (Leinhardt & Crowley, 1998). That means that by discussing an exhibit with others during meaning making, individual understanding gets enriched

(Debenedetti, 2003). In the sociocultural approach towards learning this enriching power of the social context is used to identify strategies of meaning making in participant's interaction (Vygotsky, 1981).

Study 2 is a field experiment that compares the meaning making of school groups in an exhibition space with paintings by Edvard Munch to how the exhibition was meant and conceptualized by the curator. In this arrangement of paintings the curator is highlighting the use of specific content in Munch's paintings to make distinct comparisons and juxtapositions of meaning. In the study the focus lies on laymen of art history when dealing with these curatorial juxtapositions communicated in space in the social setting of a museum visit. Integrating socio-cultural approach with an information processing stance, video data is used to analyze participants' interactions, that is to observe orientation in physical space, as well as pointing and looking, and talk to come to a moment-to-moment documentation of meaning making with art in a gallery (Wertsch, 1991; vom Lehn, 2010).

5.4 Expert-Layman Differences in Meaning Making with Representational Art: Evidence from Gaze and Thinking Aloud

Study 3 seeks to show differences in meaning making of art historians and untrained participants when viewing representational art. In a controlled setting the study focuses on the role of content for meaning making using Renaissance portraits as research material. With regard to content, laymen have been found to be specifically bound to human features (Yarbus, 1967; Vogt, 1999; Phiko et al., 2011). But in the case of Renaissance portraits, beside the depicted figures, paintings include symbolic objects essential for understanding on deeper levels of meaning, so aesthetic processing needs to include special consideration of content. In order to control for central bias, the material is split into two subsets: portraits with a single central figure and peripheral symbolic objects, and portraits with two peripheral

figures with symbolic objects also situated in the center of the painting. Combining an initial viewing task and a second viewing task with simultaneous thinking aloud, eye tracking and verbal data are used to systematically analyze perceptual and cognitive shares and how they interlock during meaning making with specific content. Contrasting experts to laymen gives insights into how art historian expertise influences aesthetic processing of representational art on the five stages formulated by Leder et al. (2004).

5.5 Summary of Aims and Focus of the Present Studies

Taken together the three studies serve the purpose to get deeper insights into how content is made relevant for meaning making with representational art. Focusing on how higher levels of meaning get addressed in aesthetic processing, first the experts' approach towards meaning making is specified, before analyzing laymen's strategies of meaning making in dependence to the social and physical context of the viewing situation and investigating the differences between meaning making of experts and laymen of art history while viewing art. The expert-layman relationship concerning meaning making with representational art is thus addressed in detail by a change of focus in each study, illuminating the experts' and laymen's perspective before centering on the gap between them. In all three studies talk is made relevant as a method to inquire into participant's underlying concepts about art and art inquiry as well as cognitive processes while engaging with a painting. Methods and analyzes are adjusted to the needs and potential of data of the different studies, ranging from a focus group with open results, over a field experiment integrating the socio-cultural and information-processing approach to give a moment-to-moment description of meaning making processes, to a laboratory setting testing hypotheses about expert-layman differences and combining eye-tracking and verbal data.

6. Study 1: A Focus Group about the Visual Culture of Art Historians

“Frankly, these days, without a theory to go with it, I can't see a painting.” - Tom Wolfe

6.1 Introduction

With regard to theoretical explanations and findings from aesthetic experiments, the core of visual competence is attentive viewing (Kesner, 2006): the disposition to explore a painting using perception and thinking in a directive way relevant to the visual culture of the respective expert community. *Seeing* and *knowing* get directive through experience and reflexion (Zembylas, 2003). In his paper *The Intelligent Eye*, Perkins (1994) describes that for 90% of visual thinking tasks, cognition he describes as “hasty, narrow, fuzzy and sprawling” (1994, 31) is sufficient to be effective and efficient in understanding. Works of art fall into the 10% that need a different cognitive approach in order to fairly experience their meaning potential. Perkins formulates four principles that need to be applied when looking at artworks to achieve and train successful meaning making: 1. give looking time, 2. make your looking broad and adventurous, 3. make your looking clear and deep, 4. make your looking organized.

Giving looking time means, to slow down to engage into a process of gazing and thinking by varying position and distance that provide different angles and perspectives on a work of art.

Looking broad and adventurous is explained with a playful trial-and-error mind-set of asking questions and looking for answers by exploring the artwork. With the principle *looking clear and deep* Perkins asks for a structured way of art-inquiry that interweaves previous knowledge with search for information and results in a logical chain of interpretations. To *make looking organized* means to set all previous principles in a meta-analytical frame with

defined steps, that is first describing then analysing formal elements before starting interpretation and ending the process in a critical judgment of “appraisal not preference” (Feldman, 1971). But how does visual literacy play out in a specific community whose visual culture involves history and time for a classification of a work according to a whole body of art, namely art-historians? Is Perkin’s guide to structure and deepen ones looking at and thinking about art also true for them?

In museum research, differences in expertise have been discussed by looking at gaps between expectations and meaning potential offered by experts in museums and the experiences and understanding of visitors exploring the exhibition space (Knutson, 2002; Piscitelli and Weier, 2002). In her article about rethinking how to communicate and offer learning experiences in art museums, Hooper-Greenhill (2000) poses the question whether art museums are primary made for visitors belonging to the same interpretative community as the museum makers, namely, art professionals. To what extent is art expertise made relevant in the exhibition space? And what are visitors supposed to understand from it?

This article reports on a focus group with four art historians formed to acquire a better understanding of what the visual culture of these art experts looks like and from which perspective on art they conceptualize and inquire into art galleries. Considering differences in cognition, gaze, language, and expectations of their social community, we present insights into art expertise useful for considerations in art education in museums and conceptualizations of empirical studies that seek to further specialise the influence of art historical expertise on aesthetic processing.

6.2 Method

A focus group is a qualitative research method to gather meaningful information about specific topics delivered by stakeholders through group-discussion (Crocket et al., 1990; House & Howe, 1999). Participants are chosen by means of homogenous characteristics. Other views and perspectives are considered when repeating a focus group with participants of distinct characteristics (Grudens-Schuck et al., 2004). As the purpose is to obtain unexpected elements that mirror the participants' beliefs and attitudes in a social setting (Lutenbacher, Cooper & Faccia, 2002), discussions are semi-structured and led by a moderator regulating discourse, keeping it on topic in an open, naturalistic way (Kruger & Casey, 2000). In our case, we wanted to know more about art historians and their expert view on art inquiry in exhibitions. The questions that were most important to us are:

1. What is the occupational field of art historians and what kind of expertise does it imply?
2. How is art defined in your professional community?
3. What does your meaning making with artworks look like? Can you describe the process?
4. What are the meaning making frameworks and methods that you acquired becoming an art historian and how did you acquire them?
5. Define the role of the museum visitor for your work: What are your expectations concerning meaning making of visitors in the art museum? In what ways does the visitors' experience differ from your experiences in art museums?

It is not the purpose of a focus group to find an answer to all questions. Questions should merely help to guide the participants through the discussion, but allowing them to answer and react to each other freely, helpful for creating a greater palette of insights achieved through group processes (Grudens-Schuck et al., 2004).

6.2.1 Participants

Four art historians, three female and one male with a mean age of 29, took part in the discussion. Discussants were chosen to have different kinds of working experience, covering academic as well as practical domains. Two participants (in the following FH and YS) had a scientific background and were doing a PhD in art history. The third participant (AL) was working as freelance artist and curator for different international exhibition projects. The fourth participant (CP) was involved in several exhibitions and working as a curator for a local cultural organisation. All participants were invited individually.

6.2.2 Data Collection

The participants met in a seminar room of our institute. The discussion was set for two hours, starting at 6 pm. The room was equipped with a flipchart and all kinds of pencils and paper for notes and mind maps. Participants were seated around a table. To document the session, a camera was installed in a corner of the room and a microphone was placed on the table to record everything being said and done. Additionally an assistant took notes on a laptop. All discussants were aware of being recorded, participated voluntarily, and were free to end or to leave the discussion whenever they wanted. The topic and purpose of the discussion was announced in the invitation letter. The discussion started with the moderator welcoming and introducing everybody. After that, an agenda with the relevant questions was presented in

order to give a basic structure to the items to be discussed. The role of the moderator was to guide and regulate the process but also to take part in the main discussion. The moderator paid attention that each discussant had an equal chance to make their points and had a comparable amount of time to speak.

6.2.3 Data Analysis

The audio file of the discussion was transcribed. We registered starting and ending times of the contributions, the person talking as well as pausing and emotional expressions. Crucial passages that were hard to understand or accompanied by nonverbal communication were checked in the video to identify the discussants attitude towards the contributions made. The transcript and additionally the notes taken by the assistant during the discussion were later analysed by two independent raters. The raters were instructed to divide the discussants contributions into single arguments and aspects, compare them to the notes taken, and to write them on file cards. On every card, they noted the person who made the contribution and the page of the transcript. Later the two raters compared their results by using a card-sorting technique. First the cards of the two raters were compiled into a single pile: Double cards that contained the same aspects were put aside; additional cards with aspects that one of the raters had not found were integrated. Together the two raters sorted the final 122 cards into thematic mind maps. In this way, the ideas and concepts that the four art historians had mentioned in the discussion were condensed, melded into one expert-view, and arranged into logical subtopics.

6.2.4 Limitations

The data collected with a focus group provides rich details on a certain topic obtained in a naturalistic setting (Creswell 2007, Yin 2003). Nevertheless, the interpretation of results is limited because they reflect the specific values, statements, and knowledge of a small number

of people, bound to factors of space, time, and group-processes. Thus, individual attitudes are not covered and the outcomes of the focus group presented here are not suitable for generalisation (Grudens-Schuck et al., 2004). Nevertheless, this method of collecting and analysing data is a great chance for researchers to acquire a better understanding of their target group's perspective (Lutenbacher, Cooper & Faccia, 2002).

6.3 Findings

The results of the focus group can be allocated to different subtopics or thematic patterns (Creswell, 2007), discussed in the focus group. When reporting the results, our goal is not to break them down into single definitions but to reflect the views of the participating art historians towards certain terms and concepts concerning art expertise. In the following, we will present the thematic patterns found through the card-sorting analysis and will document the findings with statements from the participants of the focus group (Rubenstein, 1988).

6.3.1 Defining Themselves

Art historians use art as historical documents that help them to examine and describe history.

“If you split it, the word, then you first of all have the historian. That means we view art in connection to different historical periods and try to classify it according to them.” [FH]

While historians use written sources to research historical events, art historians use figurative sources. They try to understand the meaning of artworks in the context of history, culture, and society. They interpret, analyse, categorize, explain, and exhibit art. Through art, they try to understand and describe processes and changes in society.

“Art is the perspective, the angle, maybe also the substrate of inspection, also the material to which we can assign certain cognitive processes that lead us to scientific questions related to a specific time in history.” [AL]

6.3.2 Defining Art

Art always communicates something that can be approached from multiple perspectives. Art offers meaning potential that exceeds the material level of an artwork. While the single artwork is individual and neutral, art is ideological and transcendent.

“Art always excels itself towards something else...but you have to be careful to distinguish between art and artwork because art is not simply the entity of all artworks. The artwork stands upfront and art is the ideology behind it.” [CP]

Art is not a property of an object, or object-immanent, but applied to it from outside and inside. The inside of an artwork is the idea, the concept underlying the material object.

“[...] in any case something nonverbal gets communicated, on an uncommon level. But it depends on the artwork.” [YS]

The outside is the society cherishing and defining objects as art. The worth of an artwork is determined by art historians who classify and discuss art, and art-collectors who buy it and give it an actual value.

6.3.3 The System of Art

Art can be described as a system dependent on processes and changes of culture and society. The art term that is used as basis of the system is closely connected to an understanding of art history developed in the European area.

“As a global definition I would say art is a communication-system that refers to a specific time, a specific era, especially for European history.” [YS]

An object becomes an artwork when integrated in the art-system. The art system consists of three dimensions: the artist, the artwork, and the beholder. Figure 7 shows a model of the art system as drawn by the participants.

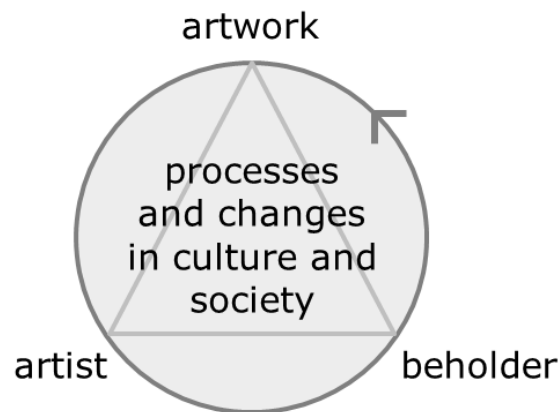


Figure 7. A Model of the Art System Including the Artwork, the Artist, and the Beholder as Drawn by the Participants

These three dimensions are conjoined by a historical frame which is constituted by the time when the artwork was created, the cultural conditions, political and religious aspects, and events at that time.

“There are multiple positions that are arranged around an artwork and that are related to each other in connection to the material object.” [AL]

The beholder is not to be mistaken for the active beholder looking at an artwork or visiting a museum. The beholder is a hypothetical but fixed element of the art system that stands for how an artwork was looked at and understood in the time of its origin.

6.3.4 The Expert’s Gaze

When regarding art, it is always analysed embedded in the art system; what differs are the aspects in the focus of analysis. Experts approach a picture in order to find out more about a certain topic. They have a hypothesis or theme in mind that they want to investigate by looking and interpreting.

“How you inquire into an artwork depends on what you want to analyse. You start by making a thorough description of everything you see, but then you start to select” [YS]

“For example you want to focus on the power of a person depicted in a painting. Maybe you would remark that he is standing out from the background. You would focus on things like that; you would concentrate on specific aspects. Because you simply cannot capture everything from an artwork, the gaze has to be led by something” [FH]

The expert gaze is led to specific aspects of an artwork that seem promising for an interpretation that holds with the hypothesis. Art-specific knowledge is needed in order to be able to ask directive questions. Art historical methods determine the perspective on an artwork; for example, analysing the presentation of power or gender are methods that give instructions how to approach a picture and look at it. The method chosen to look at a certain picture is closely connected to the scientific hypothesis. Methods structure the gaze and determine which elements of a picture are relevant to look at.

“It is like this, with what kind of glasses you look at an artwork, perhaps you can think of it that way, what your hidden agenda is, your perspective of looking at it.” [AL]

An important instrument to interpret certain aspects of an artwork is to relate them to each other and compare them to similar aspects in other artworks.

“You don’t need other paintings hanging next to it; you have them in your mind. I can’t help it but to think of where I have seen it before and how to relate it.” [FH]

The method of looking at a picture influences how the meaning potential of an artwork is made relevant for interpretation and changes the conclusion drawn from it. Thus, the use of new methods serves to give new insights to a painting. Even if it already has been firmly analysed several times before, there are always new perspectives to exploit an artwork's meaning potential.

"We creep up towards its meaning by seeing and experiencing more and more of it. And I always have some questions and want to learn and I think this need for understanding is crucial to an artwork." [FH]

6.3.5 Experts in the Art Museum

As visitors, art historians carry expectations into the museum in the sense that they have a tendency to view artworks in a gallery from the specific perspectives that they are interested in.

"It has to be very good, the painting, to let go of your methods – well at least that's true for me – it has to baffle my expectations." [CP]

Also artworks are seen in the context of the exhibition that can be read as research-results, like an article of an experiment, giving new aspects and new scientific insights to the community through *comparative viewing*.

"Comparison between different artworks is very important to us and constitutes a scientific or art historical pattern to our gaze that laymen are unlikely to have. Maybe, but I don't know, they approach one artwork after the other, and we pay more attention to the ensemble, to the context." [YS]

For curatorial work, the installation in art museums is of great importance. Artworks are related to each other, indicating that pictures hanging next to each other point out certain aspects that the curator wants to stress in the exhibition.

6.3.6 Museum Visitors in the Eyes of Experts

Laymen are expected not to understand an artwork in an art historical fashion. Visitors are assumed to have different interests for understanding when looking at works of art, acknowledging that their meaning making might lead to an understanding as ideal or precious as an art historical interpretation.

“The average visitor attends to different aspects and has different ideals about what is important about an artwork. I wouldn’t take my understanding for granted just because I am an art historian.” [YS]

In contrast to that, the average museum visitor is assumed to be ignorant of the meaningful installation of artworks in an exhibition space.

“If you look at what is happening in the Louvre on a Sunday afternoon. The paintings could be hanging differently every day and that wouldn’t make a difference for the individual visitor. They just go in to see the paintings.” [CP]

Art exhibitions demand an interest in art history. Primarily, they are made to serve the scientific interests of art historians. Secondly, there are the museum visitors coming to look at it. Laymen are not able to grasp the meaning of paintings and exhibitions on the same analytical level as experts do. This is an aspect of the art museum that art historians are aware of. They explain that art historians are not art educators.

“An art historian is not an art communicator. Primarily. An art historian can use his or her art historical knowledge to communicate art.” [AL]

6.3.7 Approaching the Needs of Laymen in Art Exhibitions

Although visitors are not able to analyse artworks and their connection on a higher cognitive level, the quality of an exhibition is important for the feeling of pleasure and aesthetic emotion arising in the visitor.

“This is the aesthetic factor that, in my view, can connect the cognitive analytical and sensual side of a museum experience. You feel that it makes sense.” [CP]

In order to let laymen get a glimpse of how art historians understand and use an exhibition, they propose that the concept of the exhibition should increase offering aesthetic comparison.

“I can make aesthetic experiences by seeing different things in different rooms that are composed together that lead me to a comparison.” [YS]

But as laymen might not look for the same in art as experts do, they suggest that a crucial element of an exhibition is to trigger questions that help visitors to realize connections.

“To ask questions is not only courageous, but a skill. To ask the right questions that improve the understanding of a picture. That’s a next step.” [FH]

An exhibition concept in its core dedicated to the needs and competences of visitors is disapproved of by the art historians because they feel that this would hinder them to carry on with their occupational mission.

6.4 Discussion

The purpose of this study was to acquire a deeper insight into the perspective of art historians towards art, how their expertise plays out when viewing an artwork, and what skills and methods are specific for them. Further it was important to understand what art historians expect of an art museum, how they use and conceptualize an exhibition, and how they comprehend and address the museum visitors.

The presented findings of the focus group show that approaching a picture, art historians have several tools that help them to use pictorial aspects and their interpretation in distinct analytical ways, leading them to a conclusion relevant to a specific hypothesis. In sum, these tools brought into sequence give a structure to the art historian perspective that influences their meaning making process with art:

1. *Generating*: before starting meaning making with a specific artwork, art historians generate a hypothesis about the artwork that they seek to test
2. *Choosing*: in close connection to the hypothesis, the adequate method to investigate the problem has to be chosen, determining the relevance of visual aspects and features
3. *Asking*: the courage to ask questions and the ability to ask the right questions
4. *Selecting*: the relevant details in a picture and leaving others aside
5. *Comparing*: to other artworks in an exhibition and to others stored in memory
6. *Concluding*: about the meaning of the painting in relation to the hypothesis
7. *Discussing*: two art historians having the same hypothesis and even using the same method to analyse a picture will come to different conclusions. Similar to philosophers or theologians, art historians are just providing possible ways to look at and understand art. This plurality in scientific output is deliberate. Therefore exchange through discussion and dialog is an important tool of the community.

Independent from hypothesis and method of approach, art historical meaning making with artworks is always put into the historical framework of the art system considering the interplay of artwork, artist, and beholder in the perspective of history and time.

Applying different methods to the same artwork is important because with every method different aspects in an artwork become relevant and the meaning potential of an artwork maximally exploited. The most important skill of an art historian is comparative viewing combined with the expertise to ask the right questions. Leder et al. state, “*the challenge of art is mainly driven by a need for understanding*” (2004, p. 489). This need is expressed in the questions that an art historian generates while interpreting aspects of the artwork and while evaluating the meaning making because these questions trigger the search for new information suitable for answers. When learning about art, what leads to a better understanding is making multiple encounters with artworks (Parsons, 1987). According to the

findings, the goal of training and exposure to art in the museum setting is to achieve and reinforce the skill of *comparative viewing* and *asking questions* that consider the meaning potential inside an artwork and outside of it—in the installation context of the gallery space.

The education concept of Form+Theme+Context (FTC) describes art education that goes beyond a form versus content discussion to accompany learners in refining their meaning making with art (Sandell, 2009). Sandell proposes to expand the consideration of form and theme with context. By contextual information, she means giving the learners access to the artist's intention and social, cultural, and historical dimensions of an artwork's meaning potential. This is also true for the context of a museum exhibition where learners are confronted with a visual concept communicating relations and connections between artworks that help learners to view artworks from different perspectives and come up with meaningful questions.

Before discussing how visitors can be guided in *comparing* and *asking* between artworks in an exhibition, one first has to look at what visitors actually do when dealing with the meaningful arrangement of paintings in a gallery space. Based on the exhibition concept of the curator of the Munch Gallery in the National Museum of Art, Architecture and Design in Oslo, study 2 looks at visitor's strategies of meaning making while viewing the artworks and interacting with group members in space. The goal of study 2 is to shed light on the social and physical influences of the museum situation on the meaning making process, especially when looking at representational art that needs specific consideration of content in order to come to a suitable understanding of art.

7. Study 2: Meaning Making of Student Groups exploring the Munch Gallery in the National Museum of Art, Architecture and Design in Oslo, Norway¹

“I have always worked best with my paintings around me. I placed them together and felt that some of the pictures related to each other through the subject matter. When they were placed together a sound went through them right away and they became quite different from when they were separate. They became a symphony.” - Edvard Munch

7.1 Introduction

In museum research, gaps between the aims, skills, and knowledge of art experts and the perceptions, experiences, and interpretations of art by visitors have been extensively explored in empirical studies (Hooper-Greenhill & Moussouri, 2002; Knutson, 2002; Piscitelli & Weier, 2002; Pierroux, 2010). Understanding such tensions is particularly relevant in view of the democratizing potential of social media currently explored in museums’ communication designs. Studies of art museums’ experiments with visitor labeling in exhibits (Parry, Ortiz-Williams et al., 2007), and crowd-sourced tagging of collection databases, are examples of approaches to bridging semantic gaps (Smith, 2006). These studies found that museum professionals positively evaluated the usefulness of the non-specialist perspective on

¹ A version of this article has been published as: Bauer, D., & Pierroux, P. (in press). Expert and adolescent interpretive approaches in a National Art Museum. *Museum Management and Curatorship*.

artworks, and that understanding interpretation through the eyes of the visitors made it possible to adapt practices as necessary (Trant, 2006). In this article, we similarly aim to contribute a better understanding of the nature of gaps between expert and lay interpretations of art, enhancing museum professionals' expectations and perspectives on visitors' meaning making.

There are countless considerations to be taken into account by curatorial teams when new exhibitions of a permanent collection are mounted in national art museums. Selections are made based on relevance to overall themes and characteristics of the architectural space (Bourdeau & Chebat, 2001), with careful consideration given to the installation to foster visitors' connections, attention, and what Csikszentmihalyi and Hermanson (1995) call sense of "flow" (Bitgood, 2013; Monti & Keene, 2013). Didactic resources are developed to create opportunities for interpretation for target audiences (Jeanneret, Depoux et al., 2010; Pujol-Tost, 2011). In this study, we examine how such considerations are taken into account in the curatorial intentions behind a new installation of a national museum's permanent exhibition of older and modern art, and we empirically investigate how such intentions become relevant for visitors' interpretative activity.

Specifically, the study is focused on the ways in which a curator and small groups of young people (17-18 years old) construct relations and use juxtapositions within and between artworks as resources in meaning making processes. The study was conducted in connection with a larger nationally funded research project in Norway that explored how museums and cultural heritage organizations may engage young people (12-18 years old) as a future audience through the use of digital and mobile technologies and social media (Pierroux & Ludvigsen, 2013). This focus was framed by research pointing to adolescents' sense of exclusion in museums (Lemerise, 1995; Mason & Conal, 2006), and the gap between the rate at which young people adopt new technologies and the much slower timescale of change and

technological innovation in museums. Furthermore, reports, also for Norway (Gran, 2011), consistently find that this key group of users rarely visits museums on their own initiative (EU Culture, 2012). This finding may be explained by connections between race, ethnicity and cultural participation, but also as a mismatch between age cultures (Farrell, 2010).

