Embodied interpretation: Gesture, social interaction, and meaning making in a national art museum

Rolf Steiera,⁎, Palmyre Pierroux a, Ingeborg Krangea

a Department of Education, University of Oslo, P.O. Box 1092 Blindern, 0317 Oslo, Norway

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A B S T R A C T

This study expands on sociocultural approaches to meaning making in art museums by exploring the physical aspects of interaction with art in traditional gallery spaces, and in the context of technology use. The notion of ‘embodied interpretation’ is introduced to explore the complexity of embodied interaction in interpreting art, and to contribute to existing vocabularies of gesture. The research is informed by sociocultural perspectives on meaning making as well notions of embodied interaction, and asks the following research questions: “What are the relevant bodily and gestural practices that shape socially situated interactions in art galleries?” and “What insights into meaning making in art museums can be gained through an approach of embodied interpretation?” The study incorporates interaction analysis and design-based research methods to investigate three episodes from a national museum in which groups of adolescents interact with three different kinds of objects: a sculpture, a painting, and an interactive tabletop. Analysis reveals that visitors use gesture, as well as bodily positioning and movement in a variety of ways to coordinate social processes, and to mediate thinking and perception in the interpretation of art.

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1. Introduction

Cultural practices related to art museum visits historically involve hushed social interactions, with exhibitions designed to encourage individuals walking reflectively from artwork to artwork, gallery to gallery, constructing meaning through observations and perhaps talking quietly with friends or family about curated displays (Bennett, 1995; Bourdieu et al., 1990; Pitman & Hirzy, 2010). However, in recent decades, a broad range of digital technologies and devices have been introduced into interpretive encounters with art in museums (Jones-Garmil, 1997; Witcomb, 1997), with visitors accessing and producing interpretations across different types of interfaces, platforms, and devices, or what Kidd (2014) calls ‘transmedia’ interactions. The expanded range of possibilities for interaction is disrupting traditional conceptions of social and physical interaction in art museums, as visitors’ engagement with digital interpretive media also bring new gestures, behaviors and movements into these spaces (Bowers et al., 2007; Heath & vom Lehn, 2002). In this article, we are interested in these newer forms of visitor experience, but particularly in light of meaning making and bodily practices in traditional encounters with authentic artworks.

Meaning making from a sociocultural perspective highlights language as the primary mediational tool (Vygotsky, 1986), with physical and material aspects of the setting often analyzed as context (Goodwin, 2000). In museum learning research, this approach has fostered attention to visitor conversation as means for understanding meaning making practices (Pierroux, 2010; Leinhardt, Crowley, & Knutson, 2002). In this study, we expand on such approaches by analyzing the physical aspects of visitors’ meaning making, both in encounters with different types of art in traditional gallery spaces, and in interactions with a digital interpretive media. We draw on Goodwin’s (2000) concept of embodied interaction, which encompasses participants’ orientations and...
movements in relation to each other and the surrounding environment, as well as their gesture and talk. We propose the concept embodied interpretation, building on the notion that gesture and movement are part of the socially situated ways in which visitors interact with and make meaning from paintings and sculptures in a gallery (Steier, 2014; Heath & Hindmarsh, 2000; Streeck, 2009b).

Our aim is to develop the concept of embodied interpretation by investigating social interactions across different types of museum objects and activities. Specifically, we analyze young adult visitors’ (17–18 years old) embodied interpretations with three different kinds of objects in a national art museum: a painting, a sculpture and an interactive tabletop. We focus on how positioning and orientation to these different kinds of representations influence meaning-making processes, and how these relate to other types of naturally occurring movements, gestures and talk. What are the relevant bodily and gestural practices that shape meaning making in these contexts? What insights into meaning making in art museums can be gained through an approach of embodied interpretation? In posing these questions, we aim to better understand relationships between representations, embodied interpretation, and meaning making in art museums. We present below a review of theoretical perspectives relevant for framing the concept of embodied interpretation applied in this study.

2. Perspectives on art and meaning making

Studying meaning making processes in art museums is intertwined with the disciplinary domains of art history, visual studies, and aesthetics, which address issues of interpretation, experience, and evaluation, or aesthetic judgment (Pierroux, 2003). Therefore, to study visitors’ meaning making in encounters with different types of artworks, it is useful to draw on this disciplinary vocabulary to describe visual characteristics of paintings, sculptures, and (digital) reproductions, as well as to distinguish cognitive processes involved in their perception, understanding, and appreciation. In the cognitive sciences, the latter involve studies of “the way viewers acquire, represent and manipulate information embedded in the formal and compositional structure of artworks in order to recognize and evaluate their content” (Carroll, Moore, & Seeley, 2012, p. 48). In this study, we draw broadly on these domains to identify aspects of art interpretation that are relevant for our analysis.

Aesthetics, art history and visual studies involve the study of how artists employ techniques, subject matter and formal strategies to draw viewers’ attention to certain aspects or features of a work, but also concern the ways in which perception, emotion, and expertise figure into the reception and analysis of art (Baxandall, 1985; Holly & Moxey, 2002). In figurative painting and sculpture, artists are trained in expressing psychological representations of human action and gestures. Expressive techniques are based on the understanding that viewers anticipate and complete depicted actions. This human capacity is attributable to the structure of social action itself, that is, as an embodied part of our empathy with human behavior (Streeck, 2009b). This empathy may be ascribed to the imaginative capacity of the beholder, but also to the socialized competence for perceiving motions as meaningful (Streeck, 2009b). In terms of interactions with digital representations of art, experimental studies in aesthetic science have shown that expert and novice viewers of different ages rate the properties of artworks reproduced as images on a computer screen ‘remarkably similar’ to original artworks in a museum gallery (Locher, 2012). Accordingly, since our focus is not on problems of authenticity in art, but rather on how visitors’ interactions play into interpretations of art in different settings, we did not distinguish between original artworks and digital representations in the design of the empirical study.

