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## Liquid Rock: Gathering, Flattening, Curing

Rachel Harkness, Cristián Simonetti and Judith Winter

*Reducing representation to writing does not bring one closer to the physical world. Writing should generate ideas into matter, and not the other way around.<sup>1</sup>*

Robert Smithson.

### Prelude

Over the last year, as the authors of this text, we have been working collaboratively to explore concrete through experiments with it as a material.<sup>2</sup> The following contribution has been formed around three gestures or movements that came to the fore as we worked the material together, namely Gathering, Flattening and Curing. By focusing on these gestures we propose an alternative story of concrete that seeks to complicate both its assumed solidity and its foundational role in the building of modernity.

In our first gesture, Gathering, we consider concrete as a concrescence or a ‘growing together’ of different materials and begin to question both its solidity and its supposed modernity. In Flattening, we reveal a tendency to smooth concrete surfaces which belongs to a view of history as the superimposition of flat squared blocks and relates to modern narratives of progress. By way of an etymological foray into the associated terms of curing, caring and curating, in the third and final gesture, we consider the nascent state of concrete as a way of thinking about resisting objectification, fossilization and the mythical promise of permanence. The article is written in the round, then, for we end where we began: with rubble, with aggregate, with elements, dispersed and gathering.

### Gesture One: Gathering

Concrete: fluid and foundational, molten and rigid, moldable and structural, ancient and modern. Dubbed ‘Cement rock’ and ‘Liquid rock’ – oxymoronic titles, both – it seems humankind has marveled at concrete’s nature for as long as we can remember. As the anthropologist Michael Taussig has put it, after Vitruvius, ‘You start with stone. You make a powder. And then in the process of building, you add



Figure 1. *Gathering (Concrete Experiments)*, 2015. © The Authors.

water and end up with a new form of “stone” in accord with the shape desired. It sounds like magic but we call it technology’.<sup>3</sup>

Concretes have been mixed, and working their magic, in one form or another for a very long time: archaeologists have found evidence of the material’s existence as far back as 6500 BC and the earliest recorded use of the material in Europe is from 5600 BC when people living along the river Danube, in the making of floors for their huts, mixed together red lime, sand, gravel and water.<sup>4</sup> Historians of the material write of its use later in time too, across the ancient world. For example, in around 100 BC, the Romans discovered how volcanic ashes from the slopes of Mount Vesuvius, when added to ‘slaked’ or mixed lime and wetted,<sup>5</sup> produced hydraulic cement.<sup>6</sup> In this sense, as John Prentice reminds us, its use was preceded by the Greeks, who used volcanic ‘tuffs’ from Santorini.<sup>7</sup>

Thus one origin story of concrete is that of volcanic beginnings, of powerful molten forces and the fallout from the eruptions of the earth. We selectively highlight such an origin tale to emphasize the fact that we wish to challenge the idea of concrete as product of recent modernity and, furthermore, the idea that concrete is simply solidity incarnate. We are doing so by taking the perspective of deep time and by focusing upon process. Our first movement or gesture, then, is to relay the sense in which concrete is a coming together of different elements and to begin to illustrate the way in which materials, such as concrete, are continually generated and dissolved through their relationship to the world and everyday life.<sup>8</sup> With Adrian

Forty, we argue that the modernity of concrete is constantly challenged by its volcanic origins and the craft of its making:

Concrete is always at risk of slipping back into its craft and earthbound origins, and only the constant vigilance of the cement and concrete industry preserves its soubriquet of 'progressive' through an aura of constant new developments and new inventions. Were this aura to vanish, concrete would lose much of its claim to be modern, and lapse back into the stock of 'traditional'.<sup>9</sup>

Concrete making is a gathering of elements, their resourcing and the pulling of them together into a routine of mixing and turning. The mix is the material ingredients, their weighting in proportion to one another, their fit for the purpose of the concrete, the continuous mixing required to keep the concrete in a liquid state. It is the context and setting, the labourers and their skills, the tools and the makings of forms. It is also that which overflows from the mix or gets cast off. Concrete is not a static, solid object, but rather is something created in and of the mix; a 'pattern of motion', to borrow David Graeber's terms.<sup>10</sup>

In our mixing experiments we resourced our bags of 'raw' materials from industrial buildings suppliers, noting the proportions recommended on the printed paper bag of Portland cement and the gradings of the fine and rough aggregates – sand and stones respectively – on their plastic container sacks. Our gathering expeditions took us to DIY stores too, where we mingled with other non-professional builders. Our tools accumulated over time as we realized their need: we graduated from found wooden sticks to purpose-made tamping rods; from cardboard forms, to sawn and nailed-together wooden boxes and, finally, readymade and standardized steel test-cube forms.<sup>11</sup>

We found ourselves amidst the labour of the process – that is, the labour so often missing from accounts of that which is built out of concrete. We felt the physicality of the turning and moving required to keep the mix from setting. On the scale that we were working our arms and backs moved the mix and took the place of the industrial mixer and its turning barrel. The three of us learnt to judge the proportions of each ingredient, not least by getting these proportions wrong at times. Through this experience we learnt of cement's 'intimate relation to water';<sup>12</sup> we began to sense its thirst.

