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How does materiality in design affect our social and sensory perceptions of materials and how can designers use these to achieve different outcomes?

A material is defined by oxford dictionary as “The matter from which a thing is or can be made” (Oxford Languages, 2023). For matter or substances to become perceived as a ‘material’, there must always be human forces at hand - it is the making of the ‘thing’ that defines what material is. This need to make with matter has been documented throughout human history, originating in purely practical motivations such as building shelters or tools, and going on to fulfill the human desire for objects of aesthetic beauty, which came to be what we now call ‘art’ or ‘design’. Until the postmodern era in the late 20th century, the purpose of material in art was either to draw attention to wealth (gold, marble), or as a vehicle to achieve the desired form, with practicality and aesthetic beauty a main focal point; the materials used were to be *seen* but not always consciously *perceived*.

In present day, there is growing interest in materiality in art, with materiality both referring to the pure matter of which things are comprised, and an artistic focus wherein the aesthetics and contextual narratives of works relate directly to, and emphasise, the materials that they are made from. Materiality has become popular grounds for artistic research exploration in recent years, partly due to the narratives that can be embedded in them. As Lamarque and Olsen state:

Rather than look for *intrinsic* properties of objects, including aesthetics or formal properties, attention has turned to *extrinsic* or relational properties, notably of a social, historical or “institutional” nature. (2004, p.9)

Though referring to art as a whole, this describes the multifaceted effect external factors have on people’s perception of materials – every material has social connotations, cultural history and environmental impacts, which combine with the maker’s socio-economic status and personal history to form a narrative around an art object, which is constantly changing (Were, 2019, P.49). These material connotations can have powerful effects, which can be harnessed by artists, designers and makers to create meaning.

Though ‘craft’, ‘art’ and ‘design’ embody different areas of expertise, note that for the purposes of this essay, ‘design’ is used as an umbrella term to embody all areas of artistic

discipline unless stated otherwise. This body of research will explore the different ways in which materials can be perceived, and how different areas of design can use these perceptions alongside materiality to achieve different outcomes; 'social' outcomes referring to material innovation, using material relations to create meaning, and preserving craft heritage, and 'sensory' outcomes relating to physical and psychological affects and experiences.

Saussure's idea of the sign and signified is a linguistic theory that explains how meanings can be inferred from the use of a recognisable image (the sign) as the signifier (the form depicted) signifies meanings (Holdcroft, 1991). Though his theory related to language, it can be reinterpreted to relate to material culture or visual rhetoric. Roland Barthes expanded on Saussure's theory, looking at it through a social lens, arriving at the conclusion that signs are never constant and are ever changing depending on cultural influences (Barthes, 1999). Barthes also focuses on the connotative and denotative aspects of the image, explaining denotation to be the literal image depicted, and the connotation as the relational layers of meaning embedded in them. These theories can be used to look at materials and what connotations we can derive from them, as materiality is intrinsically linked to material relations (Bruno, 2014, p.1); these are said to be "defined by social intervention" (Drazin 2015). Cultural narratives around materials can become entrenched in our subconscious – we do not actively think about them but when viewing an object, connections are taking place in the mind in order to understand what the object is, its purpose and its demographic, meaning that material can be used as a tool for expressing certain things, or appealing to certain groups of people. This can be used with material much like colour theory is used in marketing to connote inferred meanings (e.g. green = healthy, sustainable). Take, for instance, a simple bowl designed to be eaten from, if made with wood what could be implied is health, wholesomeness and that the person using it is environmentally conscious, but if made with plastic the implication is that the bowl is cheap, environmentally damaging and that it is designed for single use or for a child to use. Some of my own perceived connotations of material can be seen below in Fig. 1, illustrating the links between different materials.

