CHAPTER THREE

Motion

WOVEN TEXTILES MOVE AND CHANGE FOR A NUMBER OF REASONS. Some are connected to electrical circuits; others react to changes in the local environment such as temperature or humidity. Still others harbour instinctive material memory that draws them back to their original shapes. Movement can be mechanical – the result of flexibility or materials with contrasting properties, or triggered by the presence of electronic circuits. While enthusiasm for wearable technology seen in the past two decades has been tempered with pragmatism for the challenges of industrial collaboration, there exists a renewed engagement with the poetic potential of woven textiles. These woven structures make use of complex technologies, as well as the most basic inherent material properties, to become mechanically and electrically dynamic.

In the 1990s, dialogue with the Toronto craft community and specifically the Textile Museum of Canada sparked Canadian architect **Philip Beesley**'s interest in textiles. Geotextiles and netting offer the very basic approaches that underpin his experimental architectural work today. Recent investigations are part of the 'Hylozoic' series and refer to the concept of hylozism, 'an ancient belief that all matter has life'.[1] They exist as pulsing, vibrating, twitching environments capable of enveloping the viewer. Beesley's installation at the Canada Pavilion of the Venice Biennale in 2010 was described as: 'An artificial forest made of an intricate lattice of small, transparent acrylic meshwork links, covered with a network of interactive mechanical fronds, filters and whiskers. Tens of thousands of lightweight, digitally fabricated components are fitted with microprocessors and proximity sensors that react to human presence. This responsive environment functions like a giant lung that breathes in and out around its occupants.'[2]

These moving, ever-changing environments take architecture away from the permanent stuff of stone and cement and suggest in its place a future of porous boundaries capable of adaptation. 'I think woven structures can readily be described as a basis for the current work', Beesley declares. 'This work developed out of an extended dialogue with the master textile artist Warren Seelig, starting 15 years ago. In the 'Hylozoic' series, we're using a corrugated

OPPOSITE: Philip Beesley, 'Breathing Column' from *Hylozoic Soil* (detail), 2010. Laser-cut acrylic, mylar, latex, metals, custom electronics, 6m x 15m x 5m (6½ x 16½ x 5½ yd), Festival de Mexico.
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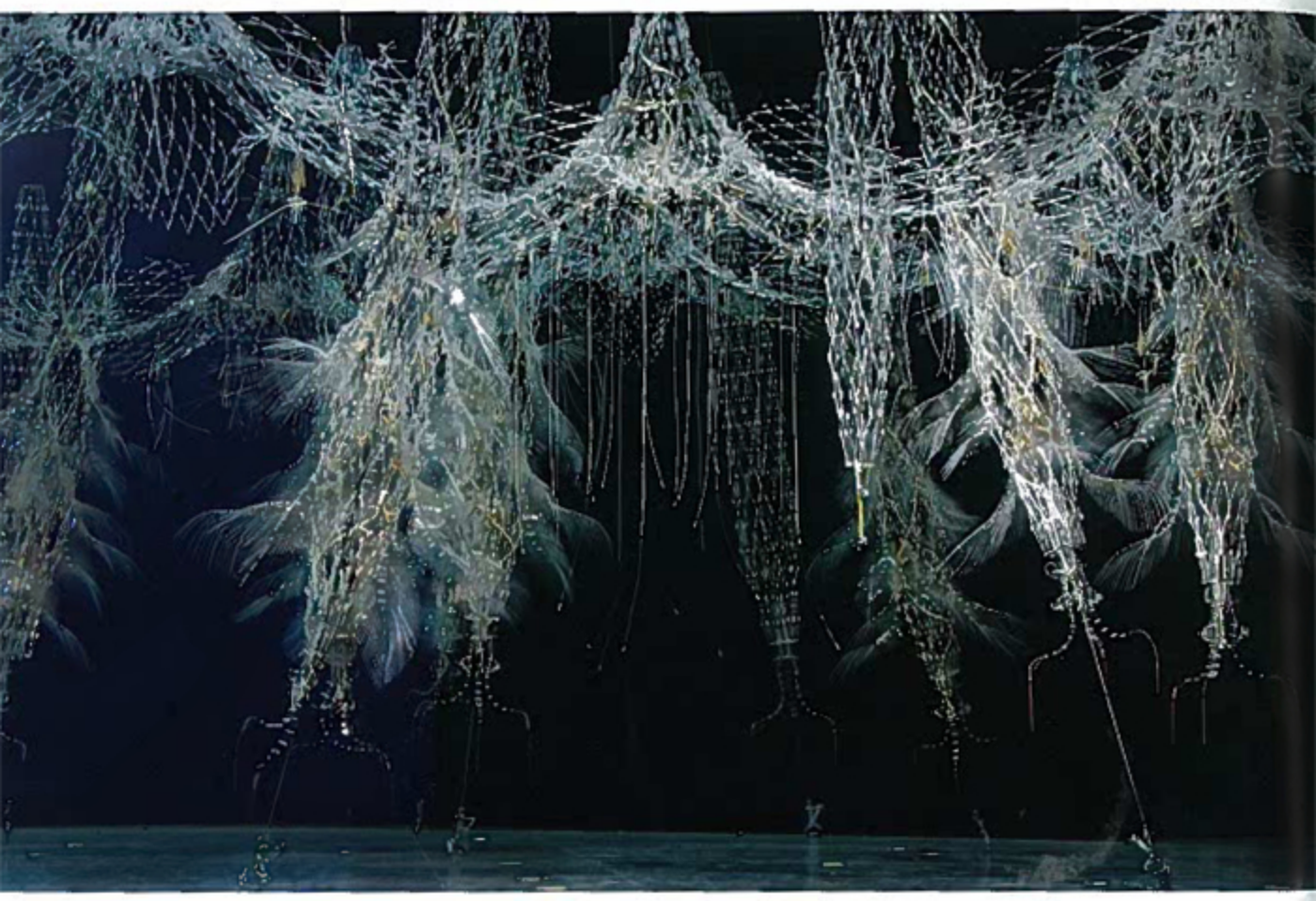

