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# iMind: Paul Klee, Dialogism & BCI

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**Abstract**

The key contributions for this design paper are to showcase a working prototype of iMind that utilizes viewers' brainwave activity to personalize an aesthetic experience with the digitized art of Paul Klee. Digital humanities and arts methodologies were deliberately employed to conduct this design. iMind aims to broaden the exploratory outlook and application development of brain-computer interactivity [BCI] being used for creative experiences. iMind is a wearable tech application that explores BCI for the use in an art gallery context. iMind encourages the rediscovery of Paul Klee's artwork by promoting a dialogical experience amongst people, through a novel brain-computer interface.

**Author Keywords**

creativity; wearable computers; visual art; BCI

**ACM Classification Keywords**

H.1.2 [User/Machine Systems]; H.5.2 [User Interfaces]: Input devices and strategies; K.4.2 [Computers and Society]: Social Issues.

**Introduction and Conceptualization**

iMind is an arts project and prototype that explores an alternative dialogue between viewers, curators, artists, and art pieces. It is meant for either art gallery or in-

## iMind

The name *iMind* is an ironic play on words. It points to the common usage of adding “I” to anything digital (e.g., “iPhone”). But, it also means “I mind!” (i.e., I mind that you are reading my mind and interpreting my thoughts). Can brain interfaces know my mind? The quizzical nature of iMind deals with the hidden curator of digitized paintings on web interfaces and provides some sense of connection through the brain interface.

The work of Paul Klee - playful, ironic, moody, avant garde, and mysterious in its own era - is most appropriate for our creation.

home viewing of digitized visual art. Using consumer Brain-Computer Interactivity [BCI] devices equipped with electroencephalography (EEG), iMind enables a user to choose different paintings from an artist’s collection based on how she/he is feeling or thinking, which is automatically captured by the customized iMind application (see Figure 1).

iMind uses digitized paintings by Paul Klee (1879–1940) obtained under the Open Access for Scholarly Content (OASC) program of the Metropolitan Museum of Art (New York) (see Figure 1). With this prototype, iMind becomes an insightful, exploratory, playful, ironic, and dialogic technique to engage with these paintings.

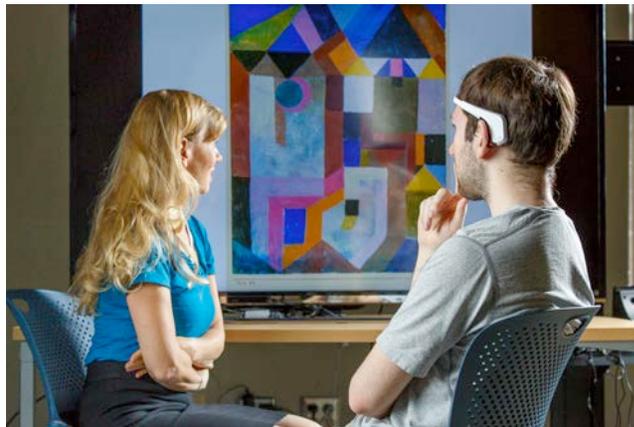


Figure 1 Using iMind to enjoy Paul Klee paintings

As a project and a novel wearable technology, iMind is geared to the idea that BCI should be treated according to the principles of “organic interaction”, a movement in the field instigated by Human Computer Interaction [HCI] expert, Jun Rekimoto [1]. iMind provides an outlet for users to explore BCI through a simplified

arts-viewing application. It follows the idea that *thinking* is a bodily-based activity, a solo subjective activity, as well as a social and dialogical practice. Klee’s paintings represent not only an aesthetic contribution to modern art; they also reveal his thoughts, imagination, and his historical moment in Europe (see Figure 2). iMind gives the viewer a new way to engage Klee using brain interactivity (see sidebar).



Figure 2 **Black Columns in a Landscape** ©The Metropolitan Museum of Art – Curatorial Description: In the spring of 1919, Klee rented a large studio in the Schloss Suresnes, a neglected eighteenth-century palace in Schwabing, Munich’s artists’ quarter. According to Klee’s son Felix, Suresnes, its park, and the nearby Englischer Garten served as inspiration for this watercolor. It depicts Ionic columns, a large chestnut leaf, a thin black cross, a small red pavilion, and a boat on the River Isar, which flows through Munich. (not on view)

By opening such a large collection for scholarly access, the Metropolitan Museum of Art, “The Met”, creates



Figure 3 Paul Klee, Photographed in 1911 by Alexander Eliasberg (public domain). Paul Klee (1879–1940) was born of German and Swiss descent. Humour, irony, and satire are important components of his artwork. Paul Klee's paintings might be characterized under movements such as Surrealism, Cubism, Futurism, Expressionism, and Abstraction [4].

new grounds for exploration; iMind answers this strategy with an exploratory interface. We collected over 80 digital photos of Klee's paintings that are *not on view* in "The Met". By offering an alternative interface for Klee paintings that are in storage, rather than hanging in the gallery, iMind enlivens the forms of digital interaction to which viewers are limited.

