



Augmented Reality Art and Proprioception: Towards a Theoretical Framework

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Abstract

Augmented reality (AR) technologies illustrate the paradoxes and promises of the mechanisms of identification, simulation, and imagining that increasingly impact lives and experiences of a contemporary human. Augmentation implies a layer of information (visual, textual, auditory) that can be called to appear or disappear on the user's screen and correlate to the objects or situation in actual environment. In what follows, I focus on the theoretical framework that informs the aesthetics, working principles and critical potential of AR-based artistic projects. I will discuss the specific mechanisms AR projects use to explore the effects of appearing and disappearing, relations of interiority and exteriority, the visible and the tactile, particularly in their relation to the feeling of proprioception.

Keywords

Augmented reality, proprioception, body-schema, body-image, sensorium, mixed reality, operability.

The conceptual strategy of AR art is to display a layer of the imaginary over the natural visual field; to intermix the real and the virtual; to make visible and "feelable" the surrounding environment in its spatial depth; and to indicate the potential for modification and intervention. The virtual here is always an addition to the already given: it implies a doubling of realities. AR interfaces are not simply windows and displays of information to navigate. They are operative: manipulating the object on the screen may be correlated with a mechanical device that maneuvers objects in the real world. This distinguishes augmented reality from virtual reality: with augmented reality there is a continuity between the physical and the virtual, the "real" does not disappear, instead new imaginary objects are projected onto it. With the experience of AR, the optic serves as a trigger to instigate specific proprioceptive feelings, e.g. anticipation and desire to experiment with new bodily modes of control. Such an interface challenges the pre-given conceptions of presence, and opens up to the embodied exploration of other potential modalities of existence and manifestation that have to do with tighter feedback loop connections between the inside and the outside, feeling and thought.

The claim behind AR art is often emancipation of the viewer's ability to discern the constructed nature of reality,

allowing them to see alternative interpretations. The potential endlessness of the layers of imaginary figures could be considered an illustration of Jean-François Lyotard's idea of the intrinsic "density" and "thickness" of the visual image, and so of our sensorium in general. The proposed means of fidelity – 3D images inserted in real time within a certain localized frame – may in the end not be as convincing as they are believed to be (e.g., because of the framing itself). Yet this technology furthers the conversation about the ontological (and aesthetic) status of the virtual image, its effects and affects, a discussion that has been recently hyper-activated by the advent of Oculus Rift VR., et. al.

Duplication of reality through adding another, imaginary layer has a productive effect: however arbitrary and even absurd, the effects of the virtual presence offer a new perspective that makes one rethink the status quo of spatial relations and the connotations behind them. An image on screen becomes a medium of its own, with its own agency, a projection surface for new meanings and new types of connections. What is produced is a fresh understanding of space and a sense of *co-presence*, i.e. the presence of something that leads beyond an individual experience.

The examples can include the projects by artists, associated with the Manifest.AR platform, famous for their interventions at the Venice Biennale in 2011, at MoMA, Occupy Wall Street, as well as other actions involving politically charged statements (location-specific virtual replacement of iconic monuments, such as the Statue of Liberty, with provocative alternatives). A predominantly formal exploration of how 3D illusion transgresses the border between immateriality and materiality and becomes operational and experiential may be exemplified by *Fractured Visions* (2014) by Tamiko Thiel. Reminiscent of avant-garde formalist experiments, the project attempts to model optical experiences of people with a rare disorder (or rather a symptom) – palinopsia, an effect of multiplication and repetition of images in the visual field in a form of superimposition, 'trailing', 'cascading', etc. The image of the iconic London Shard and buildings around it multiply and perseverate in the spectator's field of vision. The work aims to imagine an alternative type of vision, giving "the sense of being 'enclosed' in a spatial, animated visual hallucination." [1] The scientist and clinician collaborating on the project (Dominic ffytche, KLC Institute of Psychiatry), noted that AR helps to reveal palinopsia's dynamic nature –

the point of gaze, changes in fixation, the timing in relation to eye movements, the transition in and out of perceptual consciousness of the palinoptic image.