Our study was conducted at the National Museum of Art, Architecture and Design in Oslo, and is focused on an exhibition of paintings by Edvard Munch in a gallery room dedicated solely to the artist. Figure 8 gives an overview of the paintings and their arrangement, as well as the label information providing title and date of each painting. Munch himself (1933) was keenly aware of the role of juxtaposition in aesthetic experience of his paintings, noting “when they were placed together a sound went through them right away and they became quite different from when they were separate (Eggum et al., 1992, 51).” The curator's intentions and strategies for selecting and arranging works from the museum's collection of old and modern art in a new permanent installation are presented, along with his views on the intended audience and interpretation. We then explore whether and in which ways young people pick up on the curatorial intentions under different conditions.

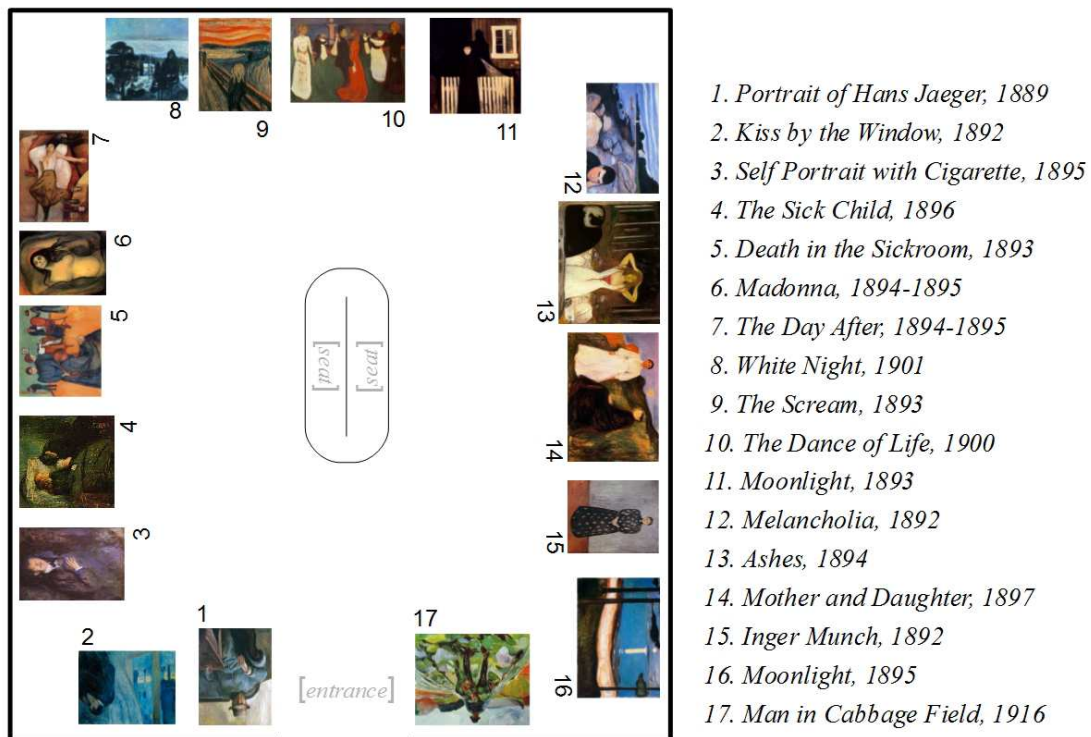


Figure 8. Schematic overview of the paintings and arrangement of the Munch gallery including label information

The project of situating this study in relation to newer perspectives in art theory, art history, and aesthetics would entail a thorough discussion of how philosophies of art and reception are framed and formulated in learning theory (Pierroux, 2006). Although such a discussion lies beyond the scope of this article, we emphasize that examining differences between expert and lay interpretations embraces in its premise the multiple ways people experience and understand art, or what Hall (1980) refers to as the polysemic character of art. Our empirical focus is on how this polysemy plays out at expert and lay levels from a museum learning perspective.

Empirical studies of the processes involved in lay interpretations of art, and the ways these may align or differ from expert interpretative strategies, have been approached from different perspectives in museum learning research. In this article, we examine two contrasting approaches in the museum learning research, referred to as information processing and

sociocultural perspectives. Methods include card sorting and mapping tasks in controlled settings, which are analyzed in combination with field observations, semi-formal interviews, and analyses of video recordings of visitors' naturally occurring gallery interactions. In the sections below, we describe these respective approaches and the methodological implications, and we investigate expert and lay interpretation processes from both perspectives. Adopting an interdisciplinary stance that draws on perspectives in art history, aesthetics, and the learning sciences we pose the following research questions: How do interactions with authentic artworks in a physical gallery space become a resource in lay and expert interpretations? Which interpretative strategies and disciplinary knowledge do adolescent visitors and experts respectively draw on when relating works to one another using representations outside of the gallery space? In which ways do visitor 'novices' notice and comprehend the meaningful arrangement of paintings as intended by curator 'experts' in exhibitions?

7.2 Learning Perspectives on Expertise and Interpretation in Art

7.2.1 Information Processing Approaches

In art theory, reception has often been conceived in terms of an information-processing model, studied as an individual cognitive processing of complex visual stimuli. From this perspective, the beholder interprets and experiences works of art on different levels, which may be analyzed according to three different functions of meaning (Arnheim, 1969). On a basic level, pictures function as a composition of visual features (e.g., size, shape, color, brightness), and information is processed largely independent from previous experience and knowledge of the beholder (Rollins, 1989). A second function of meaning is the representation of aspects of the real world. At this iconographic level of perception, it is possible to recognize something *as* something and compare it to other images depicting the

same (Gombrich, 1961). To accomplish this, previous knowledge and experiences are needed that rely on patterns and agreed upon standards and ways of interpretation in a visual culture (Bal, 2003). A third function of meaning in art reception is symbolism, whereby a painting becomes a visual token representing the artist's idea, embedded in context including space and time, as materialized thought (Warburg, 1992). This level of interpretation entails specialist knowledge about the artist, historical developments, and art concepts. In art theory, Panofsky (1975) refers to this level of interpretation as iconology, describing the ability to synthesize iconographic information and draw an expert conclusion about an artwork.

These classic distinctions in art history are relevant for information processing research to distinguish how experience and visual encounters with old and modern art become represented in specific cognitive structures, often referred to as mental models or schema (Rollins, 1989). Through such encounters, individuals' mental models develop, become refined, and alter processing of future experiences, in what Neisser (1979) terms *visual learning*. Accordingly, conceptualizing functions of meaning in art is useful when classifying relative expertise in art interpretation, and modeling cognitive processing in aesthetic experience (Leder et al., 2004). Information-processing studies contribute theories and evidence for general processes of aesthetic experience, obtained in experimental studies in laboratory settings with individuals as participants. In contrast to a gallery space, where several artworks are in the field of vision simultaneously, methods often entail presenting art 'stimuli' one image at a time.

7.2.2 Sociocultural Approaches

In contrast to such approaches in an information-processing framework, sociocultural perspectives focus on the role of social interaction, conversation, and collaboration in natural interactions and settings. In the sociocultural approach, *activity* is the unit of analysis (Crowley, Pierroux & Knutson, in press), and the focus is on how conversation and interaction unfold *in situ* in the process of ‘meaning making.’ The latter is a concept developed by Wertsch (1991) to highlight the emergent and semiotically mediated aspects of learning when mastering scientific concepts in specific contexts. Accordingly, in art museums, meaning making entails producing interpretations that draw on concepts and scientific knowledge from the domain of art. However, meaning making is not studied as an individual cognitive mastering of concepts but as social interactions situated in natural settings. People typically visit museums in groups – with family, friends, or classmates, collectively deciding which exhibits to view, what to do at each exhibit, and how to make sense of what they observe. The physical aspects of the gallery setting are also intertwined in social interactions in several ways. Laypersons select a painting through a triggered interest – a liking, preference, or attraction (Valsiner, 1992), and then explore its meaning potential through sustained attention to its semiotic and material properties (Kesner, 2006; Renninger, 2009). Interest is defined as a psychological state, and commonly refers to engagement with a particular content, in a given context, at a particular point in time, both individually and in groups (Renninger, 2009).

In keeping with developmental perspectives on psychological processes, sociocultural approaches emphasize relations between intermental and intramental planes, with permeable boundaries between social and individual functioning: “Social relations or relations among people genetically underlie all higher functions [mental] and their relationships“ (Vygotsky, 1981, 163). To study how people learn via discourse, argument, questioning, and explanation

in museum settings (Griffin, 1999; Allen, 2002; Piscitelli & Weier, 2002; Hubbard, 2011) video recordings are made of visitors' interactions. Analysis of the recordings sheds light on the ways in which other resources and tools – artworks, label, previous knowledge, technologies – are made important in visitors' meaning making. In contrast to experimental studies with individuals in laboratory settings described above, then, visitors' situated talk and interactions in natural settings are understood in sociocultural approaches as *constituting* contexts for meaning making.

7.2.3 Integrating Approaches

When reviewing studies of laypersons' interpretative talk, there are some consistent findings over the decades that integrate both information processing and sociocultural perspectives. Feldman (1990) proposed a model that distinguished between *description*, interpretation in which aspects of an artwork are named, and *formal analysis*, which focuses on relationships between different components in a composition. The describing activities provided visual facts and associations necessary to move into an interpretative stage, where subjects speculate about the meaning of a work and develop an informed judgment about its aesthetic quality or effect on the viewer. Housen (1999) similarly distinguishes between increasingly advanced stages of aesthetic development, based on studies of viewers' descriptions and interpretations of art reproductions in controlled settings. In general, studies show that a pattern of increasingly complex describing activity is necessary for critical analysis, disciplinary talk, and evaluations of an artwork's aesthetic qualities and effect (Chapman, 1978; Ott, 1989; Piscitelli & Weier, 2002). Studies show that visitors develop a discursive repertoire of concepts and observations through focused observations and interactions, building a shared vocabulary for interpretive work that draws on prior knowledge of disciplinary concepts from art and art history (Chapman, 1978; Pierroux, 2010; Knutson & Crowley, 2010). Studies of groups' unguided discourse in art museums highlight the ways in which prior knowledge,

personal connections, and social relationships unfold and develop into interpretative talk. However, findings show that without the introduction of art concepts and other disciplinary terms in ways that can scaffold learning, laypersons will not master the expertise needed to move beyond everyday knowledge (Knutson & Crowley, 2010; Pierroux, 2012).

In this study, we introduce sociocultural approaches with the aim of extending the information-processing model developed by Leder et al. (2004). This ‘model of aesthetic appreciation and aesthetic judgments’ has been used in multiple studies of card sorting and categorizing tasks, which are used to indicate the concepts and perceptual levels experts and laymen in art apply to interpreting certain works (Augustin & Leder, 2006; Belke et al, 2010). The aesthetic experience of art, Leder (et al., 2004) claims, is a challenging process that includes the identification, understanding and interpretation of an artwork processed in stages with information rotating between the higher, conscious stages of perception. Participants’ prior knowledge and expertise is coded and reflected in a five-stage model of art interpretation based on Parsons (1987).

In this article, Leder’s model of aesthetic appreciation and aesthetic judgment is used as the basis for analyzing the data and discussing the results, drawing on the different stages of art interpretation suggested in the model. However, as Leder et al. acknowledge, social processes are neglected in this model, which is mainly concerned with individual cognitive processes. Therefore, we combine this information processing approach with interactional data and analysis from sociocultural methods, with the aim of contributing a better understanding of the role played by context and social interaction in laypersons’ aesthetic experience and meaning making. Integrating information-processing perspective and sociocultural approaches, we closely observe and describe participants’ interactions to gain insight into social and situated aspects of their perception and interpretation of art, including gesture, bodily orientation, and discourse.

7.3 Methods

In this section we account for the research design and methods, acknowledging “differences between participation in an experiment and visiting an art gallery need careful consideration” (Leder et al., 2004, 494). The study is based on a curator’s installation of seventeen paintings by Edvard Munch, dating from 1892 to 1916 (see Figure 8).

First, expert and visitors were video recorded during separate visits to the Munch gallery. The purpose of the recordings was to capture and analyze participants' conversations and gestures, as well as their orientation to artworks and resources in the physical setting, such as texts and labels. Second, after the gallery visit, the expert (curator) and small groups of visitors (students) were separately tasked with identifying relations between the paintings, using reproductions in two different card-sorting activities. They were instructed to talk aloud about their interpretative strategies for grouping and categorizing the works of art during the activity. Card sorting, or “subjective classifications” (Bruner, Goodnow, & Austin, 1956), are used to generate comparative data suitable for investigating and contrasting underlying concepts when cognitively processing art at expert and lay levels (Augustin & Leder, 2006). From a sociocultural perspective, the card sorting activities may be seen as a method of 'double stimulation' (Vygotsky, 1978), in the sense that the cards (second stimulus) mediate the groups' interpretation task (first stimulus) in this setting. Video recordings of the participants' interactions allowed us to study the social process of accomplishing the interpretive task using the cards.

7.3.1 Data Corpus

The curator was first interviewed in his office about the themes and aims for the new installation of the permanent exhibition, and about the arrangement of paintings in the Munch gallery in particular. Two researchers then filmed the curator as he discussed and interpreted

Munch's paintings in the physical gallery. In a follow-up meeting, the curator performed the same card sorting tasks as the visitors. The 'expert data' comprises 60 minutes audio from the first interview, 60 minutes video from the gallery and card sorting activities, and his exhibition design materials.

'Lay data' was collected through contact with high school class teachers with field trips booked at the museum. A total of sixteen young people volunteered to participate in the study (fifteen to nineteen years of age, three male and thirteen female), recruited from four different schools over a two-week period in late 2011. Accordingly, the participants were no longer visiting in the context of 'students on a school field trip' but as a group of friends' in connection with a research project.

7.3.2 Procedure

Each group was first taken to the atelier, a separate room for the education program. The young people were informed about the planned activities, data collection methods, and time frame, and consent forms were collected regarding video recording. One member of each group was equipped with a microphone, and a researcher filmed the group with a handheld video recorder (Leinhardt & Knutson, 2004).

The groups were first invited to visit the exhibition as they might typically do with friends. To accustom each group to the presence of a camera, they began in an adjacent exhibition space and moved to the Munch gallery at their own pace. The average time spent by the groups in this exhibition visit activity was $M = 24\text{min}$ ($Min = 15\text{min}$, $Max = 35\text{min}$). Upon exiting the gallery, the group returned to the atelier for card sorting and questionnaire activities. Seated at a table, the students were first given a floor plan of the Munch gallery and asked to recall and

locate the paintings they had just seen, using pencils to mark the 'map'. They were then given A5 cards with color reproductions of each Munch painting in the room, and instructions for two different card-sorting tasks:

- (1) Mapping: spread the cards out and then arrange them next to each other in an order that seems most meaningful.
- (2) Piling: spread the cards out and then sort them into different piles according to perceived similarities, categorizing each pile using one to three keywords.

Students were asked to work collaboratively, and to 'think and talk aloud'. Finally, a brief questionnaire was given to each student, requesting information about preparation for fieldtrip, age, gender, interest and knowledge in art, and experiences during the visit. Activities in the atelier were video and audio recorded. The average time spent by groups in the atelier was $M = 22,5\text{min}$ ($Min = 15\text{min}$, $Max = 35\text{min}$). The data corpus for the visitor studies comprises 340 minutes of video, student-generated content in the form of questionnaires and memory maps.

7.3.3 Analytical Approach

Reviewing the entire corpus for instances of 'making comparisons' and 'using juxtapositions,' we observed that some of the groups occasionally made comparisons by looking, pointing, and referencing visual elements in other paintings in the room when interpreting a painting. However, the focus of the groups' attention and talk was mainly oriented to developing an interpretation of a single work rather than making interpretations of relations between the displayed works in the installation. Although observations of similarities in paintings were occasionally noted, we were unable to identify instances in which juxtapositions were made relevant as a resource in the groups' interpretive work.

Based on this initial analysis, one group of students was selected as a case study (Yin, 2003), and was followed in both the gallery and the card-sorting activities. Case studies allow for multiple perspectives in analyzing complex social events across authentic contexts (Creswell, 2007). An excerpt of interaction from the gallery setting was selected, transcribed, and analyzed, adapting methods from conversation and discourse analysis conventions in sociocultural studies (Jordan & Henderson, 1995; Derry et al., 2010).

7.4 Results

In this section we present the results of the data. First, adopting an analytic-narrative stance, we describe the expert data: the curator's approach to the design of the exhibition, his discussion of works in the physical gallery, and his strategies employed in the card sorting. Data from the teens' gallery and card sorting are then analyzed using mixed methods. We conclude this section by looking across findings from the analyses, and discuss and compare physical, social and cognitive dimensions of expert and lay interpretive approaches.

7.4.1 Analysis of Expert Data

The curator established the *Dance of Life* as title and theme for the new presentation of the permanent collection. The title refers to the famous Munch painting from 1899/1900, and to Lucas Cranach's *Das Goldene Zeitalter* from 1530. Both paintings show people dancing in the open, and communicate a central theme in Norwegian art about how nature defines the condition and soul of human life. This theme was reflected in the Munch gallery by the prominent placement of Munch's work by the same title. *Dance of Life*, the largest painting in the room, was hung on the wall facing the entrance and thus most likely to first capture visitors' attention.

The intellectual reasons for the installation were based on the curator's view that permanent exhibitions in a national gallery should have a didactic style, to show people how art in a country developed. In Norway, where the first art academy was not established until 1909, telling 'this one story' required situating developments within the context of schools or academies in other countries, since Norwegian artists studied and often worked abroad. In the Munch gallery, the curator made four thematic groupings, with careful thought to relations to explore between formal, aesthetic, and compositional features of the paintings. One didactic aim was to show that Munch worked associatively, repeatedly using certain characters and events from his own life. At the same time, each artwork is mounted with enough space to allow visitors to view and appreciate each painting in its own right. The aesthetic aims were to create a physical space that fostered a smooth and pleasing viewing experience.

When asked about whether he had an audience in mind when developing the installation, the curator explained that he always thinks of the museum situation as a stage or meeting place where people will hopefully discuss art, discovering and making judgments about artworks 'on their own' through visual comparison. The challenge for visitors in this exhibition is to 'follow the story' and to see relations in the paintings, and his aim was to balance a didactic system that teaches visitors to 'see through comparing,' with opportunities to concentrate on the single work with its own story. In his words: "it's about the hanging." However, in the Munch gallery, and with young people in mind, he verbally demonstrated a range of interpretative strategies in his talk, most of which moved beyond making comparisons at the visual level. These included *describing the artist's process*, e.g., directing attention to the use of brushstroke and layers of color to create structure and texture in a painting; *making comparisons* between both paintings in the gallery and other works by Munch not in the gallery; *contextualizing* a work by dating it and noting the uniqueness of expression for the time; and *introducing links* between process and expression in the artist's production, i.e.,

themes of human frailty and mortality. In contrast to these rich connections verbalized by the art expert in the gallery, contextual resources in the installation were minimal in keeping with existing educational practice and learning perspectives in this national museum (Aure, Illeris et al. 2009). From an institutional perspective, then, the new curator's perspectives on visitor experience align with existing display practices of minimal text, labels and use of audio tours, which are not promoted.

7.4.1.1 Expert Card Sorting – Mapping

The curator's approach to the card sorting activities was closely linked to his work with design of the exhibition. In the mapping activity, he used the cards to create a two-dimensional arrangement identical to the gallery space (see Figure 8). He made rows of cards that mirrored the physical installation, indicating walls and entrance of the room (Figure 9). During the activity he also referenced the careful thought put into the arrangement, which he had described in detail in the interview.



Figure 9. Expert's 'mapping' arrangement

7.4.1.2 Expert Card Sorting – Piling

In the piling task, the curator was asked to group the paintings in categories and name them using one to three keywords. This task entailed shifting from a visual level of comparison to a semantic level of categorical attribution. The curator piled the works according to five categories: *night landscapes* (painting 8, 16), *figure-dominated landscapes* (10, 11, 12, 13, 14, 17), *portraits* (1, 3, 15), *interiors* (2, 4, 5, 7), and *iconic works* (6, 9). The curator approached the task in a straightforward manner and completed it in two minutes. He made no reference to the installation, and used categories grounded in art expertise.

7.4.2 Analysis of Visitor Data

Similar to other participants in the study, this group of young people viewed one painting at a time, moving on only after tacitly agreeing on an interpretation. We selected an excerpt from the video data that allowed us to examine more closely how interpretative work was accomplished. We conclude this section with a discussion of how the interaction analysis relates to Leder's information processing model.

7.4.2.1 Gallery Setting

A group of four teenagers (three girls and one boy, age 17-18) enters the gallery, looks to the right, and then stops. Actual names have not been used.

1. Hedda: (pointing to Dance of Life across the room from the entrance) We can begin with that one, can't we, since it's so well known? (the group walks toward painting)
2. Ellen: Yeah, this is nice (looking at painting, as they position themselves in front of it). But what I think is so strange is
3. Susan: It's an 'T'
4. Ellen: It's an 'info' symbol
5. Susan: I know!
6. Ellen: It's an 'T' (both pointing)
7. Susan: It's supposed to be the sun, and the sun's reflection
8. Hedda: Yeah it's the sun and the light
9. Ellen: But look at his face!
10. Susan: I know, he looks like a snake
11. Ellen: Really creepy
12. Hedda: Yeah, he does. That green color.
13. Tom: Very green.
14. Susan: He looks like a gnome.
15. Hedda: He uses a lot of green in that face, compared with the others (looking around)
16. Susan: He often does that with the men.
17. Hedda: That's possible.

18. Susan: She, that one there (pointing to female figure at left in painting), has a natural face.
19. Hedda: Completely normal, in relation to the others, actually.
20. Tom: That looks like the same person (pointing to female figures left and right in same painting)
21. Hedda: In the white?
22. Ellen: Well it's called the dance of life, isn't it? With these two? In 1892?
23. Susan: When was, when was Edvard Munch born? 1840? (all lean to read label)
24. Ellen: Eehh, (laughs) I don't know
25. Susan: I read that early in his life he was really optimistic, in the way he painted colors and all, but that
26. Hedda: Mmmm. Gloomier and gloomier.
27. Susan: Yeah, but in the course of his life
28. Hedda: With all the sickness and all.
29. Susan: Mmhm.
30. Hedda: Yeah, (pointing left in painting), it's like it starts there, and then the dance, and it gets more and more...
31. Susan: Yeah, and it's called dance of life, right?

7.4.2.1.1 Analysis of Excerpt

The teens move into the room and pause, before deciding where to start. Hedda suggests that they start with the *Dance of Life*, based on her previous knowledge of the painting as “well-known” (line 1). Ellen begins to comment on something she finds strange (line 2), before Susan interrupts to remark on the similarity between Munch's rendering of light reflecting on water and the international 'I' symbol for information. They discuss what the symbol is 'supposed to be' (lines 3-8) before a shift occurs, when Ellen uses the word 'but' and directs the group's attention to the face of the central figure in the painting (line 9). Hedda agrees with Ellen and Susan's comments that it is creepy and resembles a snake, and adds an observation of the green color, on which Tom also comments (lines 10-13). Hedda continues

to reflect on the use of green in comparison to faces in other paintings as she turns to scan the gallery (line 14). The students speak quickly and most of the talk is overlapping. Tom indicates engagement in the activity through his brief comments, gaze and movements, and then makes the observation that the two main female figures in the painting appear to be the same person (line 20), and Hedda asks confirmation of which figure he meant (line 21).

In the next move, Ellen creates a bridge from their shared visual attention to an interpretation, through the utterance “well” (line 22). She links the title of the painting to the couple dancing in the center, implicitly agreeing that the figures are the same but depicted in different life phases. She ends her turn by noting the year it was painted in the form of a question, introducing time as an aspect of the interpretation (line 22). Susan picks up on this by asking the year of Munch's birth (line 23). The group collaboratively searches the label for this information, but it is not included. In this excerpt, and in the data as a whole, other paintings in the gallery space are made relevant in groups' interactions as a resource for comparison (line 15), as are labels and texts (line 23). Lacking information, Ellen laughs and acknowledges aloud that she does not know (line 24).