There is a long tradition of studies of interpretative processes and aesthetic experience from an information-processing perspective that do not account for social interaction (Leder et al., 2004; Bauer & Pierroux, 2014). This may be considered problematic, in that the majority of museum visitors are accompanied by friends, family or schoolmates, with different social dynamics and institutional practices guiding each type of visit (Crowley, Pierroux, & Knutson, 2014). As visitor studies have made the significance of the social context for meaning making in museums increasingly clear, sociocultural perspectives have been developed as an approach to analyzing interpretive processes (Pierroux, 2003, 2010; Falk & Dierking, 1992; Knutson & Crowley, 2010; Leinhardt, Crowley, & Knutson, 2002). Meaning making is studied as a mediated process in which resources, different aspects of context, and participants’ previous knowledge become actualized through social interaction (Wertsch, 1991, 1998). In a museum gallery, a group of visitors engaged in interpreting an artwork may thus be considered a meaning making activity. Knowledge is distributed across the group, resources, and context, with language serving as central ‘mediation tool’ in thinking and communication. Analyzing participants’ talk provides insight into visitors’ collective meaning making process—on school field trips, family visits, or with friends (Pierroux, 2010; Knutson & Crowley, 2010; Leinhardt et al., 2002). Findings from these studies and others in the sociocultural tradition have identified the significance of previous knowledge, identity, and motivation for visitors’ attention, talk, and engagement in art.

In this study, we expand on sociocultural research in museums by stressing an embodied perspective, which builds on the idea that analysis of physical movement and gesture may reveal aspects of meaning making not apparent in the analysis of verbal expression alone. Embodied practices are understood in a holistic sense of “gesture production, manipulation of tools, mobility in the local environment, and interaction with others” (Hall & Nemirovsky, 2011, p. 207). We synthesize sociocultural perspectives on discourse and gesture in the notion of embodied interpretation (Steier, 2014), bringing gesture and physical activity to the foreground in the analysis of mediated action.

3. Framework for understanding gestural practices

Gesture may be regarded as a collection of human practices that use the hands and body to mediate inter-subjective understanding in situated contexts (Streeck, 2009a). Research has attempted to categorize gestures in different ways, mainly with a focus on hand gestures. McNeill (1992), in important early work on gesture, identified four types of gesture: deictic, beat, iconic, and metaphoric. Deictic refers to pointing gestures, and are often used to mediate joint attention in a particular situation. Beat gestures are simple,
often unattended gestures used to provide emphasis in conjunction with speech. Iconic gestures are those that bear some visual resemblance to an object that they are meant to represent, e.g., using fingers to ‘make a circle.’ Metaphoric gestures are similar to iconic, but less literal in the representative relationship, e.g., tracing a circular motion to represent the concept of ‘replication.’

More recently, an important distinction has been made to categorize gestures according to their function in context instead of as static types (Kendon, 2004; Streeck, 2009a). This is because a particular gesture (e.g., the physical shape and position of a hand) can serve diverse functions according to the context, sometimes simultaneously. Pozzer-Ardenghi and Roth (2004) identified eight functions of gesture in the context of a lecturer’s interactions with photographs in a classroom. These functions expand on McNeill’s iconic and deictic gestures to describe how teaching with a specific type of representation in a classroom is accomplished through talk intertwined with positioning, emphasizing, highlighting, pointing, outlining, adding, and extending gestures. We draw on several of these categories in particular. Highlighting is a form of deictic gesturing that directs attention. However, unlike pointing, which references a specific feature in the visual field, a hand motion is used to designate a rough area of attention. Extending gestures are also similarly used to add representations to the image, but are instead placed outside the boundaries of the image. Pozzer-Ardenghi and Roth (2004) characterize extending gestures as “if the photograph had been taken from a greater distance, the entity would have been included” (pp. 288–89). Finally, positioning gestures involve the speaker orienting her body to extend the image into three-dimensional space (e.g. the photographer of this image was standing here). Though the contexts are different between a monologic lecture with a photograph, and dialogic discussion with art among peers, these categories provide a useful starting point for interpreting interactions with artworks. We draw on these categories in our analysis to develop the concept of embodied interpretation in art museums.

Streeck (2009a) defines ecologies of gesture as “patterns of alignment between human actors, their gestures, and the world” (p. 7). Three such ecologies are particularly important for our purposes in this study in an art museum. ‘The world at hand’ characterizes gestures in which one’s hands interact with the world through grasping, manipulating, and marking objects and the world within the immediate vicinity of the gesturer. This contrasts with the ecology of ‘the world within sight’ in which gestures are oriented in relation to the perceivable world that may be out of reach. A third ecology includes ‘depiction’ in which gestures are oriented towards co-participants without direct reference to the perceivable world. Depictive gestures are related to iconic gestures (McNeill, 1992) in that hands are used to produce a representation.

In terms of studying gesture in context, an important contribution has been made by Goodwin (2007), who proposed the notion of ‘environmentally coupled gestures.’ These are gestures that are linked to a context in such a way that they may only be understood by taking into account the environmental structure and setting. Accordingly, a gesture is environmentally coupled when its meaning and use are dependent on a mutually informed relationship between movement, dialog, artifacts, and the broader physical and social context, “fluidly linked to the other meaning making practices and sign systems that are constituting the events of the moment” (Goodwin, 2007, p. 198). In museums, as Heath and vom Lehn (2004) point out, studies of social interactions and meaning making in museums and galleries thus entail “understanding how the practical experience of exhibits and exhibitions, including art work, is inextricably embedded within the practical circumstances in which it occurs” (p. 44).