While "Fractured Visions" is about the transformation of the perspective on existing objects, Will Pappenheimer's *Large Reflector* (2013) is a virtual object – a sculpture with rotating mirror panels that instead of reflecting the current surroundings, shows the 360 view in Google Street view of the same park location. This mediates the view in a double way, locating the viewer between two worlds.

Finally, an example of the conceptual and critical usage of AR is *blemish* by CONT3XT.NET, a group of Vienna-based artists, that was presented as part of the "Invisible Pavilion" during the Venice Biennale 2011. It addresses the very medium of visual production in the digital age and its elementary unit – the pixel (in this case defective, dead), taken within the larger context of the institutional politics of image production, representation and circulation in the world of global contemporary art. *blemish* focuses on the structure of such a potential image and its weaknesses, the blind spots, emphasizing the unstable nature of reality itself and the semi-virtual nature of art. The critical dimension is revealed here through the physical experience itself – AR exploration of the renowned site of art consumption.

These projects may not be the most typical AR art examples in that, besides Pappenheimer's work, they do not fully realize the potential of the 'independently' existing imaginary objects. Yet, they are critical of both *how* and *what* is being seen, as well as of the figurative approach to reality in general, its unsteady and yet regulated nature. All of them accentuate the experiential dimension, which would not be possible without the embodied quality of perception of AR.

It can be said that the presence of the virtual object, or the transformation of vision, like in "Fractured Visions", is a pure visual effect. In all these cases, the event in its sensory certainty would be impossible without visual perception. It is viewing that causes the virtual to manifest itself both in its appearance and in potential action. For Lyotard, what is important in the work of the visual (or the figural, in his terms) is the act of manifestation, of the showing. He distinguishes the figural from language, i.e. from the discursive regime of signification and meaning construction. The figure gives language "density" and "thickness," as well as both the content and the very ability to express. Lyotard defines expression as a "presence of meaning" that appears on the "surface of discourse through effects." [2] What is shown in "expression" is the distance, the gap between the sign (the conceptual), the object (the sensory-sensible), and the space itself, which is "an order of coexistence." [3] In the case of AR, effects of a distorted or enriched image of the environment refer to the meaning that arises in the space between the virtual and the physical, mathematically constructed and intuitively perceived. The conditions of these effects have to do already not only solely with the visual, but with the distribution of meaning

within the space, i.e. with a *potentiality of space*. AR interfaces invite the viewers to novel perceptions and interactions within the given location, but also within the space where the processes of signification and "making sense" happen (what is "expressed" is both on the screen and in how the screen is being operated).

The "manifestation" of the imaginary figures is triggered by gesture: the gaze itself becomes a "gestural gaze" (P.Lichty). A slight change of the angle of view can make the object appear or disappear. The illusionary line of connection with it is controlled by the beholder's *movements* that activate it by discovering its very existence. For instance, in Pappenheimer's work certain sides and "mirror" images can be accessed only from a particular angle, just as a real sculpture should be explored from all the sides through walking around it. Unfamiliarity of the object, or the visual effects over the existing object (as in *Fractured Visions*) intrigues and stimulates curiosity and desire to engage further. As a result, the engagement is not so much with the illusory virtual, but with the actual environment, be it the geometries of a city, its representations, or the world of art (never purely concrete and local). Individual gesture and movement involved in AR art are a crucial part of a dynamic emotional experience of location, introducing additional, more improvisatory and embodied spatio-temporal dimensions that transcend veridical cartography. Media content and interaction are resituated into the real world and thereby into everyday action, incorporating techniques of mixed-reality construction.

