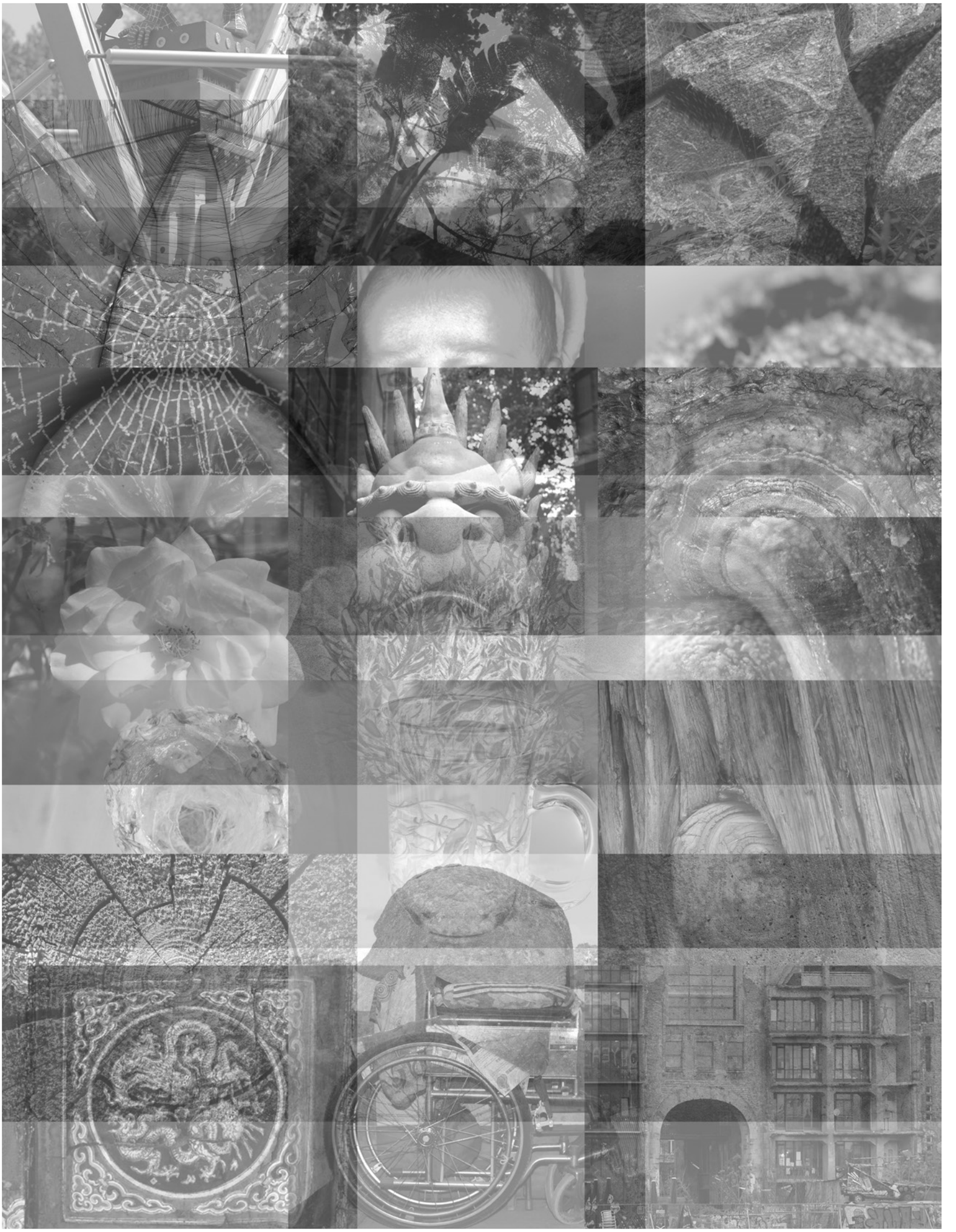

ARTIST'S ARTICLE

# *Wolkenkuckucksheim*: Art as Metaphor of the Mind

*Elisabeth Weissensteiner and Christian Freksa*

ABSTRACT

*Wolkenkuckucksheim* is a site-specific interactive computer installation created for the Cognitive Systems Group at the University of Bremen, Germany. It was conceived and implemented by the authors: an artist interested in the syntax of space and the semantics of materials, and a cognitive scientist investigating the cognitive implications of ubiquitous computing. The project unites the artistic approach of creating metaphors and the scientific approach of theoretical inquiry. In this essay, artist and scientist show in a dialogical manner how art and science gain complementary insights by working with the same cognitive tools.