The creation of the form into which we would then pour our concrete mix was actually a hugely underestimated part of the task at hand. The form, we realized, was the mirror image of our concrete projection: it was constructed upward, hollow and waiting. Even when we started to use a readymade steel mould, we still laboured over its construction and its dismantling to reveal the cured and solidified concrete within. The concrete, in contrast, emerged as if it had been grown within the mould, from the inside, out.

This concrete 'object', that we turned out into the world from its formwork, can be understood as an example of what Heidegger described as a *thing*; a gathering whose

entwined trajectories oppose the image of a self-contained *object* standing on its own. The idea here is of the “conrescence” of elements’, the coalescence or *growing together* of originally separate parts into something distinct.<sup>13</sup> As the anthropologist Tim Ingold has put it:

The object stands before us as a *fait accompli*, presenting its congealed, outer surfaces to our inspection. It is defined by its very ‘over-againstness’ in relation to the setting in which it is placed. The thing, by contrast, is a ‘going on’, or better, a place where several goings-on become entwined. To observe a thing is not to be locked out but to be invited in to the gathering.<sup>14</sup>

As concrete-makers we are amateurs. However, we did develop our knowledge of the process by repetition of the exercise, learning from our mistakes as we went along. Our stakes were low – we only produced a series of small slabs and cubes – but we still gained a sense of the way in which ‘concrete can fail as an architectural material if any component of its mixing, placement, or curing is incorrect’.<sup>15</sup> ‘Other disadvantages’, suggest architects writing on the issue, ‘include its weight and the complexities involved in the forming process’.<sup>16</sup> These are tangible disadvantages to the labourer who feels the ache of muscle and the balance of proportion. Also keenly felt are the slightly acrid smell of concrete-in-the-making, the harshly drying feel of it on the skin, the dampness of the environment and the granularity of the material as it mixes, highlighted by the rasping of the tools across it and the feel of the mixture in the hands.

Concrete poetry and the later Neo-Concrete art are both movements that influenced our choice of readymade steel form, also known as a ‘test cube’.<sup>17</sup> We wished to turn to the everyday, to the actual forms of concrete and to forms which were not abstract or removed from life. We chose to take a lead from the building-site reality of needing to test the quality and compressive strength of batches of concrete. More widely, throughout our experimentations we sought to remain with the material itself and its properties or nature. We wanted to focus upon the material sense or sensory engagement with materials. In a time when material engagements are perhaps too often being removed by the digital and technological, our approach is one that appreciates haptic material engagement and seeks to communicate its effects. Like the Neo-Concrete artists, we found ourselves relishing liquid rock’s process of conrescence and ‘growth together’ and the very heavy grounding for its metaphoric existence as firm and tangible, stable and manifest.

One history of concrete, as we saw above, speaks of volcanic origins. Another might be read as the one of *progressive modernity*: acceleration, speed and increased strength. We know of concrete’s foundational character, the anti-seismic uses of concrete and the possibility to calculate its tensile strength. However, it is the acceleration and take-off from these weighty foundations that is perhaps the most remarkable of concrete’s affordances: the experimentation with recipes and patenting of new mixes; the acceleration of hardening time and strengthening of mixes over the years; new admixtures bringing new properties; new techniques of concrete construction (such as that of its reinforcement with steel) bringing the rising and rising of

buildings, higher and higher into the skies. Reinforced concrete in particular – here again a composite of materials – has become a global metaphor for ‘progress’ and ‘development’. In the sociologist Zygmunt Bauman’s sense, concrete perhaps epitomizes a fixed or solid type of modernity.<sup>18</sup>

This progressive modernity is greedy and appears unbounded. As one architectural design textbook informs its readers, concrete’s use, meanwhile, is ‘limited only by its formwork’.<sup>19</sup> As Michael Taussig reminds us, modernist architects such as Le Corbusier made ‘the fact that it can be molded and shaped as liquid stone and therefore mimic many forms [...] into a virtual religion’.<sup>20</sup> We might venture that we have now moved beyond concrete’s worship into a period of its abuse. Either way, apart from the reasonably rare and celebrated cases of building artfully with concrete that don the pages of architecture magazines, today ‘concrete is normally used in large-scale projects, either with repetitive precast elements or with repetitive formwork that allows massive amounts of the material to be poured in place. In such typical use the emphasis is on quantity and production efficiency’.<sup>21</sup> Monumental, perhaps, but concrete is also prosaic and mundane.

On the modest sack of cement that we were using in our experiments, labels held surprising information about the huge carbon dioxide emissions that had accompanied the cement’s production.<sup>22</sup> As we gathered both our constituent materials and our knowledge of concrete making, we considered the routes things had taken to reach us: the cement for instance, the glue of concrete, had itself been through a constituting process of gathering together and then transportation across a great distance in order to reach us. No longer are concrete’s ingredients locally sourced.