Heath and vom Lehn (2002, 2004) have conducted perhaps the most extensive research on how visitors’ experiences emerge through physical and social interactions with ‘relevant others’ in art museums, identifying ways in which bodily and verbal conduct establish co-orientation and visual alignment, and illustrating how ‘configuring gestures’ and actions demarcate and imbue art objects with meaning. More recently, in a study at a national art museum, Steier (2014) identified ‘posing’ as a unique gestural action by visitors to an art museum. When a visitor recreates the posture or expression of a figure in an artwork, the embodied action involves both an internally oriented cognitive function and a socially oriented representation that engage others in an interpretive process. Other studies have highlighted the interplay of artwork, pointing, and text in art interpretation, and the complex ways in which visitors perform etiquette in art gallery settings (Christidou, 2013). We similarly explore how gestures function in meaning making in a museum setting, focusing on three different types of art: a painting, a sculpture and digital representations in an interactive tabletop. We first consider how gesture research has informed several central studies of interactions with technology in museums.

4. Gesture with technology and representations in museums

As kinetic technologies and touch-based interfaces become more integrated in the art museum experience (Alexander, 2014; Pierroux & Ludvigsen, 2013), we must broaden our conception of the kinds of materials and artifacts involved in embodied interpretation practices to include the digital. In this study, we illustrate embodied interpretation with technology by exploring small groups’ social and physical interactions with a multitouch, or ‘interactive’ tabletop. Accordingly, we conclude this review of related work by situating our study in relation to relevant research with this technology. There is extensive research on the design and use of interactive tabletops in pedagogical settings, including museums (Holdgaard & Simonsen, 2009; Hornecker, 2008; Rogers, Lim, Hazlewood, & Marshall, 2009). Although a thorough review of interactive tabletop research is not central to this paper (see Dillenbourg & Evans, 2011), we highlight and share the field’s interest in how the coupling of physical movements, words and digital representations around the tabletop make apparent subtle mechanisms of micro-level interactions that are relevant for meaning making (Fleck et al. 2009). We are interested in the gestures and movements that participants use to collaborate, think, and orient to each other while participating in an interpretive activity at an interactive tabletop (Hinricks & Carpendale, 2011; Peltonen, 2008).

One finding that is relevant for our study is how gestures are used to claim territory or mark space (Peltonen et al, 2008; Hinricks & Carpendale, 2011). In a study of multi-touch tabletop games for learning, Antie et al. (2011) found that the spatial structure of the tabletop allowed players to assume individual roles and at the same time inhibited a single player from taking over the game. We similarly explore how spatially separate but sharable territories and resources facilitate negotiation and meaning making. A second
relevant issue is the physical setting and the collaborative work entailed in visitor groups’ switching attention between content displayed on multiple screens, phones, video streams, or what Coughlan et al. (2012) call ‘device ecologies.’ Contrasting labels and other traditional textual practices in an art museum with the multiple modalities and representations in gallery interactives (including the same interactive tabletop in this study), Pierroux & Ludvigsen (2013) pointed to new cognitive, physical, and social challenges for visitors. However, in art museums, these challenges are nonetheless “firmly grounded in art historical interpretive practice, which include describing, analyzing, contrasting, and reflecting on works of art,” (p. 1291). In other words, relations between disciplinary content and digital tools are not trivial when designing to support productive interactions and meaning making in art museums.

Lastly, we refer to findings by Peltonen (2008), among others, that show how gestures specifically related to interface interactions may also be performed or modified to support social activity. Visitors using a multitouch interface were observed to be “holding photos with a pondering grip, as if thinking of what to do with the photo or waiting for an inspiration or action of a co-participant” (p. 1291). Similarly, Hinrichs & Carpendale (2011) found that visitors position their hands in particular ways to avoid obstructing the view of their co-participants. In sum, from the perspective of embodied interpretation, attention to the role of gestures and body in marking and sharing territory, the orientation to multiple devices and sources of information, and the facilitation of social interaction are important aspects of meaning making mediated by interactive tabletops.

5. Methods

The study was conducted as part of a larger design-based research project (Krange & Ludvigsen, 2009; Pierroux, 2009; Brown, 1992) that investigated new digital practices in museums and cultural heritage institutions. Visitors exploring paintings and sculptures in the galleries of a national art museum were invited to also explore a gallery offering digital interpretive experiences related to the life and work of a prominent artist featured in the permanent collection. Researchers, computer scientists, and interaction designers from the university collaborated with stakeholders from the museum to develop scenarios that offered curated content across a variety of digitally mediated experiences. Four thematic gallery interactives were developed to enhance visitors’ engagement with and interest in various aspects of Munch’s artistic production (Pierroux & Ludvigsen, 2013). In this article, we focus on embodied interactions with the multitouch tabletop in this interactive gallery space, and we reflect on the ways in which these aligned or differed from meaning making encounters with a sculpture and paintings in other galleries in the museum. We analyze visitors’ meaning-making with particular focus on their movements, gestures and talk while interacting with these artworks in the different settings.

The adolescent visitors (17–18 years old) were specifically recruited to visit the museum in a ‘non-school’ context, as this study was intended to explore young people’s motivations and interests as a future museum public. Additionally, these kinds of everyday visit contexts are underrepresented in the literature (Knutson & Crowley, 2010). The participants were instructed to visit the museum “as they normally would” with friends, with the only stipulation that they enter the interactive gallery space at some point during their visit. Multiple angles were video recorded of the visitors’ entire visit, using researcher-held cameras, fixed tripod mounted cameras, and camera glasses worn by visitors to record a first person perspective. In addition, post-visit interviews were conducted, and data logs and digital productions from the project room were collected. The data corpus comprised approximately 22 h of video recordings of 8 small groups (2–4) visiting the art museum. The average visit time for the groups was about 55 min.

