The background of the entire page is a photograph showing a stark contrast between dry, cracked, brownish-yellow earth on the left and a smooth, white, liquid-like substance on the right. The white substance has a slightly textured surface with small droplets and a jagged, organic boundary where it meets the earth. A few small, dark, dried plant stems are scattered across the scene.

ALCHEMY AND METAMORPHOSIS

NEIL BROWNSWORD



LOTTERY FUNDED

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British
Ceramics
Biennial



ALCHEMY AND METAMORPHOSIS

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Alchemy and Metamorphosis
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Program for kunstnerisk utviklingsarbeid
Norwegian Artistic Research Programme



The only principle that does not inhibit progress is anything goes... Without chaos, no knowledge. Without a frequent dismissal of reason, no progress... For what appears as 'sloppiness', 'chaos' or 'opportunism'... has a most important function in the development of those very theories which we today regard as essential parts of our knowledge... These 'deviations', these 'errors', are preconditions of progress.

P. Feyerabend, *Against Method: Outline of an Anarchistic Theory of Knowledge*, 1975



Re-producing Ceramics

Laura Breen



Re-producing Ceramics

Laura Breen



For Neil Brownsword, *Alchemy and Metamorphosis* is a return in multiple senses – to The Potteries Museum and Art Gallery, to familiar objects and to ongoing works. As he turns North Staffordshire's ceramic heritage over in his hand to uncover new perspectives, we all become co-investigators in his exploration of materials, objects, and value. His third solo outing at the museum following 1996's *The Fine Line: Revelations in Clay* and 2005's *Collaging History*, (Fig. 1) the exhibition sees the 'museumological tendency' of his work take centre stage as he reinterprets the museum's collections and disrupts the histories it presents.¹ Probing the interstices between the finished objects in the museum's aestheticising displays and the messy layers of learning and experimentation that underpin the ceramics industry's successes, *Alchemy and Metamorphosis* brings production, process and questions about intangible heritage to the fore.

Ceramic heritage

In her book *The Uses of Heritage*, Laurajane Smith describes the role that museums play in perpetuating 'Authorized Heritage Discourse' (AHD).¹ Privileging expert knowledge about the past, AHD is shored up by a focus on objects and historical evidence. It hinges on 'a range of assumptions about the innate and immutable cultural values of heritage that are linked to and defined by the concepts of monumentality and aesthetics'.² This delegitimises the experiences of a wide range of groups whose knowledge is transmitted via different means including oral tradition and the shared production of what Trevor Marchand calls 'making knowledge'.³

Since the mid-1960s a range of artists, whose work is often discussed under the umbrella of institutional critique, have sought to undermine museums' claims of neutrality, challenging their authority to interpret the past and assign value. However, as James Putnam, Alexander Alberro and Blake Stimson and others have demonstrated, artistic practices that take the 'museum as medium' are manifold.⁴ Whilst some continue the radical tradition, many others draw inspiration from the museum's collections or deploy museumological strategies to their own ends. Moreover, as Claire Robins has observed, 'Significant issues, such as ensuring contemporary relevance and maintaining public trust, have necessitated that museums become responsive to their publics' needs, as well as to changing societal values concerning class, race, gender and ethics'.⁵ As a result, commissioned 'interventions' have also become part of the interpretative arsenal of museums wishing to demonstrate their self-reflexivity.

The Potteries Museum and Art Gallery has long welcomed such interruptions to its spaces and collections. 1987's *Palaces of Culture: The Great Museum*

Exhibition came several years before shows that are held up as exemplars of artist intervention, including Fred Wilson's *Mining the Museum* (1992) and *Time Machine* at The British Museum (1994). Curator Emma Dexter initially commissioned artists including Lubaina Himid, Langlands and Bell and Jo Stockham to produce works that investigated the nature of museums. However, it soon became apparent that 'it would be possible to involve artists whose reaction would be more than purely appreciative'.⁶ Tackling the partiality of the museum's displays, their responses confronted the colonial legacy of the museum collections ('the bone in the china'), the manipulative function of museum architecture and the deleterious effects of historic working conditions in factories.⁷ Reflecting on the ambitious takeover, museum theorist Eilean Hooper-Greenhill highlighted the limitations of the museum's connoisseurly approach, expounding:

*There is no intrinsic reason not to display or write about ceramics to demonstrate the development of particular styles of decoration, or ways of using materials. But if this is the only way that those objects are displayed or discussed, and if this continues for decades, then the museum is justifiably open to the charges of bias and exclusion from those whose experience is not explored in this approach to the objects.*⁸

Brownsword himself is amongst those who have since attempted to redress the balance, foregrounding the exclusion of the artisans who worked in local ceramics factories and their embodied knowledge. *Collaging History* (2005) marked his first effort to redisplay the museum's ceramics galleries, introducing raw materials, tools and archaeology into tableaux that were largely designed for visual appreciation. He screened film footage of interviews he had conducted with Wedgwood artisans alongside the physical interventions. These endeavoured to capture the complex transfer of tacit knowledge from master to apprentice, which Marchand has described as 'a process entailing interaction between interlocutors and practitioners with their total environment'.⁹ Enriching the static displays, they offered a different entry point from which to approach the objects – one that valued production as much as product. He also showed objects he had created by glazing, remodelling, and firing remnants, such as strips of clay sheared off and cast aside during the plate trimming process or the plugs ejected from hand pared moulds. Hovering between the art object and the archaeological artefact, these frozen ciphers of making defied simplistic categorisation and called attention to the value of the ephemeral human gestures that created them.

At first glance, *Alchemy and Metamorphosis* might be viewed as a conventional retrospective. Objects Brownsword included in earlier exhibitions make re-appearances and performative installations *Factory* and *Pattern Book* are part of the programme, as are the artisans who enact them. Yet, Brownsword's approach is at odds with the very idea of the retrospective, which the Oxford English Dictionary describes as 'showing the development of a person's work over a period of time'.¹⁰ The word suggests a series of completed works by an individual or defined group, which one can look back and reflect on. However, for Brownsword, the exhibition is the latest node in an unbounded and open collective inquiry. As Alison Britton observed when writing about his first solo exhibition at museum in 1996, 'he is engaged in a compelling process of reassessing his experiences, in the belief that these are not his alone, that they will echo and resonate with other people's insecurities and trauma too'.¹¹

Britton's words capture the pervasive influence that a phenomenon sociologist Avery Gordon termed 'social haunting' has on Brownsword's practice. Describing its affective hold, Gordon argues that the spectre of acts of social violence, such as deindustrialisation, continues to intrude on the present and 'alters the experience of being in time, the way we separate the past, the present, and the future'.¹² Brownsword's biography and his deep imbrication with the ceramics industry are relayed every time he exhibits. He grew up near Bradwell Woods in Newcastle-under-Lyme in a house atop a rich seam of Etruria marl clay (Fig. 2).



Fig. 2. Surface outcrops of Etruria Marl clay, Bradwell Wood

He undertook his Youth Training Scheme (YTS) apprenticeship at the Wedgwood Factory in Barlaston before leaving for art school. Although he progressed from BA to PhD and has established a career as an artist and lecturer, those formative years continue to shape his work. He is, undoubtedly, one of the haunted. Whilst Brownsword exhibits globally, as Miwon Kwon contends, 'one of the narrative trajectories of all site-oriented projects is consistently aligned with the artist's prior projects executed in other places, generating what might be called a fifth site -the exhibition history of the artist, his/her vitae,'¹³ continually returning us - and him - to North Staffordshire, wherever he might be.

When museums present the past as something that is immutable, they simultaneously invalidate the experiences of those who are not represented in the hegemonic narratives and stigmatise those who are unable to consign them to history and 'move on'. This creates a lingering sense of shame and impotence amongst the haunted. Brownsword counters this by treating knowledge about the past as something that is emergent and contingent, aligning with recent methodological approaches to 'heritage as community research,' which unite participatory action research (PAR) and artistic inquiry.¹⁴ Just as those working in this way use the active process of 'doing heritage,' to open the past up to collective rethinking he works with social haunting to explore how the past 'could have been and can be otherwise'.¹⁵ In doing so, he forges a space where other futures, which mobilise heritage in positive ways, can be imagined.

Showing and concealment

Recognising the inadequacy of the museum's presentation of history, *Palaces of Culture* curator Dexter confessed, 'we might place row upon row of empty cabinets in a museum to symbolize all the histories that are suppressed, neglected or unobtainable'.¹⁶ Centring alchemy as process, Brownsword gestures to the hidden - the behind-the-scenes labour that culminates in the seemingly flawless cup or the slick exhibition. He makes room for the factory artisans whose skill concealed itself, the museum objects that have been relegated to storage and the agency of materials. Whilst Mieke Bal has argued that acts of showing in the museum are discursive acts that declare 'look - that's how it is!',¹⁷ *Alchemy and Metamorphosis* introduces conflicting voices and evidence into the equation, inviting visitors to excavate the past and draw their own conclusions from the sources at hand.

The performative installations that have formed the focus of much of Brownsword's work for over a decade form the heart of the exhibition. His newest piece, 'Taskscape' (2021) was conceived as part of his Whitegold International Ceramics Prize Quartz Award (2019) commission. The title, taken from a term coined social anthropologist Tim Ingold, describes the enmeshing of technical and social practices in a flow that is 'to labour as the landscape is to land'.¹⁸ In such contexts, Ingold argues, 'temporality and historicity are not opposed but rather merge in the experience of those who, in their activities, carry forward the process of social life'.¹⁹ They, thus, make explicit the living nature of heritage and the active role that humans and materials play in its metamorphosis.

The exhibition showcases Brownsword's immersion in the taskscape at the Wheal Martyn works in St Austell, Cornwall via two films. The first shows him working with four tons of Imerys china clay in a settling tank there (Fig. 3). Using replicas of the shaping tools from the Spode factory in Stoke-on-Trent to manipulate the clay, he steps back from his intimate knowledge of production techniques to explore the push and pull between man, medium and intermediary (Fig. 4). Physically engaging with the materials on which Stoke-on-Trent's ceramics industry was built, Brownsword explores how familiar resources might be used to different ends: in this taskscape, obsolescence is not inevitable. In the second film, the camera alights on the moments when clay is transformed during processing.



Fig. 3. *Taskscape*, Neil Brownsword, film still, Wheal Martyn Clay Works, 2021



Fig. 4. *Taskscape*, Neil Brownsword, film still, Wheal Martyn Clay Works, 2021

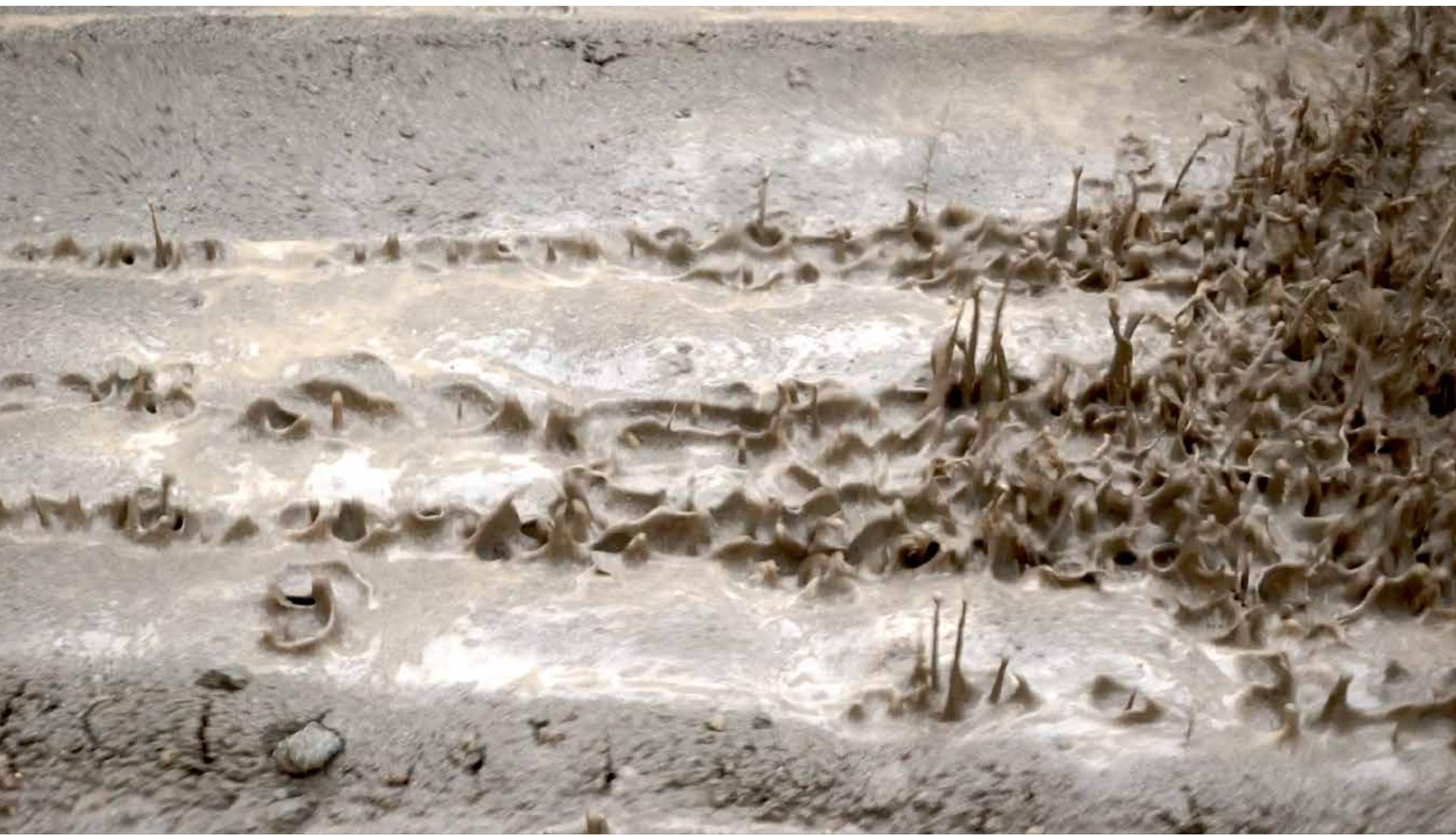


Fig. 5. *Taskscape*, Neil Brownsword, film still, 2020



Figs. 6 - 11. *Taskscape*, Neil Brownsword, film stills, 2020



Fig. 12. *Taskscape*, Neil Brownsword, film still, 2020



Fig. 13. *Taskscape*, Neil Brownsword, film still, Wheal Martyn Clay Works, 2021



Fig. 14. *Marl Hole*, Neil Brownsword, Gorsty Quarry, Newcastle-Under-Lyme, 2009

It meditates on the vibration of machinery and shifting of material punctuated by interventions by the human hand, whether moving levers to coordinate machinery or shaking filter press bags full of residue. Beautifully choreographed, the films share the mesmerising rhythms of slow television, inviting contemplation of the millions of different acts of ingenuity and interaction that combine to produce the clay used in Stoke-on-Trent's bone china industry (Figs. 5 - 12). In a related effort to rebalance the picture, Brownsword has also reunited objects with tools and processes within the displays.