## RUN-UP STORY

*Wolkenkuckucksheim* is an interactive computer installation realized for the Cognitive Systems Group at the University of Bremen, Germany. In his famous play *The Birds*, the ancient Greek comic playwright Aristophanes conceived *Nephelokokkygia,* rendered in German as *Wolkenkuckucksheim* and in English as "Cloud-cuckoo-land," as a city between earth and sky, free of human needs and divine interests [1]. Everyone wants to be there: humans and gods alike. Aristophanes constructed a deeply ironic social space. However, over the centuries, the German Wolkenkuckucksheim has become a synonym for daydreaming. Artists and scientists are often seen as daydreamers who retreat to a place where no one else seems to be permitted. Artists and scientists often seek inaccessibility when attempting to retreat from the practical demands of the day and engage in untargeted manipulation of things and introspection—at such times they are then often disparaged for "doing nothing."

Nonetheless, the scientists of the Bremen Cognitive Systems Group unanimously maintain that they cannot stand their ground in their professional field without unexpected ideas and random observations. As they research formal cognitive systems in the development of calm technology [2], they make use of all kinds of electronic gadgets. It is the interaction of user and machine that makes up the focus of their interests.

When it ultimately came to considering art for their department, which appears to the visitor as a busy beehive in a building designed to enhance scientific productivity, with uncommitted playtime combined with the paradoxical reproach of doing nothing, an investigation of the paradoxical location where nothing is done forced itself into view as a theme.

## DESCRIPTION: *WOLKENKUCKUCKSHEIM*

The premises of the Cognitive Systems Group comprise small offices around social meeting spaces in the Cartesium building of the University of Bremen. Instead of doorplates, touchscreens display the residents' names. The numerous screens, always in easy reach, offer those passing through connection to the Internet and a playground for investigating ubiquitous computing. Additionally, two larger screens are positioned in an adjacent lobby space serving as a waiting room for the nearby lecture hall. These screens provide updated information on student and university issues on demand.

*Wolkenkuckucksheim* inhabits both the small screens beside the office doors and the two larger screens in the lobby. When a person approaches an office door and looks at the screen/doorplate, an image fades in and slowly transforms into successive images, carrying the observer into another world. During this slow transformation, intermediate images appear to take shape in the overlap between successive images. The images themselves are tonally rich black-and-white photographs of everyday scenes. They form an image bank that is organized in a two-dimensional array, wherein each image has four neighbors with structurally similar features (see Article Frontispiece). On a screen, images transform into randomly selected neighbor images. Thus the intermediate images acquire visual logic rather than a representational relationship.

The images appear seemingly without effort on the viewer's part but are actually controlled by facial recognition technology. When the viewer turns away or touches the screen, the image flow stops and the screen returns to its normal doorplate functions.

In contrast, the lobby screens host ongoing image loops. Each screen's images are constructed of two superimposed images from the created image bank, overlapping via an extremely slow fade-in. Thus, the images emerging on the screens are derived essentially from four different originals, opening up a surreal imaginary space. The changes within the displayed images are so subtle that observers have the impression of sensing rather than actually seeing something happening. Sometimes people only observe a change in the image if they turn away for a moment and, on returning, notice that it looks slightly different from before. When they fix their gaze on the screen, they are drawn into an ambiguous image cosmos wherein they cannot distinguish between actually observed and imagined shapes.