After repeated viewings of the video corpus and a review of field notes, we have selected one episode from each of the following settings to analyze: a dyad interacting with a sculpture, a triad interacting with paintings, and a second dyad interacting with the multitouch tabletop. The three ‘episodes’ were selected for closer analysis because they represent a diverse collection of media, spaces, and representations that the visitors encountered and interpreted. Moreover, the episodes were chosen because we found them to be particularly rich examples of young visitors’ movements, gestures, and talk. The richness and variety of physical interactions seen in these episodes, thus, are not intended to be representative of the density of physical activity across the entire visits. However, we selected three different groups to illustrate that we have not simply chosen to analyze one particularly physically oriented group. This combination allowed us to more deeply explore the respective contexts and how the visitors’ meaning-making interactions evolve within and across different artworks.

Applying interaction analysis methods (Derry, Pea, et al., 2010; Jordan & Henderson, 1995), the video data were used to analyze visitors’ meaning-making with particular focus on their movements, gestures, and talk while interacting with the three different objects. To capture the ‘environmentally coupled’ aspects of movements, gestures, and talk in the different art encounters, the transcription of talk is incorporated into cartoon renderings of ‘frame stills’ taken directly from the video (Lymer, 2009). In this way, we highlight the embodied aspects of visitors’ movements and gestures with art and resources in the different physical settings. All participants have been given pseudonyms in the analysis below to preserve their identity.

6. Analysis

6.1. Episode 1—embodied interaction with a sculpture

Two friends are walking around in the gallery having just concluded a conversation about a van Gogh painting. They then turn to walk away and the episode begins as the pair, Rita (girl with head scarf) and Wendy (blond girl), approach a sculpture by Auguste Rodin titled The Thinker (Fig. 1).

In Panel 1 (Fig. 2), Wendy notices the sculpture first and says aloud “Oh, I know this guy.” Rita demonstrates her interest by moving to join Wendy to create a shared orientation to the work. This interaction also demonstrates Wendy and Rita’s acknowledgement of the significance of familiarity and prior knowledge for interpreting artworks in the social and cultural context of visiting a museum.
with a friend’ (Leinhardt et al., 2002). In other words, their cognitive and social engagement with the sculpture is triggered by an initial recognition of the sculpture but actualized through social and embodied interaction (Heath & vom Lehn, 2004; Wertsch, 1991). They both, in fact, recognize the iconic work (Panel 1), and Wendy recalls seeing the sculpture before, illustrating how meaning making in encounters with art may be understood as linked to identity and developed over a longer timescale than a single visit. Wendy’s positive evaluation (“Yeah, I love him”) and their respective prior experiences with representations of this sculpture are valued as culturally relevant and personally significant, activating engagement and shaping how they approach this particular artwork (Lawson & Lawson, 2013).

The pair begin their interpretative work by reading the label mounted to the pedestal (Panel 2). Rita reads aloud “Bronze,” and directs an interpretive process toward the material qualities of the sculpture. Rita leans in for a closer look, and their focus is on the way in which the delicate detail of the hair is rendered in bronze (Panels 3, 4). Wendy then moves around the work to view the sculpture from a different angle than her friend. Sculptures are often exhibited in gallery spaces to afford movement around the work and thus different viewing perspectives. Wendy’s position now allows her to view the figure’s head in profile while Rita is facing the work head on. Their physical positioning is such that different aspects of the work are perceivable to each of them while their verbal expressions signal co-orientation (Heath & vom Lehn, 2002, 2004). In pointing towards the hair feature (Panel 4), Rita uses a deictic gesture to further establish co-orientation and visual alignment toward this aspect of the work. In other words, the gesture is both linked with perception and serves a communicative role, guiding her friend’s attention and also making this particular feature visible and relevant.

Wendy’s comment that The Thinker doesn’t appear to be thinking opens the meaning of the work to different levels of interpretation and aesthetic judgment (Panel 5). First, this utterance raises the question about what exactly is “the thinker” for them? The title of the work? The embodiment of an action or idea in a material object? The intended meaning by the artist Rodin? Since they are familiar with the work, it is unclear whether the utterance is triggered by a discrepancy between the authentic work and prior experience with this iconic representation, or close observation of the pose of the sculpted figure. Second, the pose of the sculpture invites an interpretation of how ‘thinking’ may be artistically captured and conveyed. A comparison is being made, based on their aesthetic judgment, or evaluation, of how thinking should or should not look (Carroll et al., 2012). This comparative work is framed by the title of the work, as each girl explores the meaning potential and searches for details to construct a narrative and supporting arguments in the act of aesthetic judgment. Wendy directs attention to the figure’s hands (Panel 5) and presents a narrative in which “he has a big choice...
Rita, in turn, focuses on the figure’s chin to construct an interpretation that he is thinking (Panel 6). Both girls use deictic gestures with particular reference to the sculpture to emphasize and underscore their interpretations. The utterances and gestures are integrated into the aesthetic judgment process, i.e., describing particular features in relation to the whole, or the meaning that the work is interpreted as evoking, and evaluating the artist’s skills in communicating this meaning (Streeck, 2009b).

When Rita attends to the figure’s chin in this process of evaluation (Panel 6), she employs a series of embodied and gestural acts. What begins as a pointing reference to the figure’s chin becomes a marking gesture (Streeck, 2009a) as she lifts her hand while saying “higher up” (Panel 6). This motion is used to augment ‘the world at hand’ (Streeck, 2009a) by presenting a modified representation of the figure. She then moves directly into a posing gesture (Steier, 2014) by bringing her hand to her own chin to mimic the pose of the figure. In forming this pose, she is able to construct a representation for her friend of what thinking should look like. The pose also serves an embodied function for Rita, in that she places herself in the perspective of the figure to ‘feel’ what this pose means (Streeck, 2009b). The pose is thus both internally and externally oriented (Steier, 2014), serving as cognitive tool for Rita and as a

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social organizing tool for collaborative meaning making with Wendy. Furthermore, the pose produces a new representation that facilitates comparisons between the sculpture and Rita’s pose.

