



BEE TOGETHER

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How can interior design showcase the similarities between humans and bees to evoke an interest in the declining number of bees?

ABSTRACT

This design research portfolio discusses and analyses methods to improve the sustainment of bee numbers in urban areas through design. It researches ways in which to connect people with nature in cities to evoke behavioural change. This document showcases the similarities between bees and humans, and experiments with ways to showcase these through interior design to stimulate an interest in this global environmental concern. This design research portfolio aims to research and discuss previous works through a design contextualisation and create then a unique intervention to shift human behaviour. This aim is achieved through a range of material explorations as well as a probe and intervention. This research is essential as previous education methods on this global concern haven't been effective enough to sustain bee colonies. It focuses on showcasing through design rather than education, evoking interest in this global concern.

One of the main findings within my design contextualisation is from a report on the state of the world's plants and fungi carried out in 2020 which states that bee colonies are abundant within London's centre; however, figures show that there aren't enough good food sources to sustain these. This influences the design research chapter, which engages the population. The probe/survey discovered that people are aware of the lack of green spaces in cities; however, they think there are much fewer green spaces than there are. The intervention 'Feed The Bees', discussed in chapter two,

was carried out to understand better if people are willing to make a difference when given the opportunity. It proved successful in attracting passers attention; however, only influenced 10% of people to make a difference and increase food supplies for bees. Nevertheless, from this experiment, it is evident that visual aid attracts more people's attention. These research methods show that people are aware of the lack of green spaces in London but only 10% are willing to increase them.

The material exploration chapter aims to create a material that incorporates honey with construction materials. The reason for this material exploration is to directly compare the similarities between bees and humans, specifically through architecture and the built environment. This is done by mixing building materials with honey and observing these over three weeks. Two out of six samples prove successful, and these both have concrete in them, which shows concrete is strong enough to bond honey. Further research explored ways in which to showcase honey within a material. The successful experiment uses Honey, Plaster of Paris and Resin to showcase bees produce, which can be incorporated within the structure of interior spaces. The findings show that there are unique ways which help influence people to make a difference in increasing efficient food supply for bees. It is also seen that honey can be incorporated within the built environment as both a construction material and a showcased material.



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INTRODUCTION

This design research portfolio will focus on the declining number of bees and research how to showcase this issue to people through aesthetics and design rather than education, to evoke an interest in this environmental concern. Honeybees are a big part of the ecosystem; however, their decline is an environmental issue as a third of all food requires pollination from insects and 80% of that is carried out by honeybees. (Chadwick et al., 2016, Klein et al., 2009) There is therefore tremendous importance for a design intervention to influence change and inform in a novel way. This design research portfolio will discuss and analyse how design can showcase the similarities between bees and humans, to increase the interest of environmental concern, specifically in the declining number of honeybees. It will also discuss how cohabitation between humans and honeybees is feasible in an urban environment and further analyse successful projects. This research document hopes to showcase the possibility of a happy cohabitation between honeybees and humans within urban environments and the possibility of connecting people with nature through architecture and design. These will be discussed through a list of relevant subtopics within three different documents. The design research portfolio will begin with a design contextualisation, and it will then follow up with primary design research with incorporated analysis. The primary research will engage the population within cities through various research methods, such as a probe, survey and intervention. This will be carried out in the hope of better understanding people's views on the bee decline. The analysis of this research will allow for interior spaces' design specifically aimed to influence behavioural change. The study will then focus on material exploration and attempt to create a material to showcase the similarities between bees and humans within the urban environment. This material exploration will be carried out through the use of honey within building materials. The aim for this is to create a unique material which attracts attention and evokes change.



1. DESIGN RESEARCH
DESIGN CONTEXTUALISATION
showcasing the similarities between bees and humans

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“If the bee disappeared off the surface of the globe then man would only have four years of life left. No more bees, no more pollination, no more plants, no more animals, no more man.” - Albert Einstein, 1941

This design contextualisation will begin with information and research gathered on the declining number of bees, which will outline facts about the current decline and its causes. The similarities between humans and bees will then be discussed, comparing both the way humans live in cities with the way honeybees live in hives and how we build architecture for a vastly growing population compared to how honeybees manage their hives and colonies. Communication between species will also be discussed within this subsection, both between bees as well as how bees can learn from and communicate with humans. This will lead the research into the next subcategory, highlighting the connection between humans and bees. This design contextualisation will then research the history of beekeeping, discussing its origin and comparing this to beekeeping in recent years. The research will then delve into design and project-based research, focusing more on the study of environmental psychology as well as ways in which design can modify behaviour. Designing for change and showcasing through design are two closely linked subtopics that will be researched through various projects and design work that connect back to the declining number of bees and how people in cities can slow this decline.



(Solon, 2013)



(Suzuki, 2019)

the declining number of bees

The majority of bee colonies are currently in danger and declining rapidly due to factors including habitat loss, climate change, intensive farming and the use of pesticides. (Jackson, 2019) Honeybee colonies are reported declining by up to 53% in Europe over the last 10 years. The decline in honeybees is known as Colony Collapse Disorder. (Chadwick et al., 2016) This statistic shows a need to connect people to the problem and influence them to slow the decline. Humans rely on honeybees, and other pollinating insects as a third of all food we consume requires pollinating and 80% of that is carried out by honeybees. (Chadwick et al., 2016, Klein et al., 2009) As the human population grows, there is greater demand for food, causing an increase in agriculture which is reliant on insect pollination. This showcases that bees are one of the most needed creatures on the planet; however, it can be argued that people are not doing enough to sustain bee colonies.

One of the main reasons for the decline in honeybees is habitat loss. This means that bees have less forage and places to shelter due to different factors, including urbanisation which is the population shift from rural to urban areas. (Cambridge University Press, 2020) Since the 'Second World War, we have lost 97% of our wildflower meadows, leaving our bees with little natural habitat.' (Friends Of The Earth, 2017) Arguably this can show that it is essential for cities to be designed as an environment for both humans and bees to thrive within.

'Honeybees lives in societies that rival our own in size and complexity. A single hive may contain as many as 80,000 bees, which together build the hive, gather food, and feed the next generation of bees. They manage all this with only a million neurones in their head-a thousandth the number we have.'
(Zimmer, 2006)



Photography by Andreas Gursky (internalphotomag, 2017)