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**Article Frontispiece. *Wolkenkuckucksheim:* montage of selected images from the image bank, 2009. (© Elisabeth Weissensteiner)**

**Fig. 1.** ***Wolkenkuckucksheim:*** **site-specific interactive computer installation at the University of Bremen, 2009. Daydreaming in front of a computer screen. (© Elisabeth Weissensteiner)**

## An Artist's Approach: Using Scientific Theory as Artistic Metaphor

To perceive "doing nothing" as an activity, and furthermore to expect a particular location for that activity, appears paradoxical. The implied inconsistency hinges on the fact that something that is not there nevertheless is being addressed and articulated. In this process, something that is not within the range of our perception acquires sensual presence. Obviously it is the mind that creates this experience, in a process cognitive science calls *conceptual blending* [3]. Conceptual blending is a theoretical concept seen in many disciplines as explaining how perception becomes cognition [4].

As arousal of the nerves unfolds, signals travel from one part of the brain to another. Thus, thinking develops as a process in time and space within a physiological substrate. Because of its connection to thinking and its accessibility by shared observation (i.e. by reading), language became a major field of investigation for cognitive theory [5]. The study of texts via reading has offered an approach to cognitive processes, and poetic structures such as metaphors, parables and narratives can be analyzed as mirrors of conceptual blending.

Art is always made of perceptible material. Thus, experiencing art can also be described as a reading process; hence, cognitive theory, when linked with Reader Response Theory [6], helps us to understand how cognition turns perceptions into artistic metaphors. Although cognitive research has not distinguished between everyday and artistic expression, and Reader Response Theory has not made reference to cognitive processes, we will combine the two to trace how *Wolkenkuckucksheim* uses a particular environment to turn scientific theories into experiential metaphors in viewers' minds.

The mind connects to the environment via conceptualizing experiences [7]. In Aristophanes's description of Wolkenkuckucksheim as a city between earth and sky, this city is neither obliged to sacrifice to the gods nor subordinate to mundane politics. Therefore everyone wants to get in. However, anyone permitted in turns into some kind of fool. In the play the primordial experience of "container" [8] gives rise to metaphors of imaginativeness as a "box high above ground," "full of content." Those not permitted to enter can only observe those leaving the box. Observation thus becomes "entering the box," and imaginative content turns into "content of the box."

In the science department, people are not meant to be idle. They are active and express their activity. They move, they talk and they manipulate their computers and gadgets. With *Wolkenkuckucksheim,* however, they sometimes find themselves unexpectedly daydreaming in front of a computer screen beside an office door and begin watching the screen absentmindedly when unforeseen images emerge (Figs 1 and 2). For a brief period they "enter" *Wolkenkuckucksheim* (the "container"); then, possibly with mixed feelings for having been detained by these random images, they "leave" the place of distraction ("content in the box") and "return" to their ordinary department life (the "larger container").

The mind will endow with meaning anything that the body identifies and recognizes as entities. This includes not only the matter that constitutes objects but also their spatial and temporal relationships. As the mind generates meaning in a comprehensive way, it sets up a body of meaning—a narrative: Perception turns into cognition via a reading process.

However, images do not carry fixed meanings. Although the mind creates a narrative when we perceive something, other perceivers create different narratives. In order to successfully employ a produced meaning, several minds have to agree upon what they have understood rather than about what they have perceived. Therefore certain elements of the narrative are kept constant—these are the basic conceptual metaphors used in the process of constructing complex blends. These are rooted in our physical nature and ultimately constitute the common knowledge of a community [9]. Therefore, understanding one another means sharing a certain literacy. Accordingly, meaning is also rooted in agreement upon certain conditions. The philosopher of science van Fraassen expands the conditions for valid interpretations of texts [10] by applying these conditions to research in the natural sciences. He shows that research—looking at natural phenomena—can be understood as textual interpretation and shows how the relative validity of interpretations is determined by the literacy of the observers [11].

