



# Empathy in Technology Design and Graffiti

Mari Myllylä<sup>(✉)</sup> 

Faculty of Information Technology, University of Jyväskylä, P.O. Box 35 (Agora),  
40014 Jyväskylä, Finland  
mari.t.myllyla@student.jyu.fi

**Abstract.** This paper discusses empathic understanding, what it means, and how it can be acquired. After an overview of some theories and models from the existing literature, two experiments are presented, where participants were assessing graffiti works. From the results of these experiments, it can be concluded that empathic understanding involves both embodied processes and abstract inferences. Furthermore, understanding can be based on perceived, mechanistic bodily similarities and movements or on folk-psychological inferences mentalized between the observer/empathizer and an object/empathized. Empathic understanding it can also be gained by recognizing and implementing learned bodily skills and conceptual knowledge in mental simulations and theorizations. Furthermore, people have existing schemas and stereotypes that may affect their empathic understanding. In the context of technology design, this implies that the designer as an empathizer needs to consider their own and their users' perspectives and interactions in different sociocultural contexts; their background knowledge; their future intentions; and the ways empathy can be gained through both embodied processes and mental inferences.

**Keywords:** Empathic understanding · Technology design · Graffiti

## 1 Introduction

Designers who create and develop products, services, and systems for other people must have some understanding of the potential end users' thoughts, beliefs, intentions, feelings, needs, and desires, and of how the users' unique mentally representational information content may affect their behavior. It is also important to understand if and how the users would be willing and able to use designed artifacts [1]. This makes understanding the end user an essential design issue [1, 2]. Designed interactive products, services, and systems that are pleasant to use, and that fulfill some universal psychological need, may be defined as having a good user experience (UX) [3]. However, the quality of the user experience and what is judged to be good at a particular moment in the interaction may depend on, for example, the individual and the culture, as well as the specific characteristics, purpose, timing, and the context of the thing being used [4]. Interaction is an ambiguous term [5, 6], but in the context of human-computer interaction (HCI), it can be defined as involving "two entities," that is, computers and humans, "that determine each other's behavior over time" [5, p. 10]. What constitutes good interaction depends on how

one defines interaction, and therefore it ranges from being understandable, simple, and controllable to being psychologically satisfying or motivating, or to enabling the user to fluently participate in the world [5].

A designer's job is to "read the minds" of the potential end users or agents, and to predict and understand the relationships between the users' mental states, attitudes (e.g., beliefs or knowledge), and actions. This requires the cognitive ability to "mentalize" or create theories of others' minds [7]. One way to attain at least some level of this intersubjective understanding is through empathy, or "empathy building" [2, p. 1]. It can be argued that empathy, defined as the ability to understand others, has been an essential part of design thinking ever since things have been designed and created, especially for other people [1]. The term "empathy" was initially discussed in the context of philosophical aesthetics as a psychological phenomenon of experiencing beauty and emotions when viewing art, first by Vischer in 1873, and in the early 1900s, by both Lipps and Titchener. This idea then spread to other fields, such as psychology and neuroscience [8]. In the field of human-computer interaction (HCI), empathic design emerged in the early 1970s [2], and it was widely applied in the human-centered design (HCD) field in the late 1990s [8]. Because the study of empathy in human-centered technology design is a rather young line of research, it is useful to investigate the role of empathy in technology design by considering theories, models, and findings from other, more established fields, such as aesthetics, neuroscience, behavioral and social sciences, etc.

## 1.1 Definitions of Empathy and Empathic Understanding

Different scholars define the concept of empathy in different, partly conflicting ways. For example, empathy can be defined as a form of intentionality, where one individual is attuned and emotionally responding to the situated experiences, feelings, and states of mind of another [9–11]. Empathy also can be thought of as any kind of goal-oriented activity that is rich in content and that enables the recognition of subjectivity of the other individual (the empathized) from the standpoint of the observing individual (the empathizer) [2, 9]. Empathy can be understood as a passive mental association between the living bodies of oneself and of the other, based on the embodied presence of the other's personality and on the direct perception of their bodily expressions [9, 12], reflected in the observer's own imagined experience of those circumstances [10–12]. Empathy can also be understood as an ethical responsibility that an individual experiences for another individual [12]; this definition connects the phenomenon of empathy to moral theories [13].

The empathized other can also be an object, such as a work of art [8, 14–17]. For example, the empathic experience of art comes from the emotions that an artwork itself displays and from the way the perceiver relates to those emotions, rather than from the artist's mood or attitude [14]. This can even happen when an observer is viewing nonrepresentational, abstract art [18].

Empathy can be further subdivided into cognitive and emotional empathy. Cognitive empathy usually refers to an individual's cognitive ability that requires developed self-awareness and thinking to recognize and understand the thoughts, feelings, experiences, and states of mind of another person from that other's own perspective, also enabling the feelings of sympathy and compassion [10, 12, 19]. Emotional empathy may refer

to feelings such as “sympathy, empathic anger and contagious joy” [10, p. 22], which make us feel concerned about and care for others [20]. In sympathy and caring, the emphasis is mostly on negative feelings and on helping and alleviating another’s suffering [11, 14]. Empathy and sympathy can also exist simultaneously [14, 20]. We can also direct empathic emotions to ourselves; for example, in moments of anxiety or in tense interactions with other people [8]. According to Zahavi [20], empathy and sympathy are phenomena where the emotional content of an experience is perceived as separate from the observing individual’s own emotions. This distinguishes them from emotional contagion, where one individual begins to feel the way the other does [20].

Empathy does not mean that we perceive or experience others’ experiences the same way they do, nor that we can access another’s consciousness in the similar fashion as into our own [9]. We can experience the mental content and mental states of others in many different ways. I can experience the personality of another individual, but I can also be misled, or simply wrong. I am experiencing another individual as another mind, whose mental content may be partly accessible and partly hidden from me [9].