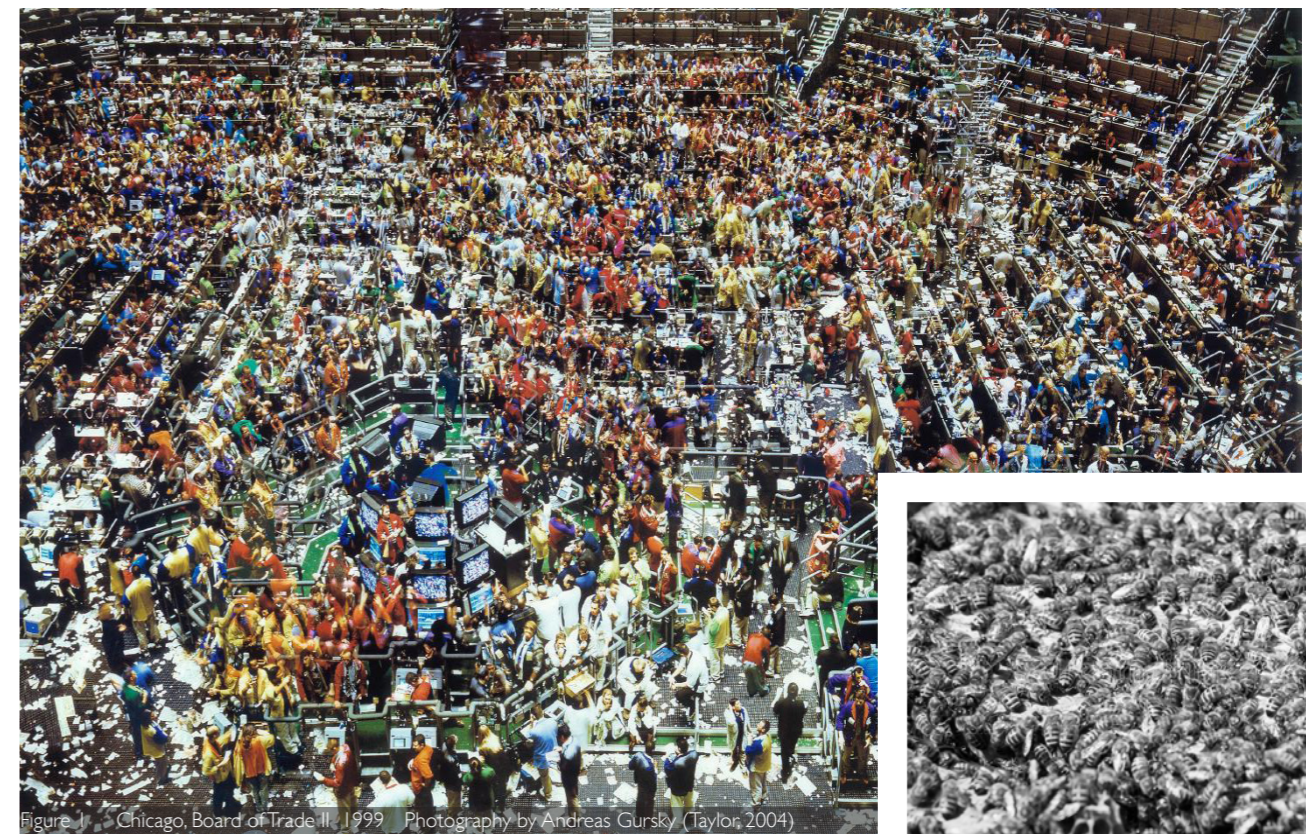


Figure 1 Chicago, Board of Trade II, 1999 Photography by Andreas Gursky (Taylor, 2004)



similarities between humans and bees architecture, the built environment, cities and living

There are many similarities between bees and humans in the way they live, communicate and design. Although some metaphorical, these similarities show a real insight into people and nature's relationship and connection. A direct link can be seen between humans and bees within architecture and the built environment. Bees use their intelligence to build their honeycombs in hexagonal shapes, used as storage. (Francis, 2013) Marcus Terentius Varro's theory was that the hexagon was that bit more compact than a square or any other shape, making it the most efficient way to divide a surface. (Francis, 2013) This showcases bees intelligence and the ability to design for maximum benefit. Interestingly, 'honeybees only expand the hive if more space is needed for a growing population', much like humans do within cities, however, in comparison to bees, humans tend to use more resources than they need most of the time. (L Winston, 2014) It can be argued that London can feel like a beehive with the overgrowth and overpopulation of it. Currently, 55% of the population live in cities, and as this percentage increases, so does the need for housing which increases the destruction of bee habitat. (Hale, 2017) This research compliments each other and offers a solution to the overpopulated cities by proposing to learn from bees and how they build their hexagonal world.

The way people in cities live can be visually seen through photographer Andreas Gursky's work, who captures urban life's overpopulation through his photographs. (Blumberg, 2020) His photograph 'Chicago, Board of Trade II' next to the photograph of bees, shown in Figure 1, can create visual links between bees and humans.



Figure 2 (Fairs, 2007)

Designer Tomas Libertiny has used a unique way to showcase how genuinely clever bees are. He takes great inspiration from bees for many of his designs and often references their intelligence within his work. Libertiny designs incredible sculptures which he then lets bees build. He designs a shape which he creates using 'sheets of beeswax printed with tessellated hexagonal patterns, and enclosed them in transparent cases.' (Fairs, 2007) This makes an inside out hive to allow bees to build on the outside rather than inside an object. This image (Figure 2) showcases one of his bee constructed vases called 'Detail of The Unbearable Lightness' which took 80,000 bees to complete. This then evolved into a collection named 'made by bees' and consisted of other shapes and works entirely made by bees. (Fairs, 2007) (Figure 3). This concept and design showcases how hard-working bees can build human objects just like humans can. Other firms and designers have taken inspiration from this and created visuals to help raise awareness of food items humans will lose if bees become extinct. (Johnson, 2020) The concept of having a bee made item is fascinating and could be a way in which beekeeping evolves in the future. Humans can use the bee made shapes as sustainable construction materials or a way to attract attention to spark behavioural change and end this environmental concern.

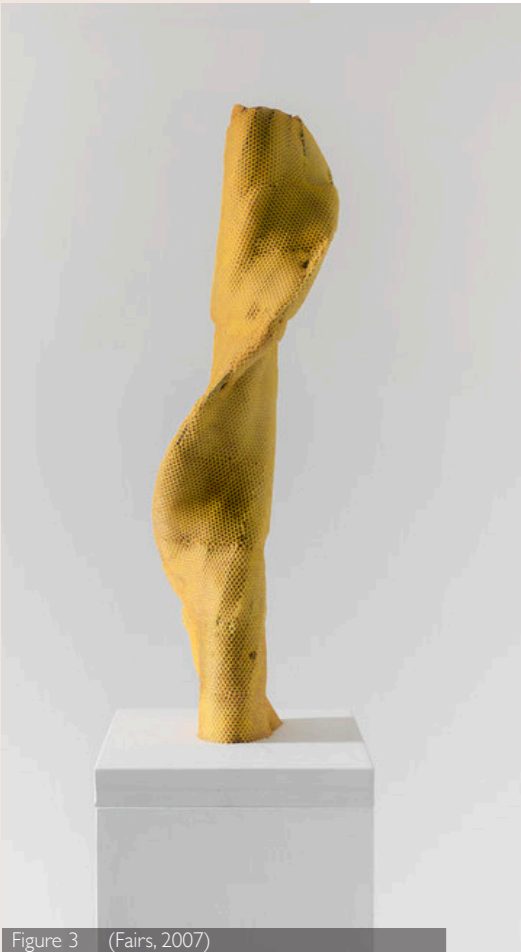


Figure 3 (Fairs, 2007)



'One of the biggest research goals of scientists studying animal communication is to one day be fully capable of communicating with other creatures, as fluently as we can communicate with other humans.' (Nelson, 2019)

communication

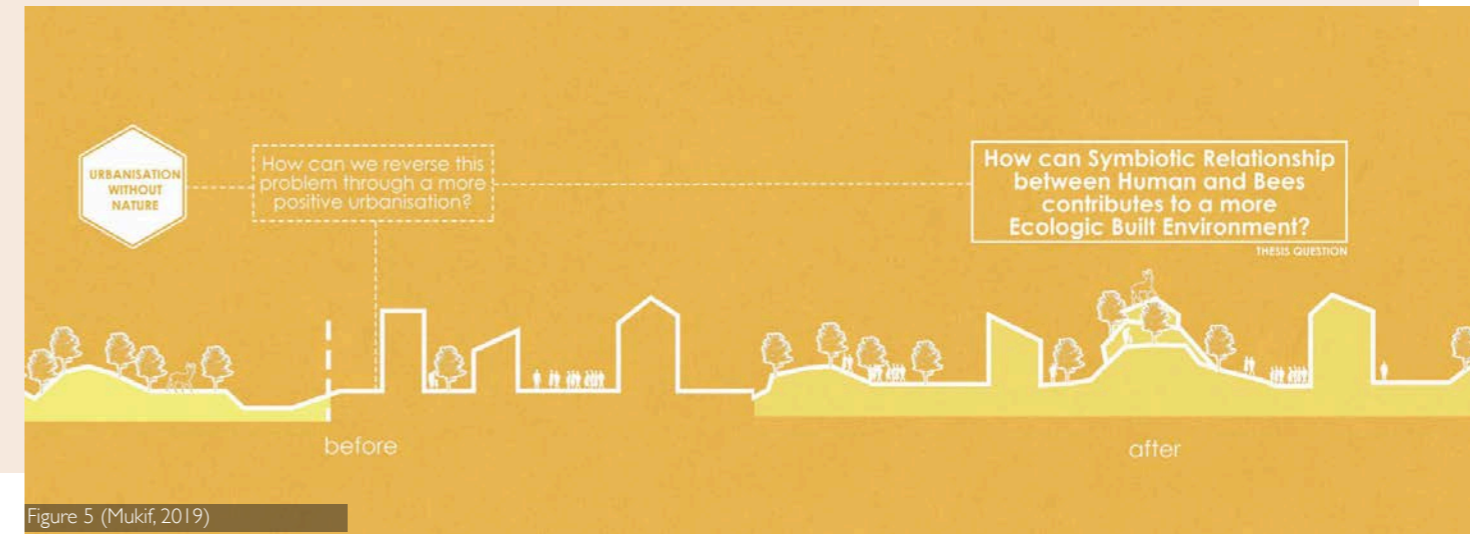
Communication between species is essential to this research as it allows humans to relate to bees in an exciting way which would be beneficial when designing to evoke an interest in the bee decline. Bees, much like humans, have their language and way of communicating, which allows for the direct comparison between the way humans communicate compared to bees. The waggle dance is a way of communication between bees. It passes on the information of a new food source or a potential new beehive location. Bees have invented this way of communicating to be able to carry it out in a dark beehive. This waggle dance conveys distance and direction to a food source as well as the quality of it. (Chadwick et al., 2016)