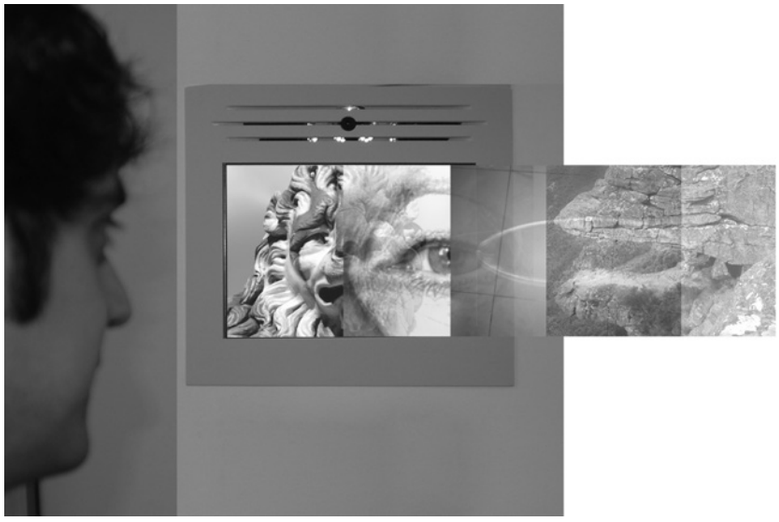


**Fig. 2.** ***Wolkenkuckucksheim:*** **watching the screen while unforeseen images emerge. (© Elisabeth Weissensteiner)**

In *Wolkenkuckucksheim* (Fig. 3), viewers agree that there are images on a screen that keep changing, but they do not agree on the product of this change. It is solely the conviction that everyone has seen something transform on the screen that unites viewers. It is the change of perceptions that gives rise to the basic conceptual metaphor of movement.

Thus people may easily agree on identifying a narrative but struggle to agree on a conclusive meaning. As conceptual blending unfolds over time and in space, it follows a particular syntax of perceived objects. What kind of perception enters the process, when this happens and where it happens in the narrative are therefore crucial for the content of the ensuing conceptual blends. Therefore the syntax controls the mental effort of building parables. As minds are individually different in spite of the common structure of their brains, it depends on the individual mind to deal with the required effort. For one person it can be a challenge to understand what for another person is joyful imagining. Cognitive theory describes this activity of building parables in the individual mind as pattern completion [12], and Reader Response Theory speaks of places of indeterminacy, which have to be filled by the reader [13]. As people's literacy enables shared knowledge, it seems to be the degree of deviation from basic conceptual metaphors—indeterminacy—that triggers the development of individual metaphors. Therefore, strategies of avoidance of basic conceptual metaphors force viewers into their own personal narrative worlds. This opens up creative freedom for the artist. By creating and then organizing perceptions in space and time, she can deliberately play not only with meanings but also with viewers' experiences. This means she can put viewers in action.

In the planning of *Wolkenkuckucksheim,* artist/co-author Weissensteiner determined that the screens at the office doors would be objects to be looked into at certain times. However, the images would not attract the viewer's attention; rather, the viewer's attention would attract the images. Webcams with facial recognition technology detect when a face is turned toward a screen and lingers for a specified amount of time (Fig. 4). Unpredictable images then emerge, referencing conceptual blending. The screens, as office doorplates, are placed where many people have to stop for various reasons. This time slot is used to engage the viewer by displaying images (Fig. 5). Thus physical objects, computer programs, theories, image structures, color schemes, display modes and time slots become organized into a new syntax—the syntax of *Wolkenkuckucksheim.* Viewers are urged to build up conceptual blends based on familiar mental spaces but have to develop complex blends that are new to them.

Viewer activity has been debated among artists since the beginning of the 20th century. As technology advanced, artists' interest in viewer participation ultimately turned into fascination with interactivity [14] and related critical reflection. Information artist David Rokeby points out that an interface "inherently constructs a representation of the user. The interface becomes a distorting mirror" [15]. Narrative theory also identifies the implicit reader as image of the intended reader in the narrative structure [16], insofar as a narrative structure is set up in a way that requires the reader to produce a certain emotional behavior [17]. The structure of interactivity can also be revealed and analyzed with the tools of narrative theory [18]. Just as

**Fig. 3.** ***Wolkenkuckucksheim:*** **Viewers agree on the basic metaphor of movement, that is, the change in perceptions. (© Elisabeth Weissensteiner)**