## 1.2 Ways to Gain Empathic Understanding

One way to gain an empathic understanding of another’s experiences, from the standpoint of the other positioned in a spatiotemporal “there” in relation to our own “here,” is through the dynamic process based on the perceived similarities of our bodies, and on our idea of how we ourselves would feel and act, emotionally and physically, in a similar situation in order to achieve the same goals [12, 21, 22]. Newborn children already seem to have some sort of dynamic body models and prereflexive empathic abilities to understand and react to psychological phenomena of other individuals as goal-directed agents [9, 12]. The ability to interact with others automatically and unconsciously via body-mediated, embodied experiences might be the primary way for intersubjective understanding throughout our lives from birth [9, 20]. Viewers of visual art often experience empathic, bodily participation and motor simulation when they view an artwork, through, for example, seeing the direction of the brushstrokes and imagining the artist’s body movements [16, 23].

According to Fuchs [21], we tend to utilize more demanding thinking mechanisms only in circumstances where we observe an event from a distance or when the object of our thought is complex and ambiguous. The concept of theory of mind (TOM) refers to an individual’s mentalizing ability to attach different mental states to themselves and others and to make inferences, anticipating and explaining the behavior of oneself or others in terms of different mental states (such as intentions, desires, and beliefs) [7, 9]. This ability has often been explained using the theory-theory (TT) and simulation theory (ST) of the mind [7, 13].

Theory-theory claims that our understanding of others and their mental states and behaviors is based on an innate ability to make inferences and models based on folk-psychological information, which enables us to read others’ thoughts and create common-sense explanations and predictions of behavior [9, 12, 13, 19]. We understand other people as “naïve attributors” via a cognitive process where the understanding is based on a “mentally stored set of functional laws” [13, p. 174] that we use, along with our observations, to make theoretical interpretations about the observed agent’s internal

mental states and behavior [13, 24]. According to the simulation theory, on the other hand, in order to understand others, we use not theories but analogies based on our own experiences of how we would think, feel, and behave in a corresponding situation. We do this by mentally putting ourselves in the place of the other, and incorporating their beliefs and desires into imagined simulations that we then project onto that person [9, 12, 19, 24]. Furthermore, instead of just TT or ST, we might have sort of hybrid mechanism, where one or the other strategy is used depending on the situation [7, 9, 19].

Simulation theory has gained support from the discovery of mirror cells and their automatic and unconscious activity in, for example, premotor, frontal, and parietal brain areas when we meet other living creatures like us. They are activated when we act or when we observe, anticipate, or imitate the goal-directed bodily actions, communicative gestures, verbal communication, and facial expressions of others [9, 12, 22, 24]. Mirror cells and their resonating may also be part of our perceptual processes that enable fast direct perceptions of others and fast reflex-like reactions through the autonomic nervous system, such as emotion-filled mental states and bodily expressions and gestures [9, 14]. Mirror cells may be essential for the brain's mechanisms that give the empathizer clues about the other's feelings, intentions, and actions, so as to enable intersubjective experiences and communication [9, 12, 14, 22, 24].

Perceiving two objects that touch one another may activate our somatosensory cortex and simulation-related processes, as if our own bodies were touched [15, 16]. Simulation processes might create a feeling of the observer's own body being in a similar geometric shape and position in relation to other objects as what is perceived in an artwork. Seeing a pole supporting a heavy object might generate the feeling of a heavy weight on the observer's own body and create empathy toward the inanimate object itself [15]. Imagining how an artist's body had moved while creating an artwork might activate the observer's own motor brain areas and mirror cells [15, 16, 25].

Some of our behavioral patterns, such as gestures or bodily expressions, are socio-culturally learned. This may affect how we perceive and interact in different situations [26]. We also learn to perform certain motor functions and behaviors in order to, for example, use devices or tools or other technological artifacts [1]. In this case, the learned bodily movements may transform into automatically activated, sensorimotor behavioral patterns and acquired skills [27, 28]. We can learn high-level information about bodily movements and action sequences from observing the actions of others, and our own learned skills may also affect how we interpret and judge the movements and outcomes of the actions of others [28]. For example, an art critic may learn to perceive and understand the skillful movements and mannerisms of an artist by immersing themselves in the artworld's social and linguistic discourse, even if the art critic does not create art [29, 30].

With the help of language and stories, we can share and understand complicated and abstract mental content, perspectives, experienced events, and learning of other people [9, 31]. When we create, share, and listen to or read stories, we also develop rational explanation models and narrative scripts and schemas for others' general behavior in relevant practical situations, whether consciously or not. We learn what has happened before, why the person in the story does what she does, what the results of her actions are; this information is reflected in our learned sociocultural categorizations, norms, practices, and contexts [7, 9, 32]. The story can be, for example, in the name or in

the background narrative of an artwork and its artist [17]. These descriptions provide semantic information that directly guides the observer's attention and offers a wider cultural and cognitive context in which the artwork is evaluated [17]. Stories can also be shared through other modalities, such as pictures or bodily gestures [31]. In empathic understanding, emotions are transferred from their original context to realistically felt events in an imagined story, where emotions are created and molded by events and scenarios, and by characters and their unique histories, thoughts, goals, and emotionally filled memories [17, 33].

There are significant differences between individuals in terms of their ability to feel empathy in different situations [10]. Simulation is most successful when the observer and the object are quite similar [7, 19]. We often feel and verbally express stronger empathy toward people we already care about or people whom we consider similar to our individual or group identities [7, 11, 19, 20, 34]. Emotions are often related to our own selves, and experiencing empathy may involve things that affect and possibly benefit the empathizer, in addition to the object of empathy [11]. In social interactions, we may use mental strategies that are based on our pre-existing opinions, beliefs, and knowledge, which benefit us and help us to fulfill our self-related goals and needs. This may skew our empathic understanding of another's experiences [19]. For example, art experts may distance themselves from the direct and automatic empathic bodily and emotional reactions that the work generates in order to focus on other aspects that they consider more important [17, 35].