Interestingly, bees' waggle dance language is universal, and bees can communicate with different bees from another country the same way they would in their own hive. (Nelson, 2019) In a way, this separates humans from bees as humans have designed many languages to communicate with each other. However, this concept has an attractive, inclusive take on communication, something people can learn from bees. In recent years the communication between different species has become prominent in zoology. (Gillam, 2011) Bees are intelligent species, and studies have discovered that they can count up to five using a small number of nerve cells in their brains. (Vasas et al., 2019) Researches from the RMIT University in Melbourne also carried out a study interacting with bees and teaching them symbols through colours for addition and subtraction. (Kaszubska, 2019) This proved successful, and the bees' accuracy was 75%, which, to a small extent demonstrates a symbolic communication with bees that has separated humans from other species by over 600 million years of evolution. (Howard et al., 2019) The research on the relationship between people and other species as well as nature is essential to allow space for interventions to improve this connection.

the connection between human and nature // what can humans learn from bees

Humans and nature's connection has evolved over many years with the relationship between humans and bees dating back more than 9,000 years. A study of prehistoric artefacts 'suggests that humans have exploited honeybees almost as long as they have been farming.' (Sessa-Hawkins, 2015) Most of the evidence gathered came from 'scenes of beekeeping in temple artwork.' (Figure 4) This shows that bees and humans have evolved together over time which could be why bees can adapt to living with people in an urban environment.

'Humility must always be doing its work like a bee making its honey in the hive: without humility, all will be lost' - St Teresa of Avila (Alive Publishing, 2015.)



Some factors are causing a significant disconnect between people and nature, strengthening their lack of environmental concern. (All Answers Ltd, 2018) In a recent thesis submission, Naim Ahmad Mukif proposes designing cities for both humans and nature to thrive in. He wants to blur the division walls, which currently divides people living in cities with nature and reconnect them. (Mukif, 2019)(Figure 5) This would be possible as honeybees are willing to live in urban environments as long as there are enough good pollinating sources. (Campbell-Preston, 2017) This concept would take away people's choice in whether or not to be connected with nature and forces them to cohabit the city. This, however, is not a negative as it can be something people get used to with time. It can then become the norm for both people and nature to have the same rights within a city. This can also be enforced through design for modifying behaviour through environmental psychology.

modifying behaviour through environmental psychology

Architects and designers have been designing to influence change through installation design, exhibition design, interior design and architecture. A way in which designers influence people's behaviours within a building is through environmental psychology, more specifically, interior design psychology. Interior design psychology is a field within environmental psychology which is "the study of human relations and behaviours within the context of the built and natural environments" according to Dave Alan Kopec, a specialist in the field. (Harrouk, 2020) The study of people within a space is factual, also referred to as evidence-based design, much like sustainable design which is based on scientific research. (Moses, 2012) Designers influence people's behaviour in different ways, using sensory design to evoke a particular emotion or attract specific consumer behaviour. For example, lavender scent relaxes the brain, which is why this is often used within spas compared to barbecue smoke which makes a room feel small and stuffy. Another example would be through colour. Red and yellow are often used in restaurants as they are potent stimulants which allow the designers to influence specific behaviours. (Envoplan, 2018) Designers can use these techniques to trigger parts of people's brains to attract certain behaviours subconsciously. This could be beneficial when provoking an interest in an environmental concern as it can be argued that often people can be disinterested when they are not given the opportunity to make a change.

"In every walk with nature one receives far more than one seeks."

- John Muir, 1877

Whilst studying people, a new type of design was developed by American biologist Edward O Wilson in the 1980s when he realised the increase of disconnection between people and nature whilst the rates of urbanisation were increasing. (Oliver Health, n.d) Environmental psychologists have researched and found that biophilic design, shown in Figure 6, improves wellbeing, increases creativity and focus. Designers and architects have taken this research and designed spaces that incorporate nature to benefit the user's wellbeing. (Browning et al., 2014) This design intervention showcases that nature can have a positive impact on wellbeing. For example, over the last 35 years, wellbeing rates in offices which incorporate biophilic design have gone up by 13%. Biologist Edward O Wilson has designed this intervention to influence wellbeing and positive attitude within the built environment. However, it can be argued that people can choose to have nature within their offices and homes. Still, they do this for themselves instead of thinking about insects and animals who need nature to remain outdoors to survive within the urban environment.

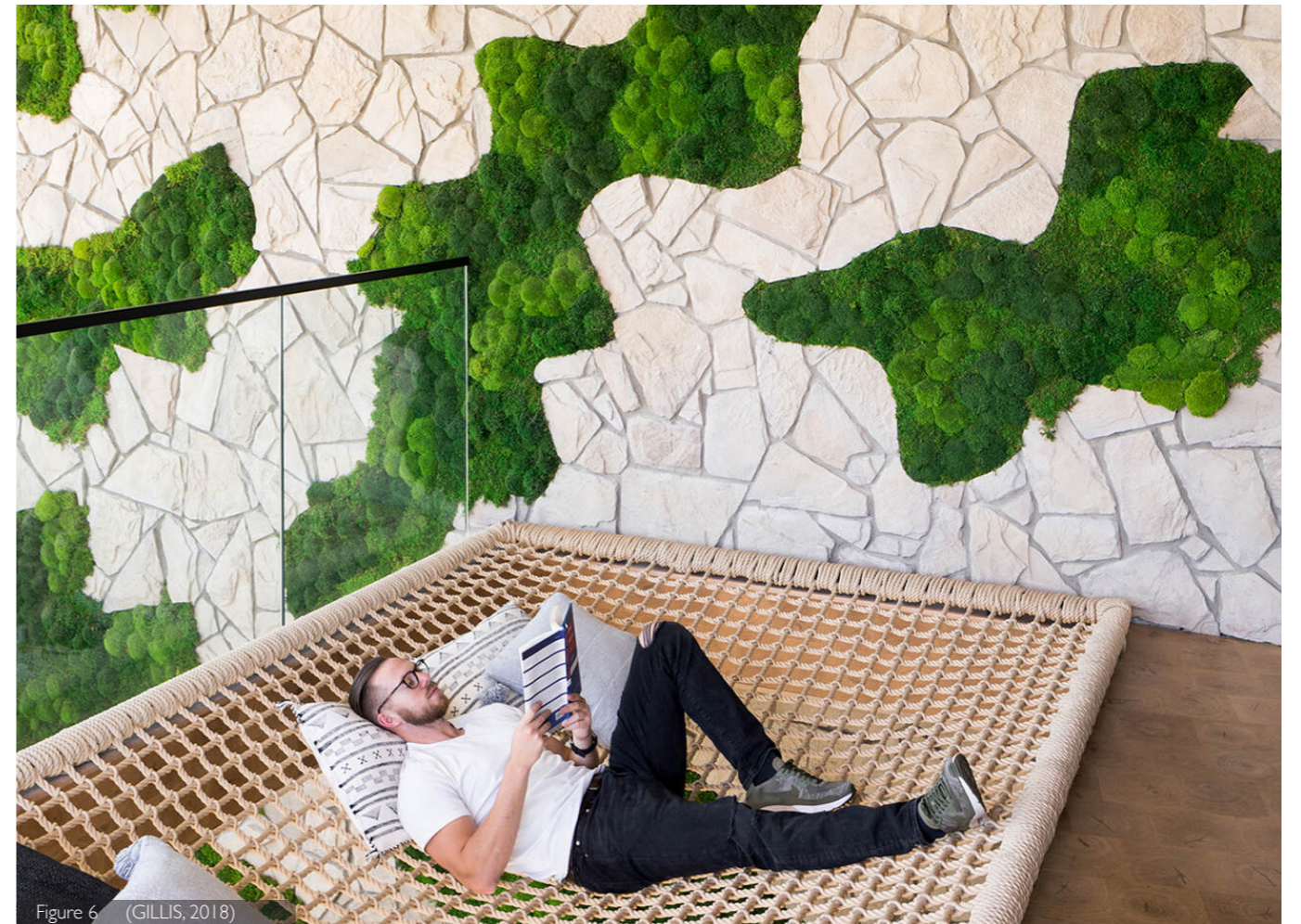


Figure 6 (GILLIS, 2018)