The scale of the impact of concrete’s use is likewise so great that it is hard to imagine. As over two billion tonnes of concrete are produced every year and current consumption is estimated to double in the next thirty years, concrete cannot be discussed without a consideration of the global industries from which it comes and to which it is tied.<sup>23</sup> Geopolitics shape and determine its production and use. In his book, *The Culture of Building*, Howard Davis remarks on how the availability of concrete’s constituent materials can be influenced by cultures operating at this worldwide scale.<sup>24</sup> He notes that ‘[t]he production and pricing of cement (perhaps the single most indispensable product in modern construction) is controlled by a powerful international cartel’, and goes on to add that,

[s]ome of this remote and large-scale operation is genuinely destructive to the environment and exploitative of vulnerable local building economies. A rise in cement prices may mean the difference between a house and no house, or between a better house and an impermanent shack.<sup>25</sup>

However, as Davis also reminds us, concrete has democratized architecture: from horse troughs and fencepost foundations to driveways and bathroom floors, concrete

– mixable on-site – has been widely used by the small-builder and do-it-yourself enthusiast.

Part of the attraction of concrete to all of its varied users is likely that ‘it seems to demonstrate a temporal nature quite different from that of earth’ or timber: we tend to perceive it as possessing of a solidity and permanence beyond that of other building materials.<sup>26</sup> Concrete seems so waterproof and so strong. Its guileful ruse is to offer us a permanent fix, once and for all. Moreover, if we consider for a moment recent innovations such as ‘self-healing’ concrete, we could see current research and development as still striving to defy decay. The fact that concrete has promised security and control (through permanence, mass and strength) to those who would wield it can be seen all around us in today’s world. From providing protection from weather, rising tides and floodwaters, to defense against marauding armies or perceived threats of terrorism, concrete is often humankind’s choice material for these structures of separation, solidity and shows of strength.

### Gesture Two: Flattening



Figure 2. *Flattening (Concrete Experiments)*, 2015. © The Authors.

Characteristic of our experiments with concrete has been the impulse to carefully fashion and smooth its surfaces; an impulse which emerged almost as soon as we poured the molten material into its form. As we noted in the first gesture, concrete’s production process and its ultimate use depends as much on the construction and



success of this form or mould as it does on the production of the material-mix concrete. Often regular in shape, the formworks are designed to create structures with clean surfaces that are most likely bound by straight angles.

In our experiments, after removing the excess concrete and shaking the form, bubbles of air trapped in the mix were released and rose to the upper surface of the concrete cubes that we were casting. This still, exposed area – the top surface of the cube – was a site that invited us to further interact with the liquid material. That is to say, we perceived an almost instantaneous corporeal tendency to flatten the upper surface. These pre-reflexive gestures to smooth out any inconsistencies provided a sense of order and completion that seemed to seal the process of the concrete's containment, as if forever. Whilst troweling the concrete, we recognized our attempts to erase the traces of the very gestures that had flattened it in the first place. We felt ourselves striving to make a perfect surface whilst also recognizing the futility of our compulsion.

Flattening can be broadly understood as the creation of a homogenous and level surface through the application of pressure to – and the redistribution of – matter. It might be said to belong to a desire to build modernity along straight lines and, in this sense, could be perceived to be an action designed to impose order upon nature.<sup>27</sup> Furthermore, it could also be argued that, over the last century, the strength of nations has come to be measured by the amount of reinforced concrete used in their construction. In the race to achieve so-called 'development' and wealth, the fashioning of appropriately 'modern' concrete structures and surfaces has been crucial.<sup>28</sup> The flattening gesture's tendency to create a 'clear', *baptismal ground* upon which to assemble modern life has played a large part in this, and it resonates with a widespread understanding of history as the layering of flat horizontal surfaces over time.<sup>29</sup>

Following the tools of our experimenting, and in particular the humble trowel, another example of this removing of the process or traces of action can be found by considering the work of archaeologists. Unlike modern builders, who tend to trowel upward to create the dwellings of the future, archaeologists often trowel downward to dig those of the past.<sup>30</sup> In trying to access the traces left by people without disturbing them, archaeologists engage in what we might describe as *the art of digging enough*. In this exercise, erasing the traces left by the trowel becomes crucial to them, especially when they are recording features of their dig. For example, before taking photographs, archaeologists often trowel away their gestures and remove their tools, hoping to objectively capture the 'original' ground upon which people once lived. In doing so, they seem to forget that their actions not only helped them to uncover these surfaces, but craft them at the same time.<sup>31</sup>

Although archaeologists would not normally smooth arbitrarily the surface of soils as they excavate them, this crafting of 'objective' surfaces coincides with a long history of flattening in how geoscientists envision time; one which can be traced back to the beginning of stratigraphic thinking in the seventeenth century.<sup>32</sup> Preserved in how contemporary archaeologists illustrate history (as the superposition of squared blocks), this view can be understood as involving a dissociation of time and space



into vertical and horizontal dimensions respectively. Along flat grounds, accessible everywhere at once, horizontal movements involve travelling through space, whilst penetrating those grounds and accessing buried surfaces involves travelling through time. Somehow, however, the laying down of a flat top layer, or its levelling, also has an effacing effect. It seems to be within this 'ground zero' narrative that the flattening of concrete, and thus perhaps concrete itself, acquires its powers. Flat concrete surfaces have created new grounds upon which modern cities can grow, seemingly 'unencumbered' by history (and, often, by people). Keeping organic life at bay, they possess an impermeable solidity that hardly affords the circulation of oxygen. Their 'clean slate' is a smothering one.