To sum up, positioning and orientation are important aspects of the embodied interpretive action of the pair. They move around the work, first to the front to read the label. When engaged in their aesthetic discussion, they again establish co-orientation and visual alignment to focus on the expression of the figure in profile, which highlights his posture. Talk and physical movement—gesture, posing, and positioning, facilitate perception and orientations to each other and the interpretive work (Heath & vom Lehn, 2002, 2004). At the end of the episode, Wendy offers a tentative interpretation that “maybe he’s sad.” Perhaps the figure is both thinking and sad, which might explain the figure’s downward gaze that Rita finds problematic. At this point (Panel 7), having each expressed an interpretation, Wendy begins to walk away and Rita leans over to read the label one more time before following her across the room.

Thus in this episode, we have seen the ways that particular spatial and social configurations unfold over the course of a meaning making interaction with a sculpture. The pair’s embodied interpretation develops through the complex coordination between word and gesture as they align themselves in relation to each other, the artwork, and the surrounding three-dimensional space. In the next episode, we turn to a different kind of artwork and configuration in the form of a painting hanging on a wall.

6.2. Episode 2—embodied interaction with a painting

A triad (Lisa, Ami and Sam) enters a new room from an adjacent gallery, where they had engaged in deep conversation about Greek mythology in interpreting an artwork. They approach a series of three paintings on a wall to their left as they enter the room. They slow down and stand near the first painting on the left, titled *Didrik Slagheck (Portrait study of Christian II Signing the Death Warrant of Torben Oxe)* by Eilif Peterssen (1875). This is a portrait study by the same artist for the larger work that hangs to the right, *Christian II signing the Death Warrant of Torben Oxe* (1875). To the right of this is yet another study by the artist of figures in the central painting (Fig. 3).

![Illustration of Episode 2—embodied interaction with a painting](image-url)
Lisa (light hair) has been wearing camera glasses for a closer view of the paintings, and points to the work on the left (the study) saying, “He’s really, really scary.” Ami (dark hair) leans in for a closer look, while Lisa looks back and forth between the work and the adjacent painting. Lisa notices that the figure in the two paintings appears similar, “he looks a lot like that person,” while pointing to the figure in the larger painting. This is where the illustration begins below (Fig. 4).

In Panel 1, Lisa was drawn to the portrait’s “scary expression” but her attention quickly shifts as she notices a similarity to the figure in the painting to the right. The video data from her camera-glasses show this act of comparison quite clearly in a dramatic back and forth head movement before she utters this observation. Lisa’s observation is dependent on her physical positioning and the movement and pointing between vertically mounted representations, and can thus be considered a gesture that is environmentally coupled (Goodwin, 2007). Moreover, her observation is only made possible through physically engaging with perceived information embedded in the formal and compositional structure of the artworks (Carroll et al., 2012). Ami follows Lisa’s lead and pointing gesture and confirms, “Yeah, it does.” Sam participates in this finding by chuckling in agreement. He then quickly moves toward the only available physical resource – the label mounted to the right of the central painting – to confirm that the artist is in fact the same for both works, and that the figures are depicting the “same guy” (Panel 2). Sam does not read the labels or titles of the works aloud but uses this knowledge to speak with disciplinary authority.

Both Lisa and Ami follow in Sam’s direction and are aware that he is reading the labels, yet seemingly ignore Sam’s utterance. Their subsequent interaction with the center painting continues to be framed by making visual comparisons between the formal aspects of the two representations, concluding on their own “So, he’s probably the same person” (Panel 3). Several bodily actions are relevant. Lisa uses pointing gestures to facilitate the comparison by directing her friends towards the figures she wishes to compare. In addition, the group spatially situates itself to be able to compare the two works, using gestures that are coupled with the physical mounting of the paintings in the gallery.

The interpretive process shifts markedly when Ami asks what the figures are looking at and then answers her own question by pointing and saying “I think they’re looking at him” (Panel 3). This line of questioning makes “gaze” a relevant feature, which in turn results in an interpretive framing that shapes the rest of the group’s interaction. The group is now focused on the orientation of the figures’ gazes to interpret the motive, or subject matter, of the painting.

At this point, the gaze of the figures becomes central to interpreting the subject matter of the painting, an interpretive strategy in art history associated with a high level of expertise. Artists’ use of figures’ gazes is important in terms of conveying narratives of power and action within a depicted scene, but also as a ‘modern’ means of acknowledging and situating the implied viewer when figures in a scene look out of the picture plane. This artistic technique thus invites viewers to anticipate and complete the action into which they find themselves drawn (Streeck, 2009b). In Panels 4 and 5, Sam demonstrates disciplinary knowledge in art history as he picks up on the girls’ observations to physically situate himself as participant in the pictorial space.

Moreover, Sam’s gestures become a useful tool for dealing with this question of gaze. Sam is, in one sense, oriented to his friends as he points to direct their attention to figures and to points in space. As he traces the figures’ gazes (Panel 4), he draws a imaginary line in space as an extending gesture (Pozzer-Ardenghi and Roth (2004)), creating a model that extends past the painting to a 3-dimensional scene that includes the space in front of the painting. With a wave of his hand, he highlights (Pozzer-Ardenghi and Roth (2004)) an approximate area in this scene to where someone might be standing and looking. He then physically occupies this space (Panel 5), positioning his body in relation to the scene. At the same time, these gestures and movements seem to be internally oriented as they support Sam’s developing interpretation of the work. Sam demonstrates art historical knowledge of classic techniques and means employed by artists to establish narrative in paintings, which involves drawing the imagined viewer into the action of the painting, and his uses embodied movements and gestures to support this interpretation and to convince his two friends.