Taskscape reconnects the production sites of North Staffordshire with those where the clays they used were made, expanding the category of ceramics from objects to living heritage (Fig. 13). It also reactivates earlier work, *Marl Hole* (2009), which saw Brownsword and collaborators testing the limits of the red marl clay at the Ibstock Brick's Gorsty Quarry in Stoke-on-Trent (Fig. 14). Transposed from Cornwall to Hanley, the films raise the museum's ghosts too. In 1992, *Mound: Re-thinking the Paradigm of Dominion* (1992) saw artist Shelley Sacks working in the gallery with seven tons of clay blackened with carbon. The clay was rubbed with oil to keep it moist, and visitors were asked to write their ideas for the future on cloth strips and attach them. Sacks carved images of 'toilers and labourers – the backbone of the world'²⁰ into the clay, describing it as a monument and reservoir of memory. Despite her attempt to celebrate the city's past, 'Mound' attracted the ire of some locals, who labelled a waste of taxpayer's money and it was even listed in a flyer listing 'ten good reasons not to vote Labour'.²¹ Presenting the area's ceramic heritage as something to be memorialised but superseded by new hopes, the metaphorical burial ground formed a stark contrast to Brownsword's more recuperative approach.

In many ways, Brownsword's oeuvre is a taskscape itself – a shapeshifting live investigation with layer-upon-layer of interconnection. The Wheal Martyn films work in dialogue with 'Relic' – a work he showed in St Austell during the Whitegold festival. It is the culmination of five year's research with china flower maker Rita Floyd, who is at the centre of multiple iterations of works such as *Re-apprenticed* and *Factory*. At Brownsword's request, Floyd has captured each individual gesture that she makes when hand modelling every type of flower in her repertoire. Broken down into their component parts, the ostensibly simple movements she makes become legible as the constituent parts of a living repository of embodied knowledge. As in *Factory*, where Floyd modelled full blooms, the discarded fragments are left in piles that echo the ceramic waster tips that once peppered The Potteries, forming a stark visual metaphor for the squandered potential of the former workforce (Fig. 15).

Brownsword has reactivated *Factory* during the exhibition, again, inviting Floyd to enact the duties she once carried out in local ceramics factories before a public audience. When the work made its debut at the Icheon World Ceramic Centre (2017), Floyd and mould maker James Adams performed alongside Korean master potters, drawing parallels between the latter's status as 'National Living Treasures' and the debased knowledge of North Staffordshire's artisans. However, this time, Floyd appears alone. As in earlier interpretations, she is shown against the backdrop of two looped videos (*Six Towns*, 2016), which survey the ruins of former production sites. Juxtaposing her vibrant knowledge with these images of dereliction and redundancy, Brownsword raises questions about the impending loss Stoke-on-Trent's embodied heritage and our duty of care for it.

In a counterpoint that gives the work a heightened resonance, Floyd normally works at The Potteries Museum and Art Gallery's sister-site (and former factory), the Gladstone Pottery Museum, demonstrating flower making to visitors. As Namita Gupta-Wiggers has observed, in such contexts 'the performance is a vehicle through which the potter provides an illusion in which audiences perceive



Fig. 15. *Factory*, with Rita Floyd, Icheon World Ceramic Centre, South Korea, 2017

that they have witnessed the making of an object like the finished objects in the booth'.²² This objectifies Floyd's skill, fixing it in the past like those artefacts.²³ Inserted into that space, *Factory* frustrates visitor's expectations. Floyd is not the 'relic' from which the companion piece takes its name. Nor is she there to teach people how to make a flower or demonstrate the production process. She is on a pedestal, performing sleights of hand that elicit wonder and then draw gasps as her skill is 'wasted.' Here, piecework is not a single act of mechanical reproduction, it is the applied articulation of accumulated expertise.

Drawing on the theories of social anthropologist Alfred Gell, Glenn Adamson has argued that understandings of craft can be aided by 'the user's ability to imaginatively approximate the knowledge of the maker'²⁴ when observing the production process. With the Potteries Museum and Art Gallery drawing a particularly high level of repeat visitors (82% in 2006 vs 59% national average and a staggering 95% of visitors surveyed in 2011)²⁵ and tens of thousands of local people once employed in the ceramics industry, the audience's capacity to grasp the skill and dexterity on display is likely to be high. One of those repeat visitors, Brownsword has walked the floors of The Potteries Museum and Art Gallery endless times during his lifetime, gathering his thoughts about the museum's failure to represent his lived experience of the ceramics industry and channelling them into his work. Consequently, for this exhibition, as Tanya Harrod wrote of *Collaging History*, 'the men and women who are and were employed in the Potteries will be a privileged audience even if the formal beauty of this exhibition will speak directly to a broad public'.²⁶

Writing about the process of enskilment, anthropologist Geoffrey Gowlland explores 'how learning emerges from social positionings, how words as well as hands might shape clay, and trust in another person might be part and parcel of acquired procedural knowledge'.²⁷ When North Staffordshire's ceramics factories closed, workers lost that sense of belonging and connection in addition to their vocation and income – a history that is largely absent from the museum's displays. However, performances such as *Factory* and *Taskscape* acknowledge that complexity and create space for grief as well as reassessment. Re-evaluating her collaboration with Brownsword, Floyd has reflected 'just because there were so many of us working together on "piece work," it shouldn't take away the fact that we were truly skilled artists in our own rights and I really don't think that I would have come to this conclusion if Neil and I hadn't worked together'.²⁸ Re-apprenticed to Floyd since 2015, co-researcher, Brownsword, admits that he has gained as much insight on his own practice from their collaboration. In many ways, these works function like 'ghost labs' – a model activist and education researcher Geoff Bright developed, which uses creative techniques to 'open the unclosed space' and negotiate trauma that is difficult to articulate through conventional means.²⁹ Just as 'doing heritage' together enabled Floyd and Brownsword to make new meanings from the past, the 'privileged audience' might, remake their own heritage through the exhibition and find a renewed sense of purpose.

Risk and renewal

The overarching theme of the exhibition, 'alchemy and metamorphosis' speaks of the magical transformation of base elements into something of greater value, of speculation and wonder. It also resonates with the discourse around studio pottery – of expression, deep knowledge of materials and the mercy of the 'kiln gods.' If the association with industrial ceramic production is less immediate, it's not because there isn't one. Ably elucidating this gap, Brownsword draws our attention to the pioneers of early industry whose work was overshadowed by subsequent developments and the trial and error that scaffolded the successes of figureheads like Wedgwood. Inspired by Rosa Menkman's writing on glitch theory, he has seeded interactions that may create dissonance through many aspects of the exhibition in the hope that they will produce new knowledge.³⁰



Fig. 16. *Factory*, with Rita Floyd, British Ceramics Biennial, 2017



Fig. 17. Pomona jug, c.1746, Brampton Museum and Art Gallery, Newcastle-Under-Lyme. (NM2006-98-54R) 3D Model <https://sketchfab.com/Bramptonmuseum/models>

The exhibition returns Brownsword to the Elers Brothers. The siblings, who established a pottery at Bradwell Hall in the late 17th century, near his childhood home, have long been a source of inspiration to him. They produced elegant pieces that resembled Chinese Yixing ware by applying metalworking techniques, such as casting into moulds, but using liquid clay. Whilst their revolutionary production methods are now appreciated, their refined redwares made little impression on their contemporaries and, as the V&A Museum notes, 'The very high price of their products and their subsequent bankruptcy was not considered an example to follow'.³¹ Although an Elers teapot takes pride of place in the museum's permanent displays, it is a curiosity, which doesn't fit neatly into well-rehearsed official histories of the evolution of the local ceramics industry. Taking that disruptive capacity as a starting point, Brownsword has positioned their works and others by figures such as Thomas Whieldon, Enoch Booth and William Greatbatch, against a timeline of ceramic history to question the notion that there was a smooth, 300-year transition from craft to industrial standardisation.

Brownsword's timeline gives a prominent position to Pomona ware loaned from the nearby Brampton Museum - the earliest known attempts to develop proto-porcelains in North Staffordshire. Reassembled from wasters found in a pit, the fragments, originally attributed to William Steers, evidence efforts to imitate Chinese porcelain in the 1740s. A world away from their refined Eastern precedents, these blistered forms are testament to the sheer ambition and tenacity of those who tried to reverse-engineer a porcelain in the absence of a recipe. Visitors can access 3D digital scans of the objects via QR codes, which allow them to lift and rotate the historic jugs, tankards, and teapots, and zoom in on surface details (Fig. 17). Bringing them into greater proximity with their material properties, the technology permits a level of engagement normally restricted to museum professionals, which moves beyond aesthetic value.³² He has also morphed scans of other historical objects in order to seek out the error within digital technology (Figs. 18 - 20).

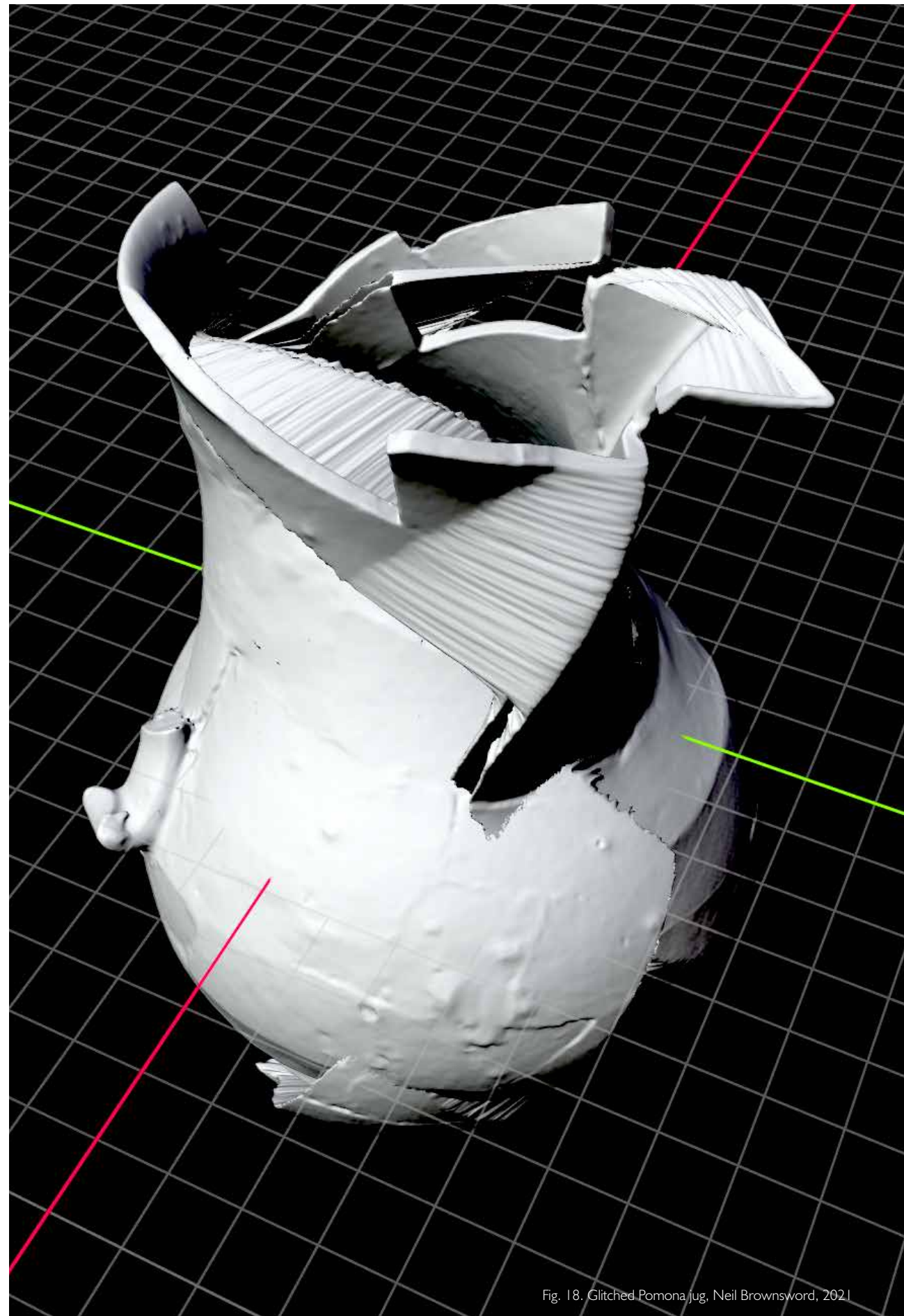


Fig. 18. Glitched Pomona jug, Neil Brownsword, 2021

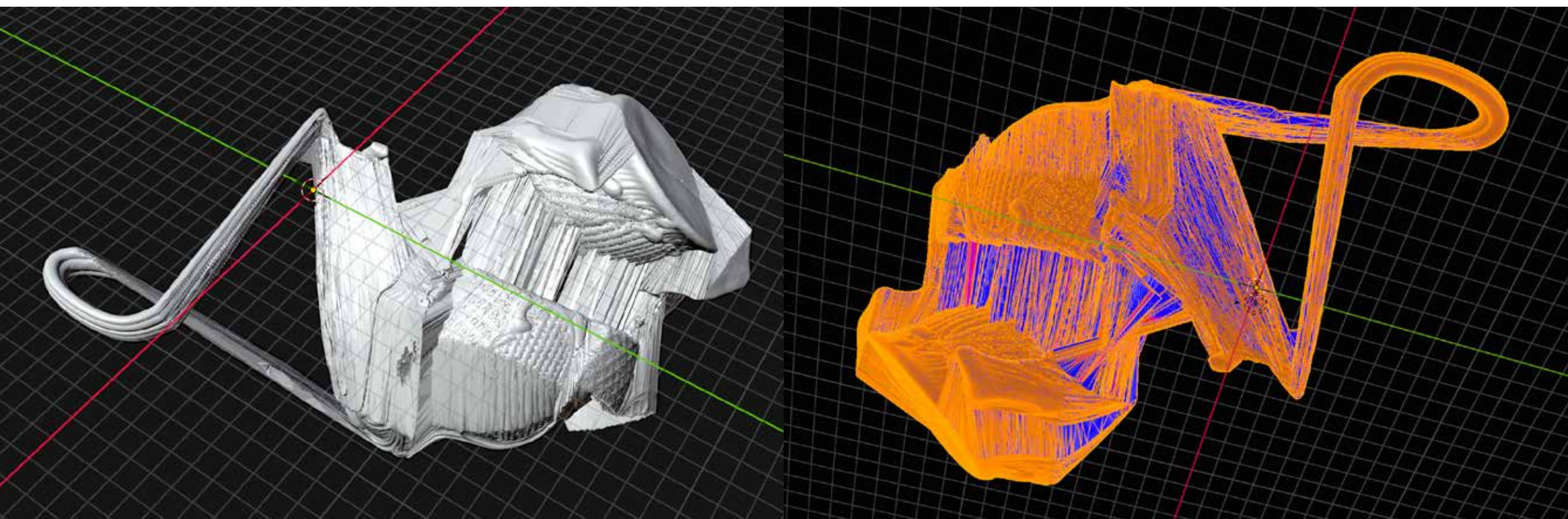


Fig. 19. Digital disruptions of a white salt-glazed stoneware sauceboat, North Staffordshire, c.1750. Neil Brownsword, 2021