In sum, we concentrate on three reasons to create iMind:

1. Paul Klee's inaccessibility to most audiences
2. Embodied interaction through an aesthetic experience
3. Curatorial role

These are discussed in the sections to follow.

### Motivation to Create iMind

#### 1. Rediscovering Paul Klee

Paul Klee is an important painter of the past century and we are losing access to his pivotal work (see Figure 3). Ninety works by Klee were given to The Metropolitan Museum of Art by one of the postwar era's leading art dealers and collectors, Heinz Berggruen to form the distinguished Berggruen Klee Collection, a permanent collection of The Metropolitan Museum of Art's holdings. Most of the ninety works in The Berggruen Klee Collection are not on view in a gallery at "The Met". An individual can physically visit only six Paul Klee works on site unless they are shown in a special exhibit (see Figure 4). As a result, a regular visitor can only experience the bulk of the collection through a web interface at "The Met" website. We created iMind to inspire an affective or bodily response to the Klee works that unites the imagination of a

viewer, a curator, and Paul Klee himself, through his works. As digital culture marches on, we are losing a heritage of painters that would benefit from rediscovery through many evolving media. While we choose to revitalize Paul Klee, iMind could extend to the work of any artist, collection, or exhibition.

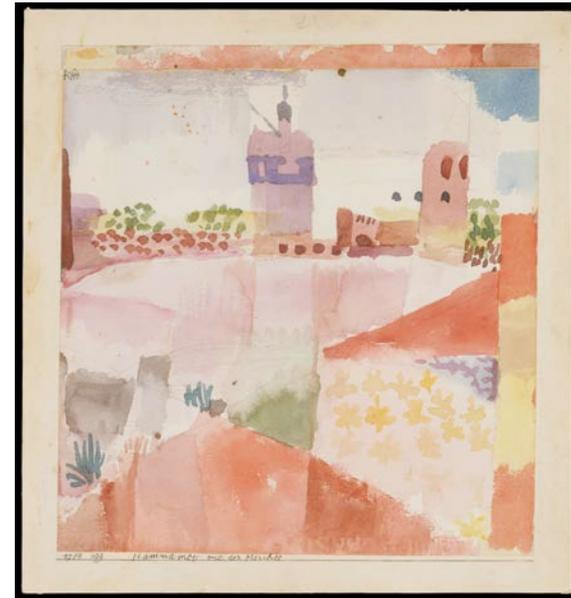


Figure 4 **Hammamet with Its Mosque** ©The Metropolitan Museum of Art, one of many Klee paintings not on display at The Met. Curatorial Description: On April 14, 1914, Klee visited Hammamet, a small town on the Mediterranean, northwest of Tunis. He captured a view of the city in Hammamet with its Mosque, a watercolor painted from outside the city walls. The upper part shows the mosque surrounded by two towers and gardens; the lower area is made up of translucent color planes (not on view).



Figure 5 **Bird Wandering Off**, Paul Klee 1926 ©The Metropolitan Museum of Art (not on view)

### 2. Embodied interaction and brain interactivity

iMind uses brain interactivity to incite an embodied feeling during the act of viewing. In a key *Communications of the ACM* article in 2008, Jun Rekimoto introduced the term “organic interaction” technologies to re-envision embodiment in interactive experiences. He states: “The part(s) of our body we use for interaction are not limited to fingers; the palm, arm, even the entire body are all potentially usable. . . such as shaking hands and gesturing.” [1]

In seeking to re-envision HCI, Rekimoto [1] rejects using the interface metaphors of traditional UI design (e.g. desktop metaphors, mice, keyboards, etc.). When the body is used as a method of interactivity, and we are to incorporate computers into more real-world

scenarios, we need to reimagine “human-physical and human-human interaction.” While he did not discuss BCI, we adopt principles of organic interaction for iMind in conceptual terms.