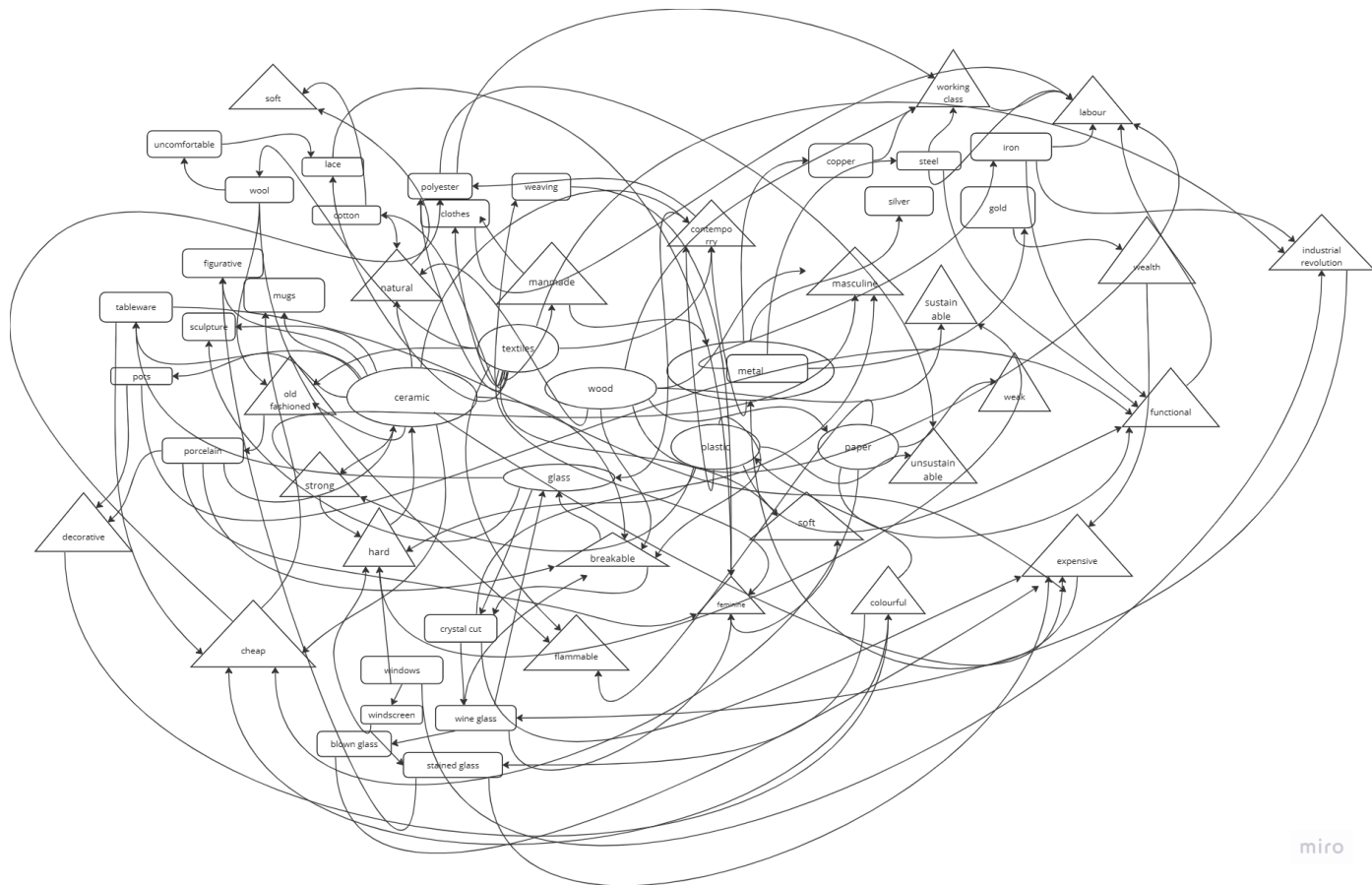


Fig.1

Map of material connotations (2023)