Susan continues that she had read that his color palette as a young artist was optimistic, 'but'. At this point Hedda picks up the 'but' with an acknowledging “mmm” and completes the thought with the words 'gloomier and gloomier.' Susan's 'yeah' (line 27) acknowledges Hedda's response as corresponding to her previous utterance, and she then elaborates by referring to sickness, an interpretation with which Hedda again concurs through an overlapping 'mmm' (lines 25-29). Hedda points to the painting, saying that 'it' starts here and becomes 'more and more' (line 31). Susan concludes the group's discussion by linking the notion of 'it' – meaning 'more and more gloomy' – once more to the theme and title of the work *Dance of Life* (line 32).

It is clear that the teens have some previous knowledge about Munch, and that art-historical information about his life and work is considered a valued resource to draw into their cognitive work. Individual previous knowledge is both prompted by and contributes to the collective interpretive process. Susan's question about when Munch was born (line 23) must be understood in the context of the unfolding discussion regarding a disturbing use of color (lines 9-17), and information introduced by Ellen about the painting's date from reading the label (line 22). This prompts Susan to reflect on Munch's artistic production and to introduce information she has read about his change in palette over time. Hedda immediately picks up on this disciplinary knowledge, which she apparently shares, and she completes Susan's utterance about the development of a gloomier palette from this time (line 26). In other words, they draw on shared knowledge of Munch's artistic production and biographical information to explain the previously noted disturbing use of color (lines 27-29). Moreover, Hedda links 'it' – Munch's personal history and 'gloomier' palette – in her next utterance, which is directed toward the narrative content in this particular painting, the *Dance of Life*.

In this excerpt, then, the meaning making process builds on observations of a disturbing green color of men's faces in the painting, on Tom's observation of the same woman flanking a dancing couple in the same plane, and on previous knowledge of developments in Munch's palette that are linked to tragic events in his life. The describing and analyzing activities provide visual facts and associations necessary to move into an interpretative stage of finding meaning and developing an aesthetic judgment of an artwork. During the unfolding dialogic process, like the trajectory in the narrative moving from left to right in the painting, their interpretation becomes anchored in the title of the work, *Dance of Life*. As the group moves and discusses other paintings in the room, they continue to notice, compare and comment on

the greenish palette frequently used by Munch in rendering faces, as part of their viewing strategy: “there’s the green again.” Such talk is in keeping with studies showing that visitors develop a discursive repertoire of concepts through focused observations, comparisons, and interactions, building a shared vocabulary for interpretive work (Chapman 1978; Pierroux 2010).

7.4.2.1.2 Integrating Analysis from Gallery Setting with Leder’s Model

Integrating this analysis with concepts from an information processing perspective, we see that the young people start their talk at the second stage of Leder’s model (2004): implicit memory integration. They choose to stop at the painting because it is familiar to Hedda. Prior knowledge thus plays a role in triggering interest (Leinhardt & Knutson, 2004). The next utterance is an aesthetic judgment made by Ellen (line 2), who states that the painting is ‘nice’. According to Leder’s model, aesthetic judgment is the result of aesthetic processing which would suggest that Ellen had already processed the painting at all five stages. However, in the social context of the group, the processing has not stopped but returns to the first stage of the model, perceptual analysis, initiated by Ellen when she remarks on ‘something strange’. Interestingly, first stage ‘perceptual analysis’ of features like color is verbally introduced quite late in the interpretative talk (line 12), after first classifying (line 10) and emotionally reacting (line 11) to their effect. This does not necessarily mean that perceptual analysis was not processed first, but suggests that in a social setting it may be more relevant to identify and display affective response *before* describing perceived features. The emergent outcome of the utterances and integration of new information becomes a collaboratively developed interpretation focused on the artist’s intention.

7.4.2.2 Card Sorting – Mapping

Seated at a table in the atelier, the students read the instructions for the task and immediately began to spread the cards out, voicing associations such as *sad* or *realistic*. They decided to first loosely group the cards to get a better overview of how they might "fit together." The first group of cards was assembled in the upper right corner (Figure 9), which they describe as "very realistic."



Figure 10. Lay group's 'mapping' arrangement

The next strategy was to look for cards with the theme *sickness*. They selected *The Sick Child* (4) and *Death in a Sickroom* (5) and placed them next to each other. They agreed that there were more ways to relate the cards, e.g., by looking at the style. This led to a sequence where each member of the group started to select and place cards, explaining the arrangement to their peers. The *sickness* cards were grouped with *Moonlight* (11) and *Mother and Daughter* (14) because of similar style. *Moonlight* (11) was moved from the end of the row to the beginning to arrange the cards according to increasing brightness.

The next row was made using similarities in color and content. *The Day After* (7) and *Madonna* (6) depicted the same woman, while the red halo of *Madonna* “linked” to the orange color in *Scream* (9). This link was illustrated by placing the cards next to each other with a small gap in between. *Scream* was part of a row of works depicting people outdoors. The teens also described this row as starting off with very “clear” paintings, which became increasingly imprecise. The two cards at left depict the same figure in different foregrounds. The two cards at bottom right have the same mood. They concluded the activity by summarizing each row, explaining the juxtapositions.

In the mapping task the students showed that they were aware of the meaning making potential, in viewing the paintings in multiple ways. Their approach appears to be closely connected to physically handling the cards and using proximity between them to illustrate relations. The process of this task can be described with three phases: an initial phase where they selected an interpretation strategy that seemed striking or easy to apply; a second phase in which the act of freely arranging and rearranging cards triggered a multitude of strategies; and a third phase in which they agreed on the final result. Interestingly, the group did not refer to their earlier interpretative work in the gallery, instead, concentrating on relations between visual elements seen in the cards.

7.4.2.3 Card Sorting – Piling

The group used their discussion and arrangement in the mapping task to sort the seventeen paintings into six different categories: *detailed/realistic* (1, 3, 15), *atmosphere/cozy* (2, 8), *serious/descriptive/scenes* (4, 5, 11, 14), *mass emotions* (9, 10, 16, 17), *depression/frustration* (12, 13) and *passion* (6, 7). The main strategy entailed categorizing the paintings according to the emotion they evoked (atmosphere, cozy, serious, mass emotion, depression, frustration, passion), but also levels of abstraction (realistic) and style (detailed, descriptive, scenes). All

student groups used more than one strategy to compare and sort the cards. Table 3 shows the results of the piling task for all student groups that took part in the study compared to the curator. The case study group is represented as Group 1. On average, participants made M=6 piles (Min=5, Max=9, SD=1.4), comprising of 1 to 6 cards (M=2, SD=1).

Table 3. The semantic categories of curator and groups of students in the card-piling activity

Curator	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
1 <i>Portraits</i>	<i>Realistic, details</i>	<i>Portraits</i>	<i>Portraits</i>	<i>Portraits, realistic</i>	<i>Widows</i>	<i>Color, black & white dresses, sky with moon</i>
2 <i>Landscapes</i>	<i>Depression, frustration</i>	<i>Nature</i>	<i>Nature</i>	<i>Mood, silence, calm</i>	<i>Sick, dying</i>	<i>Torn, same figure, outside nature</i>
3 <i>Figure-dominated landscapes</i>	<i>Mood, cozy</i>	<i>Death</i>	<i>Sorrow</i>	<i>Loneliness, creepy</i>	<i>Cold</i>	<i>Both alone, same faces, sad/serious</i>
4 <i>Interior</i>	<i>Serious, descriptive</i>	<i>Prostitutes</i>	<i>Forbidden Love</i>	<i>Theme working class, colors</i>	<i>Romantic, happy</i>	<i>Colors, dark/cold, winter outside</i>
5 <i>Iconic works</i>	<i>Mass emotion</i>	<i>Love</i>	<i>Despair</i>	<i>Life, women, aging</i>	<i>Lonely, sad</i>	<i>By itself</i>
6	<i>Passion</i>	<i>Sad and afraid</i>		<i>Erotic, same colors</i>	<i>Abuse</i>	<i>Persons are sick, same colors, going to die</i>
7				<i>Sickness, sadness, desperation</i>	<i>Afraid</i>	<i>Famous pictures, same colors, same expression</i>
8						<i>Alone, men, same color</i>
9						<i>Different color, didn't fit</i>

7.5 Discussion

In a research design that looks across information processing and sociocultural perspectives, we have explored how the study of physical and social contexts may be related to a five-stage model of individual aesthetic information processing (Leder et al., 2004). We analyzed the interpretative processes of curator expert and visitor non-specialists to address the following research questions. How do interactions with authentic artworks in a physical gallery space become a resource in lay and expert interpretations? Which interpretative strategies and

disciplinary knowledge do visitors and experts draw on when relating works to one another using representations outside of the gallery space? In which ways do visitors notice and comprehend the meaningful arrangement of paintings as intended by the curator expert in the exhibition space?

7.5.1 Physical Context

The sociocultural approach entailed collecting and analyzing video recordings of visitors' interactions in the physical gallery to shed light on processes of meaning making. Applying an information processing model of aesthetic experience (Leder et al., 2004) to interactional data, allowed us to schematically describe different aspects of cognitive processing linked with meaning making in this context. This mixed methods approach afforded analysis of expert-lay interpretations made with and without the physical dimension of an installation of authentic works of art, offering insights into how meaning making processes were altered by changing context and interpretive tasks.

The significance of the physical gallery space was apparent in the way the material qualities of authentic artworks served as a shared visual field. Analysis of single paintings by group members was mediated by gestures and talk that directed attention to visible features of the artworks, references to prior knowledge, comparisons with visual and thematic features of other works on display, and reading texts and labels in the gallery space. These *in situ* interactions fostered reflections on artwork aspects that often corresponded with the curator's aims and reached the level of iconology (Panofsky, 1975). The young people were engaged in discussing the symbolism of the painting to develop an interpretation that was in line with the expert's art-historical intentions.

Concerning the role of juxtapositions between paintings in the gallery, the analysis showed that the expert, and to a certain extent visitors, used these to make connections between works. However, we did not find in the lay data the kind of expert connections that the curator made, and which he aimed for visitors to experience. Lay interpretations were largely made at the level of individual artwork, rather than at the level of ideas behind the groupings or the overall ‘dance of life’ theme. Explicit information was not needed, the expert hoped, to engage visitors in comparing and discovering relations between artworks throughout the exhibition, conceived as a three-dimensional space. However, what we observed, in keeping with other studies (vom Lehn et al., 2001; Knutson, 2002), is that visitors generally do not physically or intellectually orient toward the gallery experience as a three-dimensional ‘information space’ but rather relate to the two-dimensional picture plane in a sequential movement along walls, viewing one painting after the other and perhaps reading labels. “The sound,” as Munch called it (Eggum et al., 1992, 51), produced by certain painting juxtapositions, did not seem to be heard by the visitors.

7.5.2 Social Context

In the gallery setting, we found that the group’s social interactions triggered the search for new information, created a shared interpretive vocabulary, and fostered joint orientation to specific aspects of works. Group members brought individual knowledge into conversations building on others’ observations and directing attention to new aspects and interpretations. As such, the process did not culminate in aesthetic appreciation and aesthetic judgment after sequentially passing through the five stages in Leder’s model (2004). Instead, we found a meaning making process that was volatile, emergent, and very much situated in the physical setting of the museum situation.

In general, how 'close' the visitors' interpretations met the curator's intentions was dependent on both their prior knowledge about art and their ability to dialogically relate this knowledge to information in the gallery which may be understood as an expression of members' cultural competence (Kesner, 2006). Shimamura (2012) describes schema for specific situations that influence information processing, with cognitive concepts built through previous encounters and knowledge that form expectations. Based on the analysis in this study, a schema specific for art galleries may thus be described as triggered information processing that includes concentrating on paintings one by one, searching for resources in the physical space for meaning making, and integrating this information through discourse with others regarding the artist's 'deeper meaning' for the artwork.

We were surprised that the visitors did not explicitly refer to prior knowledge and draw on their experience in the gallery when solving the card sorting tasks, even when prompted to do so. In the piling activity, this may be attributed to the specific nature of the task, which invited *classification* based on perceived similarities. At this semantic level, the description of similarities was constrained in comparison to the mapping task, which involved using language to negotiate an arrangement of the cards in a way that seemed most meaningful to all group members. Interestingly, we found that all of the groups approached these tasks as quite distinct from the gallery visit. We attribute this to differences in the physical and social organization of the two activities, but also to the semiotic and representational properties of the cards, mediating a primarily visual and 'hands on' approach that involved moving, flipping, and arranging reproductions in a quick and playful way.

Leder et al. state, “*the challenge of art is mainly driven by a need for understanding*” (2004, p. 489). In the gallery setting, this need is apparent in the visitors’ engagement with single artworks and their search for information in labels and previous knowledge to explore a deeper meaning. This finding supports Smith’s (2006) claim that visitors feel a need for more information to engage on higher levels of art inquiry, at iconographic and iconological levels (Panofsky, 1975). We found that group interactions in the gallery mediated meaning making at a higher cognitive level than group interactions during the card sorting, where the “need for understanding” did not seem relevant to the interpretive task. Yet the card sorting supported strategies to explore across artworks on a visual level, an approach also intended by the curator in the installation (Table 1). In sum, comparison was employed as a strategy when the group made visual and semantic classifications using cards, while the social context in the gallery afforded more descriptive strategies that collaboratively drew on the individual experience and previous knowledge of group participants.

7.6 Conclusion

An art exhibition is a rich space of visual information that has been intentionally arranged and designed to communicate knowledge of artworks, artists, and art history. Our final research question aimed at exploring the ways in which visitors notice and comprehend the meaningful arrangement of paintings as intended by the curator expert. As mentioned above, we found that young people indeed discussed and engaged with paintings in many ways that overlapped with the curator's aims and expert interpretative strategies, and there were instances in which juxtapositions with other works became relevant for their interpretive work. In this sense, the curator’s intentions were realized.

Our study also aligns with previous research in finding that visitors did not make connections between paintings, narratives, and themes through comparison and interpretation at the level of the curator's expectations or expertise. This is a critical step that the young people were unable to do, that is, to focus on specific aspects of a painting and develop arguments for interpretations on different levels in connection to other artworks. Since the curator's intentions behind the overall arrangement and juxtapositions of artworks were not apparent to the visitors, neither was it accessible as an interpretive resource or meta-cognitive strategy. In this study, then, an important gap was identified between expert and visitors: laymen do not "follow the story" because they are not aware it exists. The expert perspective that "it's all about the hanging" is simply not part of the lay schema of meaning making in art museums.

In terms of the relevance of these findings for museum professionals, this study supports interpretation approaches that explicitly invite visitors to use juxtapositions in the installation as tools for comparison, included in the information resources in the gallery. Moreover, we propose that integrating methods from sociocultural and information processing perspectives may prove useful in different phases of conceptualizing and evaluating a new exhibition. Combining analysis of gallery interactions with studies of visitor tagging and visual mapping of collections offers insight into how the intertwined physical, social and cognitive dimensions of meaning making play out in different activities and settings. Finally, this study promotes a reflective curatorial practice that embraces the visitor experience, by providing new knowledge of visitors' interpretation processes and insight into experts' expectations of visitors' meaning making.

While in the museum situation it is the gap between the curator's expectation and the visitors' interpretation that offer insights into meaning making with art under the influence of the physical space and the mediating power of social context, however it does not shed light on how meaning making differs between experts and laymen of art history in its sequential

expression of *seeing* and *knowing*. Thus the last step in this dissertation to further specify expert-lay differences in viewing representational art was to have a closer look at participants' perceptual and cognitive strategies and abilities of meaning making in a controlled setting that reduced the context of viewing to single representational paintings presented one by one. This setting of study 3 has the advantage of direct comparison of experts and laymen, investigating their gaze and thoughts while viewing a set of well-chosen representational paintings according to specific consideration of content and effects of saliency.

8. Study 3: Expert-Layman Comparison of Meaning Making with Renaissance Portraits²

“A portrait is a painting with something wrong with the mouth.” - John Singer Sargent

8.1 Introduction

To a fully knowledgeable viewer, an artwork offers extensive potential for making meaning. However, depending on their expertise, most viewers are not able to tap the full potential but experience a work of art in a way that reflects their perceptual and cognitive competence emerging from their history of encounters with art (Kesner, 2006). Empirical research about the influence of expertise on the processing of art so far has emphasized that experts tend to focus on formal aspects, including color, shape, or composition, while novices tend to focus on an artwork's content (e.g. Winston & Cupchik 1992; Nodine et al., 1993; Zangemeister et al., 1995; Augustin & Leder, 2006). But besides formal aspects, experts also possess a rich knowledge base in terms on typical motives and contents. Renaissance paintings for example characteristically depict specific human figures, contextualized by objects that bear symbolic meaning significant for a suitable art historic classification. For successful interpretation the viewer needs to take notice of seemingly peripheral details and relate the respective meaning to the overall theme. Art-historians use such encounters to trace, reveal and argumentatively prove aspects about art crucial to pursue their scientific purpose. They have developed different methods of inquiry providing them with instructions how to make use of perceived

² A version of this article has been submitted as: Bauer, D. & Schwan, S. (submitted). Expertise Influences Meaning Making With Renaissance Portraits: Evidence From Gaze and Thinking-Aloud. *Psychology of Aesthetics, Creativity, and the Arts*.

visual features for a review of art coherent to community-specific frameworks, whereas laypeople normally lack such knowledge. Accordingly, the present study seeks to identify how expertise in art history influences the manner how a painting's content is perceived and interpreted during processes of meaning making. A set of Renaissance portraits was used to investigate differences between experts and laymen of art history, using eye-tracking and think-aloud protocols to shed light on their cognitive processes while viewing the paintings.

8.2 The Present Study

In Chapter 4 differences in expertise with regard to perception and interpretation of paintings have been demonstrated both for eye-gaze data and for thinking-aloud protocols. More specifically, experts have been found to be less vulnerable to the effect of salient features in a painting, such as human features or central position (Vogt, 1999; Phiko et al., 2011). In contrast to laymen experts are able to make use of information expressed in formal and structural aspects of a painting (Nodine et al., 1993; Zangemeister et al., 1995) and are more effective in using their knowledge to find highly informative components in paintings (Antjes & Kristjanson, 1991). Verbalizations are a promising method to collect data concerning higher cognitive processes in meaning making with art (Machotka & Spiegel, 1979). Art expertise is seen in connection to analyzing style rather than content, using knowledge for interpretations of perceived pictorial aspects (Locher et al., 2007) and integrating these to get to a sufficient understanding of the artwork (Parsons, 1987; Housen, 1999). While a combination of eye tracking and simultaneous thinking aloud has been successfully applied in other fields (Van Gog, Paas, & Van Merriënboer, 2005) respective studies are rare for the field of art perception. The present study aims to fill this gap by concurrently gathering eye-gaze and thinking-aloud data for viewers with either high or low expertise in art history, while looking at a set of renaissance portraits. It considers meaning making with art a complex

cognitive process that comprises different, implicit and explicit analytical phases ending in an interpretation that can be more or less successful and satisfying. An aesthetic emotion and judgment about art that is, according to Leder et al. (2004), the output of meaning making with art is not addressed. Instead, the study focuses on the cyclic course of the aesthetic processing and how it is shaped by expertise.

In general, we assume that expertise alters the cognitive mastering and evaluation of ones meaning making process as proposed by Leder et al. (2004). Experts should inspect a painting in a structured way to find meaning in specific features serving to test interpretations that lead to a successful understanding according to existing art-historic frameworks (Panofsky, 1975). Applying eye-tracking and simultaneous thinking aloud, it is assumed that the influence of expertise on the cyclic relation between information search and interpretation can be measured by analyzing gaze fixations of participants that allude to the distribution of attention over a work of art together with verbal reports that shed light on how expert concepts of art inquiry get applied to make meaning (Locher et al., 2007). We propose a meaning-gaze hypothesis stating that the gaze of experts viewing an artwork is directed to regions of relevant meaning potential (Antjes & Kristjanson, 1991; Haider & French 1999). Also the experts' gaze is less bound to features of strong bottom-up saliency but less importance for successful understanding (Nodine et al., 1993; Vogt, 1999). Further we propose that information drawn from regions of greater meaning is used to make multiple interpretations to come to a suitable conclusion.

To investigate these assumptions a group of students of art-history is compared to students with no particular background in arts, using eye-tracking and thinking aloud to shed light on the cognitive processing during the inquiry of specific artworks. Participants view different Renaissance portraits, comprising human figures and objects with symbolic meaning potential according to art-historic Iconography. Additionally we differentiate between double portraits

with symbolic objects in the center surrounded by two human figures and single portraits with a central figure surrounded by symbolic objects. This is to control for central bias, the tendency to look at depicted objects in the center of a painting. Central bias is discussed to occur due to bottom-up effects influencing experts and laymen, as well as to top-down effects sensitive to expertise in connection to composition practices and expectations that central areas in paintings are likely to be informative.

Using a 2x2 design with level of expertise as between and type of portrait (single or double) as within subjects factor differences in meaning making were investigated in two tasks: an initial inspection of the portraits for 10s each, using eye-tracking to record eye-movements of participants; and a second inspection with the instruction to make meaning of the paintings, using eye-tracking with simultaneous thinking-aloud. We expected that combining these tasks would provide us with insights into perceptual means during meaning making with art of experts and laymen of art history.

Hypothesis 1: Art-historians pay more attention to relevant areas that hold information they can use for interpretations and are less biased by saliency of information.

To accomplish the second stage of iconographic analysis in Panofsky's model, experts need the knowledge to distinguish content with low from content with high meaning potential that can be used for interpretation (Antjes & Kristjanson, 1991; Haider & French 1999; Kesner, 2006; Zembylas, 2003). Thus, in the initial inspection task as well as in the task with simultaneous thinking aloud it was expected that experts in contrast to laymen look longer at features with symbolic meaning and less on human features. Also experts' average fixation time on symbolic features was expected to be higher than for laymen, indicating a deeper processing of these areas (e.g. Nodine et al., 1993). For both tasks it was assumed that regardless of type of portrait, experts' gaze on symbolic features and human features would

stay the same. For laymen it was assumed that they would look longer on features with symbolic meaning in double portraits, because of their central position (Yarbus, 1967; Nodine et al., 1993; Vogt, 1999; Vogt & Magnussen, 2007; Locher et al., 1996; Mc Manus, 1985). In the task with simultaneous thinking aloud it was expected that experts' verbal reports would consist of more naming and interpretations of symbolic features. Also we expected a positive relationship between looking at relevant content with symbolic meaning and the naming of symbolic content in the thinking aloud (Panofsky, 1975).

Hypothesis 2: Art historians meaning making is structured and comprises more attempts to interpret a painting.

To accomplish an iconological interpretation (Panofsky, 1975) experts have to go on a trial of interpretations that they can weigh and relate to each other for art historic understanding. Therefore it was expected that the proportion of interpretations made in the thinking-aloud would be higher for experts. It was further assumed that experts' synthesizing of interpretations referring to relevant content would reflect in a greater structuredness of experts' verbal reports. Also it is expected that in contrast to laymen experts do not feel more confident of their understanding of a painting, because they know about the meaning potential they probably missed. For the pre-iconographic description, the first stage in Panofsky's model of art inquiry, experts need to know about visual expression in the perspective of history and time. Art historic training leads to domain specific knowledge and an extensive history of encounters with art represented in specific mental concepts and schemata (e.g. Neisser, 1979; Ericsson & Kintsch, 1995; Leder et al., 2004). Using these schemata about art enables experts to condense relevant information and express it on an abstract level. Thus it was assumed that the experts' verbal reports consist of fewer units of information but more art-specific terms than laymen's.

8.3 Method

8.3.1 Participants

In total 46 students (29 female) of the University of Tübingen participated in the study, with a mean age of 25.2 years ($SD = 2.79$). Participants had normal or corrected to normal vision. The expert group consisted of 21 students of art history in advanced study period ($M = 24.95$ years, $SD = 2.56$; 4 male, 17 female). The lay group consisted of 25 students of all other faculties of the university ($M = 25.4$ years, $SD = 3.07$; 13 male, 12 female).