Kesner and Horacek [17] propose that an individual's empathic response to an artwork depends on the interaction of five things: 1) the observer's ability to respond to the perceived experiences of others; 2) the observer's cultural-cognitive ability and the observer's experiences, skills, and knowledge that help understand art and cultural artifacts; 3) the observer's individual characteristics such as age, gender, and prior life experiences; 4) how closely and in what way the observer relates to the people represented in the artwork; and 5) the observer's psychosomatic state in the moment of perceiving. The character of the empathy experienced toward art can also significantly depend on how the observer moves around and physically perceives the artwork [17].

The phenomena of empathy and empathic understanding are complex and multidimensional concepts. Implementing theories of empathy in the practical work of designers is easier said than done. Designers face several challenges when using empathic understanding in their everyday working practices. In addition to the possible biases that may affect how empathy is felt, designers may, for example, be using too-superficial or too-narrow research methods, techniques, or tools, which may yield only surface-level snapshots or stereotypes of users [2, 8, 33, 36]. As many scholars have noted [see, e.g., 2, 8, 33, 36], it is not enough to put oneself, the designer, in the user's shoes and imagine how the designer would feel there, or to describe the user in a simple, non-dialogical story that can easily be misinterpreted. Designers are not all-knowing observers who stand apart from the user. It is insufficient for designers to define what is normal based on their own perspectives and lived experiences, so that the user's experience is not appreciated, or, in the worst-case scenario, is considered a spectacle. This makes empathy an ethical

design issue [2, 33, 37]. Designers are human too. Like all humans, designers experience empathic understanding in different ways and forms, involving different processes, which can be influenced by many things, such as individual and situational factors.

## 2 Empathic Understanding in the Experience of Graffiti

Graffiti can be described as communicative cultural artifacts, and in some cases also as works of art, that are designed by their “writers” using special techniques and tools, such as spray paint, and that are experienced and judged by their perceivers [38–40]. Graffiti writers are like designers; graffiti are like technology designs; and the people who experience graffiti are like the people who interact with and experience any other designed thing. Thus, the empathic understanding of how people experience technology design can be investigated using other domains of design, including graffiti, as reference.

Two experiments were conducted to study what kind of perceptions, emotions, and thoughts people experience when they view graffiti. Both experiments took place during the Demolition Art Project [41] in late summer of 2016, where several graffiti and mural works were painted in the research location called the Petteri building in Kerava, Finland. All the graffiti assessed were large writings or interpretations of letters painted on walls. Some of the works also included a character or a figure. The participants were volunteers. Some were random passersby, and some were asked to participate by their friends (snowballing). All participants gave oral consent for participation before the experiment. Participants were rewarded for their participation with a movie ticket. The protocols from experiment 1 contain interesting unpublished data related to empathic understanding, which is the focus of this paper. In both experiments, the data were analyzed using applied thematic analysis [42] with Microsoft Excel version 16.41 software.

### 2.1 Experiment 1

**Method** *Subjects.* 19 people participated in the experiment (8 females, 11 males; age range: 13–63; mean age: 36.6 years), divided into two skill groups. The two groups consisted of ten laypeople (people who said that they knew little or nothing about graffiti) and nine experts (people who said that they knew a lot about graffiti, and of whom most, though not all, also created graffiti themselves).

*Stimuli and Procedure.* Participants individually assessed four graffiti and one mural painting, selected by the researcher. An example of an assessed graffiti work is shown in Fig. 1. A semi-structured interview was done with participants as they were thinking out loud looking at each graffiti. Protocols were recorded with a hand-held recorder. The interview had nine questions:

- Questions 1–4: what kinds of thoughts, emotions, meanings, or stories does the work evoke in you?
- Question 5: is the work beautiful, ugly, or something else?
- Question 6: what about the work’s style and colors?
- Question 7: what draws your attention in the work?

- Question 8: where could you imagine seeing it?
- Question 9: is it art?



Fig. 1. An example of an assessed graffiti work. Photo: Jouni Väänänen

**Results.** The thinking-aloud protocols were transcribed into text. Data were first classified into codes based on semantic units, which were then combined into larger categories. This analysis focused only on the type of content that relates to empathy manifested as understanding the mental content and actions of others, where the other could be either a person or an object such as the graffiti work itself. Some participants produced rich and lengthy descriptions, whereas some protocols were much shorter and shallower in their content. After analysis, several types of semantic content related to empathic understanding were found in the participant protocols. These were grouped into three themes: meaning for oneself and for others; evaluation of skills, techniques, and practices of the other and of oneself; and analogies, stories, and bodily feelings.

*Meaning for Oneself and for Others.* All 10 laypeople and 8 out of the 9 experts discussed the graffiti work's meaning for the self and how the work fits into the participant's subjective taste and preferences in art. However, 9 laypeople and 8 experts also reflected on what the graffiti could mean for and how it could be experienced by other people, such as the artist, members of the graffiti subculture, and laypeople such as "the granny next door".

The following excerpts from both a layperson and a graffiti expert are examples of how the graffiti were thought to be interpreted and experienced by other people.

“Interest, first of all in how these have been made, where these started from, and it would also be quite nice to hear what idea [the graffiti artist] had here, because there is some thought behind these for sure, but what is it? For me this is just something nice to look at.” (Layperson)

“I have to say, I appreciate that this is a complex style, which to a layperson might look like there were only arrows there, here and there, but then again it is difficult to execute this in such a way that it seems logical even to the kind of person who has more experience with these things.” (Graffiti expert)

Experts mentioned how the work may have been experienced by laypeople slightly more often than laypeople did (44 mentions by 8 experts versus 29 mentions by 6 laypeople). In general, many of the participants said that the work may be appreciated and experienced differently by other people because they have, for example, different interests, different past personal experiences, and theoretical graffiti-specific cultural and technical knowledge, as well as practical skills.