At this point (Panel 5), Lisa has walked over to read the text to the right of the painting while Sam continues tracing the convergence of sight lines of other figures in the painting (Panel 6). The title of the work again becomes a relevant resource in the interpretive process. In this case, the group uses the title to gain insight into their self-defined task of figuring out the gaze of the figures. The two girls are now both in front of the label (Panel 7) and Lisa suggests, “Oh, maybe they’re looking at death or something because it says he’s like signing the death warrant.” Sam then walks over (Panel 8) and emphatically completes the interpretation, “…warrant of Torben Oxe. Which leads me to speculate that Torben Oxe would be standing right about here.” He has backed up to occupy the very space he believes the condemned Torben Oxe would be positioned in relation to others in the scene, since the sight lines “all line up to about here ( …) in front of the throne,” chuckling with satisfaction.

In this episode, two alternative ideas were offered. First, Lisa suggested that the figures were looking at another person in the painting. Sam then suggested that it was someone outside the picture plane, about where they were standing. He argued for this interpretation by following the sight lines of two of people, in the painting. Lisa adds an additional layer to the emergent interpretation saying “Oh, maybe they’re looking at death ….” The unfolding utterances illustrate the ways in which connections are made between what the participants make relevant through their talk, gestures and embodied movements, and the formal and compositional features of the artworks. Their interpretation emerges as a result of physical and social interactions that establish a co-orientation and visual alignment (Heath & vom Lehn, 2002, 2004).

Positioning is relevant for the young people’s meaning making in several ways. First, the scale and location of the works themselves create a spatial framework for their interactions and shared observations (Bauer & Pierroux, 2014), and their relative positions to the works and to each other seems to influence their initial perceptions, visual alignment, and the roles they assume in the interpretive process, i.e., the initial comparison occurs when Lisa stands between the two works. At different points, the participants walk over to the label to read the text for supporting information. Another way that positioning is relevant is when Sam moves his body and gestures with his hands to understand and communicate where he believes the figures in the painting might be looking. This is very literally a physical interaction with the work that occurs through positioning. At the same time, the group’s bodily interactions...
are inextricably linked with interpreting content through collectively and dialogically recognizing, describing and analyzing information embedded in the formal and compositional structure of the artworks (Pierroux, 2010; Carroll et al., 2012).

Finally, not unlike the first episode, narrative is used as an interpretive strategy for this group as well. The group constructs a narrative to explain the historical scene, with only the formal properties of the work and the title as resources. Once the subject matter has been collaboratively enacted and the narrative puzzle solved, the interpretive work is concluded and the three friends begin to walk to the next painting. Although similar in terms of deep engagement and narrative strategies, their orientation to the work of interpreting this artwork by focusing on content is also quite different from the dyad’s mainly aesthetic reflections on form in the first episode, where interpretation was framed by evaluating whether the artist’s rendering of the figure adequately expressed what thinking ‘should’ look like.

Thus, looking across the first two episodes, we do see similar interactional strategies used by both groups in their processes of embodied interpretation. These include the coordinated movement and positioning of group members, particular uses of language and gesture to develop shared interpretations, as well as attention to limited available resources to construct a narrative around the work. However, aesthetic and formal qualities of the artworks themselves, as well as their physical configurations in space, invite quite different uses of the surrounding space. In the next episode, we examine the meaning making process mediated by a museum object with a different spatial configuration and new possibilities for interaction.

6.3. Embodied interaction with digital reproductions and multitouch tabletop

Situating this next episode requires an understanding of the design of the multitouch table activity with which the participants interact. The My Media station was designed as a game to scaffold visitors’ understandings of Edvard Munch’s artistic processes by highlighting the variety of media he used to develop a work or theme over a period of time (Fig. 5). The table surface displays three ‘place settings’ in which one to three participants may collaborate on two tasks, and an additional screen is mounted on the
wall at the front of the table. The first task invites visitors to chronologically arrange a selection of Munch’s versions of the works *The Scream* and *Melancholy*, each of which rendered using different media, e.g., lithograph, painting, and ink sketch. Although there is a ‘correct’ sequence, the pedagogical aim is to demonstrate how Munch frequently used different media to revisit a theme or motif, often several times over decades. The second task invites participants to again arrange three versions of a single work by Munch, but this time according to which work they think best expresses the sentiment of a text written by Munch that served as his inspiration for the motive. For this question, there is no correct answer, but the participants must agree in order to finalize a selection. Each participant makes a selection by tapping one of the digital reproductions at their own place setting. It is this second task that we will analyze for the purpose of this article.

There are three key features of this activity that were intentionally designed to facilitate collaborative meaning making. The first feature structures the organization by requiring agreement between participants. In order for a group to submit their response, all participants must agree. This constraint was introduced to promote argumentation and interpretations based on describing and analyzing the formal and compositional aspects of each work and linking these to Munch’s texts. The second feature involved the use of place settings. Each participant was given her own section of the table interface to promote more equal participation and discussion. Thirdly, a screen was mounted at the head of the table to display instructions and texts that were oriented for all participants to see. This made it possible to distinguish between shared reading and visualization activities and the gesture-based interactions with digital representations at the tabletop.