8.3.2 Material

Set of paintings: The Renaissance (14th-17th century) is an epoch in art-history characterized by the revitalization of antique values and ideas, because people developed a consciousness for having outlived them (Janson, 1988). The rising availability of literary sources and the trend to engage with the lead artists of antiquity brought Renaissance artists to pick up well-known themes and garnish them with new supplements, causing fundamental change in an artworks' meaning (Panofsky, 1975). Portrait paintings from that time comprise of figures that can be identified by surrounding objects having distinct symbolic meaning. Thus, in order to make a suitable interpretation one has not only to focus on the main act, but take also the accompanying props and attributes into account, relating the potential meaning of single objects to one another until a plausible and coherent meaning evolves.

For the present study, 10 Renaissance portraits painted by different artists were chosen, all approved to be remittance works, dating from 1434 - 1594 (Table 1). The ten portraits are well discussed in the art history community and can be inquired with the method of iconography and iconology (Panofsky, 1975).

All paintings include several objects that can be ascribed symbolic meaning: these objects can either be taken in their literal meaning, circumstantial to the portrait figure, or interpreted as symbols, as accessory parts to the portrait figure. For example several keys are depicted in the portrait of *"The Merchant Georg Gisze"* (Figure 1) that furnish the room with details, but additionally point to the merchant's power and wealth as well as his isolation in a foreign county. Like this the meaning potential of these objects makes it possible to classify and interpret the portraits according to existing historic and cultural frameworks. In the example it means that by making use of symbolic meaning of objects it is possible to identify the portrait as the Merchant Georg Gisze, recognize his personal and social attributes, and determine space and time of origin.

In order to control for central bias (Parkhurst & Niebur, 2003; Tatler, 2007; DiPaola, Riebe & Enns, 2013), we selected 5 paintings that were single portraits with a central human figure and objects with symbolic meaning and landscape around them, while the other 5 paintings showed double portraits of two peripheral figures with symbols and landscape positioned in the center (Figure 1).



Figure 11. Two examples of Renaissance portraits included in the study: on the left Hans Holbein the Younger, *"The Merchant Georg Gisze"*, 1532; on the right Jan van Eyck, *"The Arnolfini Wedding"*, 1434.

For every painting we developed a data-sheet that explicated its meaning in accordance with current iconographic research. Each data-sheet firstly specified at least four details depicted in the painting that could be read as symbols, secondly described their symbolic meaning and lastly integrated the elements into a coherent art-historic interpretation. For example the slippers in the left, lower corner of “The Arnolfini Wedding” (Figure 1), can be viewed as a symbol for hastiness and for holy ground. In their first meaning, the slippers point to the manner in which the marriage was consummated. In their second meaning, the slippers refer to a passage in the Old Testament and denote that the depicted couple is receiving a holy sacrament.

Additionally, each symbolic detail, as well as the parts of the human figures (head, hands and torso) depicted in the painting, were defined as areas of interest (AOI) for the investigation of participants’ gaze. Objects with symbolic meaning were build into AOIs separately or blended if overlapping. When a detail on a human feature had a symbolic meaning (e.g. paleness of skin), it was counted as AOI depicting a human feature.

Table 4. Specification of the paintings used in the study and the areas of interest (AOIs) with examples for symbolic detail

Type of portrait	Artist, title and date of painting	Amount of symbolic and human figure AOIs with coverage of painting in %		Example for a symbolic detail and their meaning
		Symbolic	Human Figure	
Single portraits: central human figure with peripheral symbolic details	<i>Leonardo da Vinci, Lady with an Ermin (Portrait of Cecilia Gallerani), 1489–1490</i>	2 AOIs 5,6%	3 AOIs 19,10%	The ermine, symbol of her last name Gallerani (the Greek name for ermine) and of Ludovico Maria Sforza, Duke of Milan (she was his mistress)
	<i>Lucas Cranach The Elder, Portrait of Anna Putsch, 1503</i>	5 AOIs 9,7%	3 AOIs 21,3%	White carnation, symbol for Jesus Christ, white for chasteness
	<i>Lucas Cranach The Elder, Portrait of Johannes Cuspinian, 1503</i>	5 AOIs 9,8%	4 AOIs 27%	A castle on the hill, symbol of success and religious life
	<i>Hans Holbein the Younger, The Merchant Georg Gisze, 1532</i>	6 AOIs 27,8%	4 AOIs 16,7%	Keys, symbol of power and wealth
	<i>Antonello da Messina, St. Jerome in His Study, 1460-1475</i>	10 AOIs 11,6%	3 AOI 1,3%	Lion, symbol of St. Jerome
Double portraits: peripheral human figures with central symbolic details	<i>Jan van Eyck, The Arnolfini Wedding, 1434</i>	6 AOIs 8%	6 AOIs 22,1%	Dog, symbol for wealth and faithfulness
	<i>School of Fontainebleau, Portrait of Gabrielle d'Estrées and Duchess of Villars, 1594</i>	3 AOIs 31,3%	8 AOIs 32,7%	Pinch of the right breast, symbol for pregnancy of Gabrielle d'Estrées
	<i>Hans Holbein the Younger, The Ambassadors, 1533</i>	3 AOIs 9,4%	8 AOIs 26,8%	Skull (anamorphic) , symbol of vanitas and science
	<i>Jan van Eyck, Madonna of Chancellor Rolin, 1435</i>	1 AOIs 4,7%	8 AOIs 24,4%	Garden, symbol of the Virgin Mary and the luxury of Rolin's property
	<i>Piero della Francesca, Portraits of the Duke and Duchess of Urbino, 1465-1472</i>	1 AOIs 9,9%	4 AOIs 50,3%	Boats, symbol of trade, tradition and lasting wealth

Questionnaires for state of mood and prior knowledge in art: Directly before and after the session, participants filled in the Multidimensional Mood State Questionnaire (MDMQ, Steyer, R. et al 1997). Participants affective state was specified by self-assessment of 24 items characterizing different moods (e.g. content, restless, sleepy) rated on a 5 point Likert-type response scale ranging from 1 (definitely not) to 5 (extremely). 8 items form one of 3 scales describing mood on 3 dimensions: good-bad, awake-tired, calm-nervous.

Expertise was controlled via questionnaire comprising 21 items about interest, 24 items about knowledge and 20 items about attitude towards art measured on a 5 point scale ranging from 1 (definitely not) to 5 (extremely) with an overall Cronbach's $\alpha = 0.87$. Additionally, we listed the names of different artists and asked if participants knew them and could write down their nationality and style, giving them 1 point for every right answer, the sum-score reflecting their particular knowledge in art. Also, after finishing the tasks, participants were asked which paintings used in the study had been familiar to them.

8.3.3 Apparatus

Eye movements were recorded using the remote eye-tracking device RED250 from SensoMotoric Instruments (SMI, Teltow, Germany) controlled via SMI iViewX™ workstation. The sampling frequency was 250Hz. Calibration was done using a 13-point calibration image. Stimuli were presented via SMI Experiment Center™ software (version 3.0) on a 1680x1050px DELL screen with a physical stimulus dimension of 474x297 mm. Using a chin-rest participants' heads were in 70 cm distance to the screen. For simultaneous thinking aloud we integrated a digital camera into the recording system that captured audio and video of the participants in alliance with tracking processes.

8.3.4 Procedure

Participants were tested in individual sessions of approximately 60 minutes, first filling in the Multidimensional Mood State Questionnaire (MDMQ, Steyer, R. et al., 1997) to observe the participants' mood through the run of the experiment.

It is known that eye-movements are sensible to task (Buswell, 1935; Yarbus, 1967). Verbal reports in combination to a task should be considered as a different task (Ericsson & Simon, 1993), because it increases cognitive load and slows down performance (Karpf, 1973). That is why the present study is split in two within-subject sessions: an initial inspection task and a thinking-aloud task.

After positioning the participant in the chin rest and calibrating the eye-tracking system, the session started with the initial inspection of the 10 portraits, each presented for 10 seconds, in random order. Participants were instructed to just view the paintings with no need to consider or remember anything. Between images, participants got a 10 seconds break to rest and close their eyes. An acoustic signal indicated the appearance of the next stimulus.

In a second, self-directed phase of the experiment, participants were told to think aloud while viewing the paintings (Ericsson & Simon, 1993; Holmqvist et al., 2011). They were instructed to verbalize everything that came to their mind and speak out freely like there was no one listening. When having the feeling they had nothing more to say, they could proceed with the task by pressing return on a keyboard in front of them. To accustom the participants to the task with their heads in the chin rest, we asked them to think aloud to a cartoon-strip, repeating instructions when needed and encouraging them to verbalize freely.

After the training task and renewed calibration, participants were presented the 10 paintings, in random order. Each painting was presented as follows: participants viewed the painting and simultaneously talked aloud until clicking return or reaching a time-limit of 5 minutes.

Next they got instructions to summarize their thoughts to the painting while viewing a blank screen, and to click return when finished, with a time-limit of 1 minute. A final screen asked participants how self-assured they felt of their meaning making of the painting they had just seen on a 5-point scale. After that, participants closed their eyes for a 15 seconds rest. The procedure restarted with an acoustic signal, indicating the presentation of the next stimulus until participants had seen all 10 paintings.

In the end participants repeated the MDMQ, and filled in an online questionnaire on demographics and questions concerning their knowledge, interest and attitude towards art on a 5-point scale. Additionally we asked them questions about style and origin of specific artists and which portraits shown in the study had been familiar to them.

8.4 Data Analysis

8.4.1 Gaze Data

Two participants of the laymen group had to be deleted from the data set, because of extreme data regarding fixation times, indicating technical problems with the eye-tracking.

To analyze the participants' gaze, we defined areas of interest (AOIs) as described before using the AOI-tool provided by SMI BeGaze™ software (version 3.0). That is, based on the paintings' data-sheets, each object with a symbolic connotation as well as the parts of the human figures (head, hands and torso) depicted in the painting were defined as areas of interest (AOI). If objects with a symbolic connotation overlapped, they were collapsed into a single AOI. Details and attributes of the human figures with a symbolic connotation (e.g. paleness of skin) were counted as AOI depicting a human feature. Fixations and saccades were detected using the default algorithm for high-speed event detection of the SMI BeGaze™ software (version 3.0) with a peak velocity threshold of 40°/s and minimum fixation duration of 50ms.

The two phases of the experiment, namely the initial inspection of the paintings for 10 seconds and the second self-directed inspection with simultaneous thinking aloud were analyzed separately. For each AOI participant's dwell time, that is the sum of all fixations and saccades within the AOI, was determined, and standardized for the size of the AOI. Next, for each painting, we calculated both the mean dwell time on human feature AOIs and the mean dwell time on AOIs with a symbolic connotation. Finally, the ratio of mean dwell time of the human feature AOIs of a painting and the mean dwell time on AOIs with a symbolic connotation was calculated. A ratio-value above 1 indicated, that relative to the size of the AOIs participants in average spent more time viewing human feature AOIs of a painting, while a ratio-value smaller than 1 indicated that participants spent more time viewing AOIs with a symbolic connotation.

Additionally, as an indicator for processing depth, (Nodine, Locher & Krupinski, 1993; Reingold & Charness, 2005) participants' average length of a fixation hitting AOIs with a symbolic connotation (average fixation time) for each of the 10 paintings was calculated.

8.4.2 Thinking Aloud Data

Due to technical problems concerning the audio recordings of the thinking aloud simultaneous to eye-tracking we were not able to transcribe and analyze the thinking aloud of 5 participants, reducing the number of experts to 20 and the group of laymen to 21 participants (41 participants in total).

Participants' thinking-aloud was transcribed and split into single phrases as main units of analysis. Across participants, separate protocols for each painting were compiled. In each protocol, participants' paragraphs were presented in random order to avoid recognition of specific participants by the raters. Interrater reliability was computed for 12% of each of the 10 painting-protocols with Cohen's Kappa ranging from 0.7-0.86. The remaining of the 10 protocols was split and scored by the two raters.

A coding scheme was developed based on the model of Iconology (Panofsky, 1975). According to the model, experts' meaning making with art is characterized by three phases: an initial detailed *description* of everything that is depicted followed by an iconographic *classification of symbolic meaning*, and a final *interpretation* derived from the gathered information. In accordance with the first and the last stage of Panofsky's model, each phrase got coded into one of the following categories: description (every attempt of participants to further characterize the painting by naming what they see, e.g. *there are two little figures in the background*), or interpretation (every attempt of participants to make sense of what they see, e.g. *the two smaller figures are assistant figures seemingly that serve the purpose of filling the space*). The remaining phrases (preference judgments: *I really like it*, associations: *this looks like driftwood*, or utterances that had to do with the task activity: *what else can I say*), in average 14.25% of the phrases to a painting were removed from further analysis. Then, for each participant and each painting the relative frequency of phrases coded as interpretations was calculated in dependence to the total amount of phrases coded as descriptions and interpretations.

To address the second stage in Panofsky's model, mentioning of symbolic meanings was counted in an additional coding process. As one measure we counted when participants named or described symbolic objects in their thinking aloud (e.g. *there is a parrot, there is a colorful bird*). Also, as a different measure, participants scored a point for every symbolic

meaning that they revealed in their thinking aloud (e.g. *the anamorphic skull is a symbol for vanitas*). In addition, we also counted terms that revealed art-specific knowledge (e.g. *representative, central perspective, brocade fabric, Flemish*).

At last we rated the overall structuredness of participant's thinking aloud to the 10 paintings using a point system, ranging from 1 (unstructured) to 5 (structured according to all stages in Panofsky's model). 1 point was assigned to thinking aloud characterized by volatile notions and spontaneous thoughts without any connection. 2 points were given to thinking aloud that showed coherent thinking. Further points indicated structuredness according to the three stages of Iconology, namely 3 points were given to thinking aloud with thorough description of content, 4 points if this describing part was followed by attempts of interpretation, and 5 points were given when the thinking aloud ended with a conclusion about a painting's meaning. Two raters familiar with the model, the paintings and the coding scored 12% of all protocols. Interrater reliability on this subsample of protocols yielded a Cohen's Kappa of 0.69.

8.5 Results

8.5.1 Affective State and Prior Knowledge in Art

To analyze the participants' affective state, we calculated a sum-score of the three dimensions, good-bad, awake-tired, calm-nervous, in MDMQ. An ANOVA with the between subjects factor expertise (layperson vs. expert) and within subjects factor testing time (before vs. after experiment) revealed no difference between expertise groups, $F(1,44) < 1$. For all participants, there was a setback of affective state from before (experts $M = 95.5$, $SD = 13.7$, laypersons $M = 93.1$, $SD = 11.7$) to after the study (experts $M = 89.6$, $SD = 15.6$, laypersons $M = 89.4$, $SD = 13$, $F(1,44) = 8.35$, $p < .01$).

A MANOVA of expertise (layperson vs. expert) with interest, knowledge and attitude towards art, art knowledge-score and familiarity of the paintings as dependent variables showed a main effect of expertise, *Wilks' Lambda* = .29, $F(5, 40) = 19.88$, $p < .001$. The univariate analyses revealed that experts ($M = 3.6$, $SD = .22$) were more interested in art than laypersons ($M = 2.9$, $SD = .28$, $F(5,40) = 46.58$, $p < .001$), experts ($M = 3.7$, $SD = .31$) had more knowledge about art than laypersons ($M = 3.2$, $SD = .44$, $F(5,40) = 20.95$, $p < .001$) and experts ($M = 3.6$, $SD = .29$) regarded art as more valuable than the laypersons ($M = 2.9$, $SD = .36$, $F(5,40) = 5.62$, $p = .02$). Experts had a mean knowledge-score of $M = 30.2$, $SD = 4.37$ (laypersons $M = 14.1$, $SD = 7.88$, $F(5,40) = 69.30$, $p < .001$) and were familiar with 6.0 ($SD = 1.5$) paintings on average before the study (laypersons $M = 2.2$, $SD = 1.92$, $F(5,40) = 53.90$, $p < .01$).

8.5.2 Gaze Data

For both tasks, we analyzed the AOI data with a 2 (group: experts vs. laypersons; between subjects) x 2 (type of portrait: single vs. double; within subjects) design. The respective means and standard deviations are listed in Table 2.

Table 5. Means (M) and standard deviations (SD) for eye-tracking measures

Task	Measure	Type of Portrait	M (SD)	
			Expert	Laymen
Initial inspection of all paintings (10s)	Human feature AOIs/ symbolic meaning AOIs	Single	1.8 (.98)	3.2 (3.5)
		Double	1.8 (1.02)	2.3 (1.00)
	Average fixation time on symbolic meaning AOIs in milliseconds (ms)	Single	209.6 ms (65.08)	205.7ms (89.91)
		Double	189.5 ms (29.70)	201.7ms (51.21)
Self-directed inspection of all paintings with simultaneous thinking-aloud	Inspection time in seconds (<i>self-directed by clicking return to next</i>)	Single	124.6 s (59.91)	126.2 s (56.58)
		Double	144.3 s (67.37)	147.0 s (58.49)
	Human feature AOIs/ symbolic meaning AOIs	Single	1.5 (.58)	1.7 (.82)
		Double	1.1 (.44)	1.4 (.54)
	Average fixation time on symbolic meaning AOIs in milliseconds (ms)	Single	243.3 ms (67.75)	242.0 ms (101.48)
		Double	228.5 ms (65.32)	229.6 ms (81.39)

8.5.2.1 Initial Inspection

For the first task with the initial inspection of each painting for 10 seconds, an ANOVA was performed regarding the ratio for dwell time on AOIs depicting human features to AOIs depicting objects with symbolic connotations. Experts had a significantly lower ratio, indicating that their dwell time on AOIs with symbolic connotations was higher than that of the laypersons' $F(1,42) = 4.51, p < .05, \text{partial } \eta^2 = .1$. Whether participants viewed a single or a double portrait showed no significant difference in ratio, $F(1,42) = 1.42, p = .24, \eta^2 = .03$ (Figure 2). There was no interaction between type of portrait and group $F(1,42) = 1.43,$

$p = .24$, $\eta^2 = .03$. On average, laymen spent 2.75 times longer looking at human features than looking at objects with symbolic connotations (standardized by the respective area sizes), whereas experts spent only 1.8 times longer.

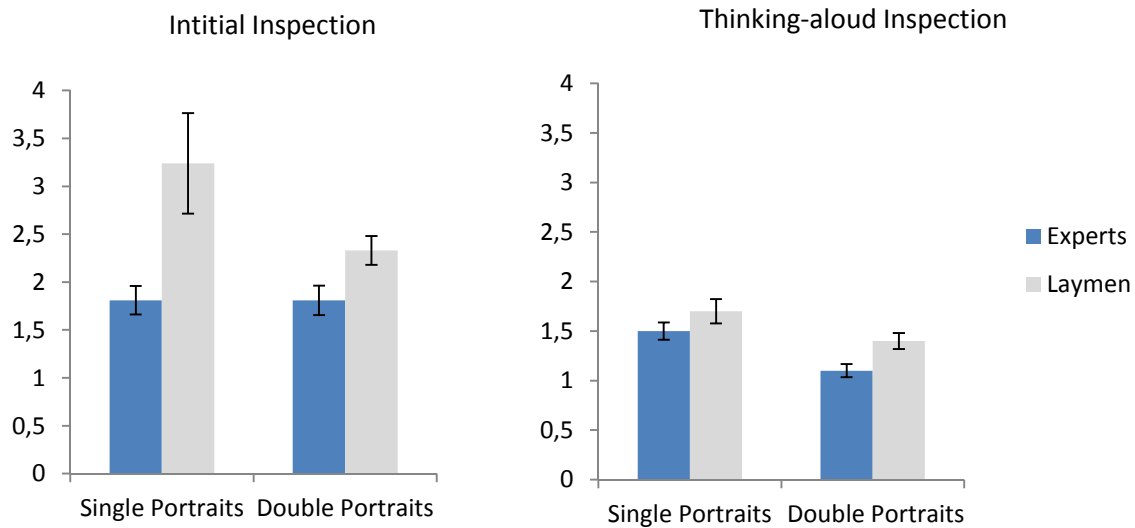


Figure 12. Means (and standard errors) for experts and laymen regarding the ratio of the dwell time on AOIs depicting human features to the dwell time on AOIs with symbolic meaning for the initial inspection and the thinking-aloud inspection task.

An ANOVA with the average fixation time on AOIs with symbolic meaning revealed no significant differences concerning expertise group, $F(1,42) < 1$, type of painting $F(1,42) = 1.28$, $p = .27$, $\eta^2 = .03$ and the interaction of the two, $F(1,42) < 1$.

8.5.3.2 Self-Directed Inspection

According to an ANOVA, in the second, self-directed task, there was no significant difference of inspection-time of the paintings between expertise groups, $F(1,42) < 1$. On average, participants inspected double portraits longer than single portraits $F(1,42) = 46.27$, $p < .001$, $\eta^2 = .52$. There was no significant interaction between expertise groups and type of portrait $F(1,42) < 1$. The respective average inspection times are listed in Table 2.

Concerning the ratio of dwell time on human feature AOIs to dwell time on AOIs with symbolic meaning, ANOVA revealed a marginally smaller ratio for experts $F(1,42) = 3.01$, $p = .089$, $\eta^2 = .07$ and a significantly smaller ratio for participants when viewing double portraits $F(1,42) = 7.83$, $p < .01$, $\eta^2 = .16$. There was no significant interaction, $F(1,42) < 1$.

Between expertise groups, there was no difference in average fixation time on AOIs with symbolic meaning $F(1,42) < 1$, but participants fixated symbolic AOIs significantly longer when viewing single portraits than double portraits, $F(1,42) = 4.55$, $p = .039$, $\eta^2 = .1$. The interaction between group and type of portrait was not significant $F(1,42) < 1$.

8.5.4 Thinking Aloud Data

For the analyses of the thinking-aloud measures, 2x2 ANOVAs were conducted with type of portrait as the within factor and group as the between factor. Table 3 shows the mean values and standard deviations for overall number of phrases, absolute number of descriptive utterances, absolute number of interpretative utterances, proportion of interpretative utterances, as well as scores for symbolic naming, symbolic meaning, art-historical knowledge and structuredness.

Table 6. Means (M) and standard deviations (SD) for the thinking aloud measures

Measure	Type of Portrait	M (SD)	
		Expert	Laymen
Phrases	Single	15.3 (6.40)	19.1 (5.86)
	Double	16.1 (5.97)	21.5 (5.16)
Description	Single	6.5 (2.56)	9.6 (2.56)
	Double	6.0 (2.09)	10.5 (2.89)
Interpretation	Single	6.7 (3.99)	5.5 (3.67)
	Double	8.0 (3.67)	6.8 (3.17)
Proportion of interpretations	Single	.49 (.13)	.33 (.15)
	Double	.55 (.14)	.38 (.12)
Naming Symbols Score	Single	6.08 (1.95)	5.92 (1.31)
	Double	8.01 (1.79)	7.08 (1.29)
Interpreting Symbols Score	Single	.46 (.56)	.15 (.14)
	Double	1.09 (.53)	.46 (.25)
Art-historic knowledge	Single	35.2 (21.54)	19.1 (10.21)
	Double	32.0 (15.01)	15.0 (7.88)
Structuredness	Single	3.4 (.73)	2.6 (.51)
	Double	3.8 (.53)	2.7 (.53)

Overall, participants' thinking aloud to the paintings comprised a mean of 18.1 phrases ($SD = 6.03$). Laypersons thinking aloud consisted of more phrases $F(1,39) = 6.71, p < .01, \eta^2 = .15$. Also there were less phrases for single than for double portraits $F(1,39) = 10.99, p = .002, \eta^2 = .22$. There was no interaction between group and type of portrait $F(1,39) = 2.8, p = .10, \eta^2 = .07$.

Experts' thinking aloud consisted of a higher proportion of interpretations than laypersons' ($F(1,39) = 15.65, p < .001, \eta^2 = .29$) and participants made a higher proportion of interpretations for double portraits ($F(1,39) = 22.79, p < .001, \eta^2 = .37$). There was no interaction between group and type of portrait, $F < 1$.

There was no significant difference in naming of symbols in experts' and laypersons' verbal data $F(1,39) = 1.33, p = .26, \eta^2 = .03$. Participants mentioned more symbols in thinking aloud to double portraits ($F(1,39) = 86.40, p < .001, \eta^2 = .7$). And there was a significant interaction between group and type of portrait ($F(1,39) = 5.50, p = .024, \eta^2 = .12$), indicating that the difference between experts and laypersons was more pronounced for double than for single portraits.