designing for change

Designing for change allows designers to develop new and exciting innovations that could potentially be the future. This is done through a lot of research on current environmental concern such as the bee decline, global warming and others. In recent years people have been encouraged to be more aware of the declining number of bees. However, due to the popularity of urban beekeeping which arose from this, beekeeping has become unsustainable in London. A report on the state of the world's plants and fungi carried out in 2020 showcases figures of green spaces and honeybee colonies in London. (Figure 7) In the diagram below the yellow areas show that 'the available forage is insufficient for the honeybee colonies, let alone other competing bee species.' (Stevenson et al., 2020) This shows that urban beekeeping is unsustainable in London as there is not enough green space per bee colony. Designer Matilde Boelhauer has responded to the concern by designing unique human-made pollinating flowers which provide food for urban bees and other pollinating insects. (Figure 8) Each flower is designed to collect rainwater which gets transported to the bottom of the stem and then mixes with sugar. This then gets pumped back up to the centre of the plant for easy access for the bees. (Boelhauer, 2019) This shows an interesting approach to the bee decline. It is a unique concept that could help the honeybees; however, this could not be a permanent solution as sugar water isn't a sustainable food source for the long term. This solution can also potentially cause other environmental issues such as pollution. It can be argued that designers tend to solve problems rather than dig to the root of the problem. It is said that designers need to challenge themselves to get to the source of the problem and use new techniques to solve this. In this instance, the root of the problem is the lack of green spaces in London's centre. (Dam and Siang, 2020)

Status of bee forage

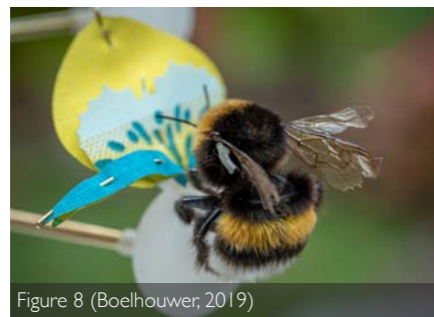
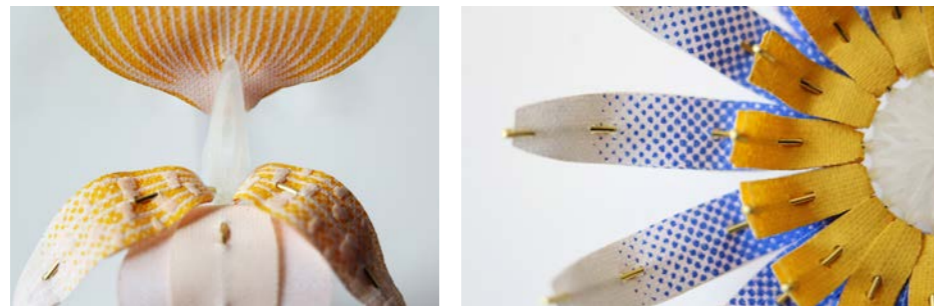
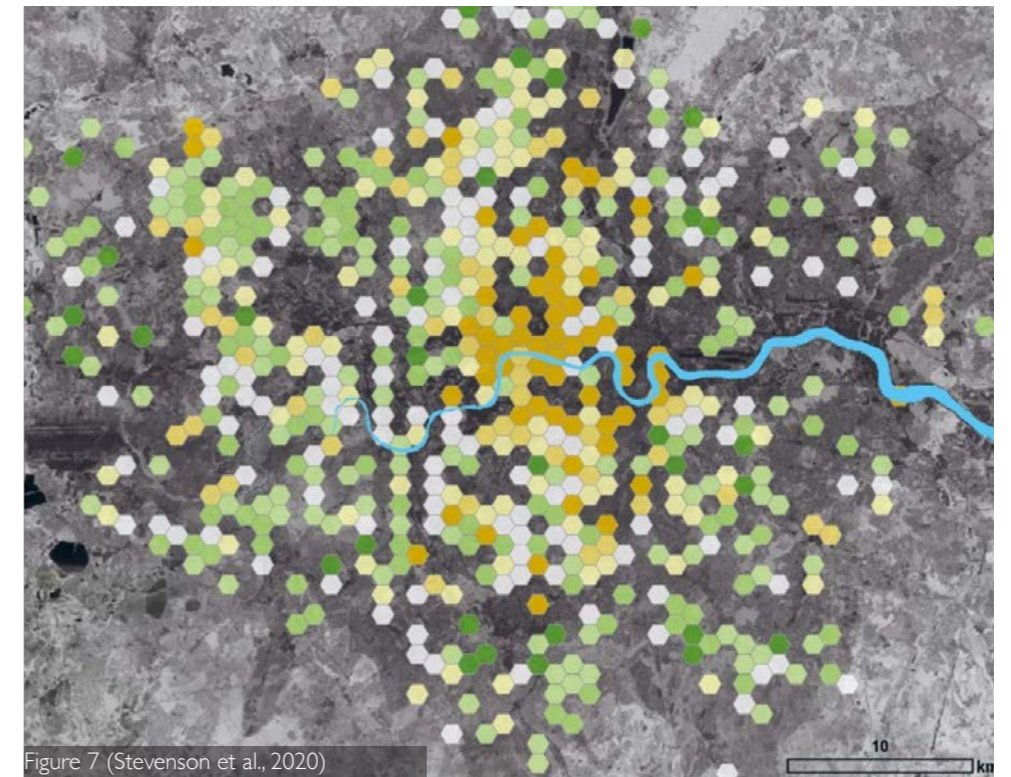
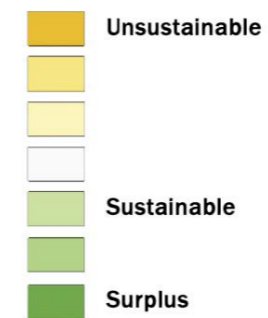


Figure 8 (Boelhauer, 2019)



Figure 9 (Buglife, 2020)

There are several factors which cause honeybee declines. It can be argued that some of the main factors are poorly managed human activities, like building on top of green space. (World Bee Project, n.d.) The BugLife UK based organisation has taken this into account and designed a map covering the whole of the UK. This map showcases links between green spaces and gardens to create unique routes, much like our roads, for bees and other pollinating insects. (Figure 9) 'These aim to increase the abundance and diversity of pollinating animals.' (Buglife, 2020) The concept is interesting as it allows people to contribute by adding their green space on the map. It may also educate people on the number of green spaces around them and influence them to create more green space for bees.

There is always the possibility that bees do go extinct in the future. Scientists are now designing robot versions of bees and testing them out to see if there is a way humans can continue living without these pollinating insects. Robert Wood, a novel roboticist, has been working on designing a colony of robotic bees and announced the first flight of the RoboBee in 2014. (Figure 10) This artificial bee was half of the size of a paper clip and weighed only 175 milligrams. The bee was still connected to a wire which is something Wood's is trying to develop. (Tiny, Robotic Bees Could Change the World, 2014) In 2018 a new RoboBee was developed which can swim, jump and fly. (Pennisi, 2017)(Figure 11). This showcases that technology is evolving and robots could be the future of human survival. It can also be questioned whether spending time developing a robotic bee instead of influencing change and educating others is more beneficial. However, other designers have focused on visually showcasing environmental concern through art, exhibition design, installation design, as well as product design to raise awareness and influence change.