However, through their pivotal role in constructions such as transoceanic channels, bridges and roads, concretes have also allowed 'moderns' to connect the world and to move across it at great and ever-increasing speed.<sup>33</sup> In the city of Brasilia, for instance, that icon of modern architecture and urban planning, we can see this made manifest. A new city built on ground perceived to be an empty plateau, but which would also have been levelled before construction, Brasilia was designed in the form of an airplane pointing towards the Atlantic. Incorporating an interconnected road system to facilitate continuous movement, this city was fashioned to allow cars to move freely and gather speed. It was designed as if to choreograph all its inhabitants, as they motor along in their lives, into the same journey towards 'destination: Progress' and the promise of development.

Drawing upon Bourdieu, in his analysis of the everyday practices that sustain social life, we might say that we citizens of concrete environments have been 'sliding from the model [or moulding] of reality to the reality of the model [or the mould]'.<sup>34</sup> There is a kernel of disruption pushing its way up through the concrete ground here though, for each flattening gesture, like the ones we produced in our concrete experiments, is based on the illusion that liquid rock comes to rest in perfect horizontality. This illusion is also that of the *smooth globe that cartography invites us* to believe in as we run our fingers across the surface of a map. It would only hold in a world where gravity does not exist. In the *gravitational sphere* that we actually live in, no fluid remains perfectly still: as long as the moon moves around the earth, the earth around the sun, and together they continue their journey across the galaxy, there will never be a concrete formed in smooth and perfect horizontality.<sup>35</sup>

The US artist Robert Smithson, known best for his provocative earthworks produced in the 1970s, is someone who has explored ideas of gravity, surface and energy in his work. In *Concrete Pour* (1969), one of his entropic site-specific pours, Smithson directed by phone the dumping of a large amount of concrete into a steep ravine embankment where unused concrete was discarded. As the mixing lorry full of liquid concrete empties its content down a pronounced slope, we are invited to reflect upon the liquidity of the unbounded material and the absence of any conventional formwork. By manipulating the habitual scale of concrete use (which, of course, is a massive one), and drawing attention to the surfaces and materials upon which it lands, smothers or infills, Smithson's pour reminds us of the volcanic origins of concrete and the violent character it acquires once it is emancipated from

its rectangular moulds. Allowed to freely interact with gravity as it flows down the irregular ground, to this day the piece and its liquid rock works to both illuminate and shatter the concepts of containment and control, concepts which have so habitually shaped modern life.

Following this thread of fluidity, movement, disorder and escape from containment, our attention in the experimenting with concrete was drawn to a counter-impulse to the flattening gesture: this impulse was to disturb the order of the smoothed surface of the cube as long as the concrete remained fresh and liquid. Unlike the previous impulse to craft an impersonal surface that belonged to no one, this new urge was about leaving a trace upon it, like people leaving their handprints in the wet foundation slabs of their homes. Becoming aware of this urge made us wonder how many dwellers of the world's concrete cities have dreamed of leaving vestiges of their existence or of having a chance to disturb the flat, anonymous surfaces of the urban realm around them.

If containment is in fact illusory, or certainly never permanent, and if that which is concrete is actually fluid, there is much in society that still maintains or seeks to maintain the illusion of containment-control. From the popularity of pre-cast concrete block use in construction (with their affordance of avoiding the uncertainties of mixing the concrete) to popular toys such as Lego and Minecraft, there are many social phenomena which suggest that the idea of our world as resulting from the *upward assembly* of standardized and solid blocks remains staunchly ensconced in the social imaginary.<sup>36</sup> Many scientists speak in terms of the 'building blocks of life', and likewise, our mainstream Western view of knowledge development is dominated by an idea of construction as conceptual assembly.<sup>37</sup> However, as we alluded to above, all concrete entities or forms are effectively built twice: they start with the first piecing together of the containing structure of the formwork and are followed by the second building, in concrete, as *infill* via 'the pour'. Thus, they are challenging the 'block-construction' paradigm somewhat. Could concrete-making, we wonder, as a form-making and casting process, illuminate a different way of thinking about life, growth, development, learning?

### Gesture Three: Curing

Concrete curing gives concrete what it needs to gain strength. This strength depends on the formation of crystals within the mix of the concrete, crystals that grow from a reaction between cement, water, sand and aggregate. Like the surface of skin the ingredients need to be kept hydrated, for without water, the crystals cannot form and the concrete is unable to develop the strength demanded of it. With enough water, the crystals flourish like tiny rock-hard roots wrapping around the sand and gravel, intertwining and melding with one another as their very characteristics are transformed. Along with water, the other essential ingredient in this curing process is temperature, not of the air that surrounds it, but of the concrete itself. The concrete must be neither too cold nor too hot. If the forming liquid is too cold, the hydration slows down. If it is in an environment that is too hot, this creates a change that is too rapid. Taken together with the heat-producing properties of the ingredients, this



Figure 3. *Curing (Concrete Experiments)*, 2015. © The Authors.

mix can become overheated. Concrete that has reacted too quickly does not allow time for the crystals to grow and results in a structure that is weak, dusty, pitted and cracking.

