Abstracts from the Spectra 2018 Symposium Part 3

Nano-Optics

TOPIC: NANO-OPTICS

INVISIBLE WORDS/INVISIBLE WORLDS

Elizabeth Day


*Invisible Words/Invisible Worlds* incorporated images of carbon nanotubes that I observed through a Scanning Electron Microscope during recent work as artist in residence at the University of Newcastle, Australia, in the Department of Physics with nanotechnologist Xiaojing Zhou of the Centre for Organic Electronics. The paper focuses on the attempts that I made with Zhou to develop ways of intervening at a nano scale to produce text as we attempted to manipulate carbon nanotubes into text formations. I wanted to extend to the level of the nano in my feminist art practice's aesthetic forms and rhizomatic figurations, its theme of migration. At the same time as I was working on various historical locations that spoke of the traumatic transplantation and imposition of British law and the prison on the Australian landscape, based on a reading of Karen Barad to consider questions of the impact of ethics and empathy at a nano scale.

Zhou had seen a connection between the rhizomatic root structures in my text “prints” and some of her tests with carbon nanotube growths. The paper discusses the extension of this collaboration with nano text to foreground the hyper-secretive unspoken worlds embedded in the history of the Parramatta sites and the significance of the latticed root structures. There is a visual analogy between the carbon nano tendrils and an unravelled wool textile. The experience of this art-science collaboration enabled the development of poetic analogies of the imagery and developed insights for a site-based work.

Note

The full version of this paper is available in the online supplemental materials.

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See https://direct.mit.edu/leon/issue/54/5 for supplemental files associated with this issue.
SENSING NANOS

Toni Fröhlich, Raewyn Turner and Brian Harris

Humans fabricate many kinds of nanoscale materials for use in daily life [1]. Imagine if nano-enabled and nano-enhanced creations should enter the human body and converge with one’s inner world. The properties of nanocreations could change depending on where the nanoparticles were, within which individual host and which system. In one case, they might be hard and precise like a stone and, in another, soft and vague like fog. They could be anywhere at any time but far too small to be intuitively understood.

Sensations are caused by nanoscale quantum processes, since receptors for light, smell, touch, taste and sound originate from tiny quanta. So how can we understand this tiny world with our senses?

We are exploring the possibility of human beings sensing ultrafine nanotechnologies, in particular cross-sensing them as synesthetic objects that have the potential to react with cells and biomolecules and become lodged in the brain and the central nervous system.

Few studies have considered the effect of nanotechnologies on the central nervous system, their enduring electromagnetic forces and thermal vibrations. Because time plays an important role in all physical and psychological processes, we may not notice the disruption and transformations that follow the consequences of consuming nanotechnologies. Engineered nanotechnologies have never before existed in nature and may cause an alteration, a nano-enabled synesthesia.

Metal-based nanoparticles may interact with the nervous system [2]. We focused our attention on various personal care products used by many people. Certain brands of sunscreen contain nano zinc oxide and nano titanium dioxide. We also found shaving cream that contains nanoscale “Titanium CI 77891.”

Although titanium nanoparticles are defined in part by their intrinsic properties, their extrinsic properties in turn are determined by relationships.

Mammalian neurons and the potato share a systemic molecular convergence [3], so we placed personal care products on two side-by-side potato slices and filmed the interaction in time-lapse video [4]. We scripted the audio using synesthetic correspondences to facial expressions. The video was overlaid with excerpts from Plato’s Dialogues on relationships and the influence of friends in shaping one another’s evaluative outlook [5].

During our investigations, we developed a robot [6] to create foam faces by moving a nozzle connected to a can of shaving cream over the surface of a slice of potato. The position of the nozzle and the flow of foam were controlled using stepper motors, from drawings converted into G code. We are interested in being able to relate the character of the face to algorithmic changes in the line drawings. We found that the ambiguous shapes made by the foam coincidentally stimulated pareidolia and emotional interpretations.

This is a work in progress.

References and Notes

The full version of this paper is available in the online supplemental materials.

4 Information on Sensing Nanos can be accessed at https://vimeo.com/288979783.
6 Information on Foam Robot can be accessed at https://vimeo.com/311325015.

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LEARNING TO UNDERSTAND COLLABORATIVE PROCESS: THE UNEXPECTED OUTCOME OF WORKING ACROSS UNFAMILIAR TERRAINS

Deirdre Feeney

My paper presents a collaborative journey including physicists, electronic, mechanical and machinist engineers in the design and fabrication of optical image devices, namely a rotating mirrored polygon machine and a hollow lens system. I did not intend to embark on a collaborative project, holding the ideas as my own. But while learning different ways of seeing and knowing the world and communicating across the boundary of my familiar terrain of visual art, I realized that these ideas and explorations no longer belonged to a single or fixed terrain.

During this project I learned to see from a different point of view, while still retaining my own, and learned how the measured world of rational knowledge might fit into an expanded vision of practice-led research in visual art. I elaborate on how process, rather than end product, became key to my research and how during this project my studio transformed into a kind of interdisciplinary laboratory, with my practice transitioning from being singularly object-based to a wider concern for how objects interrelate within systems. Finally I recount how cross-disciplinary exchange caused a significant shift in my understanding of how artistic practice might meaningfully engage outside its own sphere.

Most obviously this change in perspective emerged from directly working with my engineer and physicist collaborators. But not only did my own creative research gain from these interactions, my collaborators also extended their knowledge through lateral problem solving outside their familiar world of designing and fabricating tools for scientific measurement. For example, during the fabrication of one of the key components of my devices—a 48-faceted polygon—machinist engineer Neil Devlin developed a way of using a diamond bit from a nano-lathe to simultaneously fly-cut and polish the multiple surfaces of the polygon, and electronics engineer Paul Redman learned new techniques for streaming image feeds onto translucent SLA LCD screens. By witnessing the variety of positive outcomes from the various collaborations, I learned that my creative research includes not only the viewer who comes to see the “final outcome” in a traditional art gallery setting but also any viewer or participant who is curious about how we engage in the world in general. This includes not only those immersed in the work within an expanded context of contemporary art but also those involved in a process of making, which inadvertently achieves a diverse spectrum of outcomes.

The hollow lens system optically creates and projects a moving image, incorporating old and new technologies such as condensing lens systems, LEDs, translucent LCD screens and composite hollow lenses, in which rising and falling levels of water are controlled by an electronic pump mechanism. These combined elements project a slowly changing image-light emerging from digitally streamed scenes on the LCDs.

The polygon machine, also an image projection system, serves to conjure a moving ghost. In addition to an optical lens system, this device incorporates an electronically controlled motor, rotating mirrored polygon and image carousel. It applies a precinematic technique of frame-by-frame optical mechanics to generate the projected moving image.

In the paper I elaborate on how working with physicists and engineers to develop the components for these devices not only introduced me to new materials and processes but expanded possibilities for ways in which to explore optical objects in my future visual arts practice.

Over time, the project developed its own dynamic, contributed to and shared by all who played a part. No longer simply concerned with my optical devices, I finally began to understand the process of collaboration.

Note

The full version of this paper is available in the online supplemental materials.

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