Materials and their connotations can create affects, which are a range of neurological, physiological and aesthetic responses to stimulus, commonly associated with emotion (Frank, Wilson, 2020). Architects and interior designers use these kind of associations to create a feeling or atmosphere in a space, which in turn can affect the way we think and feel. Designer Thomas Heatherwick's podcast 'Building Soul' looks at the way that modern architecture is perceived and the problems that those perceptions have created. He interviews Anjan Chatterjee, a neuroscientist who specialises in the study of neuroaesthetics, (a field of study which looks at the brain's response to art ('Why boring buildings are bad for us', 2023)), who explains the results of a study wherein people's brain activity was monitored whilst being shown images of different of built environments. The study showed that the experience of looking at more aesthetically beautiful buildings (though subjective) engaged the same areas of the brain associated with food and sex (2023), implying that it is connected with positive, rewarding, and deeply human thought

processes. Alex Coburn, who also worked on the study, went on to conclude that there were 3 underlying components that people enjoy most in the experiencing of a building, which they define as coherence, fascination, and hominess (2023). Coherence relates to how easy the architecture is to comprehend, and how aesthetically consistent the building or interior components are. Modern buildings such as skyscrapers tend to fulfil the criteria of coherence and control (2023), often via their use of manmade materials which are commonly used together such as glass, steel and concrete, and through their designed form, which is practical and functional. However, these forms and materials combined can be repetitive and unimaginative, often seen to be “soulless [and] inhuman” (2023), which is where they fall short for ‘fascination’ and ‘hominess’.



Fig. 2 (left) Studio Gang, *Mira building, San Francisco (2020)*



Fig. 3 (right) Aedas Architects & Arup Engineers, *Al Bahar Towers, Abu Dhabi (2020)*

Fascination is described as the element of intrigue the space evokes via various methods, for instance, decorative surface features such as texture and pattern (e.g. Fig. 3), or the inherent design of the form, an example of which can be seen in Fig. 2. The latter is the most costly

and technically challenging for designers, as the level of intrigue comes from the inherent structure, which is difficult to make functional as an irregular form.

With this in mind, regular buildings that are built for function tend to look extremely similar in cities all over the world, something Heatherwick describes as a “global blandemic” (2023). The use of facades as a decorative solution can be effective in combatting this as the materials used on the outside do not have to necessarily have any relation to the matter of the inside structure – the surface is a “site of mediation and projection” (Bruno, 2014, p.3) meaning that it is the way that the building or object conveys information, be that the literal visual aesthetics or semiotic connotations. Material use in buildings has historically been linked to the locality of the built area, so material aesthetics of buildings and facades were often not a design choice but rather a necessity, as materials such as stone were difficult to transport over long distances. Today in the developed world, designers can choose from a variety of natural or man made materials, and can stray away from that of the purely functional via the use of facades in order to bring about a more comforting atmosphere, introducing curvature, patterns, geometry, texture and colours that have connotations or associations that people enjoy more, as seen in Fig. 3. We see examples of this in biophyllic design, which echoes the intricacy of nature (2023), either through use of natural materials, nature-inspired forms, or by designing a space or building with a symbiotic relationship between nature and man-made elements e.g. plant walls and roof gardens, as seen below in Fig. 4. Heatherwick explains that biophyllic design is perceived to be more homely and comforting, and our propensity for enjoying natural forms is due to the fact that “we are an old brain trapped in a new environment”(2023). The neuroaesthetic studies found that people’s emotional states and general arousal levels plummet (2023) when put into built up, modern city environments; these types of environments are extremely unnatural to humans, and our evolution has not kept up with the rapid technological advances that see the developed world spending 90% of our time amongst entirely manmade materials (Chatterjee, Coburn, Weinburger, 2021).



Fig. 4

WOHA, Parkroyal Hotel, Singapore (2013)

It could be interpreted that the same principles Heatherwick outlines apply to the objects that fill our interior environments. As the modern and postmodern eras saw a move away from the highly decorative, natural elements of design such as carving and painting seen in the arts and crafts and art nouveau movements, the 1990s and 2000s brought more clean cut, minimalist aesthetic, which was easy to mass produce in cheap materials at retailers such as Ikea - traditional furniture materials such as hardwood were often replaced with cheaper laminates or vinyl covered chipboard. Appreciation for craftsmanship went out of favour (Pye, 1968, p.17) as the focus was on the functionality and affordability of objects of utility, arguably at the cost of longevity, aesthetic value (Sessemann, 2007, p.2), and a loss of the hominess, fascination and coherence ('Why boring buildings are bad for us' 2023) that humans have been proven to experience positively. It is often argued that mass produced items do not have the same qualities or aura as those that are hand crafted (Benjamin, 1935). Recently, design trends such as maximalism are a push back to such design, with a focus on unique, decorative, vintage and handcrafted objects that will last, with conscious effort towards a sustainable materiality.