The concept of *proprioception* can be particularly relevant here, as it encompasses the complexity of perceptual relations within both the exterior and the interior of the body. The term "proprioception" comes from Latin *propius*, or "one's own", "individual", and *capio, cepi* – "to receive", "to perceive". It implies a sense of one's self felt as a relational unity of parts of the body most vividly discovered in movement and in effort employed in it. With additional stimulation and training of this sense, what changes is not only perception of external reality, but a sense of one's self – becoming more fluid and porous. A sense of proprioception relies on positionality, which suggests a subtle equilibrium between a center (our individual bodies) and the periphery (our immediate environments). The key is that the border between the internal and the external is not defined by the boundaries of the body, but is rather internalized: the outside feels as "one's own" (and this is exactly what induces the sense of presence). What makes proprioception distinct from other senses is the fact that it does not create a sense of an external object. A feeling/sense, it is not bound by sensible forms that would serve as means of objectification and externalization. In a way, it can be claimed as being the closest to what the sensory itself is [4]. Indeed, opposite of an object-based perception, it refers to the very relational structure of the body itself, irrespective of the "exteroceptive" (tactile, optic,

acoustic) or "interoceptive" (visceral) dimensions of sensibility. It is not surprising, then, that pure relationality finds its most relevant location in the motor realm, being "the sensibility proper to the muscles and ligaments." [5] The produced effect is a *meta-stable* state defined through its relations to other possible states, a point-in-motion, position "born in movement, from the relation of movement towards itself." [6]

Alva Noë develops a similar assumption about perception more generally. It unfolds in time through movement and thus has not a passive, but an active modality. The enactive approach allows him to incorporate elements from both the qualia theory (according to which sensory modalities differ qualitatively) and the 'proper objects' view (each feeling corresponds to particular object, like sound for hearing, color for vision). Sensory modalities may be different depending on the nature of the object and its appearance, but at the core of all senses lay sensorimotor skill.

In order to make this applicable to AR (which is still primarily a visual technique), we need to understand the role of an image in proprioception. It is the basis of any type of perception that the mind constantly compares images of the outside world with the ones already received and processed. The difference is in which organs are responsible for this processing and comparison. In case of proprioception, it is not either vision or haptic sense, but a more complex mixture of all five senses that engage the whole body (and the feeling of a body as a whole). Brian Massumi describes proprioception as "spatiality of the body without an image," which is exactly because it "registers qualities directly and continuously as movements". [7] How, then, can perception of images be proprioceptive? What does AR technology add to this?

The questions around mechanisms of perception and the role of images in it have long been a focus of phenomenological tradition. The word "image" is referred here not so much to the perception of an outside reality, but to self-perception. For instance, Maurice Merleau-Ponty distinguished between a body image, which treats a body as an object of intentional consciousness, and a body schema, where a body has a 'pre-reflective function' and emerges from the "operational perspective of the embodied organism". (Analogous distinction is made by philosopher of extended mind Andy Clark in his analysis of a body image as a conscious construct and a real body schema as nonconscious configuration). "Image" here stands for a socially exchangeable trope, and the challenge is to return to the "unmediated" and more "authentic" experience of the self.

A productive way to look at this challenge can be through the perspective of an Austrian psychiatrist Paul Schilder, who (long before Merleau-Ponty and Clark) emphasized the dynamic relations between the two types of images of subjectivity and (what we can call) the role of chance and potentiality in them. For him, "the body image is not only a picture of the body but also an anticipatory plan for the detailed movements the body must undertake

in order to act," the plan for movement which is "neither conscious, nor unconscious, but preconscious, that is, capable of being made conscious." [8] This helps to explain the nature of proprioception as the field of potentiality preceding actualization. The potential, preconscious movements and the image underlying them can be compared to what AR artist Patrick Lichty describes as a "vectoral gesture" – the procedure of locating the virtual object in the site of the intended audience, which is done with the help of "gestural lines of intent", imagined gestural operations of the future spectators. In order to be perceived, virtual objects first need to be placed, *in anticipation* of their later discovery. Despite this being a procedure involving complex calculation and thus strategizing, the fact of anticipation of the *potential* users and their positions reveals a new dimension in proprioception – as a feeling of the collective. The subjective perspective is projected here onto the field of intersubjectively shared possibilities.