6.4. Episode 3—agreement about Munch’s scream

Britt (dark hair) and Karen (light hair) are standing on opposite sides of the multitouch table and have been participating in the activity for about 2 min when the episode begins (Fig. 6). They have proceeded through the first question in the activity (arrange the works chronologically) without having any disagreements. We enter this episode right before they come to their first disagreement as they arrange the works according to their interpretation of which best reflects the sentiments of Munch’s famous journal entry:

*I was out walking with two friends-the sun began to set-suddenly the sky turned blood red-I paused, feeling exhausted, and leaned on the fence—there was blood and tongues of fire above the blue-black fjord and the city—my friends walked on, and I stood there trembling with anxiety—and I sensed an endless scream passing through nature."

Karen tells Britt to “click the confirm button” so that they may proceed with the activity (Panel 1). She points to the button in Britt’s place setting with a subtle tap motion as she says this. Karen acknowledges that the space in front of Britt belongs to her by not actually touching the surface. Britt then taps this button, but because they have selected different works, a message is displayed notifying them that they must agree with each other before proceeding. In this instance, the disagreement feature of the table activity has become relevant and explicit as Karen reads the message “We don’t agree”. However, this conflict is quickly resolved as Karen simply changes her answer so that they can proceed with the activity. It is not clear why Karen does not engage in the dispute. Perhaps she did not feel strongly about her selection, or perhaps she is more curious about the next question and wants to advance through the task.

This particular setting may be characterized under Streeck’s (2009a) ecology of the world at hand. The interface on the table surface is directly manipulable by the participants, and much of the gestural interaction depends on the proximity to the table. Similarly, and in contrast to the previous episodes, the pair’s feet remain largely static, as their participation at the table requires this physical proximity. The positioning of the participants in this episode then can be understood as an affordance of the design of the station.

The pair is then left with ranking the last 2 works. After a roughly 4 second pause, we can see a disagreement as the two simultaneously select different works (Panel 2). In order to recognize this disagreement, each participant must perceive each other’s selection. We see Karen tap the screen to make her selection, but in the process of negotiation, this selection transforms into a deictic gesture identifying her choice to her friend. This same gesture then transforms again into one of emphasis as she exaggeratedly taps her finger over the screen. The exaggerated tapping mimics the action of interacting with the table without actually performing the act.

To resolve this disagreement, they begin to verbally justify their selections in an attempt to persuade the other participant (Panel 3). Karen picks up on the “sadness” mentioned in the text and looks for evidence of this emotion embedded as meaning potentials in the artworks. This theme then becomes a means for her to compare the works. Britt, however, is prioritizing a different feature of the work—the screaming (Panel 4), and the reference to “blood” (Panel 5). These differing interpretations thus rest on the value and emphasis that each places on particular features of the works and the text. In this sense, the text mediates each act of comparison.

Gesture also mediates their competing interpretations when Britt performs a posing gesture to depict the emotional state of the figure of *The Scream* (Panel 4). This bodily depiction of *The Scream* also underscores studies that find negligible differences between participants’ experiences of authentic artworks and their digital representations (Locher, 2012). Similarly, Karen’s gestural depiction as she describes the ‘sunset’ feature of the representation (Panel 5) might be interpreted as an iconic or metaphoric gesture, as she uses her hands to display the trajectory of a sun setting (McNeill, 1992). At the same time, this gesture serves to augment the representation in a way that emphasizes the importance of the sun in the interpretation. The comparative work continues as they shift between the multiple representations in front of them, providing justifications or explanations for each. Karen then turns to the wall text (screen) to provide even more justification (Panel 6). Disagreement continues to structure their interaction.
Viewing knowledge as being distributed across this social and physical context recognizes that the two participants are attending to the representations in their own place settings, the representations of their co-participant, the wall text, as well as each others’ words and gestures. There is a rich variety of representations to deal with and a complex set of comparative acts are required to...
interpret the task (and accordingly, the works and text), and to apply these interpretations toward managing their disagreement. As the disagreement continues, they resort to a territory dispute rather than justifying their positions verbally. Reaching into each other’s place settings to physically resolve disagreement (Panel 7), Karen claims “HA!” when she successfully selects her choice from Britt’s zone. They then look up to the adjacent wall screen as an animated sequence of their selection is displayed (Panel 8).

In this episode, we see aspects of the group’s activity that are consistent with previous research on multitouch table interactions. These include the importance of territory in organizing collaboration (Peltonen et al., 2008; Hinricks & Carpendale, 2011) as well as the challenge of shifting attention between multiple representations across “device ecologies” (Coughlan et al., 2012). Additionally, the technology interface itself adds an additional level of activity to the embodied interpretation work seen in the previous episodes. That is, in addition to managing language, gesture, and bodily orientation, the participants physically operate the technology (for example, by tapping). In the following section, we look across these three episodes to discuss the notion of embodied interpretation more broadly.

7. Discussion—embodied interpretation

Bodily actions, as well as talk, frame participants’ orientation in the environment, facilitate social organization and collaboration, and are expressions of internally oriented aspects of thinking and perception. Through the above episodes, we have illustrated the richness of the gestural and embodied practices of the museum visitors, and the ways that these practices coordinate with talk to support meaning making in the respective settings. At the same time, we are aware of the limits of this study, and acknowledge that visitors’ physical orientations may hinder as well as foster the coordination of social interaction and meaning making. Subtle physical shifts and orientations have been found to impact the ways in which art museum visitors engage with exhibits and move through a space (Heath & vom Lehn, 2004). Similarly, Scott et al. (2013) found that interactive exhibitions designed to promote engagement may instead invite inhibition or shyness over uncertainty with their use. Based on our analysis of visitors’ interactions with different types of artworks and representations in an art museum, we have identified findings that seem promising for developing a concept of embodied interpretation.