Curing is an almost imperceptible state that, when we became aware of it, returned us once again to the ideas of gathering. We noted in our own experiments how once the gathered materials had been poured into our mould and had been allowed to settle, water slowly seeped to the surface of the form. This process, quite prosaic but also compelling, leads to a moment when there is no more visible seepage or ‘bleed water’, when the concrete might appear to be cured, but it is not yet fully set in its mould or removable formwork. Its appearance is solid, but it still asks to be kept liquid – gently misted with water or covered under blankets of polythene. Indeed, the longer the concrete remains in this formative state, the longer it will continue to grow in strength. In our forays into understanding the curing process we noticed how many skilled workers described in anthropomorphic terms the ways to nurture the concrete into being.<sup>38</sup> Through our own experiments we also found ourselves treating the concrete materials as a living thing; we took on our responsibilities to the material and often saw our failures in terms of our inability to care for the concrete,

for example, when we forgot to cover it with polythene, left the form in unsuitable living conditions, or removed it from its mould before it was ready. Thus, in addition to finding ourselves to be thinking of concrete not as an object but as a generative ‘thing’, we learnt of the nurturing process that is known as curing.

Careful curing determines our understanding of the material’s success or failure in the world of ‘solid modernity’. Solidified concrete is expected to endure, and the care and attention it is paid in this forming or nascent state is the process that allows it to meet an expected life-span or ‘service life’. Through curing, concrete is being prepared to withstand its environment or the wider world, to be able to take on the affects of structural loading, fatigue or the relentless onslaught of weather and chemical erosion.

Intrigued by the terminology used in this part of the concrete-making process, we considered the word ‘curing’. To cure means ‘restoration of health’, from the Indo-European root *cura*, ‘care’. It has ecclesiastical or religious significance, meaning ‘spiritual charge or care of souls, as of a priest for his congregation’.<sup>39</sup> The term also has its roots in the idea of nurturing, from the medieval Latin *curatus* and equivalent Latin *cūr* (*a*) *care* + *-ātus*, meaning to take care of, to take trouble, to be solicitous or attentive. It is interesting to note that the word ‘curator’ is also formed from these roots: the role of curator was traditionally a keeper of things. Curators gathered all manner of materials and artifacts from across the fields of natural history, geology, archeology and culture. From historical finds, to everyday items, initially these things were kept in collections held in *Wunderkammern* or cabinets of curiosity. Over time they grew, becoming idiosyncratic collections that later were to be ordered into encyclopedic resources and form the basis for academic studies. The history of collections leads off in its own direction, but the role of ‘curator’ was still formed out of this ‘curing’ responsibility.

Illuminated by the term’s etymology, there are a number of ways in which to interpret these ideas about ‘curing’. One understanding is of curing as a process of *nurturing* things so that they may continue to grow, transform and live. Another – quite different understanding – draws on the sense of curing that is about the process of hardening or *becoming solid*, and plays on the impulse, described above, to protect, flatten, smooth-out and create order in and of the lived world. In the first instance there is the idea of continuing to keep something alive and in its nascent state, full of possibility, for as long as possible; whilst in the latter the impulse is to fix, fossilize, contain and control life. Corroborated by even our own experiences of casting basic concrete forms, we might argue that the movement from one version of curing to the other happens all too quickly: the initial curiosity, activity of gathering and experimentation with discoveries in and of the life-world, moves too rapidly and forcibly to the all-classified, all-known containment of things once lively and now frozen-in-time.

This pattern or shift can be seen in the development of museums, galleries and institutions, where, one might argue, the work of gathering became an empty gesture as the significance of the process was forgotten. As the occupations of the ‘keepers of things’ began to be professionalized, the responsibility of the curator to

look after collections (responsibilities that had often been interchangeable with those of archaeologists and conservators) became increasingly charged with the protection and preservation of 'things' which were fast solidifying into 'objects'. Furthermore, the items that were removed from the life-world began to be placed in micro-environments: the objects lay frozen in optimal conditions for the prevention of decay and transformation. These collections of solidifying things were therefore no longer being cured, but instead were being objectified. In addition to this containment, detailed written materials were added to establish provenance and further fix their meaning. Collections became understood as repositories of knowledge and the solid material foundations upon which histories were and are written.