*Evaluation of Skills, Techniques, and Practices of the Other and of Oneself.* 7 out of the 10 laypeople and all the expert participants discussed the type and level of skills that may be required to make graffiti and that the artist may possess. Whether the artist was understood to have mastered or to lack special knowledge about graffiti aesthetics and practices was determined based on the work’s visual details that the observers could perceive in the work. Skills were also evaluated based on the perception of the technical level of the work and by imagining or thinking what techniques and actions its execution may have required from the artist.

Technique and how the work was made were discussed by all participants by noting visual aspects of the work, such as its level of technical details or size, and then imagining how the work may have actually been done by the artist. These discussions were often supported by detailed descriptions of what kind of bodily movements and technical tools and practices would be required specifically to create graffiti, as the following extract illustrates:

“I’m looking at this technical execution, here the mastery of the jug [i.e., spray can] is so phenomenal, from thinner to thicker line, and the color gradations where three shades are mixed together. And this looks easy. I could imagine the guy dancing in front of this, making it in half an hour, when in reality it has taken hours. It looks easy even though it is anything but easy, even those shapes of the letters. [Text extracted by researcher] What I most notice as a letter painter is those letters, and can I read it and can I grasp the rhythm? And if there was music my other leg would begin to tap a beat, this just takes you away.” (Graffiti expert)

The artists’ techniques and methods were often compared to observers’ own techniques and methods, especially (not surprisingly) in the case of experts. Subjective technique and doing were mentioned 47 times by 7 experts, compared to only 5 mentions by 2 laypeople. These participants discussed how they would themselves feel and experience the work if they were the artist. Some participants wondered how the work had been planned or how the idea for the work had been developed by the artist. Only 2 laypeople, but 7 out of the 9 experts, discussed how they would have come up with



or planned the work themselves, basing their ideas on their own style and skills and on various possible scenarios and situations.

*Analogies, Stories, and Bodily Feelings.* All participants used different types of analogies, where they associated their perceptions of the empathized work or artist with other familiar or imagined characters, scripts, or situations in order to describe, explain, and understand the meanings, emotions, interests, motives, and possible actions of the empathized. Some participants elaborated on how the character or events displayed in the work reminded them of some movie or cartoon characters or sequence of events that the empathizer had experienced or had learned from, for example, reading graffiti magazines. In many cases, works or artists were associated with formats of analogous stories that described the past, the present, and the implications and intentions for the future. The stories also had emotional tones or moods associated with them. For example, a layperson participant described a graffiti character as an intentional agent with plans of its own: “This does not have any meaning for me, but I bet that guy there would like to do something with all these letters and these brown balls. Maybe he is moving them somewhere.”

All participants described the visual properties of the works by drawing different kinds of visual analogies to how the work feels or is physically sensed in an analogous way to the observers’ own bodily sensations. For example, a large graffiti was described by a graffiti expert as being “cramped” in its place. The expert added that “fortunately there is some white in the borders, so that it gets space to breathe.” Some participants explained that the work seemed to create a sense of movement or a sense of heaviness or lightness through the shape or the orientation of the work’s visual elements. Perceivable properties such as shapes and colors were often compared to certain moods and emotional themes. For example, light and bright “candy colors” were said to make the work or its characters seem “happy or joyous.” Many participants also paid attention to the facial expressions of the graffiti characters, where the expression made the character look, for example, “surprised” or “frightened,” causing the observer to feel compassion for that character.

## 2.2 Experiment 2

**Method.** *Subjects.* 30 people participated in the experiment. One form was omitted from the results because the participant returned it empty, so the analysis focused on responses from 29 participants (19 females, 10 males; age range: 11–68; mean age: 39.2 years). There were 9 people who knew nothing about graffiti, 11 people who knew very little about graffiti, 6 who knew a fair bit about graffiti, and 3 who were graffiti experts (people who knew a lot about graffiti and some of whom also created graffiti themselves).

*Stimuli and Procedure.* Participants were asked to assess individually two graffiti works selected by the researcher (Figs. 2 and 3). They were asked to fill out a paper questionnaire with a pen regarding how they felt and thought about the graffiti while viewing them. One question asked, “Do you know who made this work? (Yes/No). Tell us something about the maker of this work. If you do not know the maker, describe what you think

they could be like.” There were two sets of 12 open-ended questions, 34 semantic scale questions, and 20 Likert scale questions in the questionnaire. However, only the question mentioned above was relevant for this paper about empathic understanding, and it is the one analyzed here. While assessing work #1, 22 participants wrote about how they imagined the artist. One of them knew who the artist was. While assessing work #2, 20 participants wrote about how they imagined the artist. One of them knew who the artist was. In general, the texts were quite short, ranging from one word to a couple of short sentences. This was probably because the questionnaires were quite long and the participants had to fill out the questionnaire with pen and paper, which took quite a lot of time (on average about 30–45 min) and effort.



**Fig. 2.** Graffiti work #1 assessed in experiment 2. Photo: Jouni Väänänen

**Results.** The paper questionnaires were transcribed into a digital format. Data were classified according to codes of semantic units, which were then grouped into larger categories. The ways the participants described the imagined other can be divided into four categories: age, gender, characteristics, and background.

*Age.* The assumed age of the artist varied from young to middle-aged. For work #1, 14 out of 29 participants mentioned age. 9 participants thought the artist was young or in their 20s; 2 people thought the artist was about 30; and 3 thought the artist was in their 40s or older. For work #2, only 6 people mentioned age. Of them, 3 participants thought the maker was 30–40 years old, and 3 people thought the maker was young or 20–30 years old.