7.1. The body in space: positioning and orientation

The positioning of visitor bodies in relation to representations, co-participants and resources mediates interpretive interactions in different ways. First, the visibility, and thus potential relevance of artworks and information in the environment are informed by where visitors stand and move. These orientations are also organized socially through the actions of participants. Visitors direct each other’s attention purposely through deictic gestures. Additionally, awareness of others’ attention and orientations are important for meaning making processes as a kind of unfolding mutually elaborated dance around the artifact.

The sculpture in Episode 1 is positioned in the gallery in a way that supports movement around the work, and accordingly, viewing from different angles. Features of the work become more and less relevant as the participants circled around the sculpture. The pose of “The Thinker” became particularly relevant when the visitors viewed the work in profile. Similarly, the painting in Episode 2 supported movement in front of the work, with certain positions affording attention to particular details. The space between the study and the larger painting seemed to afford acts of comparison, whereas (not surprisingly) the space in front of the label allowed the participants to make connections between the title of the work and the meaning potential in the representations.

The differences in medium also influenced aspects of the embodied interpretations of the painting and the sculpture. Tensions between the three-dimensional figure in bronze and the expressive qualities of the figure rendered in this material were central to aesthetic judgment. The two-dimensional painting, on the other hand, prompted participants to physically extend the representation beyond the picture plane through gestures to support their interpretations, and the formal qualities seemed less relevant than the narrative aspects of the depiction for the groups’ meaning making. The interactive tabletop in Episode 3 also facilitated particular acts of attention, gesture and positioning in the interpretive activity. Participants navigated between table surface and supporting texts and representations on the wall-mounted screen. This navigation was not trivial, as shifting attention between table and screen could not be performed without re-orienting one’s head. Deictic gesturing was used to facilitate orientations between representations. At the same time, interaction with the tabletop required that participants stand more or less fixed in space. This fixed position with a touch-based interface fostered interactions that were different from those with the painting and sculpture. The participants physically interacted, through touch, with the table at hand (Streeck, 2009a), and thus much of their gesturing was organized around prescribed physical forms of interacting at the level of operations (touching the table with the index finger to make a selection, for example).

7.2. The body as a tool for making comparisons

A second key feature of embodied interpretation involves acts of comparison between representations. Certain gestural practices function to orient participants toward and between multiple representations, and in some cases form new representations themselves. Comparative work between multiple representations is supported by participants’ position in space, attentional gesturing, and the meaning potential of each artwork.

In Episode 1, the two girls may be understood as comparing **thinking** in the abstract to the posture of the figure, and their position around the work facilitates this attention to his posture. There is an unsettled relation between what Rodin possibly wanted to communicate with **The Thinker** and how at least one of the girls verbally expressed her interpretation while using different kinds of gestures. The girls’ talk and gestures compared and contrasted how they understood the abstract concept of thinking in relation to...
the expression in the sculpture. As the episode progresses, comparisons between sculpture and the abstract notion of ‘thinking’ were not convincing enough to resolve disagreement. Accordingly, Rita constructs a posing gesture (Steier, 2014) as a new representation and a new object of comparison.

In Episode 2, acts of comparison can similarly be understood as embodied. Lisa stands between the two paintings to make the initial comparison, which leads to the group’s recognition of a relationship between the works. Resemblances were identified through deictic gestures, pointing out similarities in the figures across the paintings. Comparison is also the purpose when altering positions in front of the paintings, making all parts of two artworks, including the label, available as resources. In a manner similar to the previous episode, multiple interpretations are proposed based on observations and descriptions of the figures’ depicted gazes. Again, additional representations are created in an attempt to resolve emerging questions. Sam positions himself as though a participant in the depicted action, using extending gestures (Pozzer-Ardenghi and Roth, 2004) to construct a representation of the gaze of the figures that extends beyond pictorial space and into the physical that he occupies.

Digital technology added both complexity and opportunities for making comparisons in interpretive acts. At the interactive tabletop, a variety of representations were available across digital surfaces. Deictic gestures guided attention between images on the table, images on the wall screen, as well as to the participants themselves: “This one–no this one.” At the same time, managing the operation of the technology (how and where to touch) introduced a new level of complexity, gesture types, and need for attention in the interactional setting. Comparison was an explicit aspect of the task instead of a visitor-inspired strategy, as participants were asked to evaluate emotion expressed in different versions of a work, including textual. As in the episodes above, comparison was supported not only through pointing, but also through gestural depiction (Streeck, 2009a). Additional representations were enacted through gesture to emphasize key aspects of the participants’ respective interpretations. Britt recreated a screaming pose to strengthen the comparative relationship between that feature of the work and the text. Karen depicted the setting sun to emphasize that detail in her comparison.

8. Conclusion

Consideration of the bodily practices of art museum visitors reveals that interpretive processes rely on a rich and complex set of movements, positions, and orientations toward artworks, co-participants, and resources. This broadens our understanding of meaning making processes in art museums and suggests that within a sociocultural perspective, a holistic approach is required to understand complex relationships between interpretive processes, representations, and the body in space. We have introduced and elaborated on the notion of embodied interpretation to conduct our analysis by drawing on vocabularies of gesture and embodied interaction developed in contexts outside of the museum. However, we have also suggested that many of the particular gestures and actions by visitors are best understood as environmentally coupled (Goodwin, 2007), in this case, to particular museum settings and types of representations. The particular configurations of artifacts and technologies structure both social interaction and visitors’ approaches to the artworks themselves. Accordingly, understandings of gesture in other settings such as classrooms may not sufficiently account for meaning making processes in art museums. We present this study as extending research on gestural and embodied activities in museum settings, acknowledging that more research is needed to develop vocabularies and ecologies of gestural and bodily practices that are relevant for meaning making in museums. We proposed the concept embodied interpretation to enhance sociocultural analyses of meaning making with cultural artifacts — including authentic works of art, interactive technologies and digital representations.

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References