**Fig. 4.** ***Wolkenkuckucksheim:*** **webcam with face recognition technology. (© Elisabeth Weissensteiner)**

authors write their texts, the information artist draws the interface of the machine—both are structures of perceived objects. Both make readers' or viewers' minds produce various conceptual blends. This makes artists believe themselves to be in control of the viewers' minds. Viewers immerse themselves in visual art just as readers lose themselves in fiction. Simply by constructing the interface, the artist makes the viewer do what the artist intends. Digital technology lends itself in a particular manner to orchestration. As an artistic material, digital technology is not based on body experience but can nevertheless be employed in perceptible narratives. It can be incorporated in spatial and temporal arrangements of objects and become an effective tool in disorienting viewers' basic conceptual metaphors.

*Wolkenkuckucksheim* viewers idle in front of a screen, finding themselves relating to a computer (Fig. 6). They expect interactivity, as they are computer users, but they are not invited to do anything. They linger for a while. Unexpectedly, images appear, transforming slowly into each other. Viewers may turn away from the screen, but when they turn back the screen is empty. Viewers cannot revisit any of the previous images. Every time a new series emerges. Thus, some viewers feel urged to hold the picture in view by attending to the screen. Their experience is that they must not break their gaze. This again draws upon a basic metaphor: attention as holding on to something with one's bare hands. However, as there is no request sent out by the artwork, there is no confirmation of the viewer's conclusions.

A gap remains between the artist's interest in being understood and her interest in making people generate new meaning. Duchamp once described this gap as "the personal 'art coefficient,'" which "is like an arithmetical relation between the unexpressed but intended and the unintentionally expressed" [19]. As understanding rests on conventionalized conceptual metaphors and on the literacy of the viewers, a narrative consisting solely of conceptual metaphors would prohibit any discourse. Nevertheless, if a narrative did not contain any basic conceptual metaphors at all, viewers would probably not even realize that it was a syntactic structure. In order to develop new conceptual metaphors, the challenge of a deviation from basic conceptual metaphors is needed. This makes the artist interested in staging an arrangement of perceptions that trigger as many new conceptual metaphors as possible while not losing viewers [20]. There is no single or optimal determina-

**Fig. 5.** ***Wolkenkuckucksheim:*** **Unpredictable images emerge, referencing conceptual blending. (© Elisabeth Weissensteiner)**

**Fig. 6.** ***Wolkenkuckucksheim:*** **Viewers cannot revisit any of the images. (© Elisabeth Weissensteiner)**

tion of the personal art coefficient; every artwork calculates it anew.

In the Cartesium lobby, viewers watch the two larger screens. Images displayed on these screens transform extremely slowly (Fig. 7). The emergence of a new image from an existing one is rarely detected at first. After a while, however, changes in a multi-layered image are noticed—but the nature of the pictures that appear cannot be agreed upon. Every viewer perceives a very personal image. As viewers continue to discover ever-new images on the screen that cannot be agreed upon, even the connection to the machine as the agent generating the pictures may become unhinged, as viewers no longer can decide whether their perceptions are pure imagination or reflect depictions on the screen.

## A Scientist's Approach: Using Artistic Metaphor for Scientific Inquiry

The *Wolkenkuckucksheim* installation has become an object of curious inquiry about the interaction between perception and cognition in a changing environment. This unusual installation has led to a number of observations that may give rise to interesting insights into cognitive processing, including perception, conceptualization, memorization and knowledge retrieval.

Most visitors to the University of Bremen's Cartesium notice the unusual photographic compositions in the lobby as an art installation, but do not notice, as they rush through the building, that it is a dynamic installation. Upon returning to the lobby, visitors sometimes notice that a different image from the one seen before is displayed on the screen; but they rarely notice that slow changes take place before their eyes. Only when they take time to actively inquire into the content of the images do they notice something strange about them besides the unusual blend of photographs. Usually observers must briefly turn away from the screen in order to notice that the image has been transformed. The interesting aspect, however, is that—unlike at the smaller screens by the office doors—the dynamics of the visualization at the screens in the lobby are not influenced by the presence or attitude of the observer. It is the mind of the observer that appears to hold onto the stability of the image, as it cannot determine any particular entity that has changed (Fig. 8).