Fig. 5

Basse Stittgen, *Blood Related* (2017)

Material innovations are often fuelled by a need for sustainable alternatives to commonly used materials such as plastic. Innovations can be made by reframing a substance that already exists, seeing it from a different angle and using research led practice (Candy, 2020) to discover new ways of using it. Basse Stittgen is a designer who uses cow's blood which he uses to make art objects and functional items such as vinyl records, candle holders and tableware (Solanki, 2018) that he uses for art installations, as seen in fig. 5. Stittgen explains that cow's blood in particular is a massively wasted by-product of the meat industry, with 6.6 billion litres wasted by slaughter houses each year (2021), making this bioplastic symbolic as it highlights the issue of waste in the meat industry. The need and demand for affordable and sustainable alternatives to materials such as plastic is becoming increasingly urgent, as Adam Drazin states, "As more people profess to consider and examine their worlds in terms of sustainability, they perceive more clearly the materials and substances of which the world comprises" (p.17, 2015). Although this awareness of materials means that blood bioplastics are not likely to become mainstream, they make us stop and think in sustainability terms where our materials come from.

The use of blood as a material is significant as it has multiple layers of meaning due to the juxtaposition of what is typically signified by blood (death, injury, accidents) and what is signified by blood in this instance, which is an ingenious solution to a number of environmental and ethical problems. Stittgen's art installations use the blood plastic objects in an emotive and provocative way, for instance, a blood vinyl record that plays the sound of a cow's heartbeat, or a blood mirror created with 220 litres of blood - the amount wasted from 11 cows, which is the average person's lifetime beef consumption (Stittgen, 2021). The symbolism of this material, combined with the emotive context, is jarring, highlighting both the invisible truths of the meat industry and the need for greener materials, starting a dialogue in order to question the ethics of everyday consumption habits.

Stittgen also makes work based around the taboos and social connotations of human blood, identifying cultural sentiments towards blood in figures of speech such as "when you are good at something it is 'in your blood', when we are afraid, our 'blood runs cold', as kids we cut our hands to become 'blood brothers'" (2021). This mythical connection (Stittgen, 2021) blood has with life and death is what lead him to initially wanting to make objects from human blood, but went on to add another conceptual layer to the material by creating objects made from the donated blood of HIV positive people, which could be touched and held. This creates an interesting social commentary, as HIV positive people were actively rejected and stigmatised by society in the AIDs crisis of the 1980s, with people being afraid to touch them for fear of contracting the illness, although it is now understood that the virus is contracted through blood and bodily fluid. Holding an object like this could potentially reinvoke this fear, with a sense of abjection (Kristeva, 1982) as the boundary is crossed and the blood is directly touched with the hands.

Touch is often overlooked in the experience of an object, particularly one of artistic origin, as it is the sense of sight that often presides over others (Hagtvedt, 2022, p.425). Touch is important in understanding objects, and it is thought to be the most primal of the senses, being the "first sense to develop in the womb and the last to vanish with old age" (Hagtvedt, 2022, p.425). In usual art settings such as museums or galleries, there is a tension between the object and the person experiencing it, with glass cabinets or alarms between them to prohibit touching of exhibits, usually to preserve them from the wearing effects of repeated handling (Driscoll, 2020, p.157). Driscoll came to realise the importance of touch in

experiencing art when a blind person came to one of her talks and asked her to describe her artworks. She began to visit museums with blind people, who were allowed to touch artworks and explain how they perceived them. She then tried this herself, noting that she was surprised by the contrasts between visual and tactile experience (2020, p.113), with touch allowing us “the inner experience of seeing” (2020, p.9). Touching artworks can allow us to feel connected to the object on a more intimate level, allowing us to notice details such as texture, weight and temperature (2020, p.169) that we would not otherwise know from just looking. Michael Brenson (1995) suggests that the reason that touching has become taboo is the element of possession that it infers – we are often only allowed to touch what we own, so though touching art objects in museums can make us feel connected to the piece, it can also make us feel as though we have subconscious emotional ownership which could be problematic. The unspoken “no touch” rule between the viewer and the art piece could also be beneficial in how the art is perceived, as the artist has more control over how a piece is visually understood, and the distance gives the piece an aura of being of greater prominence to the viewer.