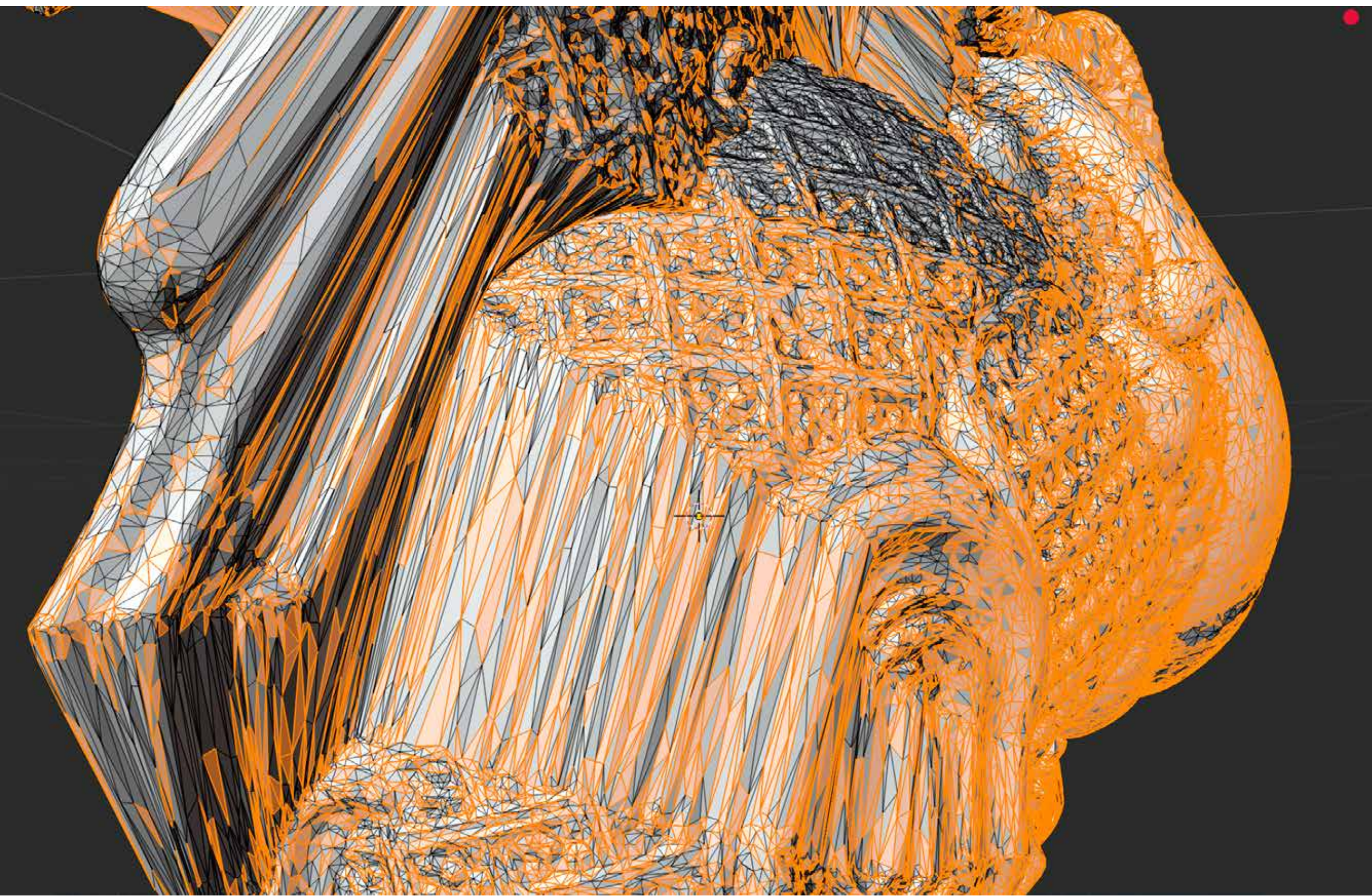


Fig. 20. Digital disruptions of a white salt-glazed stoneware sauceboat, (detail), North Staffordshire, c.1750. Neil Brownsword, 2021

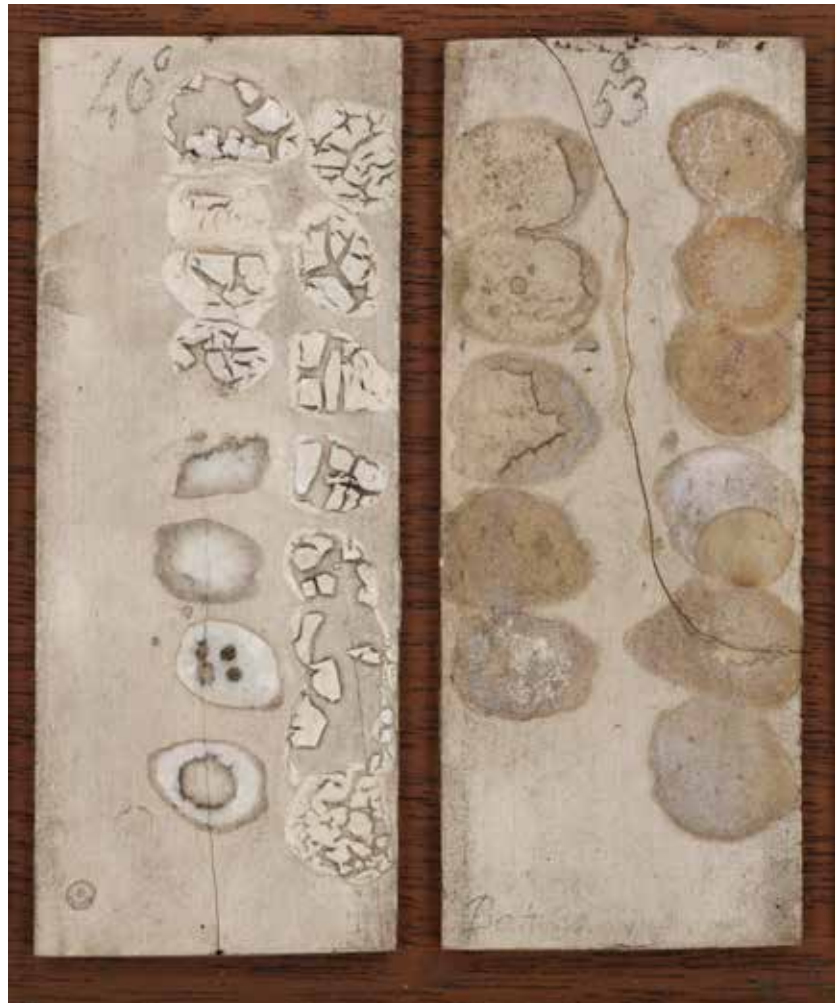


Fig. 21. Detail of a tray with various ceramic trials, made at the factory of Josiah Wedgwood, Etruria, Staffordshire, 1759-1795, museum number WE.7445-2014
Photo © Victoria and Albert Museum, London

Fig. 22. Detail of a tray with various ceramic trials, made at the factory of Josiah Wedgwood, Etruria, Staffordshire, 1759-1795, museum number WE.7096-2014
Photo © Victoria and Albert Museum, London

Although Brownsword's curation gives the marginal a place in the history of local entrepreneurship, his stance is anti-heroic. He doesn't downplay the role that Josiah Wedgwood played. Rather, he prides open the manufacturer's legacy to expose its foundations, challenging the notion of innate genius and highlighting his persistence and work ethic. A meticulous record keeper, Wedgwood retained the evidence of the experiments that he undertook when developing and refining his famed decorative glazes, Queen's Ware and Jasper bodies. Whilst some of the trials are displayed at the nearby Wedgwood Museum, Brownsword's eye was drawn to the less manicured examples from the reserve collections. Arraying eight trays of glaze trials in a display, he lays bare the scale of 'failure' that laid the groundwork for the successes. Here, perfection is an iterative process rather than the result.

Brownsword has used the 'failed' formulae to intervene in finely honed forms of production. He recreated the chemical compositions by reconciling samples with the associated recipes in Wedgwood's test books and will reactivate them during the exhibition. A series of live events will explore what happens when the haptic knowledge of artisans such as Floyd is destabilised by the introduction of inappropriate materials. The compositions will also be passed through 3D printing technologies and cast in standard production moulds to explore how it affects the output. How will those involved adapt their habitual rhythms in response to this





Fig. 23. Detail of a tray with various ceramic trials, made at the factory of Josiah Wedgwood, Etruria, Staffordshire, 1759-1795, museum number WE.7441-2014
Photo © Victoria and Albert Museum, London



Fig. 24. *Externalising the Archive*, British Ceramics Biennial 2019, digitisation of historic Spode moulds, 2019. <https://sketchfab.com/3d-models/spode-ceramic-mold-eta-093-ce7ba0206ab842df9414c40a8a488b02>

uncontrolled variable? What do the results tell us about 'thinking through making' whether by hand or machine? Or the variation and human ingenuity that lies behind the inhuman façade of standardisation?

In contrast to the Pomona ware, which only came to light through excavation, Wedgwood's experiments survive because they are attributable to the celebrated entrepreneur and deemed historically important. They, therefore, provide an illuminating foil for the latest staging of Brownsword's 'Externalising the Archive.' The work grew out of a collaborative project that grappled with the best way to preserve the information in the 70,000 moulds that remained at the former Spode ceramics factory as the site underwent regeneration. Unable to permanently house the entire collection, The City Archaeology Service surveyed them to establish their historical and technological significance and establish whether there was any repetition. This audit would help them to determine which moulds might be displayed, transferred to other institutions, or potentially destroyed. Whilst Brownsword initially supported the case to preserve all of the physical specimens, he was also interested in whether digital technologies might offer another alternative means of retention and use (Fig. 24). This led to a sustained collaboration with the Archaeology Service, colleagues at the University of Staffordshire and researchers from University College London and Brighton University, which explored the potential of 3D scanning as an archival tool.

As 'Externalizing the Archive' has evolved, the scans have provided a means of preserving the minute traces of human touch in the moulds – challenging the notion that there are any duplicates in the collection. Even those that appear identical bear witness to subtly different confluences of tools and knowledge. The Archaeology Service modified its criteria for determining the significance of the moulds during the collaboration and more than doubled on-site retention after taking artistic value and intangible cultural heritage into consideration.³³ The process also shifted Brownsword's perspective on the superiority of physical preservation with the scans enabling him to make both digital and analogue replicas of the moulds, which exceed the limitations of their progenitors. The exhibition provides a platform for some of the outcomes, including casts that monumentalise the voids in the moulds in bone china bone and castings of the otherworldly forms that emerge when different materials, such as rubber, are poured into them (Fig. 25).



Fig. 25. *Externalising the Archive*, Neil Brownsword, British Ceramics Biennial 2019

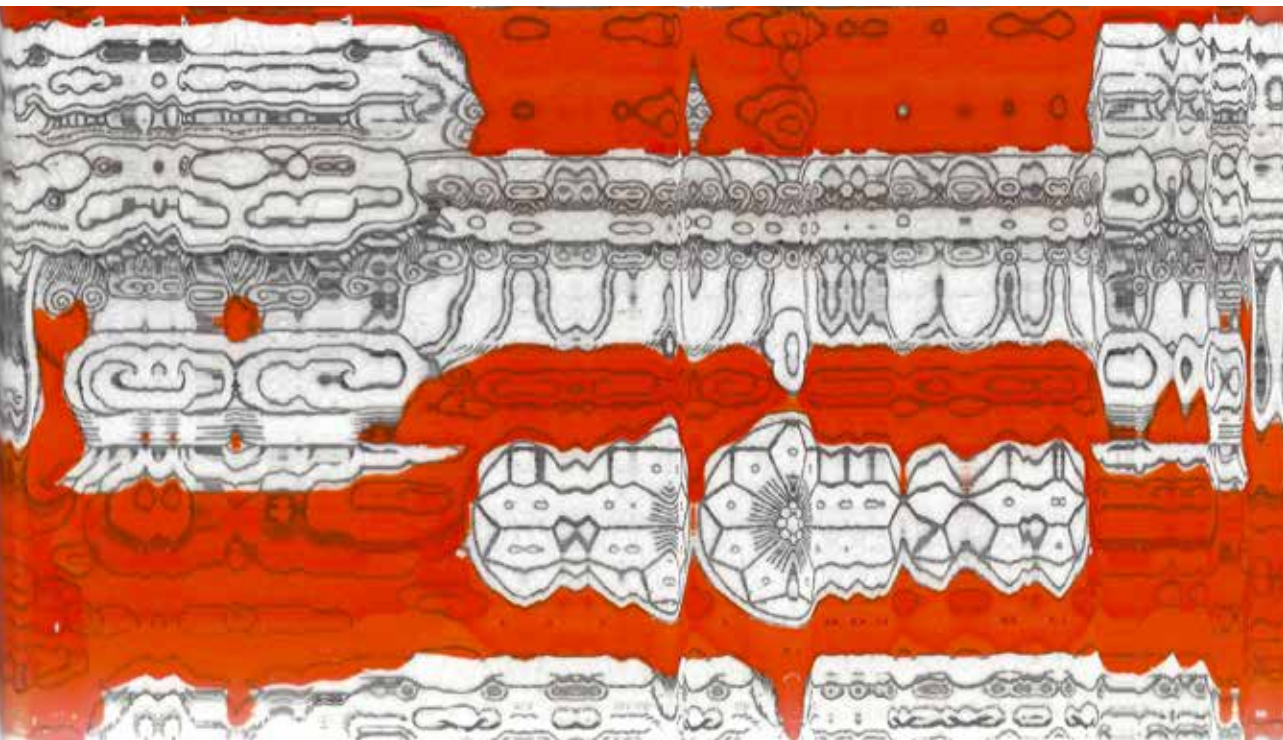


Fig. 26. *Pattern Book*, Neil Brownsword, 2018. Digital surface extraction from a Masons Bandana Ware jug, c.1830 engraved into a copperplate by Paul Holdway.