**Fig. 3.** Graffiti work #2 assessed in experiment 2. Photo: Jouni Väänänen

*Gender.* Most of the participants who mentioned gender assumed that the artists of both works were male. For work #1, 11 participants mentioned gender. Of them, 8 people assumed the artist was male, and 2 people thought the artist could be either male or female. For work #2, only 7 people mentioned gender, and all assumed the artist was male.

*Characteristics and Background.* Participants described not only the artist's mental characteristics such as personality and behavior, but also external attributes, such as what the artist may look like or where they may live in. Participants also thought about background details regarding the artist's possible expertise and professional interests, such as possibly working in a visual arts field, being a skilled graffiti writer, or having an interest in sci-fi, cartoons, or graphic novels.

For work #1, 7 participants mentioned mental characteristics of the artist: being easy-going; being chill and funny and/or sensitive; thinking and being thought-provoking. Only 4 participants commented on the artist's external attributes like body shape or brown hair. 9 out of 10 participants thought the artist had a lot of experience with graffiti.

For work #2, 12 participants described 8 mental and 4 external attributes of the artist. The artist was described as someone who thinks a lot; brave and open to new experiences; having a sense of humor; and very imaginative. 4 participants commented on external attributes, such as the artist's looks or graffiti name. 7 participants thought the artist worked in a visual arts field or was interested in visual arts and graphic forms, and 2 participants mentioned that the artist was interested in sci-fi.

*Stereotypical Descriptions of a Graffiti Artist.* The participants' assumptions may be summarized as the following stereotypical descriptions of the artists.

For work #1, the artist may have been something between a young and unexperienced hip-hopper man or woman who grew up on the streets to a middle-class, middle-size, middle-aged but youthful man. The artist is highly proficient in graffiti and likes graphic novels or cartoons.

For work #2, the artist may have been something along the spectrum from a young man to a middle-aged, bearded, male graffiti artist. He works in a visual arts field and likes sci-fi.

There was more variation in the assumptions about the artist for work #1 than for work #2.

### 3 Discussion

In order to research empathic understanding in technology design, I studied in what ways and through what kind of content empathic understanding can emerge among different people when they view graffiti. To answer these questions, I conducted two experiments. In the first experiment, 19 participants were thinking aloud in a semi-structured interview while they were assessing five graffiti works. The interview included several questions asking the participants about how they thought and felt about the works. In the analysis phase, the participants were divided into two groups, laypeople and experts, based on their knowledge of and involvement in graffiti. In the second experiment, 30 participants evaluated two graffiti by filling out a paper questionnaire. Participants were asked what they thought the person who did the graffiti was like. Two-thirds of the participants knew little or nothing about graffiti, while the rest were graffiti experts.

The literature on empathy suggests that there are two ways that people understand and empathize with the other or the empathized, whether that other is another person or an object. One is via inference-based processes or mentalizing unobservable mental states and content, and the other is via embodied processes or identifying observable or imagined behavior (or “mechanizing”) [43]. The results from the first experiment in this paper suggest that both processes of empathic understanding may be involved when people assess graffiti. The results from the second experiment suggest that people have stereotypical assumptions of others.

Based on the results from the first experiment, people have several ways or use several processes to gain empathic understanding of a graffiti work, the graffiti artist, and other viewers. These ways are compared to the observer's own bodily and mental states, characteristics, and preferences. The participants explained not only what the graffiti meant to them, but also what it may mean to someone else, such as the graffiti artist, a person who was part of the graffiti culture, or a layperson without much knowledge of graffiti. Thus, empathic understanding is related to how we understand ourselves, what we know or assume about others, and how we compare our own tastes and preferences, emotions, values, knowledge, and skills to those of others. Empathic understanding requires the understanding of mental states, mental information content, and behavior to be directed to a first-person view in the form of introspection, as well as to others. Both self-oriented and other-oriented mentalizing are necessary [8, 13].

The results suggest that participants as empathizers used both simulation and theorizing to gain empathic understanding of the other as the empathized. Simulation was expressed as imagining how they would themselves feel, think, and act in the place of the other. Theorizing was expressed by making inferences based either on folk-psychological information or on learned abstract concepts and sensorimotor, bodily practices to model what other people may think, feel and do in various situations.

Based on protocol analysis from the first experiment, the ways of understanding others include understanding the similarities and differences between the perceived or imagined bodies of the empathizer and the empathized, based on embodied processes. These can be described as imagining the felt emotions, sensations, and movements of the other. People perceive them either directly in the graffiti work as simulated bodily actions of the artist, as if the work or some character in it could itself sense or act, or by imagining one's own movements as if one were in the artist's place.

We can imagine how we would experience the physical dimensions and sensations that we perceive in the graffiti, thus feeling empathy toward the graffiti painting itself. We may also imagine from the visible traces left by spray cans what and how the artist might have thought and felt when they were creating the graffiti. In the first experiment, participants also evaluated how skilled the artist was by pondering what kind of physical actions and knowledge might be necessary to execute graffiti. In particular, the people who did graffiti themselves (graffiti experts) compared the artist's skills and technical mastery to their own skills and preferences.

In order to recognize the skillful actions and evaluate the skill level, the observer needs to have learned knowledge and theories regarding what skills are required in that specific domain. Thus, this kind of empathizing that is based on an embodied process. It requires more than just understanding the bodily movements in some prereflexive manner. The results from the first experiment suggest that there is another level to embodied processes, which is the observer's knowledge of learned sensory-motor patterns and practices, and which the observer uses to infer the bodily behavior and sensations of the other. To understand the goal-oriented actions of the other, the observer or empathizer must have a sense of what those goals might be. That requires not only imagining what kinds of goals the empathizer would themselves have in that situation, but also understanding the empathized and their individual and collective sociocultural settings, backgrounds, practices, norms, values, incentives, and other abstract concepts that relate to the empathized's specific domain of expertise. In other words, the mental information content that is stored in and retrieved from the declarative memory components seems to interact with the procedural memory components in the same system that also affects empathic understanding [28].