AR images aim to interfere in the communicational chain, a network of signals traveling and exchanging information within the body-mind complex. Thiel's *Fractured Visions* can be a curious example: unlike most of AR art, it does not create an object and instead simply alters the perspective onto the existing objects, thus, pointing not at the object, but at the subject of perception. The impression is that if something changes, it changes within you – as if the image was appearing not on the screen, but within the eye itself. This makes one connect more closely vision and movement and anticipate bodily the next *bodily informed* image. It is this kind of embodied anticipation that can be called proprioception in relation to this piece.

As Massumi explains, proprioception is an abstracting mechanism and has a special relationship with thought. Building on all sensory modes, proprioception is never one of them and instead is "the mode of experience of the amodal as such." He refers to Daniel Stern's concept "activation contour" to stress that what is in common among the different modes of perception is a rhythm. But rhythm itself is *amodal*:

"it is the Abstract shape of the event as it happens, across whatever modes it happens with. It is the immediate thinking-feeling of nonlocal linkage. ... Proprioception is not only abstracting. It is self-abstracting: it is by nature recessive, always already slipping away behind the other sense modes to the nonconscious limit of experience, where sensuous experience rejoins the pure activity of thought." [9]

For Massumi, the borderline (or the "contour") between the sensuous and nonsensuous, the visible and the invisible is discovered through movement. Movement produces "relational reality", "the suggestive force of the shared nonsensuous experience". He refers to a cognitive philosopher Albert Michotte, who explains movement as having the uncanny ability "to survive the removals of its object" – a perceptual feeling without the actual perception. Perhaps, what is left after the "removal of the object" is exactly the "pure thought" and a sense/feeling of "relational reality". The question is, then, how technologies participate in trig-

gering and enhancing this sense, and what mechanisms are involved.

In case of AR, a slice of visible reality is "taken out" and replaced (or rather superimposed) with an alternative artificially created image. The construction of that image (and the resulting illusion in the perceiver's eyes) is based on calculation, i.e. process of comparison, establishing relations between the abstracted data. This procedure by itself is nonsensuous and yet it relies on the perspective of the potential perceiver, on his/her body movements. So it is the movement that has to be preprogrammed and that later would activate the alternative reality. In the experience of AR the viewer is confronted not just with the virtual image, but with the image of the virtual, with the nonsensuously (analytically) preestablished relational structure. What the viewer is left to do is only to match their own sense of "relational reality" with what an AR producer had set up.

This adds a special dimension to the conceptual AR art projects, such as above mentioned *blemish*. The defective pixels represent the blind spots of the art world, but they also point at the potential mismatches between people's expectations (e.g. about the images they are to see) and what they are given. Technology is used here to give a critique of how images are being treated in the dominant art system. Yet, this questioning of image operations can be addressed to how blemish, a dead pixel, itself is made to operate. Blemishing the traditional kind of image, i.e. "removing the object" (in a sense of Michotte), does not let us escape the "image" of "relational reality" that we are dependent on in order to receive this critical message: the possibility of seeing these black dots is already preprogrammed, our individual perception structure – pre- envisioned (if not by the system of art, then by the machine). But to receive this message would mean to have the "sensuous experience" to "rejoin the pure activity of thought" – to feel thought, to bodily experience the very principle, the flexible structure of your own perception returned to you through the AR apparatus.

Aspects of proprioception – such as relationality, opposite to exteroception (object-perception) or interoception; the sense of potentiality and meta-stability with movement as its core; and finally the abstracting capacity – enrich and challenge our understanding of the experiential and conceptual potential of AR art. In exchange, AR technology – with its engagement of both visual and haptic senses, the virtual and the actual, intuitive bodily movements and pre-programmed "lines of intent" – invite expanding the meanings of proprioception by applying them to the sphere of human-computer interaction. Among the questions to be asked further are: What is a movement that cannot be pre-programmed (imaged by the machine) and yet produces effects? How are the criteria for the relation between the real movement and the virtual image defined? Where is the borderline between the human and machinic control?

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