It is interesting to return here to the artist Robert Smithson who wrote extensively on this issue of cultural containment. In describing the Non-Site of the gallery, where some of his earthworks were resituated' having been removed from the lived world, Smithson commented: 'Museums, like asylums and jails, have wards and cells – in other words, neutral rooms called "galleries". A work of art when placed in a gallery loses its charge, and becomes a portable object or surface disengaged from the outside world'.<sup>40</sup> He comments that objects placed in this Non-Site 'seem to be going through a kind of esthetic convalescence. They are looked upon as so many inanimate invalids, waiting for critics to pronounce them curable or incurable'.<sup>41</sup>

Through observing the gesture of curing, or thinking through curing, we are making visible concrete's own 'other', non-solid, ways of being. In many ways this process draws on the ideas of neo-concrete art mentioned previously, but it also reflects on Smithson's experiments and those of artists working in the mid to late 1960s (Eva Hesse, Robert Morris, Richard Serra et. al) who were exploring 'process' (rather than any predetermined composition or plan) and the concepts of change and transience. These artists were also considering the world in flux and learning from and listening to materials as they formed through currents of space and time. Through thinking about concrete in this way, in this fluid and nascent state, we are reminded of how the material itself challenges its own objectification. In doing so, it suggests to us that even concrete cannot be fixed in time, but is instead subject to continuous transformation.

These ideas of privileging process over objectification can be seen to have effected the changing understanding of what it is to be a curator, as changes in creative practices threw existing definitions into question. Smithson's Site and Non-Site works, together with the ephemeral and anti-monumental experiments of Eva Hesse, or the verb lists and actions of pouring, catching and throwing by Richard Serra, helped 'emancipate the curator so that they might be free from artistic and curatorial routine and the political power-structures and historically weighted authority of art institutions'.<sup>42</sup> At this time curators were learning from artists whose experiments were not based on disciplinary and stylistic constraints, but rather upon the relationship to materials and the process of working with those materials in various situations beyond the gallery. Put in another way, they were privileging *direct experience with materials* as a way of understanding the world over the representation of those experiences by museums, galleries and critical others.

Whilst our experiments with concrete were not undertaken by us as artists, they do acknowledge this creative *Zeitgeist* of an earlier era that was resistant to the commodification of things and has much contemporary relevance. Sympathetic to efforts to push at the walls of the institution, they might be described as an attempt to return objects to things; an attempt to return to the gathering of materials in space and time and recognition of the ephemeral, impermanence and fluidity of life in movement. Where societal understandings of concrete in modernity have become separated from its material growth and transformation, concrete has been distanced from its liquid nature and nascent state and come instead to represent aggressive modernism as manifest in monolithic structures such as the Hoover Dam, Panama Ship canal or Atlantic Wall. Despite these attempts to define concrete as a fixed unchanging material, or see it only in its objectified state, we view concrete here in its curing state, returning the material back to a gathering.

In the face of monolithic concrete structures and the ubiquitous presence of grey, solid and unwielding architectures, it is easy to forget the curing processes of their production and the people that built them. The modern concept of concrete was transformed with the introduction of Ferro-concrete, or, as it was later to become known, reinforced concrete. This combination of liquid rock with iron had a revolutionary influence on twentieth century architecture and urban planning. The arrival of glass and steel, together with new construction processes, saw architects freed from the design restraints of tradition: now they could play with the possibilities of joining concrete, glass and steel.<sup>43</sup> Designs in concrete were often generated through experimentation, where the material suggested the opportunity. What is significant here is that the freedom afforded to the architect and urban planner was made possible by the many anonymous production workers. These were workers who had, through their skills and labour on large-scale engineering projects, bridges and high-rise structures, reshaped cities. They were exploring the materials, being attentive to them and the process of their making, and, in their labouring, the workers were learning the nature and needs of concrete: this was concrete experimentation on a grand scale.

In modernist utopian visions, concrete linked communities through vast networks of organic spiraling roads and bridges in the sky. In this aspirational moment, concrete was a material full of possibility that promised to solve shortages in housing and improve city structures, a material whose strength would be more able to resist natural disasters. Concrete only later became associated with a modernist dystopia. Landscapes of ubiquitous concrete blocks, failed social housing and the end of post-war optimism combined to bring about the end of the love affair with the material. A careless use of concrete by those in power, its misappropriation, had led to concrete having been transformed in the social imagination into a generic and homogenous material and a firm symbol of social partition and containment. Reflecting back upon our experiments and the flattening of the concrete's surface within the bounds of its steel form, we might see a mirroring here of the way in which complex and contradictory experiences of modern life are simplified and held in place by authoritative structures. As the sociologist Zygmunt Bauman describes, classical or solid modernity emerges when space and time 'cease to be, as they used

to be in long pre-modern centuries, the intertwined and so barely distinguishable aspects of living experience'.<sup>44</sup>

Our experiments with concrete-making, expressed here in the gestures of gathering, flattening and curing, have taken place in the wider context of a time when the ruins of the Modernist era have been increasingly photographed, analyzed and dissected by cultural commentators. The recent exhibition *Ruin Lust* at Tate Britain (2014) reviewed much of this resurgence of interest in the ruin whilst highlighting the history of artists' preoccupations with the phenomenon.<sup>45</sup> In this exhibition ruins are understood as bleak but alluring reminders of our vulnerable place in time and space. *Ruin Lust* speaks to the wider phenomenon, currently being experienced across the globe, where structures built with the intent of channeling concrete's fixity and strength have been reduced to ruin, rubble and dust, with varying degrees of violence and abandonment. Returning concrete to disparate parts, ruination results in *materials in movement*. As experts on demolition fold buildings into themselves through a process we call implosion, and as dynamite turns concrete forms into rubble, its regained granular composition allows it to flow once again, like sand in an hourglass moving inwards from the upper chamber to the lower.