Brownsword's engagement with digital reproduction spans over two decades. Knowing nothing about the technology and associated skill sets, he has found freedom in his lack of training and inability to work with it 'properly.' It also has been a consistent tool in his attempts to unsettle established ways of working. The latter was perhaps most evident in *Pattern Book*, a work conceived during his V&A residency in 2017/2018, which focused on montaged scans of the patterns on 18th and 19th-century Staffordshire wares. He homed in on the tiny inaccuracies in the prints that attested to the human side of industrial production, manipulating them to produce contemporary-looking digital prints (Fig. 26). Former Spode worker Paul Holdway – an experienced engraver who he had enlisted for earlier works – then translated the design back onto a copper plate before the public in the museum's daylit gallery. Projected behind him, the live feed from a microscopic camera trained on his hands captured his dextrous rendering of each transmuted imperfection.

The V&A's *Pattern Book* performance disturbed visitors' preconceptions of industrial production by simultaneously magnifying the human error in seemingly standardised processes and laying bare the skill that is necessary to conceal that input (Fig. 27). However, at The Potteries Museum and Art Gallery, Brownsword has challenged Holdway to repurpose that skill by introducing materials that are difficult to engrave. Once more seated before a microscopic camera, he will be forced to recalibrate his knowledge as he works. This apparent move away from the digital is, in fact, a further extension of Brownsword's engagement with glitch theory. Increasing the likelihood of deviation from well-worn modes of production, he tries to propagate new growth from existing roots. For Brownsword, as for Menkman, 'while failure is a phenomenon to overcome, the glitch is a phenomenon that will be incorporated into new processes and conditions of technological design or cultural meaning'.³⁴



Fig. 27. *Pattern Book*, with Paul Holdway, Day-Lit Gallery, Victoria and Albert Museum, 2018



Fig. 28. Digital glitch of Boy and a Butterfly pattern, Newhall Porcelain, Shelton, North Staffordshire c.1800. *Pattern Book*, Neil Brownsword, 2018

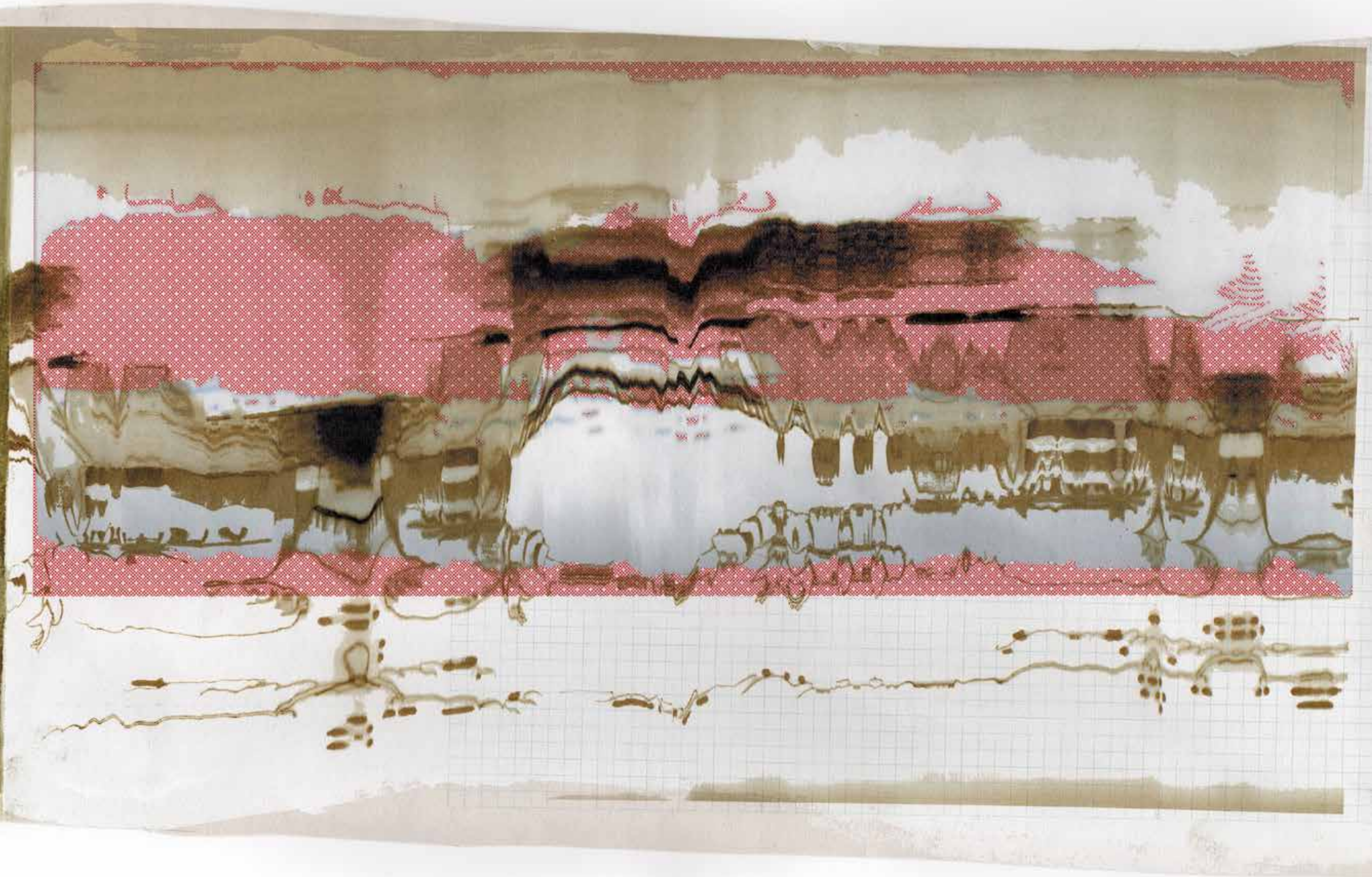


Fig. 29. *Pattern Book*, Neil Brownsword, 2018

Inspired by the ‘epistemological anarchism’ of philosopher Paul Feyerabend, Brownsword has declared ‘I want to reinstate the importance of creative risk taking as a driver for new knowledge back into my own work, which is often dogged by academic rationale’.³⁵ It is a statement that partly reflects his weariness with the current emphasis on pre-defined outputs in university and arts funding contexts. Yet, this concern with freeing himself and others from fixed methodologies and working in the moment is also a constant in his inquiries.

Deploying apprenticeship as Marchand describes it, ‘as both a mode of study and a field method’,³⁶ enables Brownsword to navigate the knotty terrain of enskilment through collective enterprise. Disassembling the museum’s narratives without replacing them with revisionist histories of his own, he invites us into a taskscape that spans the past and future. Like the component parts of the show, his practice and identity are in constant flux, as we ‘do heritage’ together. Underscoring the pivotal role experimentation and adaptation play in societal and technological progress, the exhibition also reminds us, as Smith maintains, that all heritage is intangible and can be re-made.³⁷

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More Than Just Numbers:
Josiah Wedgwood's Ceramic Trials

Rebecca Klarner

Detail of a trial for the Portland Vase, made at the factory of Josiah Wedgwood, Etruria, Staffordshire, c. 1789, museum number WE.7998-2014. Photo © Victoria and Albert Museum, London

- 1 Borax
- 2 Red lead
- 3 White lead
- 4 Sea salt
- 5 Salt peter
- 6 Flint glass
- 7 London brown glass
- 8 { India porcelain to 1794
now 2 of 3160 with 1 of 26
- 9 { Tin calcined with
2 of sulphur & borax
- 9 { Dr. in powder by melting
of shaking. Crith flour since 1780
(Stearite fired to 1794 now
- 10 { 1 of 3160 to 1 of 26
- 11 Emery since Nov. 1779
- 12 Steatite
- 13 Magnesia since Dec. 1778
- 14 Nympha
- 15 { Steatite soft to 1794
now 1 of 3160 with 2 of 26
- 16 Chalk
- 17 Calcined flint
- 18 Crude do
- 19 Hevil or wheatear
(a kind of clauk so called)
- 20 alabaster
20. Dr fired T600 washed
- 21 Sal ammoniac
- 22 Purbeck clay
- 22x do flinted
- 23 Chertsey clay
- 24 Tuffe
- 24 + Cobalt
- 25 { Small to 1794 now
1 of 1 + with 3 of 26

- 26 Pearl ashes
- 27 1 of 59 to 3 of 26
- 28 Calcareous spar
- 29 1 of 17 with 4 of 26
29. 1 of 3, 29. 1 of 2, 29. 1 of 1
- 30 White enamel to 1794
- 31 yellow do - do
- 32 green do - do
- 33 Calcined copper
- 34 Colicthar to 1794
- 35 manganese.
- 36 Naples yellow
- 37 black wax powdered
- 38 Antimony
38. Ormus do. 38. Calc do
- 39 Oke (say carr) burnt to
- 40 Sulphur
- 41 Calcined iron
- 42 Umber
- 43 Spanish brown
- 44 Bone ashes
- 45 Calc Capri
- 46 China frit
- 47 Pine apple glass
- 48 McMoris manganese
- 49 a Talon stone
- 50 Umber and iron
- 51 quartz
- 52 Radix Amethysti
- 53 Swindon's yellow clay
- 54 Alum earth
- 55 Isle of Wight sand
- 56 G. Lambert salts

- 57 Red clay
- 58 blue holding ground
- 59 Cornish Moor stone
- 59x do - dark coloured
- 60 { also called "Mander" 1 of 1
Cornwall clay 1 of 1
- 60x Dr Carlogues land
60. Dr St. James unwashed & ground
60. 2 of 2 burnt & ground
- 61 lime burnt
61. lime stone
- 62 Lym sand
- 63 Isle of Wight sand
- 64 Arsenic
- 65 Chinese Petroleum or stone
- 66 do - Haslin or clay.
- 67 White enamel
- 68 Crow Stone
- 69 Kniddle
- 70 Cream coloured glass
- 71 Tin calcined with vitra
- 72 Iron Stone
- 73 Barilla
- 74 { Lark, white chalky enclosing lead
from near Middleton Derbyshire
74. do from Scotland very white
74. do from Derbyshire bad colour
74. do created from near Chorley Lancashire
- 75 White clay from Mr Twiss Cornwall
- 76 do - from Braffington Derbyshire
- 77 Ochre
- 78 Purvie Stone
- 79 Fluor
- 80 Iron Nae
- 81 Feldspar
- 82 Emory
- 83 Nickel
- 84 Killas
- 85 Mad
- 86 Duke of Athol's clay
- 87 yellow clay from Smith
- 88 Milo clay from Mr Hauller
88. do No 4
- 89 Vitr. Tart.
- 90 Vegetable lime
- 91 discharge
- 92 lime of 74
- 93 Soda
- 94 Arsenical neutral salt
- 95 Dr Part's clay, England
- 96 Comb Martin's talcum
coloured soap rock
- 97 Newhaven clay

Fig. 2. Josiah Wedgwood's code, V&A Wedgwood Collection, MS E26-19117.
Photo © Victoria and Albert Museum, London

Materials		Febr. 13 th . 1759. at Fenton	
1	$\frac{3 \ 5 \ 6 \ 17}{32 \ 1 \ 5 \ 8}$	Trial for a colorless glaze did not succeed	:2
2	$\frac{32 \ 1 \ 5 \ 8}{}$	with a very little Manganese — No better	:2
3	$\frac{24 \ 5 \ 3}{2 \ 1 \ 6}$	Trial for a Blue, to lay upon the biscuit ware along with the colors, to imitate agate & tortoise shell	:8
4	$\frac{2 \ 1 \ 2}{}$	Trial to make a blue smalt, to mix with a white glaze, & cover the cream-colored biscuit ware, so as to make a blue glazed ware in the G.O.	:8
5	$\frac{3 \ 5 \ 17}{32 \ 1 \ \frac{1}{2}}$	Trial for a white glaze	:2
6			
7	$\frac{3 \ 17 \ 33}{120 \ 30 \ 9}$	a green glaze, to be laid on common white (or cream color) biscuit ware — Very good — March 23. 1759.	:2
8	$\frac{3 \ 3}{4 \ 1}$	Trial to blanch or whiten 3 — April 9. 1759.	:2
9	$\frac{44 \ 62 \ 20 \ 22}{16 \ 16 \ 1 \ 1}$.5
10	$\frac{3 \ 17 \ 5 \ 25}{6 \ 3 \ 1 \ \frac{1}{4}}$	Trial for a colorless glaze mixed & fired in a crucible	:2
11	$\frac{57 \ 69}{2 \ 1}$.19
12	$\frac{4 \ 1}{}$.19
13	$\frac{8 \ 1}{}$.19
14	$\frac{12 \ 1}{}$.19
15	$\frac{16 \ 1}{}$.19
16	$\frac{20 \ 1}{}$.19
17	$\frac{24 \ 1}{}$.19
18	$\frac{6 \ 39}{1 \ 1}$.19
19	$\frac{12 \ 1}{}$.19
20	$\frac{16 \ 1}{}$.19

More Than Just Numbers: Josiah Wedgwood's Ceramic Trials

Rebecca Klamer

The products of Josiah Wedgwood (1730–1795) and his company are world-famous for their beauty, perfection and ingenuity. The story of a boy born into a family of potters in Burslem, apprenticed to his brother, hindered by a disabled leg and thus forced to focus on experiments rather than throwing on the wheel, is well-told – but rarely do we look beyond the flawless results that ended up in homes of all social classes across the globe.

The V&A Wedgwood Collection at Barlaston, Stoke-on-Trent holds over 100 wooden trays, filled with thousands of small ceramic pieces, each documenting a brief moment in Wedgwood's laborious experiments. While these trial pieces on their own are most intriguing and fascinating to look at, their true history would remain obscure, were it not for Wedgwood's surviving experiment books held in the Wedgwood archives (Figs. 1, 2).¹

Minutely listing every single experiment by number together with its recipe and alongside Wedgwood's comments and verdicts, the experiment books offer a unique window not only into the difficulties of 18th-century ceramics manufacture, but also into Wedgwood's genius. Methodical in approach and meticulous in documenting every single minute change in composition, he seemed to be very aware that any breakthrough would be worthless unless he were able to reliably reproduce it.