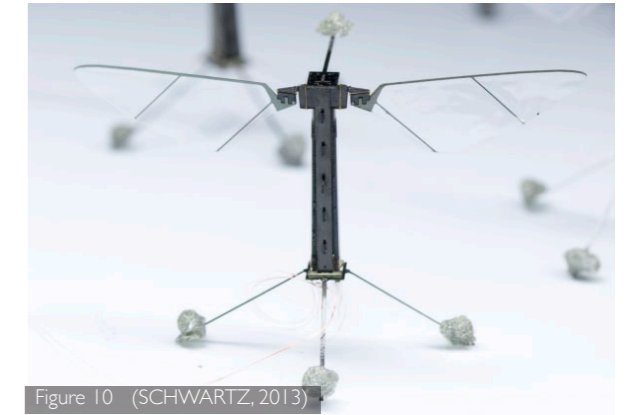


Figure 10 (SCHWARTZ, 2013)

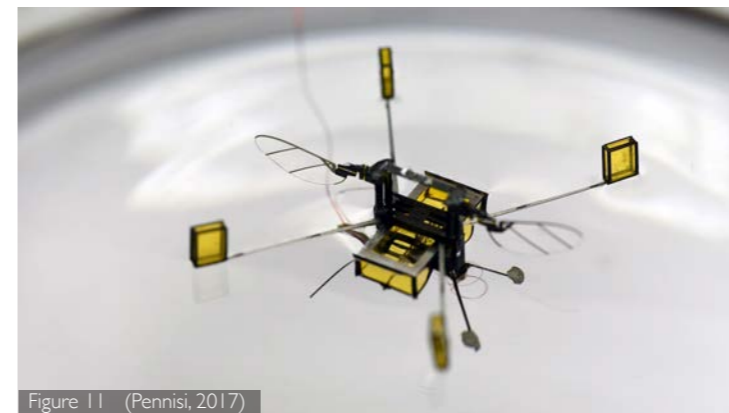


Figure 11 (Pennisi, 2017)



Figure 12 (Piatza and Albert, 2014)



showcasing through design

Showcasing through design is an aspect of design that allows designers to illustrate environmental concern whilst evoking emotion to influence the viewer to change their behaviour. Designers have been raising awareness of the human impact on the planet over many years, which can be seen in different design areas. The Connecting Cities Network focused on the main problem that people living in cities are losing touch with nature, making them less inclined to help the bee decline which was first observed in the 80's by biologist Edward O Wilson. (Oliver Health, n.d) In 2014 Sebastian Piatza and Robert Albert designed the Human Beeing Project which 'focuses on bees and their role in our urban and ecologic system.' (Piatza and Albert, 2014) (Figure 12). They aimed to create an installation which showcases the importance of bees through design. They did this by designing beehives in the shape of building facades and documented bee activity over six months. This was then edited into a 90-minute film and largely projected on the original building facade. This then allowed people to be part of the beehive, and the bees were almost the same size as the people walking past. Due to this project's popularity, it was carried out in the UK, Germany and Finland. (Piatza and Albert, 2014) This shows how important it is to showcase through design, not only by educating as it can have a more significant impact. This project invited people of all ages as it created an impact through visual aesthetics. It allowed people to be part of the buzz and directly link their lives with bee lives.



Figure 13 (Hitti, 2019)

Designer Marlène Huissoud has tackled the issue of bee habitat loss due to urbanisation by designing unique chairs for insects. (FriendsOfTheEarth, 2017)(Figure 13) Huissoud's calls this project "Please Stand By", which consists of a range of different chairs or 'hotels' for city-dwelling bees and insects designed as shelters. She uses natural materials to construct them such as unfired clay, natural binders and wood. The chairs are then perforated with holes measuring between 5cm and 10cm giving enough space for different insects to fit in. She wanted to design her first chairs for insects, not people as people have been selfish enough by taking nature and transforming it into concrete cities. (Hitti, 2019) This design showcases an exciting concept that many people can build, even on a much smaller scale, for their homes. These could also be located in busy areas in cities to give insects shelter but also to continually remind people of the insects and bees that are in danger.

"These sculptural pieces are encouraging biodiversity in the gardens and increase the ecosystem productivity." - Marlène Huissoud (Hitti, 2019)

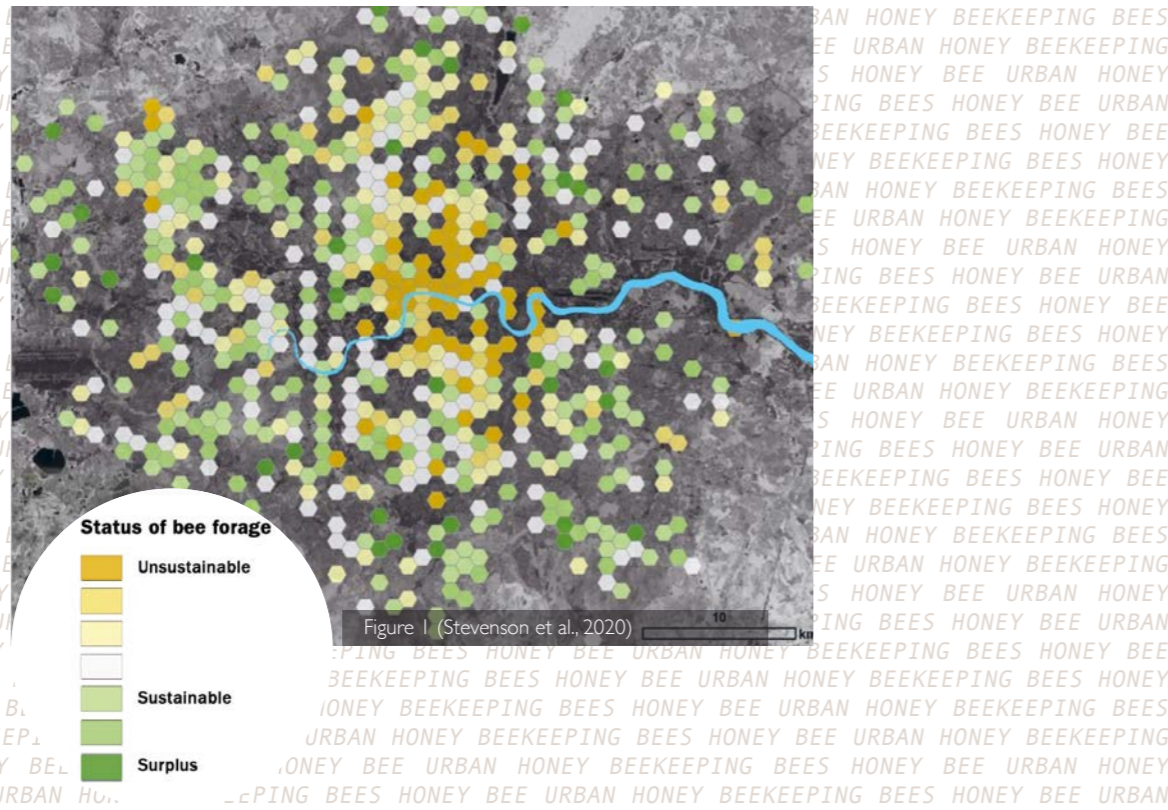


Figure 14 (Angelopoulou, 2019)

The Spanish based design studio, Culdesac has designed a series of methacrylate capsules that highlight the nuances and differences between the different types of honey. (Figure 14) They enclosed them in futuristic glass cases to showcase the different kinds of honey. They filled the glass cases 90% full to allow movement within the cases to showcase the density of each type of honey. They aimed to showcase honey as DNA by emphasising textures, colours and densities of different honey types throughout their design. (Angelopoulou, 2019) The design team focused on the relationship between customer and honey and how they got to know each other and interact. (urdesign, 2019) This is an exciting approach to showcasing through design as their innovation displays what people would be missing if bees became extinct clearly and aesthetically. It can be said that interior designers can influence behavioural change by showcasing these products to evoke an interest in the declining number of bees.