Experts interpreted the meaning of the symbols in a painting more often than laypersons $F(1,39) = 16.28, p < .001, \eta^2 = .29$. Participants interpreted meaning of more symbols when viewing double portraits than when viewing single portraits $F(1,39) = 91.11, p < .001, \eta^2 = .7$. There was a significant interaction between group and type of portrait ($F(1,39) = 11.03, p = .002, \eta^2 = .22$), indicating that the difference between experts and laymen was more pronounced for double than for single portraits.

Pearson correlation showed a significant correlation between the ratio of dwell time on human feature AOIs to dwell time on symbolic AOIs and the naming of symbolic objects ($r = -.47$, $N = 40$, $p = .001$), but no correlation between the ratio of dwell time and the interpretation of symbolic objects ($r = -.17$, $N = 40$, $p = .19$).

Concerning art-specific knowledge, a 2x2 ANOVA revealed that experts showed significantly more art-specific knowledge in their thinking aloud $F(1,39) = 14.62$, $p < .001$, $\eta^2 = .27$. Also, participants used more art-specific terms when viewing single portraits $F(1,39) = 7.84$, $p = .008$, $\eta^2 = .17$. There was no significant interaction between group and type of portrait, $F < 1$.

Finally, experts' thinking aloud was more structured than laypersons' $F(1,39) = 36.49$, $p < .001$, $\eta^2 = .48$. Also, a main effect of type of portrait was found, with participants' thinking-aloud protocols of single paintings being less structured than those of double paintings ($F(1,39) = 5.42$, $p = .03$, $\eta^2 = .12$). These two main effects were qualified by a significant interaction of group and type of portrait, $F(1,39) = 4.53$, $p = .04$, $\eta^2 = .10$, indicating that the difference in structuredness between experts and laymen was more pronounced for double than for single portraits.

8.5.5 Confidence in Meaning Making

In the thinking-aloud inspection task, participants were asked after the presentation of every painting how sure they felt of their own meaning making, estimating it on a 5-point scale. Respective analyses using a 2x2 ANOVA revealed no difference in confidence in meaning making between experts and laypersons $F < 1$. Participants felt more sure of their meaning making when inquiring into double portraits ($F(1,44) = 19.30$, $p < .001$, $\eta^2 = .31$) with a

significant interaction ($F(1,44) = 20.29, p < .001, \eta^2 = .32$). The mean confidence of laypersons remained about the same with $M = 2.95$ ($SD = .70$) for single and $M = 2.94$ ($SD = .64$) for double portraits, while experts' mean confidence rose from $M = 2.78$ ($SD = .68$) for single to $M = 3.42$ ($SD = .70$) for double portraits.

8.6 Discussion

Meaning making of art can be understood as a complex process including perceptual and cognitive shares (Leder et al., 2004). The present study aimed to give insights into how expertise in art history influences these shares investigating how seeing and knowing of experts and laymen get applied while viewing Renaissance portraits.

8.6.1 The Influence of Art Historian Expertise on Inspecting Renaissance Portraits

The main visual motif of a portrait is a certain person depicted and expressed by the artist in specific style. But particularly in portraits from earlier epochs, for example from Renaissance, the depiction of the portrayed person is accompanied by a set of objects, which have distinct symbolic connotations. These objects enable the viewer to characterize the portrayed persons, for example with regard to their personality, social status, or profession. Besides recognizing certain formal stylistic features, a sophisticated way of inquiring these paintings should therefore also take these additional elements of content into consideration.

Analysis of both initial inspection and eye tracking with simultaneous thinking aloud showed that participants looked longer on the main figures of the portrait paintings than on the accompanying symbolic supplements, even if it was controlled for the size of the respective pictorial elements. This was expected because, apart from playing an exclusive role for laymen when regarding a picture (Yarbus, 1967; Vogt, 1999; Phiko et al., 2011), human features attract attention in an automatic bottom-up process of perception (e.g. Itti & Koch, 2001; Cerf et al., 2008) and certainly also play a role for the interpretation of a portrait.

Nevertheless, compared to participants with no art historic training, advanced students of art history paid more attention to additional elements with a symbolic connotation, and thus were more effective in directing their gaze to pictorial areas highly informative for meaning making (Antjes & Kristjanson, 1991). This difference in distribution of gaze within portrait paintings seems to be more pronounced when participants were asked to “just” explore a painting for a brief period of ten seconds than when asked to inspect it at will and think aloud simultaneously, because the latter instruction might have led the participants to explore the painting more systematically.

Besides the attentive attraction of human features a similar bias has also been reported for central areas in a picture (Parkhurst et al., 2002; Parkhurst & Niebur, 2003; Tatler, 2007). We therefore hypothesized differences in gaze distribution for single and double portraits. In single portraits, human figures are normally located in the center of the painting, while accompanying elements with a symbolic connotation are located in the painting’s periphery. In contrast, double portraits locate human figures at the sides, while at least some of the accompanying elements are placed in the middle. Therefore, due to central bias, symbolic elements should be more easily noticed in double portraits, both for experts and even more pronounced for laymen. This was partly corroborated by the present results. In general, participants looked longer at double portraits than at single portraits. Double portraits offer two human figures to be described and set in relation to each other and thus might take longer to get explored than paintings depicting a single figure. More importantly, while no differences were found for portrait type during initial inspection of ten seconds, during thinking aloud, both experts and laymen looked longer at objects with symbolic meaning in double portraits, indicating the influence of central position on their gaze behaviour.

Finally, in previous eye-tracking studies (Nodine, Locher & Krupinski, 1993; Reingold & Charness, 2005) it was assumed that a deeper processing of specific aspects of a painting is associated to how long it is fixated by the eye. Thus we assumed that art historian expertise would reflect in longer fixations of highly informative areas for meaning making. In the present study we cannot account for this assumption: in both tasks participants did not differ in how long they fixated symbolic AOIs.

8.6.2 The Influence of Art Historian Expertise on Describing and Interpreting Renaissance Portraits

According to Panofsky, art historian inquiry of a painting is characterized by a thorough description of depicted content followed by interpretations of specific content before deducing how a painting is to be understood. Analysis of verbal data revealed several differences between experts' and laymen's meaning making processes. First of all, experts' thinking aloud was characterized by a greater share of interpretations in contrast to descriptions made to a painting. Thus while laymen primarily stuck to the level of describing content, experts advanced to interpret more abstract levels of meaning "hidden" in the explored content. Additionally experts' verbal reports also showed a higher structure than laymen's indicating a more systematic viewing strategy in contrast to laymen approach towards art inquiry. Further, particularly with regard to peripheral elements with certain symbolic connotations we found that experts and layman mentioned and described these elements to a similar degree, indicating that both groups were able to notice them in the paintings. But with regard to ascribe meaning to peripheral elements, experts engaged to a significantly higher degree in attempts to interpret them in symbolic terms. Together with the finding that expert used more art specific terms in their thinking aloud than laymen, the results point to specific mental concepts and schema experts in art history have built through their history of encounters with art. In the context of meaning making Bordwell (1991) distinguishes the term comprehension

from interpretation, saying that comprehension refers to understanding concerning apparent or direct meaning, while interpretation is occupied with higher, abstract meanings of a painting. This is interesting because it indicates that when making meaning with representational art both experts and laymen come to an understanding. But while experts conclude this understanding in a structured trial of focusing their attention on specific content, and revealing and contrasting meaning in various attempt of interpretation (Parsons 1987, Housen 1999), laymen rather take an understanding offered on the very surface of content. Thus besides concepts associated to style and the ability to use compositional aspects of a painting for art inquiry, experts have built specific schema how to relate and reveal deeper meaning of content.

Results showed no significant correlation between the amount of interpretations of depicted symbols in the thinking aloud and the amount of time spent on symbolic areas in contrast to human features while viewing a painting. This indicates that there is no direct function of the visual exploration of a painting and the deeper processing of it on higher cognitive levels. In contrast to that, the distribution of gaze is connected to noticing specific pictorial aspects reflected in the naming and describing of symbols in the verbal data.

Besides differences in art expertise, type of portrait also had an influence on meaning making processes. Viewing double portraits participants' thinking aloud was more structured with more phrases and attempts to reveal symbolic meaning and to interpret. This can be discussed in regard to the central position of the symbolic areas as well as to the longer viewing time of double in contrast to single portraits. In double portraits there is a relation between depicted figures that needs consideration for meaning making and might reflect in a greater occupation with interpretation.

Taken together, the present study provides first evidence that besides the style versus content dichotomy as a principle to distinguish experts and laymen of art, major differences also exist in looking at and interpreting a painting's content. Starting with the onset of gaze for pre-iconographic description they explore content in accordance to its information value for meaning making. Perceptual noticing and verbal mentioning are connected and illustrate that gaze serves as an instrument of art historical thinking (Mackworth & Bruner, 1970) - implying a first selection of information and thus classification of aspects for further processing. Art historians also make more interpretations in a structured trial that is characterized by attempts to reveal deeper meaning of specific content.

Studies investigating aesthetic processing of paintings usually use sets of differing art genres that range from abstract to representational. To our knowledge, apart from Antes and Kristjanson (1991), this is one of the first studies that have experimentally investigated the influence of art expertise when viewing representational artworks only. While this setting offers deeper insight in the different use of content, several limitations of the study should be kept in mind. First, using Renaissance paintings as stimuli might reflect in the data as special case of use of content, because in representational art of other eras symbols do not play such an outstanding role for interpretation. That is, when looking at representational art from more recent epochs, art history experts might weigh content according to different sources of meaning, including using extra-pictorial knowledge such as the artist's personal and cultural biography. Second, limitations also arise from the sample of art historians that participated in the present study. More specifically, they were students and therefore in intermediate level of expertise. Although differing from the laymen in knowledge, attitude and interest towards art they might lack the professional routine of viewing paintings. On the other hand, while most of previous studies have investigated artists as art experts (e.g. Zangemeister et al., 1995), or simply used questionnaires for diagnosing expertise, the present study explicitly focussed on

the expertise of art historians. While artists are trained to produce art, the advantage of art historians is that they are trained to make meaning with art matching the perspective of the untrained viewer. The expertise of art historians is of special interest because, regarding the situation of an art museum, art historians are the providers of the artworks and information on display while laymen go to explore and experience the exhibition. Thus studies further analyzing how experts and laymen in art history use their seeing and knowing for meaning making of art helps to create new ways of exhibiting and explaining art to a broader public, adjusted to their strategies and needs of understanding.

Finally, previous studies showed that presentation format plays a role for aesthetic processing. According to Locher et al. (2001) reproductions of paintings shown on slides are rated less interesting and pleasing than original paintings. The aura of the original (Benjamin 1977) might influence the meaning making with art in that paintings in the gallery setting are easier recognized as aesthetic stimuli (Leder et al., 2004). The museum situation might further trigger different strategies of meaning making because of the physical and social context (Falk & Dierking, 1992) as well as the activation of specific behaviour schema including to look for deeper meaning (Shimamura, 2012). While aesthetic processing in the museum has been explored concerning emotional and physiological responses of visitors viewing an art exhibition (Tschacher et al., 2012), so far there are little studies using mobile eye tracking and thinking aloud to investigate meaning making with specific art in a gallery space. Therefore, future research should try to apply the methods of the present study in the natural context of museums and gallery visits.

9. General Discussion

“The trick to forgetting the big picture is to look at everything close-up.” - Chuck Palahniuk

In this dissertation, meaning making with representational art of expert and laymen of art history was investigated. Meaning making is understood as a sequence of perceptual and cognitive processes that interlock and lead to the understanding of a painting’s meaning. Several models of aesthetic processing have been discussed, including the model of aesthetic processing by Leder et al. (2004) which describes five stages of processing with perceptual, emotional and cognitive shares that lead to an aesthetic judgment and emotion about a viewed artwork. In their model, Leder et al. also propose different aspects that influence meaning making with art such as expertise as well as the social and physical context of a museum situation. Discussing pictures as representations that comprise meaning on different levels of abstraction, it was explicated how the beholder of a painting can refer and process this meaning in dependence to these multiple contexts. Reviewing empirical studies about different aspects of aesthetic processing on different stages, the influence of expertise and genre of art in reference to the form versus content discussion in aesthetic psychology was presented. The five stages of general processing of art while viewing a painting as proposed by Leder et al. (2004) got related to a prescriptive model of art inquiry formulated by the art historian Erwin Panofsky (1975). Integrating the two models it was specifically referred to how art historian expertise might change meaning making with art on the stages of Leder et al.’s model especially concerning higher order processes.

Focusing on the different use of content for the meaning making with representational art of expert and laymen of art history, three studies were conducted: Study 1, a focus group with art historians, was dedicated to the specific skills, methods and frameworks typical for their visual culture and therefore determinant for art historic meaning making; Study 2, a field study at the National Museum for Art, Architecture and Design in Oslo, investigated the influences of the physical arrangement of paintings by a curator on the meaning making of students exploring the gallery space in small groups; and finally Study 3, a laboratory experiment, looked at the meaning making of students and non-students of art history using eye tracking and simultaneous thinking aloud to analyze the differences of perceptual and cognitive processing while viewing Renaissance portraits.

In the following chapter I am going to discuss the findings of the three studies revisiting the proposed integrated model of aesthetic processing, considering both Leder et al.'s and Panofsky's implementation of expertise influence on meaning making with art. Next, strengths and limits of the results in reference to methodology and material are taken into account. Theoretical and practical implications of the findings of this dissertation are presented in 9.3 and 9.4, before ending with a prospect on future studies.

9.1 Summary of Findings Revisiting the Integrated Model of Aesthetic Processing

Meaning making with art means to go on a journey of setting what we *see* into relation with what we *know* (Gombrich, 2002) and on the basis of that come up with a conclusion of what an artwork might mean. In the integrated model used as theoretical framework for the studies of this dissertation (see 3.6 and Figure 5, p.36), *seeing* and *knowing* is discussed in three analytical stages of perceptual and cognitive processing based on Leder et al.'s cognitive model of aesthetic processing (2004) and Panofsky's prescriptive model of iconography and iconology (1975).

The first stage in Panofsky's model is pre-iconographical description on which art historians are instructed to thoroughly describe a painting referring to content and style of depiction. This relates to the third stage of Leder et al.'s model, explicit classification, where the beholders assess a work of art according to concepts underlying their mental representations about art. Following the form versus content argumentation of aesthetic psychology, part of the domain specific concept of experts is to classify art according to style, while laymen are found to rather refer to content and emotional aspects matching their personal previous knowledge and experiences (Putko, 1989; Cupchik, 1992; Augustin & Leder, 2006). In the present dissertation it was assumed that, regarding content, differences between experts and laymen of art can be found on this level of aesthetic processing, because experts especially attend to content that seems promising for meaning making.

A first finding here is that the art historians taking part in Study 1 claimed that before starting to view a painting, they choose a method of inquiry connected to focusing on specific aspects they are interested in to answer a research question. An example that was given in the focus group was the different description of a portrait when analyzing the status in contrast to when analyzing the gender-based representation of the depicted figures. In Study 3 it was assumed that, when viewing Renaissance portraits, art historians would refer more intensely to content with symbolic meaning, no matter how salient this content is. Controlling for central bias and contrasting areas with symbolic objects to areas depicting human features, it was found that art historians indeed looked longer on symbolic objects in contrast to laymen. This was true for initial inspection for 10 seconds as well as for inspection with simultaneous thinking aloud. Further it was found that this higher percentage of looking at symbolic objects was correlated to the amount of naming and describing of symbolic objects in the thinking aloud data of participants.

An aspect of aesthetic processing on the level of explicit classification not directly formulated in Leder et al.'s and Panofsky's model is comparison. Apart from asking questions, comparison of the viewed painting to other works of art present in the museum setting as well as represented in mind is, according to the findings in Study 1, one of the most important tool of art historian meaning making, and described in the focus group as *constituting a scientific pattern to gaze*. Presenting paintings as single stimuli in a laboratory setting, this aspect was not considered in Study 3. However Study 2 addressed the influence of the relation between paintings on meaning making by contrasting the conceptualization of comparisons and juxtapositions between representational paintings in the physical space of the curator to student groups' interpretative strategies. Inside the gallery, students' comparison mainly concerned content discovered in single paintings that got discussed and acquired one by one along the walls of the exhibition space. Nevertheless, outside the gallery when dealing with a set of reproductions of the paintings, participants showed a deep engagement of comparing the paintings to each other, considering basic pictorial features like color and brightness, referring to style by relating the paintings' realism, and discovering similarities in content. This discrepancy in the behavior of the students of using comparison for aesthetic analysis in one setting but not in the other was explained discussing a behavior setting according to a museum visit (Shimamura, 2013) triggering engagement with single artworks, and a task outside the gallery facilitating to flip and compare paintings printed on cards. This argument is supported by the findings to the second card-sorting task, where participants were asked to split the represented paintings on the cards into piles and to characterize those using up to three keywords. This task instruction led to a categorization of the paintings in line with the

form versus content discussion of expert-layman differences in aesthetic psychology. Meaning making on the level of explicit classification is thus sensitive to setting, including physical aspects of setting as well as instructions or, especially considering exhibitions, provided additional information.

The second stage of the integrated model considers cognitive mastering (Leder et al. 2004) in relation to the iconographic analysis (Panofsky 1975) of a painting. This level of aesthetic processing implies to engage into interpretation of deeper meaning of content. In Study 1 the art historians describe to consider content of a painting differently by selecting informative aspects for closer inspection and asking “the right” questions. In Study 3 this approach of art historians was partly corroborated showing that experts made more revelations of the meaning of symbolic objects in their thinking aloud than laymen. However, a function of a closer inspection and interpretation could not be shown: a correlation between a relative greater attention to symbolic objects in contrast to human features and verbal reference to the meaning of symbolic objects was not significant.

Concerning the influence of the social and physical context on meaning making, findings of Study 2 show that the students engaged deeply into interpretation of different content depicted in the painting they stood in front of. The mediating function of the social context could be confirmed (Vygotsky, 1978; Wertsch, 1991; Leinhardt & Crowley, 1998) by showing that perceptual discoveries as well as previous knowledge of the different group members triggered orientation to certain pictorial features and discussion of meaning and lead to an iteration of aesthetic processing regarding the model of Leder et al. (2004). The specific aspects discussed in a painting got carried over to the next, so that the students developed a shared repertoire of inquiring the works of art. In regard to the use of the physical context of the gallery, it was found that students’ meaning making of specific aspects of the paintings were connected to collective orientation and movement towards the paintings and referring to

provided labels in space. Thus in the museum setting both the social and the physical context had a mediating function for meaning making by intensifying the engagement of the beholders into interpretation of depicted pictorial features and content. Outside the gallery, when dealing with the paintings represented on cards, the social context again intensified engagement; however, this engagement concerned the comparison of paintings according to pictorial features and similar content but not interpretation and thus no consideration of a deeper meaning (Shimamura, 2013).

The last stage of the integrated model is evaluation (Leder et al., 2004): made interpretations about certain aspects of a painting have to be drawn together to come to a final iconological interpretation (Panofsky, 1975) of an artwork's meaning. This aspect of aesthetic processing is referred to by the art historians in the focus group of Study 1 by explaining a present inquiry of an artwork to be finished with a conclusion about its meaning according to the research question that was posed before engaging into processing. However, it is indicated that art historian meaning making doesn't stop at this point, but rather is repeated with other gaze-directing research questions in mind, and accompanied by discussion in the art historian community, to reveal as much of a painting's meaning potential over time as possible.

Findings of Study 3 indicate engagement with the deeper meaning of a painting, showing that experts in art history make more interpretations compared to descriptions to the paintings than laymen. Furthermore, their thinking aloud is of higher structure, indicating that experts go about meaning making in a systematic way. Another aspect here is that experts think about the paintings on a more abstract level than laymen, reflected in so far as experts are found to use less phrases but more domain specific terms in their verbal data. Concerning the influence

of the physical context, Study 2 indicates that the museum setting triggers engagement with a painting's deeper meaning, by showing that the students' conclusions about a painting were close to the message the curator of the exhibition saw in them, depending on previous knowledge to each painting and how aspects could be brought into group discussion.

9.2 Strengths and Limitations

In his framework for a psychology of aesthetics, Jacobsen (2006) describes aesthetic processing of art to be influenced by multiple aspects concerning the different levels of meaning in a painting, and different contexts of the viewing situation including personal experience, cultural affiliation, and social and physical setting. Arguing that there is more to the meaning of a painting than the sum of its parts, he calls for an aesthetic psychology that embraces this multi-factored interdependence of meaning making and tries to describe aesthetic processes in whole rather than to cut them in pieces and work with a "mosaic of empirical discoveries" (Jacobsen, 2006, 155). The present dissertation responded to this call, looking at meaning making with art considering the different stages of aesthetic processing and different intrinsic and extrinsic sources of influences, namely expertise, and social as well as physical setting. While it is easy to "*forget the big picture*" by "*looking at everything close-up*" (Chuck Palahniuk), several limitations should be kept in mind when trying to go about the opposite.

First, the universe of art, even if reducing it to the subset of paintings, is a great one. Thus a strength of this dissertation is that it is not trying to include all eras and genres of paintings, but concentrates on investigating meaning making when viewing representational art. This makes it possible to regard meaning making according to specific assumptions, in this case the processing of content related aspects by experts and laymen of art history. However, it has to be said that even representational art differs a great deal in the specific ways how meaning

is encoded in the single paintings and how this meaning can be made relevant during meaning making respectively. In Study 2, participants engaged with paintings of Edvard Munch, a painter of expressionism who uses specific content to mirror his personal thoughts and feelings, while Study 3 used a set of Renaissance portraits that comprised objects of distinct symbolic meaning in addition to the main figures and significant for understanding. Considering that the meaning potential of single paintings (Study 3) differs from the one of an arranged set of paintings (Study 2) because it is thematically framed and thus cut by setting focus while at the same time expanding into the physical space of a gallery (Krukar & Dalton, 2013; Baxandall, 1991), the different study materials clearly have to be taken into consideration when discussing implications of present results.

The different methodological approaches in the studies are a challenge. For example, in all three studies verbal data was used to get insights into participants' thoughts and concepts about art to further describe art historian as well as laymen approach when inquiring representational art, but served a different purpose. The focus group method of Study 1 allowed to further characterize art historian skills, methods and aims in meaning making of stakeholders referring to specific concepts and frameworks in their discussion. The strength of giving direct insight into art historian expertise by making use of individual experience and attitudes set in professional discourse at the same time is the greatest weakness of this method, because results cannot account for generalizability. Thoroughly analyzing interactions and verbalizations of students during meaning making with a set of paintings chosen by a curator, both inside and outside the gallery in Study 2 made it possible to describe meaning making of laymen under the influence of the social and physical context in its moment-to-moment progression (Wertsch, 1991; vom Lehn, 2010) and close connection to Leder et al.'s model (2004). Results thus give first answers of how the mediating effect of both social and physical setting (Serrell, 1997; Leinhardt and Crowley, 1998; Debenedetti,

2003; Shimamura 2013) plays out on the different stages of aesthetic processing, but have to be regarded in reference to the specific conditions of both exhibition and students. In Study 3, the use of single and double portraits as well as comparisons of experts' and laymen's meaning making according to eye-movements and simultaneous thinking aloud made it possible to formulate and test clear hypotheses about the use of content when viewing Renaissance portraits, although results might be influenced by the fact that experts were students of art history, in fact on an intermediate level of expertise, and that lay participants might have had greater interest in art than others, just by showing interest in taking part in a study about looking at artworks.

In sum, the analytical framework of integrating a cognitive model of aesthetic processing (Leder et al., 2004) with a prescriptive model of art historian art inquiry (Panofsky, 1975) was helpful with regard to identifying in which ways different context and specific expertise influence meaning making with art. Moreover, this dissertation proposes how using a set of methods and integrating different research approaches, such as the socio cultural and information processing approach, can help in developing a methodology suitable for a framework for the psychology of aesthetics (Jacobsen, 2006) that seeks to investigate aesthetic processing from the outside in rather than from the inside out and thus has the chance of getting to the big picture of aesthetic experience.