Protocol analysis for the first experiment also suggests that people create stories in order to explain and empathically understand events and individuals when assessing graffiti. These stories have themes and plots where different events are unfolding. They have characters and involve the observer's reasoning as to why those events or characters are the way they are. They also include speculations about where those characters came from and what they were about to do next. The characters in the graffiti assessed and the other perceived content were often understood as analogous to some familiar characters or learned narratives from, for example, popular culture. However, analogies were also

drawn between, for example, a work's color scheme and certain sensations, emotional themes, or moods.

Stories bind something that is already known with new information, and in this way they create coherent narratives that help the storytellers to make sense of the world with its objects and situations and of the storytellers' own life events and experiences. This allows storytellers to share their own knowledge, values, and experiences with others [31, 32]. Stories may also display the existing knowledge and beliefs of the storyteller and of the social milieu that the storyteller participates in [7]. When in the second experiment the participants were asked to imagine what the graffiti artist would be like, four distinct themes emerged in the answers. These themes were age; gender; characteristics such as personality, lifestyle, or physical appearance; and background aspects such as the level of professionalism and interests. The responses presented some fairly consistent characteristics of "a graffiti artist" (e.g., either a young or a middle-aged man; a professional in graffiti or in a visual arts field). However, it is noteworthy that not all participants imagined the artist quite the same way. There was variation in, for example, whether the artist was assumed to be young or old; whether they could be "either a man or a woman"; whether they were from a "middle-class" background or "grew up on the streets".

Not surprisingly, some people commented on the artists' interest in cartoons or sci-fi, as there was a Mickey-Mouse-like character in the first graffiti, and visual elements that could easily be associated with popular science-fiction catalogues in the second graffiti. However, most of the participants did not know who the artist actually was, so either there was something in the works suggesting that the artist was some specific kind of person, or the participants were drawing conclusions based on their own pre-existing knowledge and schemas. In the latter case, the evaluations may be based on the observer's own learned cultural stereotypes regarding who makes graffiti and what kind of graffiti they make. Most of the participants were laypeople and presumably did not have much personal experience of graffiti artists, and were less capable of picking out visual nuances and information cues from the graffiti than actual graffiti artists. They may have had to rely on their own assumptions of the typical artist, not on what they could decipher from the graffiti, its style, and the artist's "handwriting." However, at least in experiment 2, there was little variation in the content of the participants' replies regarding how they imagined the artist. This suggests that laypeople and experts rely at least partly on the same general stereotypes, possibly because they lacked information from firsthand interactions and experiences with those particular artists, which would have helped them construct "individuated schemas" [44, p. 76] in their mental representations of those people. The participants could not base their evaluations on individuated schemas, but instead had to rely on "social scripts, narratives and social norms" [7, p. 132], which were constructed into certain stereotypes. These stereotypes are associated with membership in the specific social category of graffiti artists. This was necessary to improve the accuracy of empathic understanding and judgement of the other [44].

Overall, the following summary can be made based on the two experiments. There are four different ways of gaining empathic understanding:

1. Through embodied processes that simulate mechanistic or prereflexive motor movements and bodily similarities;

2. Through theorizing based on folk-psychological information applied to naïve interpretations of others' mental states, mental content, and intentions;
3. Through embodied processes, which include both procedural and declarative information and help recognize learned bodily skills and practices; and
4. Through theorizing based on learned knowledge and concepts applied in the form of stories or verbal descriptions.

These ways are similar to what has been suggested in the existing literature on empathic understanding [see, e.g., 7, 9, 12, 13]. They are also relevant in empathic understanding of works of art and graffiti [14, 16–18]. Furthermore, the analysis of the first experiment suggests that participants used both mental simulation and theorizing together, rather than individually, when they directed their attention to others. This supports the idea that people use hybrid mechanisms when mentalizing about others' mental states and behaviors [7, 9, 19]. An individual's assumptions about the other may follow some learned social scripts or schemas or stereotypes [7, 44].

Even though the two experiments presented in this paper support existing models and theories of mental content and empathic understanding processes, several concerns should be mentioned, which may affect the results. First of all, the number of participants was quite small. In the second experiment, the questionnaire was very long and tedious, and in addition, participants had to fill out the questionnaire by hand with pen and paper. As a result, the answers were very few and short. Thus, in the second experiment, the analysis is based on a very small sample size and a very small amount of data. In the first experiment, by contrast, people could talk out loud, and produced much more data in their protocols. Therefore, I recommend using thinking-aloud protocols rather than written forms as the research method when investigating people's empathic understanding. As a final concern, graffiti themselves may be quite a controversial, value-laden, or emotionally charged topic to some, which can skew what and how people feel, think, and say, both about the graffiti works and about the people involved in the graffiti culture.

## 4 Conclusions

In this paper I have discussed empathy in technology design, why it is important, and how ways of empathic understanding can be researched using graffiti to produce knowledge that supports technology designers' work. Empathic understanding is the ability to understand and predict the thoughts, feelings, mental states, and intentions of others. In this process, the observer or empathizer tries to perceive, recognize, and make sense of the past, present, and future mental states and experiences, feelings, thoughts, intentions, and actions of the other or empathized. Empathy is understanding what the other thinks and feels, but it is different from emotional contagion, which means actually feeling the same emotions as the other. For example, designers should be able to recognize and separate their own personal experiences and emotions from those of others. The emotions evoked by graffiti from experiment 1 are discussed elsewhere [40].