In an interview about his work on rubble and destruction with people living in northern Argentina, the anthropologist Gastón Gordillo reflects upon this ongoing liveliness of rubble and ruin:

Far from seeing ruins as dead objects associated with the past, locals tend to experience these constellations of rubble as part of the living and fraught geographies of the present. They engaged with them in a multiplicity of ways, from digging mounds looking for treasures left by the Jesuits, turning abandoned train stations into homes, avoiding ruins seen as haunted, or annually converging on places in ruins through religious processions that inject life onto places marked by legacies of violence and destruction. This is why I analyze rubble as matter with a distinct afterlife, for it continues affecting people in the present, long after those places were abandoned or destroyed.<sup>46</sup>

Rising from the ruins are also other concretes, reinvented concretes. First and foremost, concrete's own rubble is often now re-used as aggregate in new mixes, thus constituting a self-recycling mechanism of sorts that is heralded by many in the construction industry's more eco-conscious quarters. These experiments with the recycling of materials perhaps return concrete to a material of possibility rather than one of solidity, and they are not the only initiatives along these lines. For instance, chemists and material scientists working on so-called 'green' mixes are changing concrete's constituent parts for the 'better' (i.e. less CO<sub>2</sub> or more local or renewable ingredients), new construction techniques utilise concrete's thermal mass qualities, and experiment and innovation with its mixes continue, though so too do the use of older, even ancient, alternatives to cement and concrete such as lime mortar and hemp-crete. Today's experiments in greener, or sustainable, architecture and



materials create the opportunity to reclaim concrete from its negative associations of solid modernity, not least in that they allow builders to make use of concrete's 'plastic properties'.<sup>47</sup>

As we have seen, it is solid concrete's aging and weathering without due care that leads to its ruination. The work to maintain and preserve its strength is largely neglected, especially once a concrete piece has been cast. We can argue that concrete 'seems to offer a brief permanence in fixity, which by its very nature denies the possibility of renewal'.<sup>48</sup> And yet, paradoxically, it is this same ruination that opens up a possibility for renewal. As Prentice notes:

the discovery that [concrete's] durability can be severely limited has come as a shock and surprise to architects and engineers. It should not, however, be a surprise to geologists. Concrete is an artificial compound of largely reactive minerals; compared with natural rock it could not be expected to be durable.<sup>49</sup>

We are reminded here of our own observations of curing concrete and the chemical transformations of the material ingredients as they grew together. Furthermore, for some time, artists have worked with concrete in a way which communicates this actual vulnerability in solidity. Returning to *Concrete Pour* (1969), for example, allows us to consider how Smithson reflects his continued interest in the relation between industrial expansion and geological processes. In this piece the liquid rock eventually merged with the landscape. Smithson rejected the notion of the eternal, precious art object by which artists hope to immortalize themselves; his earthworks were to be consumed in time and by nature.<sup>50</sup>

Returning to the notion with which we opened, concrete remains hard-to-pin-down, but it retains the core characteristic of seeming to work like magic! For though so much of what is built from concrete seems to fail to embrace its real potential, the imagination can still soar with concrete, and the forms that can be built from this liquid rock extend much further than those limited few, too often seen.<sup>51</sup> At the same time, it cannot be denied that the environmental and social impact of concrete's production and use could be justifiably interpreted as being quite dire. Bearing this in mind, could fully acknowledging the oxymoronic and paradoxical nature of concrete perhaps allow us to re-envision concrete-making as a practice and process of careful gathering of materials, materials that will, as they cure, help to keep things alive, that will contribute to the living world that they come from? Moreover, if there is attention not just to new concrete making, but also to reviving, caring for and being attentive to concrete structures that already exist, perhaps there is a sense in which concretes can be reformed and concrete places can once more invite people in to their gatherings and ongoing life – life that is always participatory and never fixed. Concrete, after all, is somewhere in there in the mix.

#### Disclosure statement

No potential conflict of interest was reported by the authors.