CONCLUSION

In conclusion, this document has researched main aspects of the bee decline, proposed and analysed similarities between humans and bees, and further researched how these are feasible through design. Through this design contextualisation, it has been shown that beekeeping in urban areas such as London is unsustainable and that there are not enough plants in urban environments for bee colonies to survive. Cities need an intervention that will allow people to continue moving to urban areas whilst still helping the honeybees and allowing them to live in these human-made cities. This design contextualisation has also researched successful projects that allowed designers to showcase the importance of bees through installation design and product design. This knowledge will allow for further research into potential probes and different solutions to these global problems.



INTRODUCTION

The honeybee decline has been an issue worldwide for years, causing primary concern to our population. One of my design projects' main focuses is influencing change and a positive cohabitation between people and nature within cities. Connecting people with nature through design is another important goal for this chapter. Whilst researching these topics, I discovered that the honeybee colonies are of abundance in London. However, there isn't enough sufficient food supply to sustain these colonies, especially in the centre of London. (Figure 1) This is due to several factors: urbanisation, habitat destruction, and an increase in urban beekeeping in cities like London. (Stevenson et al., 2020) This primary research aims to discover if people are willing to feed the bees and help sustain the bee colonies within cities when given the opportunity. This was carried out through different design approaches, such as probes and interventions. This chapter aims to find a way in which design can influence behavioural change within the urban environment.

Map Of London

probe / survey

The initial research approach was through a probe. As stated in the 'Making Design Probes Work' article, this type of methodology is a design tool and a tool for exploration 'centred on self-identity and personal significance'. (Wallace et al., 2013) This probe aimed to discover if people are aware of the lack of green spaces in London and spark a conversation to hopefully provoke an interest in this environmental concern. This research approach was inspired by Rikke Haller Baggesen who designed a cultural probe asking her participants to use stickers to illustrate a map showing places they love to visit and crossing out or cutting out areas of the city they dislike. Baggesen also asked for suggestions on improvements within the city. (Baggesen, 2012) (Figure 2) This approach influenced me to design my cultural probe, which engaged the public with nature and asked them how many green spaces they think there are on a black and white map of London. I wanted to find out people's perspectives on this matter to help me successfully design a space to influence positive change and increase the abundance of green spaces in London. I wanted to know if people think there needs to be more green space in London to help me research further if people are willing to make a difference. The probe included a packet of green stickers and asked the participants to customise their maps according to how many green spaces they think there are in London. (Figure 3) I then sparked a conversation on this topic by showing them how many green places there are in London and compared the results with the actual number of green spaces.



Figure 2 (Baggesen, 2012)

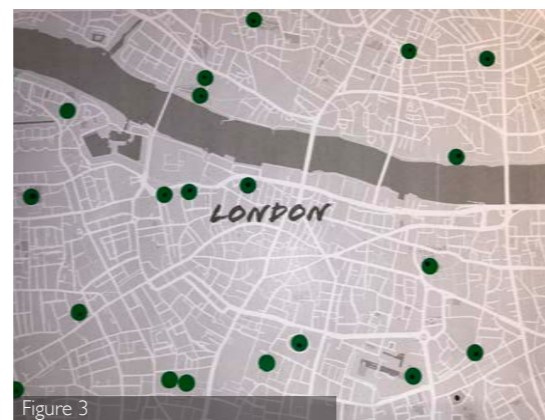


Figure 3

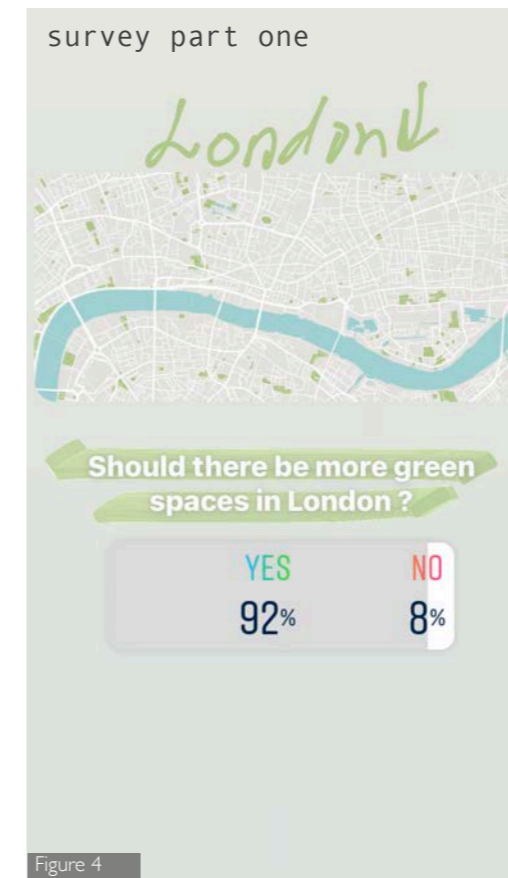


Figure 4

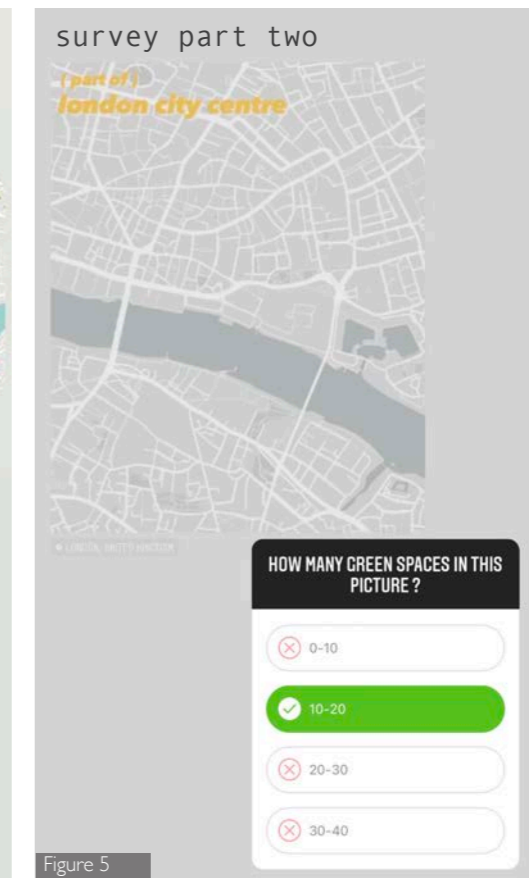


Figure 5

However, due to current circumstances with coronavirus, this research was difficult to carry out with many people. I changed my approach and carried out similar research through a survey on social media. I created two separate polls and asked my Instagram followers if they think there should be more green spaces in London, I also included an image of the centre of London which showcased the number of green spaces. (Figure 4) I then created a second poll which asked people how many green spaces they think there are in a certain area of London. The image shown was black and white, which didn't give them any hints to the answer. The poll included 4 options; between 0-10, 10-20, 20-30, 30-40 green spaces. (Figure 5) The reasons for choosing this research approach were similar to the probe. I wanted to question more people's perspectives on the loss of green spaces within the urban environment. These polls allowed me to engage more people than the probe allowed me to, which helped me gain better insight into people's perspective on the issue.



While discussing biopic design in the first chapter of this design research portfolio, Edward O Wilson, the American biologist who first introduced biophilic design, noticed an increase in the disconnection between people and nature while urbanisation rates increased, in the 1980s. (Oliver Health, n.d) It was interesting to research people's opinions on the number of green spaces and the connection between people and nature, as urbanisation has multiplied over the last 40 years. I wanted to challenge Wilson's design strategy and Ahmad Mukif's design proposition discussed in the first chapter through this research method. Mukif proposed to blur the division walls, which currently divide people living in cities with nature and reconnect them. (Mukif, 2019) I wanted to step back and find out if people are aware of this division or if it has now become the norm.