But even these thorough records would remain partly illegible were it not for the survival of one particular document: the key to the code which Wedgwood devised to encrypt his recipes, rendering them worthless to curious but uninitiated eyes (Fig. 1).² Industrial espionage was a common reality and as a manufacturer who not only invested an inordinate amount of time but also financial resource in the constant development of new wares, he depended on always being one step ahead of his competitors. Losing exclusive use of the latest formula would have been a devastating setback. Wedgwood's code utilises a fairly simple numerical encryption: every ingredient of his recipes has its own coded number and at first glance the recipe looks like a set of fractions, curiously written in two colours of ink. It is Wedgwood's way of denoting how many parts (black ink) of every ingredient (red ink) have been used in the mixture.³ This essay will highlight some of the materials in Wedgwood's experiments allowing us to go beyond the beauty of the finished product and to retrace his footsteps in navigating the reality of an 18th-century potter, scientist and perfectionist – looking at Wedgwood's code is looking beneath the surface.

The Basics: Borax, Lead, Salt and Saltpetre

Salt-glazed stoneware was by far the most commercially successful product of the Staffordshire potteries from the end of the 1600s until the 1760s when it was surpassed in importance by Staffordshire's cream-coloured earthenware of which Wedgwood's famous Queen's ware was a particularly fine manifestation. The first numbers in Wedgwood's list of materials used for his experiments reveal the starting point and the foundation of his success: borax, lead, salt and saltpetre are common ingredients in ceramic glazes. Indeed, the very first experiment in Wedgwood's experiment book, dated 'Febr. 13th 1758, at Fenton', is a 'trial for a colourless glaze'.⁴ Wedgwood disappointedly comments 'did not succeed' and in experiment number two he tries the very same recipe 'with a very little Manganese' but: 'no better'.

Fig. 1. First page of experiments in Josiah Wedgwood's experiment book, V&A Wedgwood Collection, MS E26-19117. Photo © Victoria and Albert Museum, London

A Green Glaze for a Cauliflower

Experiment number seven dated 'March 23, 1759' is trialling 'a Green glaze, to be laid on common white (or cream color [sic]) biscuit ware – Very good'. The green glaze was perfected during his partnership with Thomas Whieldon, whom he mentions in the very first sentence in the introduction to his experiment book: 'This suite of Experiments was begun at Fenton hall, in the parish of Stoke upon Trent, about the beginning of the year 1759, in my partnership with Mr Whieldon'. It was Wedgwood's earliest public success and while wares in the shapes of cauliflowers, melons or pineapples with colourful lead glazes were also produced by many other Staffordshire potters, he is often credited to be the first.⁵



Fig. 3. Detail of a tray with various ceramic trials, made at the factory of Josiah Wedgwood, Etruria, Staffordshire, 1759-1795, museum number WE.7137-2014. Details also showing trial 3107, containing ingredient 23, Cherokee clay. Wedgwood comments: 'A very fine white body, perfect porcelain and seems to stand well.' Photo © Victoria and Albert Museum, London

Cherokee Clay from America: Material Number 23

Among Wedgwood's list of materials, we soon discover ingredient number 23: Cherokee clay. This ingredient's chemical set up is as important as the mystery of its origin and its sourcing in North America.⁶ Wedgwood had seen samples of this mysterious substance by July 1766, at the latest.⁷ In May 1767 he told his business partner Thomas Bentley about Thomas Griffiths (fl. 1750–1775) who 'hath resided many years in N[orth] : A[merica], & is seasoned to the S[outh] C[arolina] climate [...] & has had many connection with the Indians'.⁸ After much rumination as to how he could obtain quantities of this pure white clay for his sole use by means of a patent, he took advice from the Duke of Bridgewater who 'does not think a Patent will stand for an exclusive right to the Cherokees, and upon the whole advises to send a Person over immediately without applying for grant, Patent or anything else'.⁹ Wedgwood engaged Thomas Griffiths who obtained six tons of Cherokee clay, which were shipped to Staffordshire (Figs. 3 and 4).¹⁰



Fig 4. Tray with various ceramic trials, made at the factory of Josiah Wedgwood, Etruria, Staffordshire, 1759-1795, museum number WE.7137-2014. Photo © Victoria and Albert Museum, London



The first time ingredient number 23, Cherokee clay, is mentioned in Wedgwood's experiment book is in trial number 250 where he mixes one part with one part of ingredient 19, 'Kevil or Wheatear'¹¹ and fires it in the white oven. He comments: 'Transparent, of snowy whiteness, but seems to want tenacity. Try it with less of 19'. He tries again in experiment 251, adding one part of ingredient 12, steatite: 'opake [sic], dull white, very tender, as bibulous as a tobacco pipe. The 12 has made a great alteration in this for the worse.'¹² While the chemical properties of the American clay convinced many English potters that it was indeed a very superior clay, Wedgwood also realised the marketing value of its origin as he explained to Bentley on 15th December 1777:

I have often thought of mentioning to you that it may not be a bad idea to give out, that our jaspers are made of the Cherokee clay which I sent an agent into that country on purpose to procure for me, & when the present parcel is out we have no hopes of obtaining more, as it was with the utmost difficulty the natives were prevail'd upon to part with what we now have [...]. They [his 'large and fine jasper tablets'] want nothing but age & scarcity to make them worth any price you could ask for them. We use a considerable quantity of Radix Jasperini (74) now [...]. A Portion of Cherokee clay is really used in all the jaspers so make what use you please of the fact.¹³

Radix Jasperini

Compared to all of the innovations Wedgwood achieved through tireless experimenting, jasper is his sole true invention – a ceramic body with no precursors, deemed his most successful and most popular.¹⁴ While we cannot ascertain the actual quantity of Cherokee clay ultimately being used in Wedgwood's jasper, if any, this nevertheless leads us to the last of Wedgwood's coded materials discussed in this essay: number 74, 'Radix Jasperini', also known as 'Cawk'. Number 74 first appears in experiment 1610 where it is mixed with 17 (calcined flint), 22 (Purbeck clay) and 44 (Boneashes [sic]). Josiah comments 'good white transparent body' and in experiment 1613 where he slightly adjusts the proportions: 'The best of this series, a very pretty body. The addition of 1 part of 17 [calcined flint] has a very good effect in this No'. 'Cawk' is the essential ingredient in Wedgwood's original recipe for jasper of which it constitutes more than 50 per cent. We know that 'Cawk' is barium sulphate which Wedgwood struggled to differentiate from barium carbonate, delaying the development of a successful and reliable recipe.¹⁵ When he finally shared the recipe with Bentley on 6th February 1776, he did so utilising his trusted code to avoid this most precious of all his recipes falling into the hands of his competitors.¹⁶

Towards the end of his career, with jasper developed into a reliable material for most wares, Wedgwood took on yet another challenge, a true copy of the famous Portland Vase, a Roman glass vase regarded as the pinnacle of cameo glass-cutting and famed throughout the Western world. While he was attempting to emulate the effect of translucent cut glass with opaque clay, Wedgwood encountered many obstacles, probably most tangibly demonstrated in two trial vases preserved in the V&A Wedgwood Collection, showing the effects of over-firing and insufficient adhesion of the reliefs to the vase body (Figs. 5, 6 and 7).¹⁷ Finally, after years of trialling, he achieved a perfect copy in 1789 and took subscriptions from 1790 (Fig. 8).

Fig. 5. Detail of a trial for the Portland Vase, made at the factory of Josiah Wedgwood, Etruria, Staffordshire, c. 1789, museum number WE.7999-2014. Photo © Victoria and Albert Museum, London



Fig. 6. Trial of the Portland Vase, made at the factory of Josiah Wedgwood, Etruria, Staffordshire, c. 1789, museum number WE.7999-2014. Photo © Victoria and Albert Museum, London



Fig. 7. Trial of the Portland Vase, made at the factory of Josiah Wedgwood, Etruria, Staffordshire, c. 1789, museum number WE.7998-2014. Photo © Victoria and Albert Museum, London



Fig. 8. First edition copy of the Portland Vase owned by the antiquarian Thomas Hope, made at the factory of Josiah Wedgwood, Etruria, Staffordshire, 1793, museum number WE.8000-2014. Photo © Victoria and Albert Museum, London

From Judging the Colour of the Flames to a Thermometer

Many of these trials are impressed, incised or labelled with a coded sequence of letters, which Wedgwood explains in the introduction to his experiment book:

The degrees of heat, in my former books, were expressed by the different ovens, & the different parts of them, which the experiment pieces had been fired in. GO signified the Gloss oven, BO the Biscuit oven, and WO the white oven; and the letters B, M, T prefixed to these meant the bottom, middle, & top of the respective ovens. – TBO means the highest part of the Biscuit oven in which we set ware, which is before the top of the chimneys or flues, called bags by the potters, and TTBO signifies the uppermost sagar [sic] of the pile, except the one with which it is covered. No other means than the above were at that time known, not only of communicating to any other person, but of preserving to myself, any idea of that very essential circumstance in experiments of this kind, the degree of heat to which matters were exposed. But having lately invented a Thermometer, for measuring these higher degrees of heat, as far as we can go above ignition; the heats made use of in the several experiments are now expressed in the degrees of that thermometer.¹⁸

This gives us yet another insight into the many challenges facing potters in the 18th century: the high temperatures in Staffordshire's typical bottle kilns, well over 1000°C, were hard to control and even harder to measure.¹⁹ The kiln men were amongst the best-paid staff in the factory; they were skilled at judging the temperature by the colour of the flames, peering into the heat and in doing so, we are told, scorching their eyebrows and lashes. Wedgwood's invention of the 'thermometer' in 1782 revolutionised the firing process. Kiln temperatures were instead measured by relating them to the shrinkage of fired clay. His invention – often called the 'pyrometer' referring to pyrometry, a branch of physics for the measurement of high temperatures, though Wedgwood only ever called it 'his thermometer' – was critical. The mercury thermometer, invented by Daniel Fahrenheit in 1714, only measured up to the boiling point of mercury, which occurred at just 356°C (673° Fahrenheit respectively), thus rendering it inadequate for the production of ceramics. Wedgwood had conducted a thorough literature review regarding thermometers through the volumes of the *Philosophical Transactions of the Royal Society* spanning the years 1693 to 1778.²⁰ The temperatures were measured in degrees Wedgwood (°W) and read off a scale which was marked at intervals of 0.05 inch, each division corresponding to 1°W.²¹ Understanding the importance of this device for the advancement of the pottery industry, Wedgwood shared it freely and as a result was made a Fellow of the Royal Society in 1783 (Figs. 9 and 10).

While at first sight these trial trays rarely reveal their true meaning, on second sight they give us an incredible insight into Wedgwood's methodology and allow us not only a glimpse beneath the surface of Wedgwood's spectacular products but also a brief encounter with Josiah Wedgwood the man.

Fig. 9. Tray with various ceramic trials, made at the factory of Josiah Wedgwood, Etruria, Staffordshire, 1759-1795, museum number WE.7405-2014. Photo © Victoria and Albert Museum, London

Rebecca Klarner is an art historian, specialised in European decorative arts, focussing on ceramics. She gained her degree and MA in History of Art and English Linguistics from the University of Cologne after being fully trained in goldsmithing in Germany. Her research covers subjects from the 18th to the 20th century and has been published in various national and international peer-reviewed journals. In Autumn 2021 she will commence her PhD on 'The Question of Good Design - Wedgwood's role in the shaping of public taste in the 20th century (c.1936-1986)' as an AHRC-funded Collaborative Doctoral Partnership between University of Leeds and the V&A Research Institute, while continuing in her role as Assistant Curator for the V&A Wedgwood Collection.





Fig. 10. Detail of a tray with various ceramic trials, made at the factory of Josiah Wedgwood, Etruria, Staffordshire, 1759-1795, museum number WE.7405-2014. Shown are trials for 'various compositions with clay, in order to make a body to diminish in burning as much as possible, upon the idea of forming a thermometer'. Photo © Victoria and Albert Museum, London.

We would like to thank the volunteers of the Arts Society branches of North Staffordshire and Stafford, who since 2018, almost as tirelessly as Wedgwood himself, have been cataloguing and transcribing Wedgwood's trials to be accessible as part of the V&A online catalogue. While this project is still ongoing we are hoping to inspire future research as well as future experiments with the improved accessibility to these unparalleled documents of 18th-century scientific curiosity and tenacity.

References

- ¹ V&A Wedgwood Collection, MS E26-19117. Presented by Art Fund with major support from the National Lottery Heritage Fund, private donations and a public appeal. In fact, Wedgwood appears to be very aware of the importance and indeed the legacy of this particular experiment book, so much so that while he mentions using it during experimentation (see endnote 3), the surviving book is a clean copy, transcribed by the chemist Alexander Chisholm (1723–1805) whom Wedgwood employed in 1781 as his secretary and chemical assistant, as well as tutor to his children. There are several manuscripts in the V&A Wedgwood Collection that could be classed as experiment books. The one referred to in this essay (MS E26-19117) documents experiments Number 1 to Number 4832.
- ² V&A Wedgwood Collection, MS E26-19117.
- ³ Wedgwood explains this in the introduction to his experiment book: 'In the following experiments I have expressed the materials by Numbers, which in this instance are a species of short hand and save more writing. They have likewise an advantage of not being legible without the key, to

any person who might happen to take up the book, which is often, in the course of making the experiments, unavoidably exposed to such accidents.'