Fig. 6 & 7

Bonnie Kemske, *Cast Hugs* (2009)

We have a need for touch, whether from physical human embrace or picking up and inspecting an object we are considering buying (Hagtvedt 2022, p.425). Handling objects helps us to assess the value of the piece, feeling its material and aesthetic quality. Bonnie Kemske describes craft and applied arts as “the touchable arts” (2009, p.327) and creates tactile ceramic objects that explore this idea. These irregular looking shapes are made “*by and for the body*” (2009, p.323) meaning that the form is moulded to fit snugly to the body so that it can be hugged or cradled in the arms. Kemske explains that the materiality of ceramics in particular is important in this respect, as ceramic objects have been handled and used for thousands of years, giving it a familiarity that can aid in overcoming our reluctance towards touching art (2009, p.327). Aspects of the material experience are documented in Kemske’s research – she describes how the clay begins cool to the touch but warms to the skins temperature, the sense of intimacy and comfort, and even the feeling that it becomes an extension of her own body (2009, p.329). The pieces are designed to be held by the audience, turning them into a participant. An emotional response to the work can be observed in a video on Bonnie Kemske’s YouTube video, ‘Towards the embrace’ (2010)

where they can be seen to be handling it in a slow, careful manner, as one might do with a newborn baby, which is partly due to it being a piece of art and therefore having a “precious” aura (Benjamin, 1935), and partly due to the materiality of the piece; ceramics, though durable, are also easily broken if dropped. The use of ceramic means that this piece also has a weight to it that gives the piece a personified presence - Kemske notes that this weight contributes to the comforting effect it has (2009, p.327).



Fig. 8

The Nettle Dress (2023)

The making and material relationship can be heavily connected to our emotions – certain materials may be difficult or pleasant to work with, or they may have sentimental memories connecting them to the maker’s personal story or heritage. Material can play an elemental part in making art that tells a story, often using the cultural and social semiotics of material to create metaphors. *The Nettle Dress* (2023) is a documentary that follows textile artist Allan Brown as, following the death of his father and wife, over 7 years he creates a dress from hand woven, hand spun yarn made from nettles found in local woodland. Brown describes in detail his emotional story, whilst the video shows him carrying out the arduous tasks involved with the taming of the material of nettles. The amount of labour involved is synonymous with the pain of his experience of grief, as he can be seen physically channeling

his energy and emotions into the threads that he creates, explaining that he believes the history of the past 7 years is “crystalised into this material” (2023). Alain De Botton and John Armstrong describe the therapeutic effects sublimative acts like this have, stating that:

In art, sublimation refers to the psychological processes of transformation, in which base and unimpressive experiences are converted into something noble and fine – exactly what may happen when sorrow meets art (2013, p.25)

Through the tactility of the material, and the constant, “unimpressive experiences”(2013, p.25) of harvesting the nettles, spinning the yarn, weaving the cloth, and sewing the garment, we see that this represents a process of moving on, putting one foot in front of the other in order to arrive at a finished piece that - though unassuming aesthetically - represents and tells a story of the journey Brown has been on, as he comes to believe that he “was being transformed by the nettle, not the other way round” (2023). The weaving of nettles into fabric is an ancient craft technique, and his documented journey highlights our loss of the skills involved - the lengthy, ‘slow craft’ making process also puts into perspective the amount of unseen work that goes into fashion garments and textiles, work that is now outsourced from developing countries where workers are often exploited.