9.3 Theoretical Implications

As described in Chapter 2 of this dissertation, an artwork is an intentional visual expression that invites the beholder to engage with its meaning. Meaning is coded in a painting on different levels of abstraction (Arnheim, 1980; Solso, 1994; Doelker, 1999; Mitchell, 2003) that build the internal and external structure of a painting (Piecha, 2002). Partly the internal meaning of a painting is forced on the viewer bottom-up according to effects of gestalt and

other compositional aspects possessing saliency (e.g. Arnheim, 1974; Itti & Koch, 2001). Top-down the meaning of a painting is analyzed in its style and form under the influence of previous knowledge and experience and consideration of specific contexts, such as the social and physical setting of the viewing situation (Falk & Dierking, 1992). Sticking to the internal structure of a painting, meaning making leads to comprehension – the understanding of a painting on obvious, direct meaning. The occupation with the external structure of a painting, namely the embedding of a painting in cultural heritage, society and time, leads to interpretation – the understanding of symbolic, abstract or hidden meaning (Bordwell, 1991; Piecha, 2002).

Most of the studies in aesthetic psychology reviewed in this dissertation refer to the internal structure of a painting. Using different methods like ratings, eye tracking, card sorting and brain scanning, they focus on how pictorial features on the level of composition and style are perceived, classified and judged by beholders. Findings concern automatic and deliberate processing located on the three first stages of Leder et al.'s model (2004): perceptual analysis, implicit memory integration, and explicit classification. So far, concerning these levels of processing, aesthetic psychology has concentrated on the form versus content approach towards a differentiation of experts and laymen of art. By choosing representational art only as study material for this dissertation it was possible to have a closer look at how content is made relevant in different ways by experts and laymen, concerning top-down processes of perceptual and cognitive analysis of art.

There are only a few studies so far occupied with meaning making of the external structure or symbolic level of a painting. Studies referred to in this dissertation used verbal data of participants who were asked to talk about what they thought while viewing paintings of different style and genre to formulate strategies of meaning making on higher cognitive levels (Machotka & Spiegel, 1979) and models explaining aesthetic development (Parsons, 1987;

Housen 1999). By using the integrated model of aesthetic processing in reference to Panofsky's model of iconography and iconology (1975) and Leder et al.'s cognitive model of aesthetic processing (2004) as a basic analytic rationale for this dissertation, higher-order cognition concerning the meaning making with symbolic content was explicitly addressed. Findings in verbal data of all three studies show that, on high levels of aesthetic processing, interpretation is of great importance. For the art historians in Study 1 a typical skill associated to their profession was to ask the right questions. In Study 2 it could be shown that the physical context of a gallery space triggers laymen to look for a deeper message in the paintings (Shimamura, 2012). In Study 3, experts in art history differed from laymen in revealing more often the symbolic meaning of depicted content as well as making more interpretations set in relation to descriptions made to a painting.

According to Kesner (2006) and Zembylas (2003) exceptional performance in understanding art is the ability to control one's attention on an artwork in order to gain information and to focus on specific aspects important for meaning making. This aspect of art expertise is reinforced in the focus group of Study 1 by the art historians stating that from the very start of an aesthetic encounter the art literate beholder has a research question in mind that he or she wants to answer by selective, focused perceptual and cognitive analysis of a present work of art. Study 3 corroborates this by showing that experts look longer on specific symbolic content in Renaissance paintings in relation to human figures than laymen. Also it is shown that this viewing behavior correlates with the noticing of symbolic content in participant's thinking aloud. Together with the finding that thinking aloud of experts in art history also contains more revelations of symbolic meaning, as well as a greater percentage of interpretation presented in a structured way, Study 3 sheds first light on how the different stages concerning higher-order cognitive processes are interlocked and organized to a sequence in time.

9.4 Practical Implications

From a practical point of view, in terms of art education inside and outside the museum setting, the findings of the first study of this dissertation suggest emphasizing on tools and programs that train viewers' skills of *asking questions* and *comparing*. Before starting meaning making with a work of art, *asking questions* indicates to decide what general aspect or theme is of prior interest determining the analytical perspective under which the present painting is visually and cognitively inquired. This first decision defines the aspects of a painting that are most informative for meaning making. In the process of meaning making *asking questions* refers to the use of previous knowledge and experience to make sense of perceived aspects through interpretation. During the trial of interpretation *comparison* is an effective strategy to generate new questions and to intensively explore the meaning potential given by the internal structure (Piecha, 2002) of a painting.

The findings of Study 2 indicate that this *asking questions* is mediated by social context. A first step towards art historic meaning making is therefore to view and discuss works of art in company (Debenedetti, 2003). The physical space of a gallery also has a mediating effect on meaning making towards interpretation, because visitors are triggered to search for the deeper message in a painting (Shimamura, 2013) and develop and enrich their repertoire of meaning making strategies while moving from one painting to the next. But while strategies of inquiring an artwork evolve during the exhibition visit, interpretations and also comparison mostly refer to the painting viewers are presently engaging with. However, *comparison* is a strongly used strategy concerning basic pictorial features and content when participants are presented with card reproductions of paintings outside the gallery setting. This indicates that using comparison as a meaning making strategy is rather a means of task and setting than a lack of ability.

This aspect of the card sorting task to not imply for participants to look for a deeper meaning might also play a role in Study 3, where participants are merely asked to say what they think when viewing a painting. A difference of expert-lay meaning making therefore might also be that when viewing paintings art historians rely on their community concepts and frameworks that imply to always look for a deeper meaning, while laymen need hints and cues of task and setting to assume so. Cues to search for a deeper meaning in the gallery setting start with expectation: when going to a museum visitors assume to be presented to art (Leder et al., 2004) and to the original (Hampp & Schwan, 2014), while in other settings this assumption might have to be prompted first.

The finding that student groups didn't seem to notice the curator's special reference to juxtapositions and comparisons of content in his arrangement of paintings was discussed in Study 2, pointing out that visitors are unaware of this meta-level added to an art exhibition by curators. Using new technologies, art museums today try to provide for tasks and situations in which visitors are prompted to engage in comparison. One approach is to implement multi-touch tables inside the museum that offer possibilities of direct comparison of pictorial features and content of artworks digitally represented on the table's screen (Blattner et al., 2013). Multi touch installations facilitate categorizing and comparing artworks in new ways according to keywords created by other visitors and museums staff (e.g. Städel Museum, Frankfurt am Main) and in connection to additional information explaining pictorial relations (e.g. Herzog Anton Ulrich Museum, Braunschweig). Another example is "gallery one" in the Cleveland Museum of Art (Alexander et al., 2013). Gallery one is a separate gallery space in the museum dedicated to visitor engagement with art in different tasks encouraging to digitally explore art through reenacting and retracing, or by choosing artworks in a digital app that provides additional information.

However, all these examples of engaging visitors into meaning making with art by means of comparison and providing information do not offer a link to the meta-level of curatorial rationales and choices apparent in the specific arrangement of artworks in the galleries. To create an awareness for the meaning potential of an exhibition as a connected combination of paintings set in space (Maxwell & Evans, 2002; Tzortzi 2007; Roppola , 2013) and to make visitors use an exhibition as a 3D information space rather than a slideshow while moving along walls (e.g. Choi, 1999; Serrell, 1997; Melton, 1972), I propose a multimedia guide to take along (alone or in company) while exploring a museum including different highlighting-tools on different levels: Concerning additional information, the guide should provide visitors with explicit information about the curatorial meta-concept, including staff-interviews, list of chosen artworks in a specific gallery room, list of left-out artworks remaining in the museum archive, and relations between all these artworks according to theme and pictorial resemblance. On the level of the physical space of a gallery room, the multimedia guide should provide a way finding app that highlights the next possible movements to nearby artworks according to exhibition themes and conceptual juxtapositions. And finally on the level of single paintings, the guide should highlight different pictorial features and content in connection to changes of their meaning potential when choosing between certain methods of art historical inquiry for successful meaning making.

9.5 Future Research

A finding of the focus group in Study 1 was that before art historians start to engage into aesthetic processing with a specific work of art, they formulate a question connected to viewing an artwork under a specific perspective. This approach towards a painting determines the method of inquiry and thus the aspects of a painting most informative for meaning making. In this dissertation, Panofsky's model of iconography and iconology (1975) has been

used for a basic theoretical framework. For art historians this model is one method out of many that can be chosen to inquire into a painting. Therefore future research has to have a closer look at the predefinition of informative versus non informative areas in a painting due to different art historical methods and how offering these methods to experts and laymen influences their meaning making.

The presented studies refer to representational paintings of specific style and age, namely expressionist paintings of Edvard Munch from around 1900 and Renaissance portraits of various artists from around 1500. The different ways and levels on which meaning can be coded in a painting (e.g. Arnheim, 1974; Doelker, 1999; Mitchell, 2003) are referred to and utilized differently in the diverse genres and eras of art. Thus style and age of representational art determine which aspects of the internal and external structure of a painting (Piecha, 2002) need consideration when heading for successful meaning making. Deeper meaning might not be understood by considering explicit symbolic meaning of specific content, but by knowing the artist's biography and interpreting content accordingly, or by acknowledging that a specific painting might ask for a great deal of beholders' share (Gombrich, 2002) to make sense of pictorial ellipses (Danto, 1981). Thus I propose that future research should consider the variety of painted art by conducting studies of same method but systematically changing intrinsic consistent sets of material to test for influences of genre, era and style.

In the museum setting, paintings have a different status (Hampp & Schwan 2014) and are thus more likely to be recognized as art (Leder et al., 2004). Findings of Study 2 indicate that the physical as well as the social context of the situation in which paintings are inquired influence aesthetic processing. Future research should acknowledge this by manipulating the social and physical setting while using a constant set of stimuli. This could be done by investigating meaning making of single and small groups of participants with or without art historian expertise visiting and exhibition space. Using mobile eye-tracking with simultaneous thinking

aloud mediating effects of the exhibition space should be investigated distinguishing between participants viewing a randomized arrangement of paintings, and participants viewing different conceptualized arrangements of paintings with a clear theme and aimed viewing strategies on the curatorial meta-level. Like this, expert-layman differences of meaning making in an art gallery could be investigated using different sets of consistent artworks over time on a systematic basis.

In general, although referring to aesthetic processing regarding the sequence of the five stages of cognitive processes and the influences of the social and the physical setting of the museum situation, aesthetic experience as a unique state of mind, combining the cognitive accomplishment of understanding a painting with a deep feeling of pleasure or satisfaction (e.g. Apter, 1984; Solso, 2003; Russell, 2003) has not been considered in this dissertation. While this exceptional state should not be confused with judgments of liking or preference, this emotional state of aesthetic satisfaction has gotten little attention in research of aesthetic psychology so far. An exception is the study by Tschacher et al. (2012) that measured participants' skin conductivity and heart rate while they were exploring an art exhibition using new technology of mobile physiologic measuring with electrodes integrated in a glove. This approach might be a starting point for future research that considers the emotional activation and aesthetic arousal in connection to expertise and ability to perceptually and cognitively explore and understand art.

Summary

In the present dissertation aesthetic meaning making is understood as a process combining perceptual, emotional and cognitive shares that can be experienced as more or less successful and satisfying in relation to the final understanding of a painting's meaning. Referring to different scientific fields, such as philosophy, visual sciences, art history and psychology, it is explained that paintings represent meaning on different levels of abstraction that have to be considered in dependence to multiple contexts, such as personal previous knowledge and level of experience, or the social situation and physical setting in which a painting is viewed. It is discussed how expertise in art influences meaning making by presenting different models and frameworks of aesthetic processing: Developmental models describing identified skills and abilities of beholders in reference to different stages of visual literacy, and cognitive models conceptualizing meaning making as a sequence of perceptual, emotional and cognitive processes that take place while looking at a present work of art. Leder et al.'s cognitive model (2004) that describes aesthetic processing in five stages and considering possible influences of expertise and context is combined with Panofsky's model of iconography and iconology (1975) that describes a systematic method of art historic art inquiry and built into an integrated model of meaning making used as basic framework for analyses in this dissertation. Studies of aesthetic psychology are reviewed and presented in accordance to Leder et al.'s (2004) and Panofsky's (1975) model to discuss differences in meaning making of experts and laymen of art.

These theoretical and analytical considerations are used to examine the special expertise of art historians in relation to meaning making with art. Referring to the form versus content approach in aesthetic psychology and using the integrated model of aesthetic processing as basic theoretical framework, the dissertation focused on experts' and laymen's use of content

for meaning making when looking at representational art. Three studies were conducted to get deeper insights into the specific characteristics of art historian expertise (Study 1), to address the influence of social and physical context on meaning making when exploring a set of representational art chosen and arranged by an art historic professional (Study 2), and to specify expert-layman differences in using informative and less informative content for meaning making with single representational paintings (Study 3).

Study 1, a focus group with art historians discussing about aims, skills and concepts according to their professional frameworks, indicates that the meaning potential of specific pictorial features and content is defined before actually engaging into viewing a painting by specific hypotheses that an art historian wants to test by analyzing a painting that determines the angle or perspective on a painting and is connected to the use of specific methods of art inquiry. According to the art historians of the focus group, meaning making itself is characterized by attempts of interpreting different features of a painting using asking questions and comparison as main strategies or tools of relating aspects in or between paintings.

In Study 2, groups of students were videotaped while exploring a gallery space and engaging into card sorting tasks outside the gallery with paintings by the expressionist Edvard Munch. Meaning making was analyzed in relation to the exhibition concept and educational means of the exhibition curator, using socio cultural methods and discussing results according to the five stage model of aesthetic processing by Leder et al. (2004). Findings showed a mediating effect of the social and physical context of the exhibition context as well as task-specific mediation of comparison between paintings outside the gallery setting. Comparisons between paintings inside the gallery settings indicating an occupation with the curatorial concept behind the arrangement of the paintings could not be shown, indicating that participants were not aware of this meta-level of meaningful information provided by the curator in the gallery space.

Finally, Study 3 explored differences in meaning making of experts and laymen of art history when viewing Renaissance portraits presented to them one by one on slides in a laboratory setting. Using eye tracking and simultaneous thinking aloud, participants' perceptual and cognitive reference to content with high meaning potential compared to content less informative for meaning making was investigated. Findings show, that experts of art history look longer at symbolic content in relation to areas depicting human features. Further, in contrast to laymen, experts' thinking aloud consists of a higher percentage of interpretation, reveals more often the meaning of symbolic objects and is more structured.

In sum, the studies of this dissertation provide first evidence how meaning making with representational art understood as interlocked sequence of perceptual and cognitive processes is influenced by art historian expertise and the social and physical setting of art inquiry. Thus the present dissertation addresses a topic of great interest for both art education and museums that seek to provide situations, tools and different formats for laymen to engage into effective meaning making with art with the potential to learn and improve visual literacy according to the expert perspective of the art historian community.

Zusammenfassung

In Kunstaussstellungen planen und konzipieren Kuratoren die Zusammenstellung von Bildern und Information nicht nur in Hinblick auf ästhetische Kriterien, sondern auch, um den Besuchern kunstspezifisches Wissen zu vermitteln. Für Besucherinnen und Besucher, die diese Ausstellung erkunden, ist das räumliche Vermittlungskonzept der Kuratoren aber nur ein Faktor von vielen, der die Art und Weise, wie sie Bilder ansehen und verstehen, beeinflusst. Neben den physischen Faktoren eines Ausstellungsraums sind der Verlauf und das Ergebnis einer Bildbetrachtung auch von individuellem Vorwissen und Erfahrung mit Kunst abhängig, und davon geprägt, ob die Bilder alleine oder in Begleitung erkundet werden.

In der vorliegenden Dissertation wird die ästhetische Auseinandersetzung mit Kunst als mentaler Prozess formuliert, der sich aus mehreren Verarbeitungsschritten mit perzeptuellen, emotionalen und kognitiven Anteilen zusammensetzt. Ausgangspunkt des Prozesses ist die aktuelle Betrachtung eines Bildes, dessen Bedeutung durch Schauen und Denken vom Betrachter erfasst wird. Der Prozess mündet im Verständnis des Bildes, was vom Betrachter als mehr oder weniger erfolgreich und befriedigend eingeschätzt werden kann. Unter Bezugnahme auf unterschiedliche wissenschaftliche Felder, unter anderem der Philosophie, Bildwissenschaft, Kunstgeschichte und Psychologie, wird erläutert, dass Bilder Bedeutung auf ganz unterschiedlichen Verständnisebenen tragen, die vom Betrachter in Abhängigkeit vom Kontext für das Erfassen der Bedeutung eines Bildes herangezogen werden. Als Kontext bestimmende Faktoren werden in der vorliegenden Arbeit die soziale Situation sowie die physischen Gegebenheiten, unter denen ein Bild angesehen wird, näher betrachtet. Es wird diskutiert, wie die Expertise von Kunsthistorikern den Prozess der Bedeutungsfindung bei der Betrachtung von Gemälden beeinflusst. Dazu werden verschiedene Modelle der Bildanalyse präsentiert, die den ästhetischen Verarbeitungsprozess zum einen anhand der Fähigkeiten und

Fertigkeiten von Betrachtern auf verschiedenen aufeinanderfolgenden Entwicklungsstufen darstellen, und zum anderen als allgemeingültige Sequenz perzeptueller, emotionaler und kognitiver Prozesse zur Erfassung von Bildbedeutung formulieren. Bedeutsam für die Studien dieser Arbeit ist das kognitive Modell der ästhetischen Wahrnehmung und Verarbeitung von Leder et al. (2004), das in der Abfolge von fünf Verarbeitungsstufen Einflussfaktoren wie Expertise, Museumskontext und soziale Situation der Kunstbetrachtung berücksichtigt. Dieses Modell wird mit dem Ansatz der Ikonographie und Ikonologie des Kunsthistorikers Erwin Panofsky (1975) verknüpft. Panofsky beschreibt darin einen dreistufigen Verlauf der Bildanalyse in Abhängigkeit von bestimmten kunsthistorischen Fähigkeiten und Fertigkeiten. Die Integration beider Modelle dient als theoretische Grundlage für Konzeption und Analyse der Dissertationsstudien und wird dazu verwendet, Unterschiede zwischen Laien und Experten bei der Betrachtung von Bildern zu diskutieren.

In bisherigen Forschungserkenntnissen wird ein Unterschied zwischen Laien und Experten vor allem darin gesehen, dass sich Experten zur Erfassung der Bildbedeutung auf Aspekte der Form eines Kunstwerks beziehen, während sich Laien auf Angaben zum Inhalt eines Bildes beschränken. Um ästhetische Prozesse von Experten und Laien zu untersuchen wird deshalb häufig Studienmaterial verwendet, das sowohl abstrakte als auch gegenständliche Bilder enthält und Unterschiede in der Betrachtungsweise der beiden Bildgenres durch Laien und Experten als Argument für die Form-versus-Inhalt Debatte wertet. Im Gegensatz dazu konzentriert sich die vorliegende Arbeit ausschließlich auf figurative Kunst. Mit Bezug auf das integrierte Modell der kognitiven Bildanalyse nach Leder et al. (2004) und Panofsky (1975) soll untersucht werden, wie sich kunsthistorische Expertise speziell auf den Gebrauch von inhaltlichen Aspekten beim Betrachten und Verstehen von Bildern auswirkt. Drei Studien wurden durchgeführt, um die charakteristischen Eigenschaften kunsthistorischer Expertise zu erfassen (Studie 1), den Einfluss des sozialen und physischen Kontexts auf die Erfassung der

Bedeutung einer Zusammenstellung von Bildern durch einen Kurator zu untersuchen (Studie 2) und Experten-Laien Unterschiede im Gebrauch von informativem und weniger informativem Inhalt bei der perzeptuellen und kognitiven Analyse figurativer Bilder zu spezifizieren (Studie 3).

In Studie 1 wurde die Diskussionsmethode der Fokus-Gruppe mit Kunsthistorikern durchgeführt mit dem Ziel, die theoretischen und praktischen Grundlagen kunsthistorischer Expertise näher beschreiben zu können. Vier Kunsthistorikerinnen und Kunsthistoriker, zwei mit professionellem Hintergrund im musealen und zwei im wissenschaftlichen Bereich, diskutierten über Absichten, Fertigkeiten und Konzepte kunsthistorischer Bildanalyse. Dabei wurde deutlich, dass die Bedeutung einzelner inhaltlicher Elemente für das Verständnis eines Bildes nicht per se durch die gemalten Aspekte im Bild festgelegt ist, sondern erst durch eine Ausgangsfragestellung des Betrachters bestimmt wird. Diese Fragestellung ist vergleichbar mit einer Hypothese über die Bedeutung des Bildes, die durch systematisches Ansehen und Nachdenken über bestimmte inhaltliche und stilistische Aspekte im Bild geprüft werden soll. Die Systematik der Bildanalyse ist durch den Gebrauch bestimmter Methoden festgelegt, die in der kunsthistorischen Tradition begründet liegen. Den Teilnehmerinnen und Teilnehmern der Fokus-Gruppe zufolge ist die kunsthistorische Herangehensweise zur Erfassung von Bildbedeutung vor allem durch Vergleichen und Fragen stellen charakterisiert, was es ermöglicht, einzelne Aspekte im Bild und zwischen verschiedenen Bildern in Beziehung zu setzen und mögliche Bedeutungen kritisch durchzugehen und zu beleuchten.

In Studie 2 wurden Gruppen von Schülerinnen und Schülern auf Video aufgenommen, während sie gemeinsam einen Ausstellungsraum mit Bildern des Expressionisten Edvard Munch besuchten und in einem separaten Raum verschiedene Aufgaben mit Karten, die die Bilder der Ausstellung als Reproduktionen zeigten, durchführten. Unter Gebrauch soziokultureller Methoden und des fünf-Stufen-Modells von Leder et al. (2004) wurde analysiert,

wie die Schülergruppen die Bedeutung der Bilder im Zusammenhang zum Ausstellungs- und Vermittlungskonzept des Kurators erfassten. Die Ergebnisse deuten darauf hin, dass sowohl der soziale als auch der physische Kontext der Bildpräsentation förderlich dafür sind, dass Schülergruppen sich vertieft und detailliert mit Bildinhalten auseinandersetzen. Vor allem der Ausstellungskontext, aber auch bestimmte Aufgabenstellungen tragen dazu bei, dass höhere Bedeutungsebenen in Bildern erwartet und berücksichtigt werden. Der Gebrauch von Vergleichen bestimmter Inhalte zwischen den Bildern in der Ausstellung, entsprechend des kunsthistorischen und pädagogischen Konzepts des Kurators, konnte nicht gezeigt werden. Das deutet darauf hin, dass diese vom Kurator implizierte Vermittlungsebene der Ausstellung von Schülergruppen nicht erkannt und somit nicht genutzt werden konnte.

In Studie 3 wurde schließlich untersucht, wie Laien und Experten der Kunstgeschichte die Bedeutung von Portraits der Renaissance erfassen, die ihnen in einem Laborexperiment nacheinander auf einem Bildschirm präsentiert wurden. Begleitend zur Aufzeichnung der Augenbewegungen wurden die Probanden gebeten laut zu denken. Dadurch konnte erfasst werden, welche inhaltlichen Aspekte zur Erfassung von Bildbedeutung bei Renaissanceportraits von Laien und Experten besonders angesehen und bedacht werden. Die Ergebnisse zeigen, dass Experten Inhalte in den Bildern berücksichtigen, die symbolische Bedeutung tragen, während sich Laien auf die portraitierten Menschen und zentralen Objekte konzentrieren. Zudem konnte gezeigt werden, dass Experten sich in ihrem Denken über Renaissanceportraits darin von Laien unterscheiden, dass sie gesehene Inhalte nicht nur beschreiben sondern auch interpretieren. Zudem gehen Experten strukturierter bei der Bildanalyse vor und versuchen öfter die Bedeutung symbolischer Objekte zu erfassen.