As Bennett and Rosner [2] suggest, designers need to be attuned to the differences in other people's bodies and social relationships, and to connect, share experiences with,

and learn from those people. To do this, designers could investigate and use at least four ways of gaining empathic understanding, which I have presented in this paper. They are understanding others (whether people or objects) via embodied processes through bodily similarities and simulations; via folk-psychological inferences; via recognizing learned skills and bodily practices; and via inferences based on learned information such as knowledge and concepts. An empathizer needs to recognize and understand not only what kind of bodily sensations the empathized other may have, but also what kind of meanings different objects and contexts may have to the empathized. Thus, the empathizer needs to have some idea of the knowledge, beliefs, interests, characteristics, past life, future goals, and the social setting of the person they are observing and trying to understand, and of which things are important to that person [1, 2].

Technology designers also need to consider whose perspective they are embracing—their own or that of others—when they are developing their user understanding. Designers also need to be aware of their own and other people’s thinking biases, such as what kind of stereotypes the observer or the observed might have. This could affect whether and how people feel empathy, and how this may affect the observer’s understanding of the observed.

**Acknowledgements.** I would like to thank Jouni Väänänen, the project manager for the Demolition Art Project, where this study was conducted and my supervisors Pertti Saariluoma, Professor of Cognitive Science in University of Jyväskylä, Annika Waenerberg, Professor of Art History in University of Jyväskylä, and Johanna Silvennoinen, Postdoctoral Researcher. This research was supported by grants from the Finnish Cultural Foundation [grant number 00180743] and the University of Jyväskylä, Faculty of Information Technology. I have no conflicts of interest to disclose.

## References

1. Saariluoma, P., Cañas, J., Leikas, J.: *Designing for Life: A Human Perspective on Technology Development*. Palgrave Macmillan, London (2016)
2. Bennett, C.L., Rosner, D.K.: The promise of empathy: design, disability, and knowing the “other.” In: CHI 2019: Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems, Paper no.: 298, pp. 1–13 (2019). <https://doi.org/10.1145/3290605.3300528>
3. Hassenzahl, M.: User experience and experience design. In: *The Encyclopedia of Human-Computer Interaction*. Second edition. Interaction Design Foundation. <https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed>. Accessed 26 Feb 2021
4. Hassenzahl, M., Tractinsky, N.: User experience—a research agenda. *Behav. Inf. Technol.* **25**(2), 91–97 (2006). <https://doi.org/10.1080/01449290500330331>
5. Hornbæk, K., Oulasvirta, A.: What is interaction? In: *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, pp. 5040–5052 (2017)
6. Lilienfeld, S.O., Sauvigné, K.C., Lynn, S.J., Cautin, R.L., Lutzman, R.D., Waldman, I.D.: Fifty psychological and psychiatric terms to avoid: a list of inaccurate, misleading, misused, ambiguous, and logically confused words and phrases. *Front. Psychol.* **6**(1100), 1–15 (2015). <https://doi.org/10.3389/fpsyg.2015.01100>



7. Apperly, I.: *Mindreaders: The Cognitive Basis of “Theory of Mind.”* Psychology Press, Taylor & Francis Group, Hove and New York (2011)
8. Dong, Y., Dong, H., Yuan, S.: Empathy in design: a historical and cross-disciplinary perspective. In: Baldwin, C. (ed.) *AHFE 2017. AISC*, vol. 586, pp. 295–304. Springer, Cham (2018). [https://doi.org/10.1007/978-3-319-60642-2\\_28](https://doi.org/10.1007/978-3-319-60642-2_28)
9. Gallagher, S., Zahavi, D.: *The Phenomenological Mind*, 2nd edn. Routledge, London (2012)
10. Maibom, H.L.: Affective empathy. In: Maibom, H. (ed.) *The Routledge Handbook of Philosophy of Empathy*, pp. 22–32. Routledge, London and New York (2017)
11. May, J.: Empathy and intersubjectivity. In: Maibom, H. (ed.) *The Routledge Handbook of Philosophy of Empathy*, pp. 169–179. Routledge, London and New York (2017)
12. Thompson, E.: Empathy and consciousness. *J. Conscious. Stud.* **18**(7–8), 196–221 (2011)
13. Goldman, A.I.: *Joint Ventures: Mindreading, Mirroring, and Embodied Cognition*. Oxford University Press, New York (2013)
14. Carroll, N.: Empathy and painting. In: Maibom, H. (ed.) *The Routledge Handbook of Philosophy of Empathy*, pp. 285–292. Routledge, London and New York (2017)
15. Currie, G.: Empathy for objects. In: Coplan, A., Goldie, P. (eds.) *Empathy: Philosophical and Psychological Perspectives*, pp. 82–98. Oxford University Press, Oxford (2011)
16. Freedberg, D., Gallese, V.: Motion, emotion and empathy in esthetic experience. *Trends Cogn. Sci.* **11**(5), 197–203 (2007). <https://doi.org/10.1016/j.tics.2007.02.003>
17. Kesner, L., Horáček, J.: Empathy-related responses to depicted people in art works. *Front. Psychol.* **8**(228), 1–16 (2017). <https://doi.org/10.3389/fpsyg.2017.00228>
18. Gernot, G., Pelowski, M., Leder, H.: Empathy, Einfühlung, and aesthetic experience: the effect of emotion contagion on appreciation of representational and abstract art using fEMG and SCR. *Cogn. Process.* **19**(2), 147–165 (2017). <https://doi.org/10.1007/s10339-017-0800-2>
19. Spaulding, S.: Cognitive empathy. In: Maibom, H. (ed.) *The Routledge Handbook of Philosophy of Empathy*, pp. 13–21. Routledge, London and New York (2017)
20. Zahavi, D.: Simulation, projection and empathy. *Conscious. Cogn.* **17**, 514–522 (2008). <https://doi.org/10.1016/j.concog.2008.03.010>
21. Fuchs, T.: The brain—a mediating organ. *J. Conscious. Stud.* **18**(7–8), 196–221 (2011)
22. Ratcliffe, M.: Phenomenology, neuroscience and intersubjectivity. In: Dreyfus, H., Wrathall, M.A. (eds.) *A Companion to Phenomenology and Existentialism*, pp. 329–345. Blackwell Publishing, Maiden (2006)
23. Taylor, J.E.T., Witt, J.K., Grimaldi, P.J.: Uncovering the connection between artist and audience: viewing painted brushstrokes evokes corresponding action representations in the observer. *Cognition* **125**(1), 26–36 (2012). <https://doi.org/10.1016/j.cognition.2012.06.012>
24. Lohmar, D.: Mirror neurons and the phenomenology of intersubjectivity. *Phenomenol. Cogn. Sci.* **5**, 5–16 (2006). <https://doi.org/10.1007/s11097-005-9011-x>
25. Leder, H., Nadal, M.: Ten years of a model of aesthetic appreciation and aesthetic judgments: the aesthetic episode—developments and challenges in empirical aesthetics. *Br. J. Psychol.* **105**(4), 443–464 (2014). <https://doi.org/10.1111/bjop.12084>
26. Hofstede, G., Hofstede, G.J., Minkov, M.: *Cultures and Organizations: Software for the Mind*, 3rd edn. McGraw-Hill Education, New York (2010)
27. Bassett, D.S., Yang, M., Wymbs, N.F., Grafton, S.T.: Learning-induced autonomy of sensorimotor systems. *Nat. Neurosci.* **18**(5), 744–751 (2015). <https://doi.org/10.1038/nn.3993>
28. Wolpert, D.M., Diedrichsen, J., Flanagan, J.R.: Principles of sensorimotor learning. *Nat. Rev. Neurosci.* **12**(12), 739–751 (2011). <https://doi.org/10.1038/nrn3112>
29. Collins, H.M., Evans, R.: *Rethinking Expertise*. University of Chicago Press, Chicago (2007)
30. O’Connor, F.V.: Authenticating the attribution of art: connoisseurship and the law in the judging of forgeries, copies, and false attributions. In: Spencer, R.D. (ed.) *The Expert Versus the Object: Judging Fakes and False Attributions in the Visual*, pp. 3–27. Oxford University Press, New York (2004)