- ⁴ V&A Wedgwood Collection, MS E26-19117. It entails '32 parts of ingredient 3 [white lead], one part of ingredient 5 [saltpetre], five parts of ingredient 6 [flintglass [sic]], and eight parts of ingredient 17 [calined flint]'.
- ⁵ Such as in Reilly, R., 1995, *Wedgwood. The New Illustrated Dictionary. Woodbridge: Antique Collectors' Club*, p. 203, where it is also admitted that shades of green with the help of copper had already been achieved by the Romans.
- ⁶ This 'Cherokee clay', also known under its Cherokee name 'Unaker' is china clay (kaolin), a very white clay which together with china stone (petuntse) was needed to make true porcelain. William Cookworthy (1705–1780) who would discover English china clay and china stone at St. Austell in Cornwall, first mentioned Cherokee clay in 1745, for more information see e.g. Ramsay, W. R. H.; Gabszewicz, A.; Ramsay, E. G. (2001): 'Unaker' or Cherokee Clay and its relationship to the Bow porcelain manufactory. In *ECC Transactions* 17 (3), pp. 474–499. Wedgwood shows great interest in these English materials, however, since 1768 their use was protected by a patent taken out by Cookworthy. When Wedgwood would have been able to buy the patent from Cookworthy's successor Richard Champion (1743–1791) in 1778, he was no longer interested, very likely because the recent development of his new jasper clay was promising enough.
- ⁷ V&A Wedgwood Collection, MS E25-18119, letter from Josiah Wedgwood to Thomas Bentley, July 1766: 'Please to give my compliments to Mr. Vigor and desire he will send the few pounds of earth he has by him that I may give it a fair tryal [sic] but I find others have been dabling [sic] with it before us, for a Brother of the Crockery branch call'd upon me on Saturday last & amongst other clays he had been trying experiments upon shew'd me a lump of the very same earth which surpris'd me a good deal & I should almost [sic] have thought myself robb'd if it had not been much larger than my pattern. He told me it came from South Carolina, that he had a large boxfull [sic] of it sent to him by a Gentleman of his Acquaintance, but he could make nothing at all of it & had return'd the remainder to his friend again. I was not sorry to hear the latter part of his story which I could the more easily credit as I find the tryals [sic] I have made that it will require some peculiar management to avoid the difficulties attending the use of it.'
- ⁸ V&A Wedgwood Collection, MS E25-18146, letter from Josiah Wedgwood to Thomas Bentley, 20th May 1767.
- ⁹ V&A Wedgwood Collection, MS E25-18147, letter from Josiah Wedgwood to Thomas Bentley, 23rd May 1767.
- ¹⁰ Finer, A., and Savage, G., 'The Selected Letters of Josiah Wedgwood', 1965, p. 272. Letter to Sir William Constable, 3rd November 1783. The letter is said to be in the possession of 'R. C. Constable Esq.'.
- ¹¹ 'Kevil (Derbyshire): a veinstone consisting of a mixture of calcium carbonate and other minerals'. Thrush, P. W., *A Dictionary of Mining, Mineral, and Related Terms: U.S. Bureau of Mines*, 1968.
- ¹² It is interesting to note that while the numerical sequence of Wedgwood's materials imply a certain order, be it of importance or of introduction to his experiments, number 23 appears to have been 'reserved' for Cherokee clay almost from the onset of his documented experiments: experiment number 3 uses ingredient 24 (Zaffre), and experiment number 7 for the green glaze employs ingredient 33 (calined copper). It is also possible, that the order of ingredients in Wedgwood's coded numbering system was edited at a later stage.
- ¹³ V&A Wedgwood Collection, MS E25-18802, letter from Josiah Wedgwood to Thomas Bentley, 15th December 1777.
- ¹⁴ See e.g. Campbell, G., (Ed.) *The Grove Encyclopedia of Decorative Arts*. Oxford: Oxford University Press, 2006, p. 546.
- ¹⁵ Reilly, R., 1995, p. 51.
- ¹⁶ V&A Wedgwood Collection, MS E25-18651, letter from Josiah Wedgwood to Thomas Bentley, 6th February 1776.
- ¹⁷ It is interesting to note that these two vases appear to have been fired without a base, suggesting that they were full-size trials rather than actual vases that did not survive the fire.
- ¹⁸ V&A Wedgwood Collection, MS E26-19117.
- ¹⁹ Present-day jasper is fired at 1180°C.
- ²⁰ Josiah Wedgwood's Commonplace Book, V&A Wedgwood Collection, MS E39-28408, p. 10. His first endeavour, the so-called 'thermoscope' utilised the phenomenon of certain clay mixtures progressively changing in colour during the firing process. He devised a colour scale of clay cylinders in a glass tube for reference against test cylinders fired with the wares. However, he soon abandoned this idea, presumably after the lack of objectivity in judging the colour tones was pointed out by Sir Joseph Banks in 1781.
- ²¹ It is commonly assumed that 1°W relates to c. 130°F/54°C. In 1784 Wedgwood attempts to compare his scale to the one of Fahrenheit (Wedgwood, Josiah (1784): *An Attempt to Compare and Connect the Thermometer for Strong Fire, Described in Vol. LXXII. of the Philosophical Transactions, with the Common Mercurial Ones*. By Mr. Josiah Wedgwood, F. R. S. Potter to Her Majesty. In *Philosophical Transactions of the Royal Society of London* 74, pp. 358–384.) but his results were proved to be inaccurate. Wedgwood's device relies on the assumption that clay shrinks in a progressive and linear way directly relatable to temperature, however, this is not entirely accurate, especially when taking into account what we now know as the principle of 'heat work', i.e. burning shrinkage not only depending on temperature but also on the duration of firing. See the very thorough analysis of John Chaldecott (1916–1998): Chaldecott, J.A., *Presidential Address. Josiah Wedgwood (1730-95) - Scientist*. In *The British Journal for the History of Science* 8 (1), 1975, pp. 1–16.



Developments in the North Staffordshire Pottery Industry, 1600 -1800

Dr David Barker

Saggar containing blackware or 'shining black' teapots which has suffered damage or collapse during the glost firing, excavated at the Albion Hotel site, Hanley; c. 1760.
Image courtesy of The Potteries Museum and Art Gallery, Stoke-on-Trent



Black basalt teapot waster, collapsed during firing, excavated at Shelton Farm; late 18th century
Image courtesy of The Potteries Museum and Art Gallery, Stoke-on-Trent

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Dr David Barker

Introduction

This essay sets out to provide context for the items selected for Neil Brownsword's 2021 exhibition *Alchemy and Metamorphosis*. To understand these wares and their significance, it is important to examine the broader context of innovation and technological change over the period from 1600 – 1800.¹ The period divides into two unequal parts. The first, from 1600 to 1720, was one of continuity, albeit with a gradual, but constant expansion in the scale of involvement in the industry, in the scale of output, and in market activity. The second, from 1720 saw the industry transformed into something approaching its modern form, with new processes, new wares and a global market for these.

The evidence

For the study of the pottery industry of this period the standard range of documentary evidence is available – wills, inventories, letters, diaries, factory account books, recipe books, apprenticeship records, personal accounts and observations, the works of early historians, and so on. While some of these sources provide evidence for the processes used in pottery manufacture, few are concerned with the sort of detail about the products of the industry which would help us today.

Numerous examples of the wares produced during this period also survive in public and private collections. However, while they offer a perspective on the output of British potters at this time, they are pieces with no context other than that of the collection in which they now exist. In many ways, their survival misleads, for it is the result largely of decisions based upon a piece's aesthetic or technical merits. They tell us little about the wider output of manufacturers or the choices made by consumers at the time, while the problem of distinguishing the products of one manufacturing centre and another has led to many incorrect attributions and false assumptions about the different industries. Fortunately, it is a period for which – in North Staffordshire, at least - there is an abundance of archaeological evidence, including large assemblages of wasters from production sites. The north Staffordshire evidence clearly points to a significant increase in manufacturing activity during this period.

Archaeological material cannot address all of the outstanding questions of what was produced where, and by whom, but it provides a solid body of well-sourced, datable material with a clearly-defined context. It can also reveal the precise range of wares produced in the area, often at the level of individual workshops or manufactories.² Moreover, archaeological recovery does not discriminate on the basis of quality, completeness or technical merit, and an emphasis on production waste has yielded important evidence for manufacturing processes, for placing and firing, and for the difficulties encountered at each stage of production. In the case of waster dumps used by a single manufactory, it is possible to see the development of wares, styles and processes over a known period of time. The most notable example of this is the dump used by the factory of William Greatbatch in Fenton (Fig. 1), which revealed the changing nature of this one factory's output over a twenty-year period, from 1762 – 1782.³ Archaeology can also reveal the remains of the ovens in which wares were fired, enhancing an appreciation of the limitations of early firing technology and the improvements which were made over time (Fig. 2).⁴

Beginnings

The two centuries from c. 1600 to c. 1800 witnessed major advances in both the character and scale of pottery production in North Staffordshire. These advances resulted not only in new products and new processes, but in the transformation



Fig. 1. Section through William Greatbatch's waster dump, Fenton



Fig. 2. Planning one of the ovens during excavations at Shelton Farm. Image courtesy of The Potteries Museum and Art Gallery, Stoke-on-Trent

of the region from one which was primarily agricultural to one which was predominantly industrial. Moreover, manufacture which served a local or, at best, regional market at the beginning of this period, was supplying customers throughout Europe, the Caribbean, the colonies of North America and beyond well before its end. An increased demand for ceramics during the period stimulated production in North Staffordshire, while the growing importance of overseas markets ensured that manufacturers became outward-looking in responding to customer requirements.

That pottery production should have been established in the North Staffordshire Coalfield is unsurprising. Access to coal was key, for it was used in great quantities for firing and was expensive to transport. In places, coal outcrops at the surface, but the best coals occur in deeper seams which had to be mined.

Alongside the coals are clays of different types and qualities, suitable for both throwing and moulding pots, and for bricks and tiles, while lead for glazing is found only a little further afield in North Staffordshire and Derbyshire.

Both documentary sources and archaeological evidence show that potters were exploiting the area's natural resources from as early as the 14th century, but little is known of the scale or organisation of manufacturing at this time.⁵ Potters are recorded in Burslem, Hanley and Penkhull during the 16th century but excavated wasters of this date⁶ suggest that their products were broadly similar to those of other regional coalfield industries, such as those of north Warwickshire, south Derbyshire, south Staffordshire and south Lancashire. Wares include lead-glazed coarse earthenwares, high-fired purple wares and fine dark glazed cups fired in saggars (Fig. 3).

Continuity and expansion

More abundant documentary references to potters and pottery-making during the 17th century are accompanied by a marked increase in the quantity of archaeological material recovered from production sites. At least twelve potters have been identified in a study of wills and probate inventories for the parish of Stoke-on-Trent proved between 1600 and 1650, at least nine of whom were described as being of Burslem.⁷ A clear picture of the local industry cannot be formed from the inventories alone, but there is evidence to suggest that production was on a scale which was far from modest. For example, throwing wheels are as likely to be listed in the plural as in the singular, and in 1623 one potter, Thomas Daniel of Burslem, left two his two sons John and Thomas 'workhouses, smoakehouse, potte ovens ... and potwheels', amongst other things, suggesting an operation of some size. Another potter, Thomas Daniel, had considerable quantities of lead for glazing in his stock valued at £6 13s in 1633, while in 1626, besides 'all things belonging to potting', William Leigh of Burslem, owned 'part of a coalmine called Small Roe' [sic], an early example of a North Staffordshire potter with wider financial interests. Just one inventory, that of Richard Daniell of Burslem, proved in April 1619, provides evidence for the types of wares produced by these potters: amongst his stock were 'earthen pottes, panpotts and cuppes' valued at 3s 4d – in other words, jars, milk pans or dishes and fine glazed cups, the last probably of blackware.

Archaeological evidence points to the production around this time of blackwares (Fig. 4), yellow wares (Fig. 5), Midlands purple-type wares (including butter pots) and slipwares (Fig. 6), with the overwhelming majority coming from Burslem⁸ and Hanley.⁹ While precise dating of ceramics in production waste groups is difficult, similar wares in an archaeological deposit dating to 1647 in the moat of Eccleshall Castle, just 23km to the south of the Potteries, confirms that these types were in widespread use before the middle of the 17th century.¹⁰

Excavated finds suggest that by the mid-17th century North Staffordshire ceramics had begun to acquire a distinctly local character setting them apart somewhat from similar wares made elsewhere. This distinctiveness developed further during the second half of the 17th century, at a time when production was expanding in scale and becoming increasingly sophisticated. In her study of the development of the Staffordshire pottery industry from 1660 to 1760, Lorna Weatherill has shown a significant increase in the number of potteries operating, from just under thirty in the 1660s, to just under fifty in the 1670s, and 67 in the decade 1710 - 1719.¹¹ By the early 18th century it is probable that in excess of 600 individuals were employed in pottery manufacture, on the basis that Josiah Wedgwood estimated that six men and four boys were required to produce on oven-full of mottled ware and black ware.¹² Moreover, by this time, it is clear that pottery-making had become a full-time occupation, rather than something which was often carried on alongside farming.¹³



Fig. 3. Glazed cups – so-called Cistercian ware – excavated in Burslem; 16th – early 17th century



Fig. 4. Blackware cup wasters from Queen Street, Burslem, showing the small clay pieces used to raise them from the sagger base; c. 1640-1650



Fig. 5. Large yellow ware cup, excavated Burslem; c. 1640-1650



Fig. 6. Slipwares excavated in Newcastle Street, Burslem; stylistically these vessels appear to be early; c. 1640-1650



Fig. 7. Two slipware dishes from a deposit of 90 or so excavated at Hill Top, Burslem; c. 1680-1700

A typical North Staffordshire production group of the late 17th century comprises wasters of decorated slipwares (Figs. 7-8), blackware, butter pots (Fig. 9), and coarse earthenwares (Fig. 10), together with mottled wares and salt-glazed stonewares (Fig. 11) towards the end of the century.¹⁴ In broad terms the range of wares is similar to that of other regional pottery centres (such as Wednesbury, Ticknall, Rainford, Buckley and Wrenthorpe), although perhaps with minor differences in vessel forms and decoration. Moreover, the raw materials, manufacturing processes and methods of firing were also broadly similar across the industry. Earthenwares were thrown or press-moulded, often decorated with coloured slips and coated with lead glaze. Vessels were once-fired, with saggars being used for hollow wares.

Commercial advantages

Despite comparisons with other regional industries, there was something which set the Staffordshire industry and its wares apart, enabling it to expand both its output and its markets, and which allowed the industry to move forward into a new transformational phase of development in the 18th century. The reasons for this are not entirely clear. Staffordshire products could be of a high quality, the result of skills learned over generations, but not all were so, and it would be wrong to assume that high quality wares were not being made elsewhere. Moreover, evidence suggests that quality – itself a subjective term – was not a major factor affecting the potter's ability to sell or the customer's willingness to purchase.

North Staffordshire certainly benefitted from its geology and the availability of raw materials, but was not unique in this. Here, at least, the natural resources more than compensated for the area's geographical situation which was far from ideal – inland and separated from navigable waterways by between 40 and 70km. It is hard to avoid the conclusion that scale played a significant part in enabling the industry's development – the concentration of so many individuals – often with close family connections – actively engaged in a single occupation. The result of greater manufacturing activity would inevitably be an increased output of wares, which would drive down costs to the manufacturer and prices to the customer, and deliver increased business.