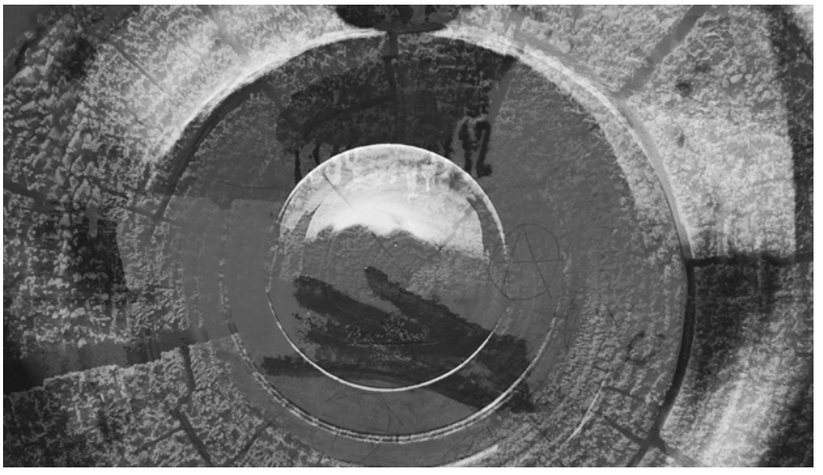
Conversely, visitors who have been informed about the slow transformations of the images in *Wolkenkuckucksheim* have reported seeing changes in the images even when the computer behind the installation has stopped transforming them. Due to the blend of a total of four original photographs, each subject to an interpretation of its own, the observer looking for change will find change by attending to different motifs in the different overlapping image components.

Another stunning observation was that after more than a year of routinely encountering the images on the screens in the lobby, viewers did not find that the image sequences became boring, even though they are composed of only a few hundred originals. We would have expected the images to become familiar to the frequenters of the building such that they would no longer be interested in looking at them. This, however, is apparently not the case.

Below we attempt to provide explanations of the phenomena observed above in terms of underlying cognitive processes.

"Cognitive agents"—as we may collectively refer to human and artificial cog-

**Fig. 7.** ***Wolkenkuckucksheim:*** **The lobby screens show extremely slow transitions. (© Elisabeth Weissensteiner)**