31. Shialos, M.: Human storytelling. In: Shackelford, T.K., Weekes-Shackelford, V.A. (eds.) *Encyclopedia of Evolutionary Psychological Science*, pp. 1–4. Springer, Cham (2017). [https://doi.org/10.1007/978-3-319-16999-6\\_1074-1](https://doi.org/10.1007/978-3-319-16999-6_1074-1)
32. McAdams, D.P.: How stories found a home in human personality. In: Goodson, I., Antikainen, A., Sikes, P., Andrews, M. (eds.) *The Routledge International Handbook on Narrative and Life History*, pp. 34–48. Routledge, Oxon and New York (2017)
33. Wright, P., McCarthy, J.: Empathy and experience in HCI. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, April 2008, pp. 637–646 (2008)
34. Feyaerts, K., Oben, B., Lackner, H.K., Papousek, I.: Alignment and empathy as viewpoint phenomena: the case of amplifiers and comical hypotheticals. *Cogn. Linguist.* **28**(3), 485–509 (2017). <https://doi.org/10.1515/cog-2016-0109>
35. Leder, H., Gerger, G., Brieber, D., Schwarz, N.: What makes an art expert? Emotion and evaluation in art appreciation. *Cogn. Emot.* **28**(6), 1137–1147 (2014). <https://doi.org/10.1080/02699931.2013.870132>
36. Siegel, D., Dray, S.: The map is not the territory: empathy in design. *Interactions* **26**(2), 82–85 (2019). <https://doi.org/10.1145/3308647>
37. Heylighen, A., Dong, A.: To empathise or not to empathise? Empathy and its limits in design. *Des. Stud.* **65**, 107–124 (2019). <https://doi.org/10.1016/j.destud.2019.10.007>
38. Myllylä, M.: Graffiti as a palimpsest. *SAUC—Street Art Urban Creat. Sci. J.* **4**(2), 25–35 (2018). <https://doi.org/10.25765/sauc.v4i2.141>
39. Myllylä, M.: From experiencing sites of past to the future of the Demolition Man, and how graffiti fits to all. *UXUC—User Exp. Urban Creat. Sci. J.* **1**(1), 26–37 (2019)
40. Myllylä, M.: The good, the bad and the ugly graffiti. In: Rousi, R., Leikas, J., Saariluoma, P. (eds.) *Emotions in Technology Design: From Experience to Ethics*. HIS, pp. 87–104. Springer, Cham (2020). [https://doi.org/10.1007/978-3-030-53483-7\\_6](https://doi.org/10.1007/978-3-030-53483-7_6)
41. Demolition Art Project: Taiteen kotitalo sijaitsee Keravalla. <http://www.purkutaide.com>. Accessed 2 Dec 2020
42. Guest, G., MacQueen, K.M., Namey, E.E.: *Applied Thematic Analysis*. SAGE Publications, Thousand Oaks (2012)
43. Spunt, R.P., Satpute, A.B., Lieberman, M.D.: Identifying the what, why, and how of an observed action: an fMRI study of mentalizing and mechanizing during action observation. *J. Cogn. Neurosci.* **23**(1), 63–74 (2011). <https://doi.org/10.1162/jocn.2010.21446>
44. Lewis, K.L., Hodges, S.D.: Empathy is not always as personal as you may think: the use of stereotypes in empathic accuracy. In: Decety, J. (ed.) *Empathy: From Bench to Bedside*, pp. 73–84. MIT Press, Cambridge, MA (2012)