- <sup>1</sup> Smithson, "Cultural Confinement," 155.
- <sup>2</sup> It is important to note that our experiments and observations are in many ways investigative, formed through our conversations with materials and our reflections on our own experiences of working across the disciplines of anthropology, archaeology, architecture, art and philosophy.
- <sup>3</sup> Taussig, *My Cocaine Museum*, 162.
- <sup>4</sup> Hein, "Concrete History".
- <sup>5</sup> Slaked lime is calcium hydroxide, a product created by heating limestone and mixing it with water.
- <sup>6</sup> Prentice, *Geology of Construction Materials*, 171.
- <sup>7</sup> Ibid., 171. Volcanic 'tuffs' are soft rocks of ash.
- <sup>8</sup> Ingold, "Materials Against Materiality".
- <sup>9</sup> Forty, *Concrete and Culture*, 15.
- <sup>10</sup> Graeber, *Anthropological Theory of Value*, xii.
- <sup>11</sup> The test cube was recommended to us by the attendant at the building suppliers store. This is a standard form used in the compressive-strength testing of concrete mixes.
- <sup>12</sup> Taussig, *My Cocaine Museum*.
- <sup>13</sup> Heidegger, *Poetry, Language, Thought*.
- <sup>14</sup> Ingold, "Bringing Things to Life," 4 [after Heidegger, *Poetry, Language, Thought*, 167].
- <sup>15</sup> Bell and Rand, *Materials for Architectural Design*, 50.
- <sup>16</sup> Ibid., 50.
- <sup>17</sup> See Mary Ellen Solt, ed. *Concrete Poetry. A World View*. Neo-Concrete Art was established in response to Concrete Art, which emphasized the use of materials, planes and colour to convey objective scientific principles through art objects. The Swiss artist Max Bill, a major exponent of Concrete Art, had significant exhibitions in São Paulo, Brazil, in the early 1950s, inspiring a younger generation of artists there. In 1959, the *Neo-Concrete Manifesto* was written by a group of artists in Rio de Janeiro that included figures such as Lygia Clark, Hélio Oiticica and Lygia Pape who shared a similar interest in abstract forms but wanted to merge art and life.
- <sup>18</sup> Bauman, *Liquid Modernity*.
- <sup>19</sup> Bell and Rand, *Materials for Architectural Design*, 50.
- <sup>20</sup> Taussig, *My Cocaine Museum*, 160.
- <sup>21</sup> Davis, *The Culture of Building*, 257.
- <sup>22</sup> The CO<sub>2</sub> is produced by way of burning the fossil fuels that fire the cement production, as well as by the chemical conversion process used in the production of clinker, a component of cement, in which limestone (CaCO<sub>3</sub>) is converted to lime (CaO) and releases carbon dioxide as a by-product.
- <sup>23</sup> Crow, "The Concrete Conundrum".
- <sup>24</sup> Davis, *The Culture of Building*, 179.
- <sup>25</sup> Ibid., 179.
- <sup>26</sup> Harkness, *Thinking Building Dwelling*, 329.
- <sup>27</sup> Ingold, *Lines: A Brief History*.
- <sup>28</sup> Forty, *Concrete and Culture*.
- <sup>29</sup> Simonetti, "Time, Space in Archaeology".
- <sup>30</sup> We should bear in mind that digging is also part of building. Therefore builders dig and build into the future as much as they do into the past. The same could be said of archaeology. Archaeologists excavate as much into the past as they do into the future. See Harkness, "On Stone Houses". Also Simonetti, "Forward Into the Past" and Simonetti, "Past Under Your Feet".
- <sup>31</sup> Edgeworth, *Acts of Discovery*, 82. See also Simonetti, "Forward Into the Past".
- <sup>32</sup> Simonetti, "Time, space in archaeology". Also Thomas "Archaeology's Place in Modernity".
- <sup>33</sup> Kern, *Time and Space 1880–1918*. Also Urry, *Climate Change and Society*.
- <sup>34</sup> Bourdieu, *The Logic of Practice*, 39.
- <sup>35</sup> In terms of what it represents, then, the gravitational sphere is therefore quite fundamentally different from the smooth-globe cartography.
- <sup>36</sup> Lego and minecraft are two extremely popular games for children of all ages that allow users to create worlds, in real and virtual spaces respectively, that are built entirely from rectangular blocks.
- <sup>37</sup> Ingold, *Making*, 132.
- <sup>38</sup> We watched videos and films of concrete-making and concrete experimentation, we talked to builders and architects we met in the course of our wider research, and to hardware store staff. From numerous sources came the same idea that if you take good care of liquid rock when it is young it will grow up to be a strong and well formed adult.
- <sup>39</sup> Winkelman, *Culture and Health*, 14. Also Morris, *Dictionary of English Language*, 323.
- <sup>40</sup> Smithson, "Order of the Material".
- <sup>41</sup> Ibid.
- <sup>42</sup> Hoffman, "Curatorialization of Institutional Critique," 324.
- <sup>43</sup> See, for example, the work of architects such as Jacobus Oud, Walter Gropius, Mies van der Rohe, Le Corbusier, Carlo Scarpa and Oscar Niemeyer.
- <sup>44</sup> Bauman, *Liquid Modernity*, 8.
- <sup>45</sup> See *Ruin Lust* catalogue, published on the occasion of the exhibition *Ruin Lust* at Tate Britain, 4 March - 18 May 2014.
- <sup>46</sup> Elden, *Interview with Gastón Gordillo*. See also Gordillo, *Rubble*.
- <sup>47</sup> Davis, *The Culture of Building*, 257.

<sup>48</sup> Harkness, *Thinking Building Dwelling*, 329.

<sup>49</sup> Prentice, *Geology of Construction Materials*, 181.

<sup>50</sup> Hobbs, *Robert Smithson: Sculpture*.

<sup>51</sup> Concrete can be textured and patterned, smooth and granular, the structural and the

decorative. It is both the masonry-mimicking and the planar, the repetitive and the detailed. It can be cultivated and 'green', carefully crafted and maintained and reborn from the rubble of its forbears.

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