ABOVE: Philip Beesley, *Hylozoic Grove*, 2008. Laser-cut acrylic, Mylar, latex, metals, custom electronics, 4 x 10 x 3 m (13 ft 1 in. x 32 ft 10 in. x 9 ft 9½ in.), Ars Electronica Centre, Linz, Austria.
PHOTO: © PBAI

Philip Beesley, *Hylozoic Soil* (detail: overhead view), 2010. Festival de Mexico.
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diagrid meshwork ... acting out the same paths as fibres within a coarsely woven textile arranged on the bias ... I was searching for a flexible, "live" hand to the fabric where the material could span while still being capable of draping.'[3]

Early works by Beesley's team were constructed by hand with pliers and small tools, but confronted what he terms 'a cruel disparity of scale'.[4] Digital fabrication methods helped solve his extremely labour-intensive work. He is quick to admit that a shift in perspective around the potential of digital fabrication contributed to his research. 'The idea that the digital is insensitive and soulless turns out not to be the case at all,' he confides, 'there is a lovely physicality to it.' Because digital fabrication now plays such a central role in making the work, material choices are restricted. 'Selection of polymers and sheet goods tends to be driven by compatibility with the machinery. This new craft has a restricted range, but it is also tremendously enabling.'

Are these constructions alive – or semi-living? Beesley returns to cloth, explaining: 'Think of cloth as sensitive to the influence of the body and environment. There are three kinds of activity in our installations, each relating to textiles in particular ways and each moving progressively closer to definitions of life. First is a receiving function, akin to the way a gauze veil might float around the body of the wearer. In the same way that the draping function of a textile can be described as having a particular hand, our meshworks float and move in response to their surroundings, flexing with physical contact with viewers and to local movements of air. Second is an active, mechanical response where components operate in kinetic patterns. This response combines artificial intelligence and electrically driven mechanisms. It involves a dense meshwork of miniature components, arranged in complex interlocking tileworks that we design by using textile-based ordering systems. These include arrayed microprocessors organised like an organic neural net, integrated with gridded physical components. The flexible interlinking components employ tightly-nested tessellation patterns and tartan-gridded wiring and structural fibre organisations in densely woven arrays. Third, near-living chemical metabolisms are now being integrated into the environment, supported by artificial-life laboratories in the UK and Denmark. These fluid circulation systems operate by depositing delicate layers of material and by building up felted skins. These are currently housed within glass containers that run throughout the environments. With more development, we're hoping that fibres made from these chemical reactions can cover the meshworks and function as self-renewing architectural envelopes that can change and decay with the seasons.'

Describing general design principles that guide his project, Beesley says: 'The component meshworks are deliberately weak and fragile – they are designed to

share and shed their forces. Directly like the intermeshed structures of a woven textile, the system gains resiliency and strength by densely combining many small elements. Temperature, human occupation and environmental cycles all directly work on these sensitive components and the materials soak up that influence.'

Beesley respects the fact that it is a 'sympathetic viewer' who understands these responsive settings as intelligent, but posits that the reasons to pursue such poetic challenges are in fact quite tangible. They can enhance and support the environment as a cooperative layer in much the same way as we see geotextiles stabilising soil erosion. They can work to capture and process carbon in a way similar to that of a filter or lymph system. But as experimental forms, they are what he readily terms a 'mongrel space' and warns that these magical environments are currently 'far from equilibrium'.