After the two polls had been up for 24 hours, I took them down and analysed the results. The results weren't close, and it was evident what people's opinions were on the topic. During the first poll (Figure 6), 115 people took part. When asked 'Should there be more green spaces in London?', 92% of people said yes, and the other 8% said no. One of my research implications, which could have made people choose option B, could be due to the unclarity between; Central London and Greater London in my polls. In the second poll, when asked to correctly identify green spaces from a black and white map of London, 77 people took part. There were 16 green spaces in the image which made the second option (10-20) correct. The most popular answer was between 0-10 with 44 people answering this. 28 people answered correctly at 10-20 green spaces, and 5 people guessed between 20 and 30 green spaces as they thought there were more. (Figure 7)

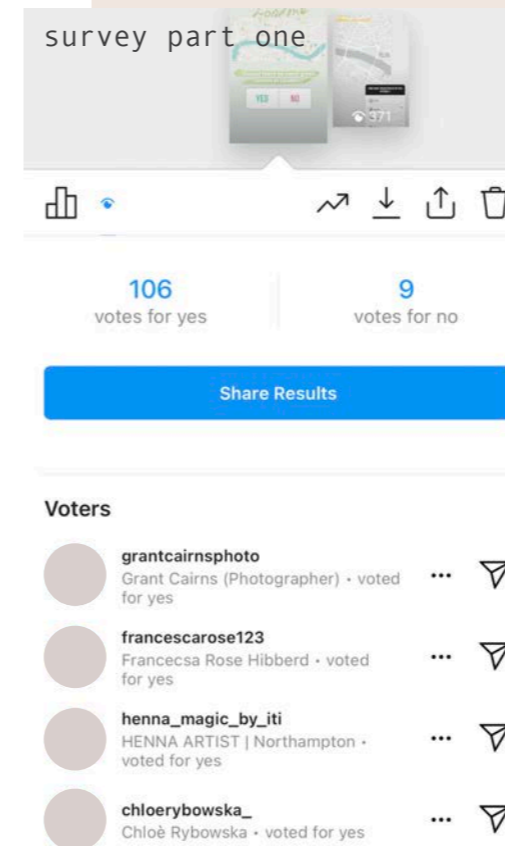


Figure 6

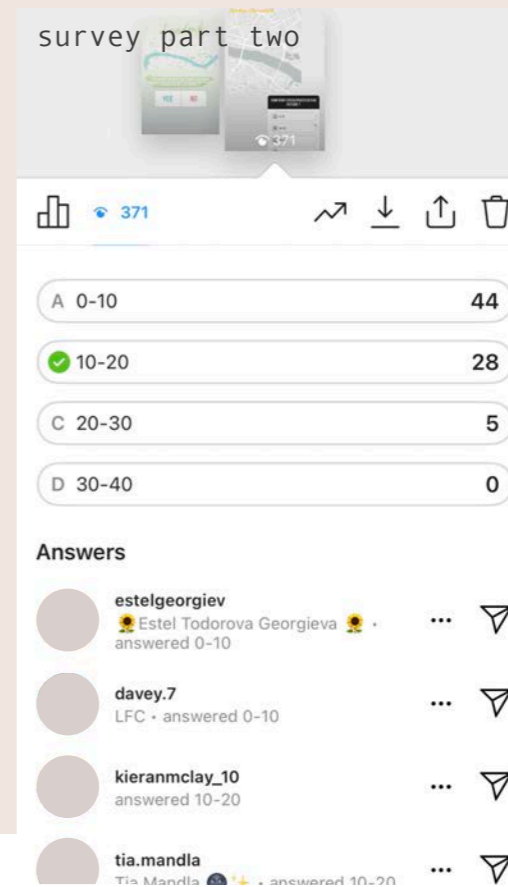
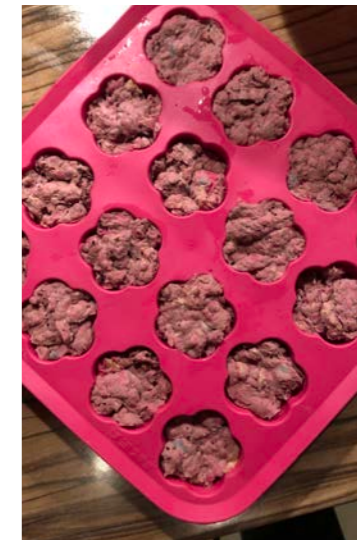
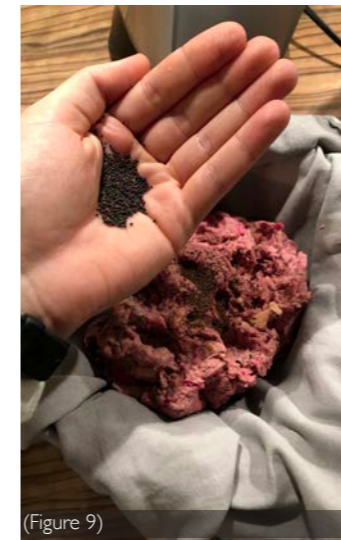


Figure 7

This research has shown that people are aware of the lack of green spaces within urban areas; however, they believe there is even less green spaces than there was shown in the image. This observation indicates that Ahmad Mukif's design proposal to blur the division between nature and cities can be an effective solution. Edward O Wilson's biophilic design could be another way to increase the abundance of greenery within a town; however, this design targets interior spaces. My research and Mukif's proposition targets urban landscapes. However, it can be argued that biophilic design used alongside an easily accessible resource to increase green spaces could influence people to make a change. These findings will help me design my own space that allows people to increase green spaces within London whilst blurring the division walls between nature and cities. My primary research has shown that people are aware of this concern and think there needs to be a change. This insight shows that I don't need to educate through my design but instead focus on designing a space that allows nature, people, and cities to coexist. To do this, I carried out my next research by creating seed bombs to increase green spaces in cities.

Seed Bombs experimentation

For this design experiment, I chose to create a product that increases plants and flowers in cities. After discovering a report on the state of the world's plants and fungi, discussed in the first chapter of this design research portfolio, I became aware that the honeybee colonies are of abundance in London. However, there aren't enough plants to sustain these colonies. (Stevenson et al., 2020) This finding allowed me to research ways to increase plants and green spaces in cities to integrate within my design space. I was greatly inspired by Glasgow based designer, Darren Wilson, who owns the company Kabloom. He has designed seed bombs which people can purchase and throw into areas in the city that they would like to brighten up. (Figure 8) The seed bombs have been designed to attract and increase the diversity of pollinating insects in cities. (Wilson, n.d.) I started the process by experimenting with making my seed bombs, and the aim was to create these most simply, using ingredients found in most households. (Figure 9) I used newspaper and other colourful paper which I tore up in a bowl. I then poured in 2 cups of warm water and left this to soak for 10 minutes. I blended the water and paper which created a pulp like a mixture. The next step was to add the seeds into the mix; the seeds I used were varieties of great plants for pollinators. The plants I went for were foxglove, gypsophila elegant and evening primrose. Once I mixed in the seeds into the mixture, I then rung-out all the water using a towel. Next, I took small parts of the mix and pressed it into moulds. The moulds were left overnight, and on the next day, I took the seed bombs out of the moulds. This proved successful as they stayed in their shape and didn't crumble away. (Figure 10)



(Figure 9)



Figure 8 (Wilson, n.d.)



(Figure 10)



Seed Bombs Growing After Being Planted

While researching Matilde Boelhouver's responses to the declining number of bees, as discussed in the first chapter of this design research portfolio, Boelhouver's inspired me to challenge her techniques. She designed unique human-made pollinating flowers that turned rainwater into sugar water to feed hungry urban bees. (Boelhouver, 2019) This is a fascinating approach to the decline of bee colonies; however, isn't a sustainable full-time solution as bees only require sugar when there isn't sufficient food supply. Boelhouver's intervention might increase environmental pollution as parts of the pollinating plants are made of plastic. This challenged me to experiment with seed bombs, which increase green spaces in cities, and are created using materials people have in their households. I did this to try and find an accessible and sustainable solution to the problem.

Once I took the seed balls out of the mould, they kept their shape and were used within the next design experiment. After four days of having the seed bombs in my house, I started noticing growth even without being planted in soil. This could've been due to moisture in the seed bombs even after 12 hours of drying in the mould. The newspaper and coloured paper used was compostable, which allowed the plants to grow through. The ingredients used; newspaper, water and seeds were very quickly accessible, which has allowed me to create successful seed bombs efficiently. This shows that even though Matilde Boelhouver's design concept could help the bee colonies as an emergency food supply, there are more straightforward ways to create sufficient food supplies within urban areas. These seed bombs are also fully biodegradable which doesn't harm the planet like the laser cut human-made pollinating plants by Boelhouver might. It can be argued that if more people knew about the accessibility and affectedness of these seed balls, there might be a better abundance of food supply within urban areas for pollinating insects. As I carried out this research during winter, it was challenging to observe bee attraction rates and plant blooming qualities. This research could be carried out again during the summer period to monitor the bees' attraction to the plants as well as the rate of growth.