Although the focus is on the story and the making process, there are also layers of symbolism in the material itself, both for the maker’s personal journey and the conveying of the story. The materiality of nettles is highlighted in this film, and many people would not have known that nettle can be (and has historically been) woven into yarn for textile use. The perception of nettles is generally negative, as people are fearful of touching them or think of them as a weed rather than a plant that is useful. This perception is challenged, as the nettles are shown in a positive light, with Brown showing how you can even pick them with your bare hands. The Nettle Dress shows that through the use of the hand and sense of touch, seemingly unpleasant materials and substances can be turned into something of beauty, and that layers of meaning can be imbued by a maker into the materials they use.

Though physical materials are what are usually associated with materiality, it can be limiting to assume that materials in artistic expression are always tangible substances and physical matter. There are a number of intangible, or untouchable “things” that can still be perceived with the other senses, and therefore used by artists as a material, such as, sound, space, and

light. Use of light as a material is incidental in most artist's work, whether the aesthetic qualities and forms are simplistic, or complex, they are visually perceived via the use of light. The study of light has been occurring for millennia, and the theories of what it actually is have gone through numerous iterations. Plato believed that rays of light came *from* objects to enable us to see the surface qualities, qualities that Democritus called the "shell" or "profile" of an object (Ramos, 2015, p.5). By 300BC, Ancient scholars had discovered that light travels in straight lines and has laws of refraction and reflection, however, they mistakenly believed that in order to perceive objects, light emits from our eyes (Ramos, 2015, p.3-5). Isaac Newton was the first to publish a scientific work on light, called Opticks, where it is explained that light has the ability to produce the sensation or perception of all the colours of the rainbow (Ramos, 2015, p.5) as it is our eyes that sense this, not the light itself changing. We now understand light to be electro magnetic waves travelling in a vacuum at a speed of almost 300 kilometres per second (Ramos, 2015), this definition helping us to see light as a definable "thing", though it is generally now categorised as energy, rather than matter. Use of light as a material makes us question the definition of material as "matter from which a thing is or can be made" (Oxford languages, 2023), as forms and experiences can be made with and of light.



Fig. 9

James Turrell, *The Light Inside* (1999)

The artist James Turrell uses light as his material to create spaces, where often the source of light is unseen, yet surrounding and immersive. The glowing light spaces are coloured, giving the effect of being inside the colour (Gunter, 2018, p.311). Turrell explains that his use of light stems from his conservative quaker upbringing, where the belief is that art is a vanity and the meeting houses have no decorative qualities, though they often make use of natural light via windows or skylights (2017). There is connection between religion and light, as light is associated with good, rather than evil or dark, it is the thing that keeps us alive and therefore is god-like. Turrell sees light *as* a material, as opposed to the actual source emitting the light, as he explains, “it’s like dealing with sound, so you make an instrument that produces it the way you want” (2017), meaning that the lighting system is more of a tool to achieve the lighting effects which are experienced. The lighting spaces vary in the placement and colour of light, but there is almost always a sensation of being enveloped or inside a dense colour field (Gunter, p.311) due to the diffused layers of light with no apparent source. Turrell’s work *The light inside* (1999) is an installation that sees participants entering a corridor with various light sources creating the illusion of multiple planes of field; the initial

perception is that there are walls to the corridor that are emitting light, and at some point the participant realises that they can walk through these 'walls' as they are actually thin beams of light. This play on perceptions can be seen to invoke childlike excitement and wonder in the participants, as their proprioception, or ability to situate oneself in a space (Massumi, 2002) is affected, creating a surreal and novel experience – Turrell even describes how people have tried to sue him as they have perceived walls or objects to be solid, touchable matter and therefore tried to lean against them, resulting in them falling over and injuring themselves.

The notion of perceiving things that are not actually in front of us is something that light enables us to do every day, via the use of screens. We do not notice the surface or material of the screen, but rather look through the glass or plastic to be transported into other places, effectively seeing through the “mechanical eye” of a camera (Berger, 2012). Virtual reality advancements are set to bring another dimension to the immersive effects of screens, giving the perception of being actually there, within a world, as the camera viewpoint moves with the head and body. But what does this mean for the future of materiality? Whilst we could perceive materials in virtual reality via sight, and possibly sound, there are currently limitations to the level of reality we can recreate digitally, meaning that full experiential sensory perception cannot be truly replicated. Contrary to Kemske and Hagveldt’s vision of a haptic future in design, VR could further distance us from the overlooked senses, leading us into realms of visual wonder and beauty but lacking the full spectrum of senses that make our experience fundamentally human.