Die Diskussion der Studienergebnisse in Zusammenhang mit dem integrierten Modell der ästhetischen Bildanalyse auf der Grundlage des psychologischen Stufenmodells der ästhetischen Informationsverarbeitung von Leder et al. (2004) und der kunsthistorischen

Lehre zu Ikonographie und Ikonologie von Panofsky (1975) ermöglicht es, den Ablauf der perzeptuellen und kognitiven Verarbeitungsprozesse bei der Bedeutungsfindung von Bildern genauer zu formulieren. Die Ergebnisse der Dissertation zeigen aber auch, dass Inhalt für die Erfassung von Bildbedeutung von Experten und Laien der Kunstgeschichte unterschiedlich genutzt wird. Die Debatte innerhalb der ästhetischen Psychologie den Bezug auf Form versus Inhalt eines Kunstwerks als herausragenden Unterschied zwischen Laien und Experten der Kunst zu betrachten, muss also neu geführt werden. Zukünftige Forschung sollte demnach stärkeren Fokus auf die Nutzung von inhaltlichen und formellen Aspekten für die Erfassung von Bildern auf höheren Bedeutungsebenen durch Laien und Experten legen. Die Ergebnisse der vorliegenden Arbeit sind aber auch für die museale Praxis von Bedeutung, da sie andere Herangehensweisen an die Kunstvermittlung im Museum empfiehlt, die Besucherinnen und Besuchern Situationen und Instrumente bereit stellen, in denen gemeinsam und vergleichend der Bedeutung von Bildern nachgegangen werden kann.

References

- Alexander, J., Barton, J., & Goeser, C. (2013). Transforming the Art Museum Experience: Gallery One. *Museums and the Web 2013: Proceedings*. <http://mw2013.museumsandtheweb.com/paper/transforming-the-art-museum-experience-gallery-one-2>
- Antes, J. R., & Kristjanson, A. F. (1991). Discriminating artists from nonartists by their eye-fixation patterns. *Perceptual and motor Skills*, 73(3), 893-894.
- Apter, M. J. (1984). Reversal theory cognitive synergy and the arts. In W. R. Crozier and Chapmann A. J. (Eds.) *Cognitive processes in the perception of art* (411-447). North-Holland: Elsevier Science Publishers.
- Arnheim, R. (1949). The Gestalt theory of expression. *Psychological Review*, 56, 156–171.
- Arnheim, R. (1974). *Art and Visual Perception: A Psychology of the Creative Eye*. Berkeley, CA: University of California Press.
- Arnheim, R. (1980). *Visual thinking*. Berkeley and Los Angeles: University of California Press.
- Augustin, D., & Leder, H. (2006). Art expertise: a study of concepts and conceptual spaces. *Psychology Science*, 48(2), 135.
- Augustin, M. D., Leder, H., Hutzler, F., & Carbon, C. C. (2008). Style follows content: On the microgenesis of art perception. *Acta psychologica*, 128(1), 127-138.
- Aure, V., H. Illeris, H. and Ôrtegren, H. (Eds.). (2009). *Konsten som läranderesurs*. [Art as resource for learners]. Skärhamn, Nordiska Akvarellmuseet.

-
- Bal, M. (2003). Visual essentialism and the object of visual culture. *Journal of Visual Culture*, 2(1): 5-32.
- Barthes, R. (1977). *Image-Music-Text*. London: Fontana.
- Baxandall, M. (1991). Exhibiting intention: Some preconditions of the visual display of culturally purposeful objects. In Lavine, S. & I. Karp (Eds.). *Exhibiting cultures: The poetics and politics of museum display* (33-41). Washington, DC: Smithsonian Institution Press.
- Beardsley, M. C. (1983). An Aesthetic Definition of Art. In H. Curtler (Ed.) *What is Art?* (15-29). New York: Haven.
- Belke, B., Leder, H., Harsanyi, G., & Carbon, C. C. (2010). When a Picasso is a “Picasso”: The entry point in the identification of visual art. *Acta psychologica*, 133(2), 191-202.
- Belke, B., Leder, H., Strobach, T., & Carbon, C. C. (2010). Cognitive fluency: High-level processing dynamics in art appreciation. *Psychology of Aesthetics, Creativity, and the Arts*, 4(4), 214.
- Benjamin, W. (1977). The Work of Art in the Age of Mechanical Reproduction. In H. Arendt (Ed.) *Illuminations*. New York: Schocken Books.
- Bennett, K. M., Latto, R., Bertamini, M., Bianchi, I., & Minshull, S. (2010). Does left–right orientation matter in the perceived expressiveness of pictures? A study of Bewick’s animals (1753–1828). *Perception*, 39(7), 970.
- Berger, J. (1972). *Ways of seeing*. London: British Broadcasting Corporation and Penguin Books.

-
- Berger, R. (1963). *Discovery of Painting*. Thames and Hudson, London, UK.
- Berlyne D. E. (1974). *Studies in the new experimental aesthetics: Steps toward an objective psychology of aesthetic appreciation*. Washington, DC: Hemisphere Publishing Corporation.
- Bitgood, S. (1993). Social influences on the visitor museum experience. *Visitor Behavior*, 8(3), 4-5.
- Bitgood, S. (2013). *Attention and Value*. Walnut Creek, CA, Left Coast Press.
- Blattner, E., Dutz, S., Gerjets, P., Imhof, B., & Schwan, S. (2013). Vom Nutzen psychologischer Forschung für das Kunstmuseum: Das multimediale Besucherinformationssystem EyeVisit. *Museumskunde*, 78 (2), 100-105.
- Bordwell, D. (1991). *Making meaning: Inference and rhetoric in the interpretation of cinema*. Harvard University Press.
- Bourdeau, L. & J.-C. Chebat. (2001). An Empirical Study of the Effects of the Design of the Display Galleries of an Art Gallery on the Movement of Visitors. *Museum Management and Curatorship*, 19(1): 63-73.
- Brill, J. M., Kim, D., Branch, R. M. (2007). Visual Literacy Defined – The Results of a Delphi Study: Can IVLA (Operationally) Define Visual Literacy? *Journal of Visual Literacy*, 27(1), 47-60.
- Bruner J. S., Goodnow J. J., & G. A. Austin. (1956). *A study of thinking*. New York: John Wiley and Sons.

-
- Brunner, C. (1975). *Aesthetic judgment: Criteria used to evaluate representational art at different ages*. Unpublished doctoral dissertation. Columbia University.
- Bühler, K. (1934/1990). *The Theory of Language: The Representational Function of Language*. Translated by D. F. Goodwin. Amsterdam: John Benjamin's Publishing.
- Buswell, G. T. (1935). *How people look at pictures: a study of the psychology and perception in art*. Chicago: The University of Chicago Press.
- Carney, J. D. (1994). Defining Art Externally. *British Journal of Aesthetics*, 34, 114-123.
- Carroll, N. (1993). Historical narratives and the Philosophy of Art. *Journal of Aesthetics and Art Criticism*, 51, 313-326.
- Cela-Conde, C. J., Marty, G., Munar, E., Nadal, M., & Burges, L. (2002). The 'style scheme' grounds perception of paintings. *Perceptual and motor skills*, 95(1), 91-100.
- Cerf, M., Harel, J., Einhauser, W., & Koch, C. (2008). Predicting human gaze using low-level saliency combined with face detection. *Advances in Neural Information Processing Systems*, 20, 241–248.
- Chapman, L. H. (1978). *Approaches to art in education*. New York: Harcourt Brace Jovanovich.
- Chatterjee, A. (2011). Neuroaesthetics: A coming of age story. *Journal of Cognitive Neuroscience*, 23(1), 53–62.
- Chen, J.C.-H. (1997). An Examination of Theories of Aesthetic Development with Implication For Future Research. *Journal of Taiwan Normal University: Humanities and Social Sciences*, 42, S.13–27.

-
- Choi, Y. K. (1999). The morphology of exploration and encounter in museum layouts. *Environment and Planning B: Planning and Design*, 26(2) 241 – 250.
- Chokron, S. & De Agostini, M. (2000). Reading habits influence aesthetic preference. *Cognitive Brain Research*, 10, 45-49.
- Coffey, A. (1968). *A developmental study of aesthetic preferences for realistic and nonobjective paintings*. Dissertation Abstracts International, 29,(12b). 4828.
- Creswell, J.W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: Sage.
- Crockett, S. J., Heller, K. E., Merkel, J. M., & Peterson, J. (1990). Assessing beliefs of older rural Americans about nutrition education: Use of the focus group approach. *Journal of the American Dietetic Association*, 90, 563-567.
- Crowley, K., Pierroux, P., and K. Knutson. (In press). Informal Learning in Museums. In K. Sawyer (Ed.) *Cambridge Handbook of Learning Sciences*, Chapter 23. Cambridge: Cambridge University Press.
- Csíkszentmihályi, M. (1990). *The Art of Seeing. An Interpretation of the Aesthetic Encounter*. The Paul Getty Trust.
- Csikszentmihalyi, M. and K. Hermanson. (1995). Intrinsic Motivation in Museums: Why does one want to learn? In J. Falk and L. D. Dierking (Eds.) *Public institutions for personal learning: Establishing a research agenda* (67-77). Washington, DC, American Associations of Museums.
- Cupchik, G. C., & Gebotys, R. J. (1988). The search for meaning in art: Interpretive styles and judgments of quality. *Visual Arts Research*, 38-50.

- Cupchik, G. C. (1992). From perception to production: A multilevel analysis of the aesthetic process. In G. C. Cupchik, and J. Laszlo (Eds.) *Emerging visions of the aesthetic process* (82-99). New York: Cambridge University press.
- Cupchik, G. C., & Winston A. C. (1996). Confluence and divergence in empirical aesthetics philosophy and mainstream psychology. *Handbook of perception & cognition: Cognitive ecology*. San Diego, CA: Academic Press.
- Danto, A. C. (1981). *Transfiguration of the Commonplace*. Cambridge, Mass: Harvard University Press.
- Davies, S. (2001). Definitions of Art. In B. Gaut and Lopez D. (Ed.) *The Routledge Companion to Aesthetics*. (169-179) London: Routledge.
- Davy, G. (2005). What is museum fatigue? *Visitor Studies Today*, 8, 17-21.
- Debenedetti, S. (2003). Investigating the role of companions in the art museum experience. *International Journal of Arts Management*, 52-63.
- Derry, S. J., Pea, R. D., Barron, B., Engle, R., Erickson, F., Goldman, R., et al. (2010). Conducting Video Research in the Learning Sciences: Guidance on Selection, Analysis, Technology, and Ethics. *Journal of the Learning Sciences*, 19(1): 3–53.
- Dickie, G. (1974). *Art and the Aesthetic: An Institutional Analysis*. Ithaca: Cornell University Press.
- DiPaola, S., Riebe, C., Enns, J. T. (2013). Following the masters: Portrait viewing and appreciation is guided by selective detail. *Perception*, 42, 608-630.

-
- Doelker, C. (1999). *Ein Bild ist mehr als ein Bild. Visuelle Kompetenz in der Mediengesellschaft*. [A painting is more than a painting. Visual competence in media science.] Stuttgart: Klett-Verlag.
- Dysthe, O. (1999). Dialogic Perspectives on Teaching and Learning. *The Dialogical Perspective and Bakhtin*. Bergen: University of Bergen.
- Eggum A., Heller R., Lathe C., and Woll, G. (1992). *Edvard Munch - The Frieze of Life*, edited by Mara-Helen Wood. London: National Gallery Publications.
- Eisner, E. W. (1985). Aesthetic modes of knowing. In E. W. Eisner (Ed.) *Learning and teaching the ways of knowing*. Chicago: University of Chicago Press.
- Ericsson, K. A. (1991). *Towards a general theory of expertise. Prospects and limits*. Cambridge: University of Cambridge.
- Ericsson, K. A., & Simon, H. A. (1993). *Protocol analysis: Verbal reports as data* (Rev. ed.). Cambridge, MA: MIT Press.
- Ericsson, K. A. (2003). Valid and Non-Reactive Verbalization of Thoughts During Performance of Tasks. *Journal of Consciousness Studies*, 10 (9-10), 1-18.
- Falk, J. H. & Dierking, L. D. (1992). *The museum experience*. Howells House.
- Falk, J. H. & Dierking, L. D. (2000). *Learning from Museums: Visitor Experiences and the Making of meaning*. Altamira Press.
- Fechner, G. T. (1871). *Zur experimentalen Aesthetik*. [About experimental aesthetics]. Abhandlungen der Koeniglichen Saechsischen Gesellschaft der Wissenschaften.

-
- Fish, S. (1980). *Is there a text in this class? The authority of interpretative communities*. Cambridge, MA and London: Harvard University Press.
- Freimuth, M., and Wapner, S. (1979). The influence of lateral organization on the evaluation of paintings. *British Journal of Psychology*, 70, 211-218.
- Gibson, J. J. (1978). The ecological approach to the visual perception of pictures. *Leonardo*, 11, 227-235.
- Goldman, A. 1995. *Aesthetic Value*. Boulder: Westview Press.
- Gombrich, E. H. (1994). *The image and the eye: further studies in the psychology of pictorial representation* (2nd ed.). London: Phaidon.
- Gombrich, E. H. (2002). *Art and illusion: A study in the psychology of pictorial representation* (6th ed.). London: Phaidon.
- Goodman, N. (1976). *Languages of Art: An Approach to a Theory of Symbols*. Indianapolis, Hackett Publishing Company.
- Gran, A.-B. (2011). *Hva vet vi om etnisk norsk kulturkonsum?* [What do we know about the ethnic Norwegian culture consumption]. Perduco Kultur for Norsk.
- Grudens-Schuck, N., Lundy Allen, B. & Larson, K. (2004). *Focus Group Fundamentals*. Ames, Iowa: Iowa State University Extension.
- Haider, H., & French, P. A. (1999). Eye movement during skill acquisition: More evidence for the information-reduction hypothesis. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 25, 172-190.

-
- Hall, S. (1980). Encoding/Decoding. In S. Hall, D. Hobson, A. Lowe, and P. Willis (Eds.). *Culture, Media, Language: Working Papers in Cultural Studies* (128-138). New York: Routledge.
- Hampp, C., & Schwan, S. (2014). The role of authentic objects in museums of the history of science and technology: Findings from a visitor study. *International Journal of Science Education*, DOI: 10.1080/21548455.2013.875238.
- Hekkert, P., and van Wieringen, P. C. W. (1996). The impact of level of expertise on the evaluation of original and altered versions of post-impressionistic paintings. *Acta Psychologica*, 94, 117–131.
- Heller, W. (1994). Cognitive and emotional organization of the brain: Influences on the creation and perception of art. In D. W. Zaidel (Ed.) *Neuropsychology* (271-292) London: Academic Press.
- Holmqvist, K., Nyström, M., Andersson, R., Dewhurst, R., Jarodzka, H., & van de Weijer, J. (2011). *Eye tracking: a comprehensive guide to methods and measures*. Oxford University Press.
- Hooper-Greenhill, E. (2000). Changing Values in the Art Museum: Rethinking Communication and Learning. *International Journal of Heritage Studies*, 6, 9-31.
- Hooper-Greenhill, E., & Moussouri, T. (2001). *Visitors' Interpretive Strategies at Nottingham Castle Museum and Art Gallery*. R. C. f. M. a. Galleries. Leicester, University of Leicester: 2.

-
- Hooper-Greenhill, E. & Moussouri, T. (2002). *Researching Learning in Museums and Galleries: A Bibliographic Review*. R. C. f. M. a. Galleries. Leicester, University of Leicester: 42.
- House, R., and K. Howe. (1999). *Values in Evaluation and Social Research*. Thousand Oaks, Calif.: Sage.
- Housen, A. (1999). *Eye of the Beholder: Research, theory and practice*. Paper presented at the Aesthetic and Art Education: A Transdisciplinary Approach Conference, Lisbon, Portugal.
- Hubard, O. M. (2011). Illustrating Interpretive Inquiry: A Reflection for Art Museum Education. *Curator: The Museum Journal*. 54(2): 165-179.
- Itti, L. & Koch, C. (2001). Computational Modeling of Visual Attention. *Nature Reviews Neuroscience*, 2, 194-203.
- Itti, L. (2005). Quantifying the contribution of low-level saliency to human eye movements in dynamic scenes. *Visual Cognition*, 12 (6), 1093-1123.
- Jacobsen, T. (2006). Bridging the arts and sciences: A framework for the psychology of aesthetics. *Leonardo*, 39(2), 155-162.
- Janson, H. W. (1988). *DuMonts Kunstgeschichte unserer Welt* [DuMonts arthistory of our world]. Dumont Verlag: Köln.
- Jarodzka, H., Scheiter, K., Gerjets, P., & van Gog, T. (2010). In the eyes of the beholder: How experts and novices interpret dynamic stimuli. *Learning and Instruction*, 20, 146-154.

-
- Jeanneret, Y., A. Depoux, Luckerhoff, J., Vitalbo, V., and Jacobi, D. (2010). Written Signage and Reading Practices of the Public in a Major Fine Arts Museum. *Museum Management and Curatorship* 25(1): 53-67.
- Jolicoeur, P., Gluck, M. A., & Kosslyn, S. M. (1984). Pictures and names: Making the connection. *Cognitive psychology*, 16(2), 243-275.
- Jones, M. G., & Brader-Araje, L. (2002). The impact of constructivism on education: Language, discourse, and meaning. *American Communication Journal*, 5(3), 1-10.
- Jordan, B., and A. Henderson. (1995). Interaction Analysis. *The Journal of the Learning Sciences*. 4(1): 39-103.
- Karpf, D. A. (1973). *Thinking aloud in human description learning*. Dissertation Abstracts International, 33, 6111-B.
- Kemp, W. (1998). The work of art and its beholder. The methodology of the aesthetics of reception. In Cheetham, M. A. (Ed.) *The subjects of art history: historical objects in contemporary perspectives* (180-196). Cambridge.
- Kennick, W. E. (1958). Does Traditional Aesthetics Rest on a Mistake? *Mind*, 67(267), 317-334. Published by: Oxford University Press
- Kesner, L. (2006). The Role of Cognitive Competence in the Art Museum Experience. *Museum Management and Curatorship*. 2006. 21 (1): 1-16.
- Knutson, K. (2002). Creating a Space for learning: Curators, Educators, and the Implied Audience, In G. Leinhardt, K. Crowley and K. Knutson (Eds.) *Learning Conversations in Museums* (5-44). Mahwah, Lawrence Erlbaum.

- Koestler, A. (1970). *The act of creation*. London: Pan Books.
- Köhler, W. (1929). *Gestalt psychology*. Oxford, England: Liveright.
- Korff, G. (2002). *Museumsdinge. deponieren – exponieren* [Museumobjects. deposing and exhibiting them]. Köln, Weimar, Wien: Böhlau.
- Kristjanson, A. F., & Antes, J. R. (1989). Eye movement analysis of artists and nonartists viewing paintings. *Visual Arts Research*, 21-30.
- Krueger, R., and M.A. Casey (2000). *Focus Groups: A Practical Guide for Applied Research* (3rd edition). Thousand Oaks, CA: Sage.
- Krukar, J., & Dalton, R. C. Walk, Look, Remember: Art galleries as spaces facilitating memory. In *Proceedings of the 9th International Space Syntax Symposium*. 074:01–19. Seoul, South Korea.
- Lang, A. (1992). On the knowledge in Things and Places. In Cranach, M., Doise, W., & Mugny, G. (Eds.). *Social representations and the social basis of knowledge*. Bern: Huber Verlag.
- Leder, H., Belke, B., Oeberst, A., and D. Augustin. (2004). A model of aesthetic appreciation and aesthetic judgements. *British Journal of Psychology*. 95: 489-508.
- Leder, H., Carbon, C. C., & Ripsas, A. L. (2006). Entitling art: Influence of title information on understanding and appreciation of paintings. *Acta Psychologica*, 121(2), 176-198.
- Leder, H. (2013). Next steps in neuroaesthetics: Which processes and processing stages to study?. *Psychology of Aesthetics, Creativity, and the Arts*, 7(1), 27.

-
- Leinhardt, G., & Crowley, K. (1998). Museum learning as conversational elaboration: a proposal to capture, code, and analyze talk in museums. *Museum Learning Collaborative*, <http://mlc.lrdc.pitt.edu/mlc> (accessed February 5, 2014).
- Leinhardt, K. Crowley & K. Knutson (2002). *Learning Conversations in Museums*. Mahwah, Lawrence Erlbaum.
- Leinhardt, G., & K. Knutson. (2004). *Listening in on Museum Conversations*. Walnut Creek, CA: Altamira Press.
- Lemerise, T. (1995). The role and place of adolescents in museums: Yesterday and today. *Museum Management and Curatorship*, 14(4): 393-408.
- Levison, J. (1993) Defining Art Historically. *Journal of Aesthetics and Art Criticism*, 47, 21-33.
- Locher, P., Gray, S., & Nodine, C. (1996). The structural framework of pictorial balance. *Perception London*, 25, 1419-1436.
- Locher, P. J., Smith, J. K., & Smith, L. F. (2001). The influence of presentation format and viewer training in the visual arts on the perception of pictorial and aesthetic qualities of paintings. *Perception London*, 30(4), 449-466.
- Locher, P., Krupinski, E. A., Mello-Thoms, C., & Nodine, C. F. (2007). Visual interest in pictorial art during an aesthetic experience. *Spatial Vision*, 21(1-2), 55-77.
- Ludes, P. (2001). *Schlüsselbild-Gewohnheiten. Visuelle Habitualisierungen und Koordinationen. In Kommunikation visuell : das Bild als Forschungsgegenstand - Grundlagen und Perspektiven*, [Keyimage-Habits. Visual Habituation and Coordinations. In *Visual*

-
- Communication. The Image as Object of Research - Principles and Perspectives], edited by Thomas Knieper and Marion G. Müller, 64-78. Magdeburg: Halem.
- Lutenbacher, M., W. Cooper, and K. Faccia, (2002). Planning Youth Violence Prevention Efforts: Decision making Across Community Sectors. *Journal of Adolescent Health*, 30, 346-354.
- Machotka, P. (1966). Aesthetic criteria in childhood: justifications of preference. *Child Development*, 37(4), 21-28.
- Machotka, P. & Spiegel J. P. (1979). Construction of Pictorial Meaning. *Studies in the Anthropology of Visual Communications*, 5(2), 115–131.
- Mackworth, N. H. and Bruner, J. S. (1970). How adults and children search and recognize pictures. *Human Development*, 13, 149-177.
- Markovic S. (2012). Components of aesthetic experience: aesthetic fascination, aesthetic appraisal, and aesthetic emotion. *i-Perception*, 3, 1–17.
- Mason, D. D. M. and M. Conal. (2006). 'The Feeling of Exclusion': Young People's Perceptions of Art Galleries. *Museum Management and Curatorship*, 21, 20-31.
- Massaro, D., Savazzi, F., Di Dio, C., Freedberg, D., Gallese, V., Gilli, G., & Marchetti, A. (2012). When art moves the eyes: a behavioral and eye-tracking study. *PloS one*, 7(5), e37285.
- Maxwell, L. E. & Evans, G. W. (2002). Museums as Learning Settings: The Importance of the Physical Environment. *The Journal of Museum Education*, 27(1), 3-7.

-
- McManus, I. C., Edmondson, D., and Rodger, J. (1985). Balance in pictures. *British Journal of Psychology*, 76(3), 311-324.
- McManus, I. C., & Kitson, C. M. (1995). Compositional geometry in pictures. *Empirical Studies of the Arts*, 13(1), 73-94.
- Melton, A. (1972). Visitor Behavior in Museums: Some early Research in Environmental Design. *Human Factors*, 14(5), 393-403.
- Mitchell, W. J. T. (2003). Interdisziplinarität und visuelle Kultur. In H. Wolf (Hrsg.). *Diskurse der Fotografie: Fotokritik am Ende des fotografischen Zeitalters, Bd. II* (38-50) [Interdisciplinarity and visual culture. In H. Wolf (Eds.) Discourses of photography: photocritique at the end of the photographic age]. Frankfurt am Main: Suhrkamp.
- Monti, F. and Keene, S. (2013). *Museums and Silent Objects: Designing Effective Exhibitions*. Surrey: Ashgate.
- Neisser, U. (1976). *Cognition and reality: principles and implications of cognitive psychology*. WH Freeman.
- Nodine, C. F., Locher, P. J., & Krupinski, E. A. (1993). The role of formal art training on perception and aesthetic judgment of art compositions. *Leonardo*, 219-227.
- Nothdurft, H.C. (2000). Saliency from feature contrast: temporal properties of saliency mechanisms. *Vision Research*, 40, 2421-2435.
- Ognjenović P. (1991). Processing of aesthetic information. *Empirical Studies of the Arts*, 9, 1-9.