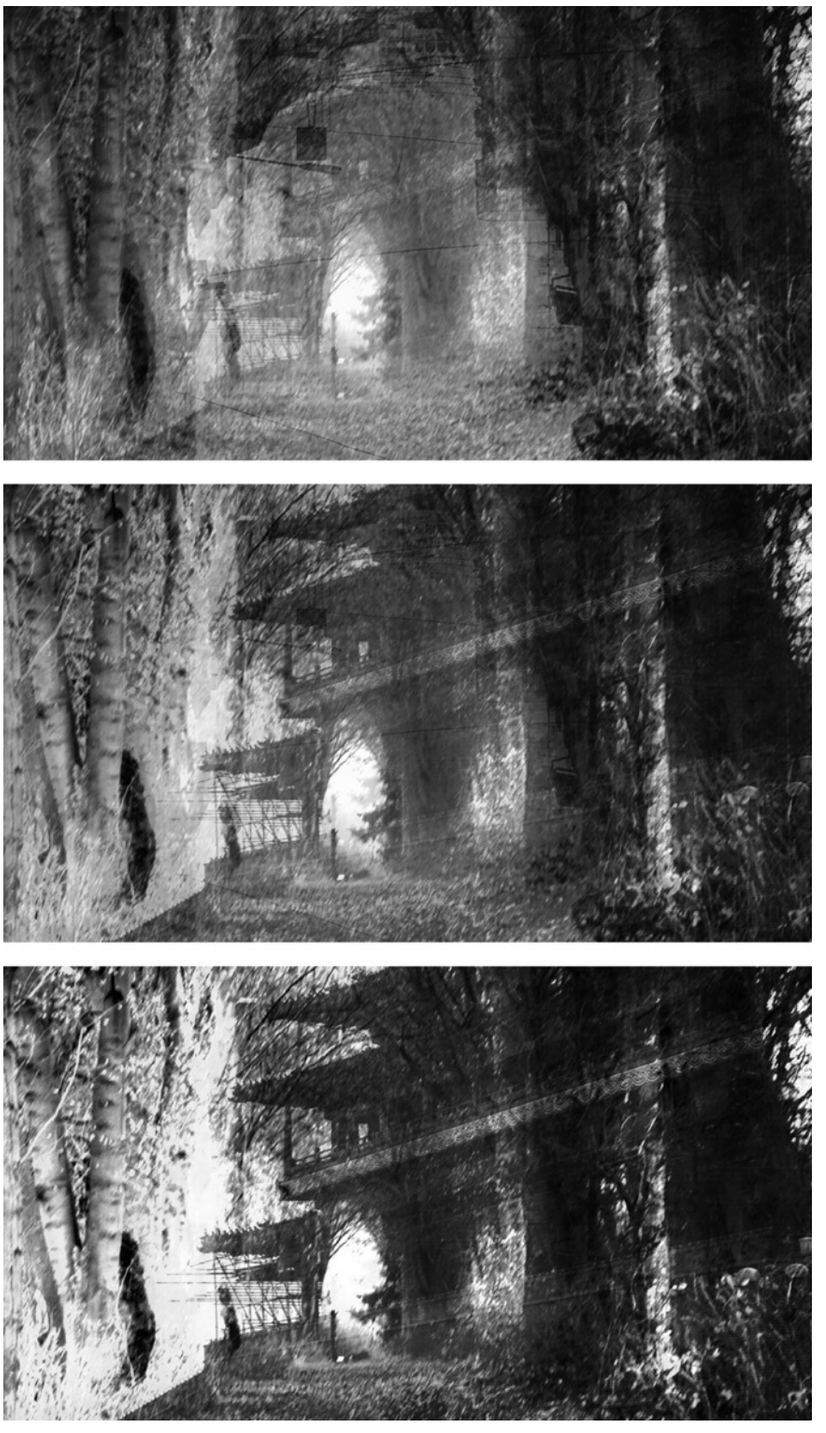


**Fig. 8.** ***Wolkenkuckucksheim:*** **Three moments of a** ***Wolkenkuckucksheim*** **image sequence. (© Elisabeth Weissensteiner)**

nizers from the viewpoint of cognitive science—are highly trust-dependent systems. For example, a person who cannot trust in the persistence of the floor that he saw just before putting his foot down would be hopelessly lost in his environment, because he would feel insecure. People who have experienced earthquakes will understand this point. Cognitive agents depend on the validity of most of their memories of an environment; they will focus their perceptual attention on aspects of the environment where they expect changes against the stable background. For example, whereas we expect the ground on which we walk to be stable, we expect vehicles possibly to move; thus, as traffic participants, we focus our perceptual attention on vehicles and assume that the roads will stay where they were when we last saw them. For safety reasons, we develop ways of mentally registering the movements of one to several traffic participants even when we do not actually look at them. These movements are only relevant to us if they take place at a speed that might lead to a close encounter or collision while we are present.

Extremely slow changes in our environments are cognitively irrelevant, for the most part, and we neither notice nor register them. Accordingly, we usually do not expect them either; it is a cognitively economical assumption to believe that objects in our environment will not change unless we have specific reasons to believe otherwise. In *Wolkenkuckucksheim*, changes are very subtle and very slow; they take place across the entire image simultaneously, in a way comparable to changes in lighting conditions in the environment, which we typically do not notice. The change acts as a background phenomenon for which our perceptual system attempts to compensate rather than as a foreground phenomenon that our perceptual system attempts to interpret. When we observe the transformation of a *Wolkenkuckucksheim* image, from one blending stage to another, everything that was in the image a little while ago is still there—only a bit stronger or weaker. However, this is a very common experience even with static images: We do not recognize all objects in an image simultaneously. Image understanding is a gradual process, and an object that we do not see at first becomes more prominent to us once we recognize it. We are so familiar with such perceptual experiences that it is simpler to attribute them to the nature of our perception than to an ever-changing environment.