Archaeological finds can show where in this country – and abroad – North Staffordshire wares were being used, but evidence for how they arrived there is less forthcoming. Dr Robert Plot's account of pottery-making in North Staffordshire suggests quite modest arrangements for the distribution of wares, with potters selling their products 'chiefly to the poor Crate-men, who carry them at their backs all over the Countrey...'.¹⁵



Fig. 8. Press-moulded slipware dish with firing crack and contact scars from placing; found Hanley; early 18th century



Fig. 9. Butter pots found in the Potteries; 17th century. Image courtesy of The Potteries Museum and Art Gallery, Stoke-on-Trent



Fig. 10. Rim sherds of coarse earthenware dishes with glazed interiors, excavated Burslem; mid – late 17th century. Image courtesy of The Potteries Museum and Art Gallery, Stoke-on-Trent



Fig. 11. Brown salt-glazed stoneware mug and saggar, found Burslem; c. 1700-1710.
Image courtesy of The Potteries Museum and Art Gallery, Stoke-on-Trent

Nevertheless, such methods clearly worked, for Staffordshire ceramics are well-represented in late 17th- and early 18th-century domestic groups in many parts of the British Isles. Another slightly later reference specifically refers to the ability of the Staffordshire manufacturers to produce and sell more cheaply than some of their competitors. In referring to the potteries of Potterspur, Northamptonshire, John Morton in his *Natural History of Northamptonshire*, published in 1712, states: 'Were our materials never so good, [the pottery] is never likely to flourish very much with us because the way of living here is more expensive than in Derbyshire [i.e. the potteries of Ticknall] and Staffordshire, and the potters of those two counties who bring hither their wares upon little horses or asses, usually begging their victuals, do on that account afford their wares at much under-rates as our potters here cannot live so well upon the trade'.¹⁶

Whatever the limitations of the methods of distribution, North Staffordshire manufacturers were able to tap into an export trade of sorts during this period. Evidence for this comes primarily from archaeological work in North America and the Caribbean, which consistently yields Staffordshire wares amongst the wide range of British and European ceramics present on early colonial sites. Indeed it is clear that Staffordshire ceramics were reaching North America, albeit in small numbers, from c. 1610 onwards,¹⁷ but by the end of the 17th century they are sufficiently common finds on east coast American sites and on sites in the Caribbean colonies to suggest an organised export trade on a fairly substantial scale. Examples of Staffordshire wares are also found on Continental European sites at this time.

A ceramic revolution

By 1720, therefore, pottery production in North Staffordshire was thriving, with wares which competed successfully in both home and overseas markets. However, developments in the period 1720-1730 brought about the complete transformation of the local industry, with innovations which were to change the course of ceramic production throughout Britain and to determine the character of British wares even to the present day. New ware types, new processes and a significant increase in the scale of production established the North Staffordshire industry as the driving force in British ceramic manufacture, exerting a tremendous influence upon home production generally and hastening the decline or demise of some sectors of the industry. By the end of the 18th century North Staffordshire manufacturers were amongst the leading suppliers of ceramics across much of the globe.

A range of factors contributed to this 'ceramic revolution', but significant amongst them was the growing popularity amongst the well-to-do during the early 18th century of the new beverages, tea, coffee and chocolate. The need for vessels in which to serve, and from which to consume these new drinks was met in part by imported Chinese porcelain, but this commanded a high price. There was a significant gap in the market for less expensive, home-produced tea and coffee wares of a good quality to meet the requirements of the less affluent middle classes. This gap was filled by a range of new refined earthenwares and stonewares introduced by Staffordshire manufacturers in or around 1720. These new wares were different in every respect from past production and their impact upon individual manufacturers' operations and upon the industry as a whole was immense. A number of important innovations at this time contributed to these developments. One, the introduction of the great wheel, freed the thrower from the need to power his wheel, the power being provided by another, usually a child, which consequently increased the thrower's output. Lathe-turning, by contrast, made possible the production of the thin-walled vessels now in demand. Lathe-turning allowed the bodies of newly-thrown vessels, still in a leather-hard state, to be pared down to a thinness which could not be achieved by throwing alone, while also opening up a range of decorative possibilities.



Fig. 12. Teapots in glazed red earthenware with additional slip bands, excavated at Shelton Farm; c. 1720-1740



Fig. 13. Teapots and cover of white salt-glazed stoneware (left) and agate ware, excavated at Shelton Farm; c. 1720-1740

Initially, the types of fine earthenware introduced were made from local clays. The most widespread were the red wares (Fig. 12), widely made by the early 1720s, and the agate wares whose bodies were made of clays of different colours, which appeared towards the end of the decade (Fig. 13). These earthenwares differed from what had gone before in that they were twice-fired, with separate biscuit and glaze firings giving greater control over the final product and making possible the production of earthenwares of a consistently high quality. Saggars, already standard in the manufacture of single-fired earthenwares and stonewares, were now required for both stages of the firing process, while the glaze firing also required a range of kiln furniture to support and separate glazed wares within the saggars.

Salt-glazed stonewares (once-fired) had been produced in North Staffordshire since the late 17th century, but the introduction of white salt-glazed stoneware in, or slightly before 1720,¹⁸ marked a turning point for the industry (Fig. 13). Local clays continued to be used for many types of ware, but the white stonewares and later white earthenwares required white-firing clays which could not be obtained locally. 'Ball clays' were brought in from Devon and Dorset to meet this need, to be supplemented later in the century by white-firing china clays from Cornwall. Another important raw material from outside the region necessary for the production of the new fine wares was flint. Calcined and crushed to a powder, flint was added to the clay body mixes to help wares withstand higher firing temperatures without distortion, and to glazes to help them to adhere to biscuit-fired bodies. Flint was sourced on the south-east and east coasts of England, but was processed in and around the Potteries, either within the pottery manufactories or by specialist concerns.

The need to bring raw materials into the area in quantity greatly expanded the horizons of North Staffordshire manufacturers, situating them within a network of carriers, dealers and middlemen who maintained the industry's supplies. These came by sea, river and then by packhorse from the river ports in ever greater quantities. In 1721, for example, Thomas Fenton was bringing in (ball) clays from Bridgnorth and Liverpool for his potworks at Shelton, paying for 66 'clodds' [sic] of clay in November 1721;¹⁹ at around 35lb. for each ball, this represents a little over one ton which would have required carriage by eleven packhorses.²⁰ The same road, river and sea routes used to bring raw materials into North Staffordshire were used to move finished goods out, thereby increasing the home trade and giving manufacturers access to the sea ports for their export trade. Weatherill documents a rise in the quantity of ware taken down the Weaver from 50 tons or almost 1,000 crates in 1734 to more than 600 tons, or 12,000 crates, in 1760.²¹

Manufactories

For the manufactories now producing the new earthenwares and stonewares, more efficient methods of clay preparation were essential. This had previously taken place outdoors, with drying in sun kilns dependent upon the weather, but a move indoors seems to have begun as early as 1718. From this time potters' inventories show a rise in riddles, lawns, sieves and paddles and other equipment connected with clay preparation in mixing tanks, while the regular mention of kilns and hot houses suggests that heated 'slip kilns' had largely replaced the sun kilns.²² All of this speeded up clay preparation significantly and ensured a better quality clay.

What little evidence there is suggests that before the 1720s production took place in small workshops, often modified from other uses - perhaps domestic - and typically having just one oven.²³ However, there is clear evidence of a general increase in the number of workshops in the second quarter of the 18th century to provide additional accommodation for the new processes - turning, slip-making and clay preparation, throwing, handling, glazing, saggar-making and warehousing.²⁴ In 1747, one of North Staffordshire's most successful manufacturers, Thomas Whieldon, occupied a new manufactory in Fenton which comprised 'pot ovens, houses, buildings, warehouses, work houses, throwing houses...'.²⁵ While this and other similar descriptions of pottery-making premises have a generic feel to them, the general inclusion of terms such as warehouses and throwing houses in the plural is significant.

Changes in production can also be seen in the number of ovens which manufactories possessed. From 1720 all references to ovens in potters' wills are in the plural,²⁶ a development which reflects an increase in either the scale or the diversity of production from this time. The manufacture of twice-fired earthenwares required separate ovens for biscuit and glost firings, while manufactories which made both twice-fired earthenwares and salt-glazed stonewares would have required a minimum of three ovens. Increased output demanded a greater capacity for firing, and some of the largest 19th-century factories had ten or more ovens. However, many manufacturers pursued profitable businesses well into the 19th century with just one biscuit and one glost oven, and even the so-called Ivy House Works in Burslem, which Josiah Wedgwood occupied briefly between 1759 and 1762, still had just two ovens at the time of its demolition in 1835.

Workers

The production of the new wares affected not only the layout of the manufactory, but also the size and composition of the workforce. In contrast to the earlier small workshops which could be operated by a few multi-skilled operatives, the manufactories which emerged during the second quarter of the 18th century comprised a number of separate workshops for different processes.²⁷ While



Fig. 15. Biscuit white earthenware (creamware) milk jug and sugar bowl with sprigged decoration; excavated Town Road, Hanley; c. 1755-1760

the processes involved in the production of the new wares can be determined with some certainty, the extent to which multi-tasking was still pursued cannot. However, evidence clearly points to an increase in specialisation amongst the workforce and a more rigid division of labour before the middle of the century. Simeon Shaw states that, 'Up to 1740, in each manufactory, all the persons employed were, the slip-maker, thrower, two turners, handler (stouker), fireman, warehouseman, and a few children, and, to be really useful to the master and secure sufficient employment, a good workman could throw, turn and stouk [i.e. apply handles]'.²⁸ After 1740, however, 'The increase of workmen, the subdivision of labour in every process; and the dexterity and quickness consequent on separate persons confining themselves solely to one branch of the Art, with the time saved in the change of implements and articles, instead of retarding, greatly promoted the manufacture, by increasing its excellence and elegance.'²⁹ Surviving apprenticeship indentures also indicate a move away from the all-embracing training in the '*Art & Mystery of the Potter*', to more focussed apprenticeships which excluded certain skills.³⁰ In 1731, for example, Aaron Wood was apprenticed 'the art, trade, mystery, and occupation of a potter to learn, that is to say, turning in the lathe, handling, and trimming (throwing on the wheel being out of this indenture excepted)',³¹ while by contrast Josiah Wedgwood was apprenticed, in 1744, to learn the 'Art of Throwing and Handling',³² and in 1752, George Bagley was apprenticed to Thomas Whieldon 'to learn to handle', but nothing more.³³

Between the years 1750 and 1755, the workforce at Thomas Whieldon's Fenton factory varied between 16 and 25, including children. Amongst these were: a slip maker from Lane End; Little Bet Blour 'to learn to flower' [i.e. to decorate 'scratch blue']; John Austin for placing white; Thomas Dutton for vining [i.e. sprigging]; William Keeling for handling; Wm. Cope for handling, vining & cast ware; John Barker for the hovel; George Bagnall for firing; Elijah Simpson for turning; Samuel Jackson for throwing saggars & firing; & 'a boy of Bet Bloor for treading the lathe'.³⁴ Otherwise, evidence for the numbers of workers employed in manufactories at this time is sparse.

Further developments

The transformation of the North Staffordshire industry was largely complete by the 1740s. By this time the use of plaster of Paris moulds had become widespread, making possible the mass-production of identical vessel forms, including table ware forms (Fig. 14). At about the same time, a new type of twice-fired earthenware with a white body made from ball clay and glazed with lead was introduced; this was cream-coloured earthenware, or creamware, whose



Fig. 14. Plaster of Paris dinner plate mould, excavated on William Greatbatch's waster dump, Fenton; c. 1775



Fig. 16. Creamware saucer with over-glaze painted decoration which has not been properly hardened-on, excavated on William Greatbatch's waster dump, Fenton; c. 1775



Fig. 17. Red stoneware wasters, over-fired and distorted, with engine-turned decoration, excavated at Shelton Farm; c. 1765-1775



Fig. 18. View of the excavations at the Longton Hall porcelain factory. Image courtesy of The Potteries Museum and Art Gallery, Stoke-on-Trent

importance to the industry was to increase over the next three decades (Fig. 15). As the industry continued to expand new decorative techniques were applied to wares - coloured glazes, under- and over-glaze painted decoration (Fig. 16) and, with the introduction of the engine lathe in the mid 1760s, engine-turning (Fig. 17). All of these contributed towards a standardised appearance for wares of the period, something which was accelerated by the introduction during the 1780s of under-glaze transfer-printing on earthenware. Transfer-printing had a profound and lasting impact upon the appearance of ceramics. Using tissue paper as the medium for transferring images from engraved copper plates to the body of the ware, transfer-printing set the scene for an explosion in the quantity and range of identically decorated wares in the 19th century. Each new process required specialist workers and suitable accommodation within the factory.

Of the many new wares introduced in the mid to late 18th century creamware was arguably the most important and influential. Although first introduced in the 1740s, it was improved and modified into the 1760s and beyond. Technically it was not a significant development, but through Josiah Wedgwood's securing of royal patronage for his version of the ware, promotion amongst the gentry and nobility and imaginative marketing elsewhere as 'Queen's Ware', it was to become *the* fashionable ware of the later 1760s and 1770s, replacing Chinese porcelain as the table ware of choice at the dinner tables of the upper classes.³⁵

The search for porcelain had only a limited impact upon production in Staffordshire. Manufacturers required considerable capital to support a period of experimentation needed to find a body which would be stable during firing; commercial success eluded most attempts and most British porcelain-making ventures were short-lived. In mid 18th-century Staffordshire only the Longton Hall factory was able to maintain production of soft-paste porcelain for more than a short period (1751-1760) before its collapse.³⁶ In this venture, the Longton Hall partnership relied upon the skills of William Littler who was clearly a potter of some ability and who may already have had some experience of experimenting with the manufacture of porcelain.³⁷ Excavations at Longton Hall have revealed structural evidence for the factory (Fig. 18), including its ovens and decorating kiln,

together with a wide range of sherds, saggars (Fig. 19), kiln furniture and other production material. These finds provide a valuable insight into all aspects of porcelain production at Longton and the difficulties of firing wares in an unstable soft-paste body (Fig. 20).³⁸

Even more of a mystery is exactly what led to the attempts to produce porcelainous wares – and by whom – in Newcastle-under-Lyme. Were it not for the excavation between 1969 and 1971 of a small porcelain kiln and related wasters within what had previously been the manufactory of earthenware potter Samuel Bell (working from 1724 until his death in 1744) in Lower Street,³⁹ little beyond a few documentary references would have been known about this venture. The sherds are unusual, many with competent under-glaze painted decoration in blue in oriental landscape and floral styles, but most are not translucent, and all are severely distorted or fractured with badly blistered glazes (Fig. 21). The porcelains clearly did not progress beyond the experimental stage and probably did not exceed a few small oven-fulls. They have been thought to be the work of William Steers, merchant of Hoxton, London, who had applied for a patent to make 'transparent earthen ware in imitation of porcelain or china' in 1742/3.⁴⁰ However, a recent reassessment of the documentary evidence shows that, although he moved to Newcastle in late 1745 after his patent application had been rejected and rented the property formerly belonging to Samuel Bell, Steers cannot have been responsible for the excavated wasters.⁴¹ He had moved back to London in March 1746 when his house and associated pottery workshops and ovens were advertised to let, and so was not in Newcastle at the time that these wares were produced. Clear dating evidence for these wasters, comes in the form of a single teabowl bearing the date '25th July 1746', putting its manufacture firmly in the period after Steers's time in Newcastle. Despite much debate, no conclusive evidence as to who might have produced these wares has yet been found, although the Newcastle lawyer William Nicklin appears on the margins of this mystery. Nicklin, who had helped to finance William Littler's porcelain experiments in the late 1740s, and was one of the original Longton Hall partners, was living adjacent to the works in Newcastle by the 1750s.⁴²

Even the discovery of true, 'hard paste' porcelain did not greatly affect production in North Staffordshire, for the use of China clay and China stone for porcelain-making (the key ingredients) was largely restricted by patent from 1768 until 1796. Towards the latter years of the patent, several manufacturers did begin to produce wares in hard paste bodies, but this was short-lived for in the late 1790s a new porcelain body was developed by Josiah Spode which exceeded all of the hard-paste bodies in whiteness, translucency and ease of manufacture. This was bone china. With a body comprised of approximately 25% China clay, 25% China stone, and 50% calcined animal bone, bone china was not true porcelain, but its whiteness, translucency and ease of working ensured that it became, and remained, the dominant British porcelain of the 19th and 20th centuries.