-
- Panofsky E. (1975). Iconography and Iconology: An Introduction to the Study of Renaissance Art. In E. Panofsky (Ed.) *Meaning in the Visual Arts: Papers in and on Art History* (26–54). Garden City, NY: Doubleday.
- Parkhurst, D.; Law, K. & Niebur, E. (2002). Modelling the role of salience in the allocation of visual selective attention. *Vision Research*, 42, 107-123.
- Parkhurst, D.J., Niebur, E. (2003). Scene content selected by active vision. *Spatial Vision*, 16(2), 125–154.
- Parry, R., M. Ortiz-Williams, Sawyer, A. (2007). How Shall We Label Our Exhibit Today? Applying the Principles of On-Line Publishing to an On-Site Exhibition. In L. Tran and D. Bearman (Eds.) *Museums and the Web 2007*. San Francisco, California, Toronto: Archives & Museum Informatics.
- Parsons, M. J. (1987). *How we understand art: A cognitive developmental account of aesthetic experience*. Cambridge: Cambridge University Press.
- Perkins, D. N. (1994). *The Intelligent Eye: Learning to Think by Looking at Art. Occasional Paper 4*. Los Angeles: The Paul Getty Trust.
- Piecha, A. (2002). *Die Begründbarkeit Ästhetischer Werturteile* [The Justification of aesthetic judgments]. Paderborn: Mentis-Verlag.
- Pierroux, P. (2003). Communicating Art in Museums. *Journal of Museum Education*, 28(1), 3-7.
- Pierroux, P. (2006). *Meaning, Learning, and Art in Museums: A Situated Perspective*. Oslo, Unipub.

- Pierroux, P. (2010). Guiding Meaning on Guided Tours. Narratives of Art and Learning in Museums.” In A. Morrison (Ed.) *Inside Multimodal Composition* (417-450). Cresskill NJ: Hampton Press.
- Pierroux, P. and Ludvigsen, S. (2013). Communication Interrupted: Textual Practices and Digital Interactives in Art Museums. In K. Schrøder and K. Drotner (Eds.) *The Connected Museum: Social Media and Museum Communication* (153-176). London, Routledge.
- Pihko, E., Virtanen, A., Saarinen, V.M., Pannasch, S., Hirvenkari, L., Tossavainen, T., Haapala, A., and R. Hari. (2011). Experiencing art: the influence of expertise and painting abstraction level. *Frontiers in Human Neuroscience*, 5.
- Piscitelli, B. and K. Weier (2002). Learning With, Through, and About Art: The Role of Social Interactions. In S. Paris (Ed.) *Perspectives on object-centered learning in museums* (121-151). Mahwah, Lawrence Erlbaum.
- Posner, R. (1998). Fighting Semiotic Pollution in Europe. In W.B. Hess-Lüttich, J.E. Müller and A. van Ziest (Eds.) *Culture, Sign, Space / Raum, Zeichen, Kultur – An International Conference on the Semiotics of Space and Culture in Amsterdam*. (16) Tübingen: Narr.
- Pujol-Tost, L. (2011). Integrating ICT in exhibitions. *Museum Management and Curatorship*, 26(1): 63-79.
- Putko, A. (1989). Cognitive interpretation of works of art in the artist's and layman's unsophisticated experience. *Polish Psychological Bulletin*, 20, 33-41.
- Puttfarken, T. (2000). *The Discovery of Pictorial Composition*. Yale University Press, New Haven, CT, USA.

-
- Rambow, R. (2000). *Experten-Laien-Kommunikation in der Architektur*. [Expert-layman communication in architecture]. Berlin: Waxmann.
- Reingold, E. M & Charness, N. (2005). Perception in chess: Evidence from eye movements. In G. Underwood (Ed.) *Cognitive processes in eye guidance* (325-354). Oxford: Oxford University Press.
- Rollins, M. 1989. *Mental Imagery: On the Limits of Cognitive Science*. New Haven, CT, US: Yale University Press.
- Roppola, T. (2013). *Designing for the Museum Visitor Experience*. Routledge.
- Rosch, E. (1975). Principles of categorization. In E. Rosch & E. Lloyd (Eds.), *Cognition and categorization* (27–48). Hillsdale, NJ: Erlbaum.
- Rubenstein, R. (1988). The use of focus groups in audience research. In S. Bitgood, J. Roer, & A. Benefield (Eds.) *Visitor Studies – Theory, research, and practice* (180-188). Jacksonville, AL: Center for Social Design.
- Russell, P. A. (2003). Effort after meaning and the hedonic value of paintings. *British Journal of Psychology*, 94 (Pt 1), 99–110.
- Russell, P. A., & Milne, S. (1997). Meaningfulness and hedonic value of paintings: Effects of titles. *Empirical Studies of the Arts*, 15(1), 61-73.
- Sandell, R. (2009). Using Form+Theme+Context (FTC) for Rebalancing 21st-Century Art Education. *Studies in Art Education*, 50(3), 287-299.

-
- Sachs-Hombach, K. (2003). *Das Bild als kommunikatives Medium. Elemente einer allgemeinen Bildwissenschaft*. [The picture as communicative medium. Elements of a general visual science]. Köln: Halem Verlag.
- Schelske, A. (1997). *Die kulturelle Bedeutung von Bildern* [The cultural account of pictures]. Dt. Univ.-Verlag.
- Schlesinger, G. (1979). Aesthetic Experience and the Definition of Art. *British Journal of Aesthetics*, 19(2), 167-176.
- Schwan, S., & Zahn, C. (2006). Der Bildbetrachter als Gegenstand bildwissenschaftlicher Methodik. In K. Sachs-Hombach (Ed.) *Bild und Medium. Kunstgeschichtliche und philosophische Grundlagen der interdisziplinären Bildwissenschaft* (214-232). [The beholder as a subject of visual science methodology. In K. Sachs-Hombach (Ed.) Image and medium. Art historical and philosophical foundations of interdisciplinary visual science.] Köln: Halem Verlag.
- Serrell, B. (1997) Paying attention: the duration and allocation of visitors' time in museum exhibitions. *Curator*, 40 (2), p. 108-125
- Shigeto, H., & Nittono, H. (2010). *Stimulus complexity and meaningfulness differently affect the viewing duration, recognition performance, and subjective interest of the viewer*. Paper presented at the Third International Workshop on Kansei, Fukuoka, Japan (Proceedings, pp. 227–230).
- Shimamura, A. P. (2012). Approaching a science of aesthetics: Issues and ideas. In A. P. Shimamura and S. E. Palmer (Eds.) *Aesthetic Science: Connecting Minds, Brains, and Experience* (3- 28). New York: Oxford University Press.

-
- Smith, J. K. & Smith, L. F. (2001). Spending time on art. *Empirical Studies of the Arts*, 19, 229-236.
- Smith, M. K. (2006). *Viewer Tagging in Art Museums: Comparisons to Concepts and Vocabularies of Art Museum Visitors*. Proceedings of the 17th ASIS&T SIG/CR Classification Research Workshop, Advances in Classification Research. 17.
- Solso, R. L. (1994). *Cognition and the visual arts*. Cambridge, MA, US: MIT Press.
- Solso, R. L. (2003). *The psychology of art and the evolution of the conscious brain*. Cambridge, MA, US: MIT Press.
- Steyer, R., Schwenkmezger, P., Notz, P. & Eid, M. (1997). *Der Mehrdimensionale Befindlichkeitsfragebogen(MDBF)* [The Multidimensional Mood State Questionnaire (MDMQ)]. Göttingen: Hogrefe.
- Tatler, B. W. (2007). The central fixation bias in scene viewing: Selecting an optimal viewing position independently of motor biases and image feature distribution. *Journal of Vision*, 7(14), 1-17.
- Trant, J. (2006). Exploring the potential for social tagging and folksonomy in art museums: Proof of concept. *New Review of Hypermedia and Multimedia*, 12(1): 83-105.
- Tschacher, W., Greenwood, S., Kirchberg, V., Wintzerith, S., van den Berg, K., & Tröndle, M. (2012). Physiological correlates of aesthetic perception of artworks in a museum. *Psychology of Aesthetics, Creativity, and the Arts*, 6(1), 96.
- Tyler, C. W. (1999). Is art lawful? *Journal of Consciousness Studies*, 6, 673 – 674.

-
- Tyler, C. W. (2007). Some principles of spatial organization in art. *Spatial Vision*, 20(6), 509-530.
- Tzortzi, K. (2007). Museum Building Design and Exhibition Layout. In *Proceedings of the 6th International Space Syntax Symposium*. 072:01–16. Istanbul, Turkey.
- Valsiner, J. (1992). Interest: A Metatheoretical Perspective. In K. A. Renninger, S. Hidi and A. Krapp (Eds.) *The Role of Interest in Learning and Development*. Hillsdale, N.J.: Lawrence Erlbaum Associates.
- Van Gog, T., Paas F., & Van Merriënboer, J.J.G. (2005). Uncovering expertise-related differences in troubleshooting performance: Combining eye movement and concurrent verbal protocol data. *Applied Cognitive Psychology*, 19, 205-221.
- Vogt, S. (1999). Looking at paintings: patterns of eye movements in artistically naive and sophisticated participants, *Leonardo* 32, 325.
- Vogt, S., & Magnussen, S. (2007). Expertise in pictorial perception: eye-movement patterns and visual memory in artists and laymen. *Perception London*, 36(1), 91.
- vom Lehn, D., C. Heath, et al. (2001). Exhibiting Interaction: Conduct and Collaboration in Museums and Galleries. *Symbolic Interaction*, 24(2): 189-216.
- vom Lehn, D. (2010). Examining “response”: video-based studies in museums and galleries. *International Journal of Culture, Tourism and Hospitality Research*, 4(1), 33-43.
- Vygotsky, L. S. (1978). *Mind in society. The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

- Vygotsky, L. S. (1981). The genesis of higher mental functions. In J. V. Wertsch (Ed.) *The concept of activity in Soviet psychology*. Armonk: Sharpe.
- Wadsworth, B. J. (1996). *Piaget's theory of cognitive and affective development: Foundations of constructivism*. Longman Publishing.
- Walker, S. (2004). Artmaking in an age of visual culture: Vision and visuality. *Visual Arts Research*, 30(2), 23-37.
- Warburg, A. M. (1992). *Ausgewählte Schriften und Würdigungen* [Selected Essays and Appraisals], edited by Dieter Wuttke. Baden-Baden: Koerner.
- Wertheimer, M. (1923). Untersuchungen zur Lehre von der Gestalt. II. [Experiments for the theory of gestalt.] *Psychologische Forschung*, 4(1), 301-350.
- Wertsch, J. V. (1991). *Voices of the mind: A sociocultural approach to mediated action*. Cambridge, MA: Harvard University Press.
- Winston, A. S., and Cupchik, G. C. (1992). The evaluation of high art and popular art by naive and experienced viewers. *Visual Arts Research*, 18, 1–14.
- Wittgenstein L. (1921). *Tractatus logico-philosophicus*. Suhrkamp Edition Nr.12, (1963). Frankfurt am Main: Suhrkamp Verlag.
- Worth, S. (1981) *Studying visual communication*. Philadelphia: University of Pennsylvania Press.
- Yalowitz, S. S., & Bronnenkant, K. (2009). Timing and tracking: Unlocking visitor behavior. *Visitor Studies*, 12(1), 47-64.
- Yarbus, A. L. (1967). *Eye movements and vision*. New York: Plenum Press.

- Yin, R. K. (2003). *Case study research: Design and methods* (3rd ed.). Thousand Oaks, CA: Sage.
- Zangemeister, W. H., Sherman, K., & Stark, L. (1995). Evidence for a global scanpath strategy in viewing abstract compared with realistic images. *Neuropsychologia*, 33(8), 1009-1025.
- Zembylas, T. (2005). Visuelle Kompetenz. Zur Formation von Könnerschaft und Kennerschaft im künstlerischen Feld. [Visual competence. The formation of expert abilities and knowledge in art]. In K. Kókai (Ed.) *Visual Culture*. (137-157) Budapest: Museum Ludwig Budapest.
- Ziese, M. (2010). *Kuratoren und Besucher. Modelle kuratorischer Praxis in Kunstaustellungen* [Curators and visitors. Models of curatorial practice in art exhibitions]. Bielefeld: transcript.

List of Figure

Figure 1. The Treachery of Images (1929) by René Magritte.....	9
Figure 2. A Reproduction of Chatterjee’s Framework of Aesthetic Processing (2003).....	31
Figure 3. A Reproduction of the Model of Aesthetic Experience of Marković (2013).....	33
Figure 4. A Reproduction of Leder et al.’s Model of Aesthetic Appreciation & Aesthetic Judgment...	34
Figure 5. Integrated model of Leder et al.’s five stages of aesthetic processing and Panofsky’s three stages of iconographical and iconological meaning making with paintings	37
Figure 6. On the left: <i>Madonna</i> (1884-85) by Edvard Munch, on the right: <i>Portrait of Gabrielle d'Estrées and Duchess of Villar</i> (1594) by the School of Fontainebleau	60
Figure 7. A Model of the Art System Including the Artwork, the Artist, and the Beholder as Drawn by the Participants	73
Figure 8. Schematic overview of the paintings and arrangement of the Munch gallery including label information.....	83
Figure 9. Expert’s ‘mapping’ arrangement.....	95
Figure 10. Lay group’s ‘mapping’ arrangement	101
Figure 11. Two examples of Renaissance portraits included in the study: on the left Hans Holbein the Younger, <i>"The Merchant Georg Gisze"</i> , 1532; on the right Jan van Eyck, <i>"The Arnolfini Wedding"</i> , 1434.....	116
Figure 12. Means (and standard errors) for experts and laymen regarding the ratio of the dwell time on AOIs depicting human features to the dwell time on AOIs with symbolic meaning for the initial inspection and the thinking-aloud inspection task.	127

List of Tables

Table 1. The five stages of aesthetic development as described in the model by Parsons (1987) and the model by Housen (1999).....	26
Table 2. The three stages of Panofsky’s model of Iconography and Iconology.....	29
Table 3. The semantic categories of curator and groups of students in the card-piling activity.....	103
Table 4. Specification of the paintings used in the study and the areas of interest (AOIs) with examples for symbolic details	118
Table 5. Means (M) and standard deviations (SD) for eye-tracking measures.....	126
Table 6. Means (M) and standard deviations (SD) for the thinking aloud measures	129

Appendix

A. Questionnaire Study 2

Questionnaire | Munch Room | The National Museum of Art, Architecture and Design

VP Nr: _____

Grade: _____

Age: _____

Gender: m f

- Would you describe yourself to be interested in art? no yes
- When was the last time you visited an art museum/exhibition? _____
- How often in a year do you visit art museums/exhibitions?

seldom | 1-5 times a year |

once a month | 1-3 times a month | every week

- Do you have a creative hobby? no yes
- What is it? _____

- In what context are you here? (e.g. arts class, history class, ...)

- Why did you go to the museum today?

- Were you looking forward to visit the Munch Room? no yes
- Did you visit it before? no yes
- What were you expecting from visiting it?

- Were you looking for anything in particular?

-
- How much time did you spent in the room approximately? _____
 - Did you have a look at all paintings in the room? no yes
 - Did you find the text and labels useful? no yes
 - Did you talk about what you saw in the exhibition while walking through the Munch Room? no yes
 - What did you talk about?

 - What were your personal highlights of the exhibition? Note 3 things.

 - Was there anything about the visit that made you remember it better?

 - Having walked through the Munch room, do you feel that the exhibition has a certain theme to it? Which one?

 - Was there anything in particular that made you feel very strongly about the subject - perhaps something that you saw, heard or talked about today?

 - What do you think the curator wanted to show by choosing and hanging up the paintings of Munch like he did?

- What aspects of the gallery-visit were most important for you to do the card-sorting activities?

Please complete the following sentences: I was...

- surprised by... most interested in... inspired by... disappointed by...
 bored by... most enthusiastic about...

B. Questionnaire Study 3

Mit diesem Fragebogen möchten wir Erkenntnisse zu Ihrem Kunstwissen und Kunstinteresse im Zusammenhang mit Kunstwerken **in Form von Bildern** gewinnen. Wir haben dazu einige Fragen vorbereitet und bitten Sie nun, alle Fragen sorgfältig zu beantworten. Wir sichern Ihnen zu, dass Ihre in dieser Umfrage erhobenen Daten lediglich für Forschungszwecke und anonymisiert verwendet sowie streng vertraulich behandelt werden. Rückschlüsse auf Ihre Identität werden nicht möglich sein!

Vielen Dank für Ihre Mitarbeit!

Bitte bewerten Sie im Folgenden, wie sehr die jeweilige Aussage auf Sie persönlich zutrifft. In allen Aussagen geht es um Ihre ganz persönliche Meinung - es gibt keine „richtigen“ oder „falschen“ Antworten. Bitte geben Sie für jede der Aussagen an, inwiefern sie persönlich zustimmen.

Einstellung zur Kunst

Bitte geben Sie für jede Aussage an, inwieweit diese auf Sie zutrifft.

	trifft überhaupt nicht zu				trifft absolut zu
Kunst ist für mich wichtig.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich suche bei Kunstwerken nach künstlerischer Relevanz.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst ist für mich so viel wert, wie ein Kunstkenner bereit ist dafür zu bezahlen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst ist notwendig für die Gesellschaft.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es ist mir wichtig, die bekanntesten Künstler und ihre Werke zu kennen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich suche bei Kunstwerken nach gesellschaftlicher Relevanz.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst ist mehr wert, wenn sie im Museum ausgestellt ist.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunstwerke sind für mich historische Dokumente.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wenn ich ein Kunstwerk betrachte, frage ich mich nach seiner tieferen Bedeutung.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst ist für mich Wissen, das mir gesellschaftliches Ansehen und Prestige verleiht.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst ist für mich ein Statement des Künstlers über seinen Blick auf die Welt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich suche bei Kunstwerken nach nichts, ich lasse einfach nur das jeweilige Kunstwerk auf mich wirken.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst bedeutet für mich Kommunikation zwischen Kunstwerk und Betrachter.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Emotion und Empathie helfen mir ein Bild zu verstehen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst hilft mir andere Perspektiven wahrzunehmen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst muss authentisch sein, um mir zu gefallen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst muss auch provozieren können.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst ohne eine erkennbare Aussage erscheint mir oft belanglos.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst muss für mich nicht nur schön sein	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst sollte auch abstrakt sein.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Weiter

Kunstinteresse

Bitte geben Sie für jede Aussage an, inwieweit diese auf Sie zutrifft.

	trifft überhaupt nicht zu					trifft absolut zu
Mein Interesse an der Kunst wurde in der Schule geweckt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich informiere mich über aktuelle Kunstausstellungen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mein Interesse an der Kunst wurde mir durch mein persönliches Umfeld (Familie, Freunde usw.) vermittelt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst wird für mich erst dann interessant, wenn sie eine nicht sofort erkennbare Aussage/Bedeutung vermittelt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mein Interesse an der Kunst hängt mit meiner Arbeit zusammen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich rede gerne über Kunst	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst muss mich faszinieren, damit ich mich damit befasse.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich informiere mich über bestimmte Künstler, Epochen oder Stilrichtungen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst erlebe ich auch als künstlerische Eindrücke und Erlebnisse im Alltag.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich gehe gern in Kunstausstellungen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich habe Interesse an den Geschichten und den Hintergründen zu den einzelnen Bildern.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hintergrundwissen über ein Werk ist irrelevant, das einzige was zählt ist die Wirkung des Bildes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mein Interesse an der Kunst ist durch eigene künstlerische Tätigkeiten entstanden.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst muss mir gefallen, damit sie mich interessiert.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mein Interesse an der Kunst bezieht sich nur auf bestimmte Künstler/ Stilrichtungen/Epochen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich würde gern mehr über Kunstwerke und ihre Künstler wissen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mein Interesse an der Kunst bezieht sich auf alle Stilrichtungen der Malerei.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich finde es spannend mir vorzustellen, wem das Bild schon gehörte und wo es bereits hing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mein Interesse an der Kunst bezieht sich vor allem auf die geschichtlichen Aspekte.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst lässt sich nicht nur in künstlerischen Ausstellungen und Museen finden.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	niedrig					hoch
Wie würden Sie selbst Ihr Interesse an der Kunst einschätzen?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Weiter

Kunstwissen

Bitte geben Sie für jede Aussage an, inwieweit diese auf Sie zutrifft.

	trifft überhaupt nicht zu					trifft absolut zu
Ich kenne verschiedene Künstler und ihre Werke.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Professionelle Einschätzungen sind wichtig um als Laie die Bedeutung zu verstehen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Die einzelnen Kunstwerke sagen mir etwas über den Künstler.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bilder betrachte ich im historischen Kontext.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Der individuelle Stil des Künstlers ist das wichtigste Element um ein Werk zu verstehen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Die Zusatzinformationen, die zu einem Bild präsentiert werden, sind mir wichtig um ein Werk besser verstehen zu können.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bilder haben eine Bedeutung, die ich entziffern kann.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mein Kunstwissen erleichtert mir das verstehen von Kunstwerken.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst sagt mir etwas über die Gesellschaft in der sie entstanden ist.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich muss mehr über Kunst lernen um sie zu verstehen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich kenne mich in verschiedenen künstlerischen Epochen aus.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich denke, Kunstwerke lassen sich nie vollständig entschlüsseln.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mit Hilfe meines historischen Wissens kann ich Bilder besser verstehen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich habe Kenntnisse von verschiedenen künstlerischen Stilrichtungen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mein Kunstwissen wurde mir an der Schule vermittelt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mein Kunstwissen wurde mir durch mein persönliches Umfeld (Familie, Freunde usw.) vermittelt.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mein Kunstwissen habe ich aus kunsthistorischen Büchern, oder Zeitschriften.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wenn ich ein Bild betrachte, vergleiche ich es mit anderen, die ich kenne.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wenn ich einen neuen Künstler kenne, vergleiche ich ihn mit Künstlern, die ich schon kenne.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Professionelle Einschätzungen sind für mich beim Betrachten eines Bildes unwichtig.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich vergleiche Bilder aus der gleichen Epoche miteinander.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wenn ich ein Kunstwerk betrachte, stellen sich mir immer neue Fragen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunst muss Interpretationsspielraum lassen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es macht mir keinen Spaß schockierende Kunstwerke zu betrachten.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Weiter

Welche Darstellungsformen von Kunst gefallen Ihnen?

	überhaupt nicht				sehr
Abstrakte Kunst	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gegenständliche Kunst	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Portraits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fotographien	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Landschaftsbilder	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Graffiti	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stilleben	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Weiter

Welche der folgenden Künstler kennen Sie. Geben Sie bitte die jeweilige Nationalität und Stilrichtung an, falls Sie sie nicht wissen, können Sie einfach raten

	Bekannt ja/nein	Nationalität	Kunstrichtung / Stil
Henri Matisse	<input type="text"/>	<input type="text"/>	<input type="text"/>
Jan van Eyck	<input type="text"/>	<input type="text"/>	<input type="text"/>
Joseph Beuys	<input type="text"/>	<input type="text"/>	<input type="text"/>
Salvador Dali	<input type="text"/>	<input type="text"/>	<input type="text"/>
Antonello da Messina	<input type="text"/>	<input type="text"/>	<input type="text"/>
Pablo Picasso	<input type="text"/>	<input type="text"/>	<input type="text"/>
Jackson Pollock	<input type="text"/>	<input type="text"/>	<input type="text"/>
Piet Mondrian	<input type="text"/>	<input type="text"/>	<input type="text"/>
Ernst-Ludwig Kirchner	<input type="text"/>	<input type="text"/>	<input type="text"/>
Andy Warhol	<input type="text"/>	<input type="text"/>	<input type="text"/>
Victor Vasarely	<input type="text"/>	<input type="text"/>	<input type="text"/>
Anselm Kiefer	<input type="text"/>	<input type="text"/>	<input type="text"/>
Hans Holbein der Jüngere	<input type="text"/>	<input type="text"/>	<input type="text"/>

Weiter

Demografische Daten

Geschlecht? Männlich Weiblich

Geburtsjahr

Was studieren Sie?

In welchem Semester sind Sie?

Falls Sie nicht studieren, welchen Beruf üben Sie aus?

Bitte geben Sie Ihre persönliche VP-Kennung ein.

Weiter