When we turn away from the screen and turn back, however, we apparently engage a somewhat more involved perception and cognition process: We reassess whether the world is still the same as it was when we last saw it and we may consider the global change in the appearance of the image in comparison to the first imprinting of the image in our mind. Why can we be led to believe that something has changed in an image even if it has not? Again, our gradual recognition process does not allow us to distinguish between changes in the image and changes in our knowledge about it; thus, if we have good reason to believe that there are changes in the image, we happily attribute our changing insights into the image to changes in the world

rather than to our perception processes. In other words, our own actions in the environment strongly influence our expectations and perceptions.

Why is it that the images in *Wolkenkuckuckssheim* do not appear very familiar to frequent observers of the artwork in the lobby despite their fixed sequence and limited image repertoire? The reason may lie in the fact that our memory of images is largely categorical rather than continuous. Photographic memory is very storage-intensive, and it is impossible for people even to remember correctly the details of images that have left important impressions on them over a lifetime. However, it is very important for us to recognize scenes and situations that we have seen before in order to make intelligent decisions.

Human cognition has developed an intelligent approach to dealing with this dilemma: Although in normal people photographic memory persists for only a very short time (less than a second) in our perceptual system, we have a stunning capacity to recall and identify from memory images with which we have been presented [21]. The brain needs the perceptual image information to calculate stable images as bases for interpretation. After this is done there are much more economical ways of representing the image content: The recognized objects and their spatial arrangement can be categorized, generalized and connected with prior knowledge.

Therefore most of us cannot correctly reconstruct detailed images of what we have seen. This is well exemplified by change blindness experiments [22], which show that participants overlook elements in a series of perceived events. Furthermore, change-detection research differentiates between concepts of change and shows that focused attention is needed to identify change. This strengthens the assumption that the calculated image representations consist only of selected features [23].

What does all this have to do with our perception of *Wolkenkuckucksheim*? As we do not remember detailed images but rather some interpretations of the specific blend of images we may see at any given time, we may actually see a much larger variety of scenes than we would expect to on the basis of the constituent originals. Due to the gradual blending between the original photographs, at any given time some objects in the resulting image may be more prominent than others, and the scene perceived may be categorized differently than when the blend of the same photographs is seen in a different blending stage. As a result, a large number of scenes may be perceived, and the overall repertoire of images becomes more varied and interesting.

This latter effect appears on the smaller screens next to the office doors (Fig. 9) to a lesser extent than on the large screens in the Cartesium lobby. The reason is that on the small screens only two-fold image blends are generated, while on the large screens, the blended images are themselves (static) blends of two images. As a consequence,

**Fig. 9.** ***Wolkenkuckucksheim:*** **Two-dimensional array of constituent images and their neighboring candidates for image transition. (© Elisabeth Weissensteiner)**

it is considerably easier to recognize the depicted entities on the smaller screens. The interest of the small-screen image sequences results from the variability in their transitions, as the image sequence is not completely predetermined. Thus, while on the large screens the moment of encounter may have an imprinting influence involving the scene that is seen, on the smaller screens the fascination results partly from the indeterminacy of subsequent transitions.

## Conclusions: Calculating the "Art Coefficient"

*Wolkenkuckucksheim* uses components of the spatial, temporal and hypothetical environment of the Cognitive Systems Group in the Cartesium building at the University of Bremen to stage a narrative. This narrative is fitted within the familiar narratives of the resident scientists' everyday lives. Because it both reorganizes and alienates elements of the perceptual habitat of the group, it triggers indeterminacy. As new narratives cannot be forced onto the viewer's mind but can only be suggested, it triggers very personal narratives that cannot be confirmed by others. Thus cognitive theory, as part of the artistic inventory, becomes an individual metaphor; literary theory, in turn, provides elements for the syntactic structure; and technology turns into an enhancer of the deviation from basic conceptual metaphors. Thus, *Wolkenkuckucksheim* acquires an individuality and avoids becoming a model for a cognitive phenomenon. Instead, it guides the viewer into uncertain, self-driven, interpretive imagination and provides a space for creative experience.

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