Contrary to this, there is also the possibility that virtual reality could bring about positives for materiality design, as the ‘materials’ used would not be limited to location, time, skill, or money as is the case with materials in the real world. The environmental impacts of creating materials from substances, the transportation of said materials, the processes involved in using them to make things from, and the consideration of the life span of the subsequent designed object, could all be theoretically eliminated by making things in VR instead. However, this solution is rudimentary, as unless technology advances enough to perceive VR worlds with every sense, the experience of the designed objects or spaces will not be perceived to have the same value as the real object, as the aura (Benjamin, 1935) will be like that of a photograph or reproduction rather than having the real material object in front of

you, with its makers marks and full scope of material qualities telling the story of its unique handcrafted nature. The loss of the tangibility of objects could further detach us from the emotional aspects of materials, the tacit experience of making with the hands, and the heritage of traditional craft processes and skills - works like Bonnie Kemske's hugs or Allan Brown's nettle dress, in which the experience of the object or of making process is integral to the communication of meaning, would not have the same effect. It seems unlikely that handcrafted objects would be more positively received in the virtual world, as we see in the present day there seems to be a growing trend away from the easily reproducible, factory made items towards the appreciation of hand made, well made items that last, with a focus on sustainable materials. Material advancements such as Basse Stittgen's blood bioplastic could lead us further towards a conscious materiality where people notice materials, as opposed to the previous invisibility of materials which made it easy to be ignorant to the negative effects they have.

An unexpected outcome I have deduced from this research is that there is a strong tie with materials and emotions, whether used in buildings, interiors, art objects, or as a means of storytelling, the histories and connotations of material run deep through our psyche; whether we are makers or designers or not, we have a tacit knowledge (Polanyi, 1966) of material connotations, which affect our subconscious thoughts and emotions. The case studies looked at all have an emotional connection or reaction, filled with complexity and sometimes conflicting; the repulsion and intrigue of Stittgen's blood plastic, the sadness and hope of Brown's nettle dress, or the loving, human-like intimacy of Kemske's hugs contrasted with the negative initial experience of its rough exterior texture and cold temperature. Heatherwick's research into the semiotics of buildings and spaces highlight scientifically the effects that material use can have on our moods, and with mental health problems becoming an increasing issue, materiality practice and research will be more important than ever going forward to mitigate negative emotional effects of material environments. As designers, actively perceiving the material of which our designs are comprised and having a better understanding of their personal affects and social and environmental effects is a powerful tool in creating meaningful art that can change the world for the better.

Another point of interest is the importance of touch in our experience of design, which is likely to be grounds for further research in coming years, as designers look deeper into

elevating their works via meaning creation and relational experiences. As the world has become more connected digitally, it has become more disconnected physically. Modern design is actively removing touch in our day to day life – we have automatic doors, contactless payments, and self driving cars – but we do not yet understand what negative implications this eradication of our most primal sense could have. The positive effects of touch in the making process are also apparent, though the recent deskilling of art education (Roberts, 2010) could mean that the art of the future will lack the tacit knowledge of material that is needed to really push the boundaries in materiality practice. Hands on, contemporary craft practices are coming back into the spotlight in mainstream media, with programs such as BBC's 'The Great Pottery Throwdown' and Netflix's 'Blown Away' bringing more people to want to study in traditional crafts areas. This body of research has shown the many different disciplines that are involved with materiality in very different ways, and the effect materiality can have on perceptions of materials, spaces and objects.

I believe that the future may bring about less perceived differences between design disciplines, and more of a blurring of the crossovers between design, craftsmanship and art, bringing artists and designers back into the tactile experience of making by looking at the craft skills of the past in a new way, seeing more collaborative works between the different disciplines come to fruition, for example, crafts techniques in the architectural and vice versa. This will lead to material innovations that will inform our day to day experiences, and, though the future of material is uncertain, it is the narratives we designers create in the present that will inform perceptions of the materials of the future.

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