Science or empiricism?

The decades after 1720 witnessed a great number of innovations within the pottery industry – including processes, new wares and new ways of working. Unfortunately, documentary sources are not concerned with how or why innovations occurred. In order to begin to answer these questions, evidence must be teased out from multiple sources and interpretations may vary. With the exception of Josiah Wedgwood, manufacturers throughout this period have left few written records of their own experiments, innovations or motivations – or, at least, they have not survived. Experimentation was undoubtedly taking place throughout the period, but perhaps not with the scientific rigour employed by Wedgwood. In this, and in recording his work, he was exceptional and arguably the first in the Staffordshire Potteries to approach his work in this way.



Fig. 19. Saggars, saggur cover, soft-paste porcelain teabowls and the stilts upon which they were fired from the Longton Hall excavations; 1751-1760



Fig. 20. Collapsed soft-paste porcelain teapot from the excavations at Longton Hall; 1751-1760
Image courtesy of The Potteries Museum and Art Gallery, Stoke-on-Trent



Fig. 21. Sherds of experimental porcelain vessels with under-glaze blue-painted decoration excavated at Lower Street, Newcastle-under-Lyme; c. 1746



Fig. 22. Wasted experimental porcelain jug, excavated at Lower Street, Newcastle-under-Lyme; c. 1746. Bampton Museum and Art Gallery, Newcastle-Under-Lyme. (NM2006-98-9R), <https://sketchfab.com/3d-models/pomona-jug-nm2006-98-9r-0b47c6b1cff14a6a8f2588c52268fb6e>

An understanding of clays and their properties had been developed over centuries and had been passed on through the generations. The few surviving examples of written body recipes and glaze recipes from this period point to the empirical nature of much of this knowledge, based upon observation and experience of the ways in which materials reacted in certain conditions. However, empiricism is not far removed from scientific experiment and is, indeed, an important part of this process. Have not glaze and body recipes always been modified or improved on the basis of observation, experience and trial and error? Is this empiricism or science? The main difference is that the results of the latter are recorded and that modifications are made on the basis of an experiment's results. What we lack for pottery manufacture is evidence for the widespread recording of the results of experimentation at this time. While we assume that potters possessed an understanding of the raw materials – clays, glazes and colours – that were directly relevant to their own operation, acquired through experience, we cannot properly understand the impact of external influences upon their work. Yet it is clear that pottery manufacture did not take place in isolation and the experiences those working and innovating in other industries – often built on scientific experimentation as much as on empirical evidence – were available to, and directly relevant to the potter. For example, a few surviving recipe books for the colours used in ceramic decoration indicate a detailed understanding of their properties, their uses and their preparation, and yet we do not see colours being widely used on ceramic in North Staffordshire until the 1750s. Was this knowledge derived from other sectors of the ceramics industry, such as the delftware or porcelain branches being pursued in London and other parts of the country, or has it been and adapted from other industries?

In considering the contribution of Josiah Wedgwood to the application of science to pottery manufacture, we should remember that there was a vast body of acquired knowledge for him to draw upon, test and develop. Moreover, Wedgwood was not coming to his work without experience: he came from a large, well-connected family which had a long involvement in all aspects of the pottery trade and the importance of these family connections cannot be emphasised too much. After all, his older second cousins, John and Thomas Wedgwood, had become the wealthiest potters in North Staffordshire.

Archaeological evidence

If the evidence for why developments occurred is not clear, it is abundant for the processes themselves. Surviving vessels illustrate the finished product, but wasters recovered by excavations on factory and factory dump sites provide direct evidence for the vicissitudes of production – for the difficulties experienced at every stage of the production process and of the actions taken to mitigate these. These might simply be the application of a piece of clay to repair a crack or weakness in a vessel prior to firing, or they might involve, for example, the creation of a new range of kiln furniture to support and separate wares during firing (Fig. 23). Items of kiln furniture at this period were hand-made by the thousand; not all did the job for which they were intended and pieces fused to the vessels they were intended to protect, although evidence of failure, nevertheless help to clarify the manner in which placing of different types of ware was carried out (Fig. 24). These items are quite anonymous, produced by children within the factory. Finds of potters' tools, however, have more personal associations: they belonged to the workman and often bear dates, initials or even names (Fig. 25).

Business and trade

The impact of innovation is also abundantly clear. Employment within the industry increased to a figure which Arthur Young estimated in 1769 to be around 6,000 in the various manufactories or almost 10,000 in the wider industry,⁴³ but reliable figures for the numbers of potteries in the area are lacking. A figure somewhere in the region of the of 150 claimed by potters petitioning Parliament in 1762 is



Fig. 23. Stilts with built-in 'drip trays' to catch free-flowing coloured glazes during glost firing, excavated on William Greatbatch's waster dump; 1765-1770



Fig. 24. White salt-glazed stoneware plate rims with roughly-formed clay separators fused to them and with contact scars, excavated at the Foley, Fenton; c. 1765-1775



Fig. 25. Potter's ceramics profile tool used to shape the underside of a vessel rotating on a plaster mould, excavated Burslem; late 18th century

probably not far from the mark.⁴⁴ Some of the larger factories employed 50 or more people, but these were the exceptions. Even as late 1851 over 60% of pottery factories employed fewer than twenty workers,⁴⁵ a level comparable with early to mid 18th-century workforces.

Developments from 1720 also had an impact on trade and the growth of markets for Staffordshire wares. Trade at home and overseas was well-established by 1730 and was without doubt an important catalyst for the 'ceramic revolution' of the 1720s. It continued to underpin all subsequent development in the Potteries and to be significantly enhanced by new products which met customers' changing requirements. We can discount McKendrick's view that 'in 1730, the Staffordshire potters sold their wares almost solely in Staffordshire. Their goods found their sale in the local market towns... To sell in London in any quantity was rare, to sell in Europe virtually unknown'.⁴⁶

The business records of leading manufacturers John and Thomas Wedgwood illustrate the extent of this one firm's home trade in the mid 18th century. Their customers included private individuals and dealers in most major and some minor towns and in cities, with concentrations in London, Bristol, Newcastle-upon-Tyne, Sunderland, Manchester, Liverpool and Gloucester, and they supplied all sectors of the market, from taverns to the houses of the nobility.⁴⁷ The Wedgwoods' records also show that their brother-in-law, Jonah Malkin, a small-scale manufacturer of white-dipped stonewares, had customers far afield in Bristol, Exeter, London, Plymouth, Gloucester, Liverpool and Ireland in the late 1740s.⁴⁸

By the late 18th century, most of Staffordshire's factories were involved in long distance trade of some kind. Manufacturers appreciated that their success depended upon an efficient transport network and in 1762 they petitioned Parliament for a new turnpike road from Burslem to Lawton in Cheshire, claiming that, 'The Ware of these Potteries is exported in vast Quantities from London, Bristol, Liverpool, Hull, and other Sea Ports, to our several Colonies in America and the West Indies, as well as to almost every Port in Europe... And the Trade flourishes so much as to have encreased [sic] Two-thirds, within the last fourteen years'.⁴⁹ The claim is far from extravagant, and by the late 18th century new markets were being developed in South America, Africa and Asia. Considerable attention has been devoted to the trade in ceramics to the USA. This market was undoubtedly growing as the 18th century progressed, but Europe was, and remained main destination for Staffordshire's exports until 1835.⁵⁰

Another feature of the industry from the 1720s was an increase in investment, reflected in the growing number of partnerships between practical potters and financial backers. These were common within the delftware sector of the industry from the mid 17th century,⁵¹ and porcelain manufacture required substantial financial input from non-potter partners from the very beginning. In North Staffordshire, however, the first recorded partnership is that between John Fenton, 'gentleman' of Newcastle-under-Lyme, and his nephew Thomas Hill, a potter fresh from his apprenticeship.⁵² In 1719/20 they undertook to produce new-style fine earthenwares and white salt-glazed stonewares in Shelton. Fenton was the financial backer, erecting workshops and ovens, and allowing buildings held by him to be used by the business, for which he received rent and interest on money spent on the buildings. The venture was short-lived, but such partnerships became more common as the century progressed. That said, the majority of potters operated on a scale which required little capital investment, leasing premises from other potters or from businessmen with no direct involvement in the trade.

By the mid 18th century, it was not unusual for the larger manufacturers to have business interests beyond pottery production. John Baddeley of Shelton, for example, was heavily involved in the milling of flint, which was sold to local factories,⁵³ but a new breed of pottery-capitalists is represented by John and

Thomas Wedgwood of Burslem. They invested widely, bought and let land, buildings and factories, and became the leading money-lenders of the town. They had interests in coal mines and in a flint mill (until they built their own windmill in 1751), and invested considerable sums in local turnpike roads and both the Trent & Mersey and Caldon Canals.

Final thoughts

By and large, this essay has steered clear of personalities and their supposed contributions. Some cannot be avoided. Josiah Wedgwood is important for so many reasons, not least because we have a large body of documentary evidence – letters, business accounts, records of his experiments, as well as the physical results of some of these experiments; others, such as John and Thomas Wedgwood and Thomas Whieldon have left behind business records, even if their products are less well understood. But to concentrate upon these exceptional individuals risks ignoring what is happening more widely with the industry. Even William Greatbatch, about whom much has been written following the excavation of his factory waster dump,⁵⁴ was far from typical. He was a skilled modeller with the capacity for original design, and was highly regarded by Josiah Wedgwood for whom he worked as an independent potter from 1762 - 1782. Wedgwood's regard for him extended to settling his debts, following his bankruptcy, and employing him on very favourable terms as general manager at his Etruria factory. The majority of potters, by contrast, are all but anonymous; they did not innovate; they occupied factories on seven-year leases, using the equipment that came with the factory; produced generic wares – often for other manufacturers - which they did not mark, buying in raw materials, moulds and transfers from specialist suppliers; and often their businesses failed. Their products go unrecognised today much as they were in their own time when they were completely interchangeable with those of their neighbours, for this is what the market required.

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2018	<i>Further Thoughts on Earthy Materials</i> , Kunsthau Hamburg.	1998	Recognition for Achievements in Ceramics, Buckingham Palace, London, UK
2018	<i>60th Faenza Prize</i> , Museo Internazionale delle Ceramiche in Faenza, Italy.		
2018	<i>Pattern Book</i> , Victoria and Albert Museum, London.	Selected Collections	
2017	<i>Factory</i> , Neil Brownsword, Blas & Knada, Stockholm, (solo).	2016, 2011	Victoria & Albert Museum, London, UK
2017/18	<i>Putting It at Stake</i> , Lidköping, Sweden 2017, RIAN Design Museum, Sweden	2016, 2005	The Potteries Museum and Art Gallery, Stoke-on-Trent, UK
2017/2019	<i>Woman's Hour Craft Prize</i> . Victoria & Albert Museum, BBC, Crafts Council (touring).	2015	Korea Ceramic Foundation, Icheon, Korea
2017	<i>Place and Practices</i> , British Ceramics Biennial, Stoke-on-Trent.	2015, 2011	Middlesbrough Institute of Modern Art, Middlesbrough, UK
2017	<i>Neil Brownsword: Factory</i> , Icheon World Ceramic Centre, South Korea (solo)	2014	Yingge Ceramics Museum, New Taipei City, Taiwan
2016	<i>Central China Ceramics Biennale</i> , Henan Museum, Henan Sheng, China	2011	Brighton and Hove Museum, Brighton, UK
2016	<i>Re-Apprenticed: Factory</i> , Ashmolean Museum, Oxford, UK	2009	National Public Art Council, Stockholm, Sweden
2016	<i>Material Language</i> , Roche Court Sculpture Park and Gallery, Salisbury, UK	2008	British Pavilion, Fu Le International Ceramic Art Museums, Shaanxi Sheng, China
2015	<i>Re-Apprenticed</i> , Raphael Gallery, Victoria and Albert Museum, London, UK		
2015	<i>Fragile?</i> National Museum Wales, Cardiff, UK		
2015	<i>8th Gyeonggi International Ceramic Biennale</i> , Icheon, Korea		
2014-2015	<i>Transformator</i> , Bomuldsfabrikken, Arendal, Norway (touring)		
2014	<i>Terra Nova</i> , 2014 Taiwan Ceramics Biennale. Yingge Ceramics Museum, New Taipei City, Taiwan		
2013	<i>Topographies of the Obsolete: Vociferous Void</i> , Spode, British Ceramics Biennial, Stoke-on-Trent, UK		
2011-2012	<i>Thing, Tang, Trash</i> , Permanenten, The West Norway Museum of Decorative Art, Bergen, Norway		
2011	<i>Relic</i> , Permanent Gallery in conjunction with Brighton and Hove Museum, Brighton, UK (solo)		
2011	<i>Interloqui</i> , Caterina Tognon Arte Contemporanea, 54th Venice Biennale of Art, Italy		
2010	<i>WCC-BF Second European Triennial of Ceramic and Glass</i> , Mons, Belgium		
2010	<i>Contemporary British Studio Ceramics: The Grainer Collection</i> , The Mint Museum of Art, North Carolina, USA		
2009	<i>Possibilities and Losses: Transitions in Clay</i> , Middlesbrough Institute of Modern Art, UK		
2009	<i>Elegy</i> , Blas & Knada, Stockholm, Sweden (solo)		



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