### 3. Dialogism and Curatorial Practice

iMind deliberately interprets the role of the curator in the experience of digital arts viewing. When one sees a painting in a gallery (for example, Figure 5), one sits at the nexus of minds and imaginations. The viewer participates with the painter through the painting; however, one also participates with the gallery curator who chooses a piece for an exhibit, an art dealer who donated a painting, an architect who designed the room to hold a piece, and so on. For example, Heinz Berggruen, the person who donated the Klee collection, explains the world of imagination that Klee ultimately inspired for him:

“What was my involvement with Klee? What was it that drew me so close to his work from the very beginning and increasingly over the years? Klee himself, who is most articulate in his numerous writings (diaries, lectures, essays), says he is not concerned with our everyday world but with the world beyond our commonplace reality: ‘I cannot be understood in purely earthly terms. For I can live as happily with the dead as with the unborn. Somewhat nearer to the heart of all creation than is usual But still far from being near enough.’ Klee’s world is not an abstract world any more than Klee is an abstract painter. It is a world both related to and yet far removed from what we see around us. It is a world of mystery and fantasy, of dreams and whims, and yet it is a world that is never gratuitous and certainly not obvious” [4]

The iMind project begins with the premise that human thought is more dialogic than monologic. Many other BCI technologies, for example, isolate the user through activities rather than encourage the idea that even thought and thinking is a social practice. iMind is influenced by the Russian philosopher Mikhail Bakhtin's notion of dialogism, the belief that language and thought are ultimately social in addition to being unitary [2]. Bakhtin wrote of dialogism "After all, our thought itself -- philosophical, scientific, artistic -- is born and shaped in the process of interaction and struggle with others' thought" [3]. Because iMind involves a computer actively reading how two different people react to digitized art, an *emotional dialogue* occurs between people – a viewer, a curator, and the artist who originated the work – even when they are not in the same physical space.

### **Intended Audience and Experience**

iMind seeks to reclaim the social aspect of *thinking* when it comes to viewing art in a digital context. In a traditional art gallery, many people decide which pieces a viewer will eventually see. Decisions over including a certain piece of art might be based on how it evokes a certain mood that the artist and/or curator determine. In a sense, the experience of looking at art is like a dialogue amongst curators, artists, and crowds of visitors who have come to view an exhibit. A silent conversation occurs. The ultimate intent is to invite some kind of subjective emotional response to art. There is never an objective outcome.

iMind mimics aspects of this scenario. **First**, an artist, curator, or simply another person designates an emotional category signifying happy, sad, calm, or angry for each artifact in the Klee collection within the iMind interface (e.g., a collection of digitized paintings). This designation forms part of the piece itself because it is a subjective act performed by one person for another person. It is an act of curation. **Second**, a viewer would be invited to experience iMind on a comfortable seat and reflect upon the digitized art on a screen. The artifacts would appear on a large screen or a projection wall. **Third**, as the viewer wears the brain headset and reflects on the art, iMind tracks the viewer's brainwave fluctuation, and indicates the person's current brain reactions using an algorithm that makes this determination. However, this determination is also subjective; iMind relates brain fluctuation to a set of emotions that are categorized as signifying happy, sad, calm, or angry. **Fourth**, iMind shows the viewer digitized art (i.e., Paul Klee paintings) on the screen as a response to both the viewer's feelings and the other person's original emotional curatorial designation.

The effect is meant to be suggestive, evocative, curious, and thought inducing, rather like a dialogue. As digitized paintings subtly appear on the screen, two people trade "feelings" through the brain responses of the viewer and the pre-coding of the visual artifacts by the first person. The result is an aesthetic experience that uses this new medium, brain-computer interaction, in a novel way and one that celebrates subjectivity in human thought rather than objectivity.

## Technological Functionality



Figure 8 Muse Headset

iMind has adapted the Muse<sup>1</sup> brain sensing headband. Muse uses EEG as a brain measurement tool. It measures the electrical activity on the scalp that is created by neurons firing in the brain. To record and analyze this electrical activity, a set of electrodes is placed on the user's head. To measure the brain activity, the electrical activity of each electrode is subtracted from the reference point. There are many different EEG devices for data collection that vary in reference points or number of electrodes. EEG devices are becoming cheaper, making the technology more available and affordable than before.

Written in Unity, we created a custom version of iMind that adapts the Muse software and brainwave technology, but we transformed it to display paintings in a customized interface. The interface focuses on just one piece of art in the main display area. While viewing this main piece, user's brainwaves are gathered and classified as one of four emotions (defined by us), which informs the programs next choice of art.

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<sup>1</sup> <http://www.choosemuse.com/>



Figure 6 WeAreWearables Event 2015. Image courtesy of Billy Lee



Figure 7 Person trying iMind at event in Toronto, 2015.

Therefore, users will only see paintings tagged as a certain emotion when they are feeling what we define as the corresponding emotion. We also added visualizations for the actual brainwave activity to help us in the course of development. We can see that the device is working and test if the emotions are recorded accurately reflect that of the participant. We can choose to hide or show this visualization for real viewers.

## Conclusion

iMind constitutes an explorative BCI interface promoting a dialogical relationship amongst people viewing art in a digital context. In future, it might be adapted for smarthome technology whereby a wall serves as a portal to an art gallery. It could be used by an artist in the creation of an exhibit with the intent to deliberately inspire a response in viewers.

## Acknowledgements

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