This research has helped me better understand the simplicity of creating these seed bombs and will help me influence my visitors to make their seed bombs and increase the abundance of flowers and green spaces within the urban environment. This design approach helped me carry out my next experiment through an intervention to get an idea of how willing people are to help the declining number of bees when given the opportunity.

Feed The Bees

intervention

Carrying out an intervention within a city allowed me to connect people with nature whilst giving the opportunity to feed the bees and increase plant diversity. COMMONstudio's intervention inspired the design of my own intervention. They approached the problem of insufficient green spaces in cities by designing a coin-operated vending machine which dispenses seed bombs. This project has been very successful with the company installing 150 more devices since its launch in 2010. (COMMONStudio, 2010) (Figure 11) I was also motivated by an intervention in Rotterdam, designed by studio Harmen De Hoop in 2004. They illegally placed soil on a public path in Rotterdam and put a sign saying 'grow your own vegetables' which I thought was unique and eye-catching. (HARMEN DE HOOP, 2014) (Figure 12). My design intervention's main goal was to show if people are willing to save the bees when given the opportunity. I wanted to understand better if showcasing the similarities between bees and humans through visual aids has a behavioural influence when dealing with environmental concern. After the Map of London probe/survey, it was clear that people are aware of the lack of green spaces within urban areas. This intervention aimed to find out if people would make a difference when given the opportunity. I did this by deciding to combine my inspirations and design my own plant pots which I placed in Edinburgh City Centre, alongside the seed bombs. I wanted these pots to be eye-catching, so I created a sign asking people to 'feed the bees' and a few smaller signs informing people what the seed bombs are for and letting them know they are welcome to plant one. (Figure 13)



Figure 11 (COMMONStudio, 2010)



Figure 12 (HARDEN DE HOOP, 2014)

making process



(Figure 13)

As this was a two-part intervention to understand better if visual aids influence people, I created posters that went alongside the pots. I decided to carry out the two-part approach by putting up the plant pots without the signs for 30 minutes and after this time, adding the signs and leaving them for another 30 minutes. (Figure 14) Whilst the intervention was up, I stood nearby and observed passers-by to see if they read the signs, stopped and had a look or planted a seed bomb. I gathered information by tallying how many people stopped and had a look and how many people planted a seed bomb. I carried out this approach during both of the experiments. This allowed me to directly compare the results and be able to form conclusions from this intervention.

final intervention



(Figure 14)

One of the main concerns discussed in the first chapter of this design research portfolio was the disconnection between people and nature within the urban environment. This was highlighted during the 'Map of London' experimentation. However, the Human Beeing Project, discussed in Chapter 1, showcased bees and influenced the connection between people and bees through a projection on buildings' facade. (Piatza and Albert, 2014) This project, much like the B-Lines in London project by BugLifeUK, also discussed in Chapter 1, was designed to create a sense of community all whilst increasing diversity of pollinating animals. I designed my intervention to challenge the Human Beeing Project by taking this idea a step further and not only visually showcasing bees to provoke an interest in change but also to give the opportunity to make a change there and then. It can be argued that often people see information on bee decline but then have to go out of their way to help. Within my intervention, I wanted to trial how people would respond when they don't need to go out of their way and when the possibility for action was right in front of them. I also wanted to have a completely different approach to the scientists and designers behind the Robo Bee, as discussed in Chapter 1. Instead of planning for the extinction of bees, my design aimed to save the bees, feed the bees, and sustain them whilst they are around.



People Interacting With Intervention



Planting Seed Bombs

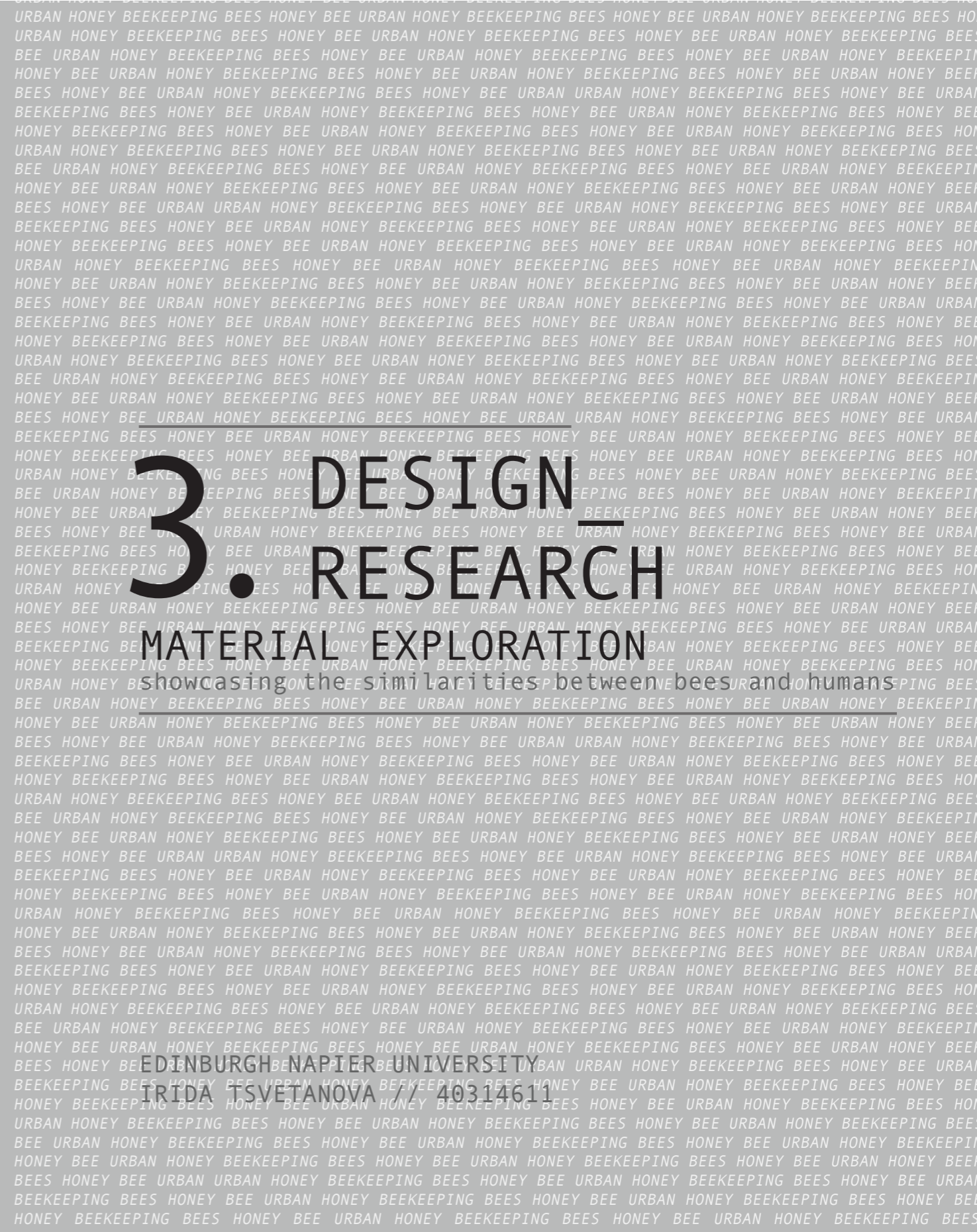
Altogether 80 people stopped to look at the plant pots. In the first 30 minutes, 32 people stopped and read the information. In that time 4 people planted seed bombs. After this time was over, I placed the posters along-side the plant pots to better understand if posters influence people to plant seed bombs. In the next 30 minutes whilst the posters were up, 43 people stopped and observed, and again another 4 people planted the seed bombs. This research influenced only 10% of people who observed the plant pots to plant a seed bomb. After analysing the survey, it was evident people were aware of the lack of green spaces; however, when given the opportunity to change this, only 8 people out of 80 did.

Nonetheless, these figures show that people are more enticed when there is visual aid; however, the visual support provided did not influence them to plant a seed ball. A reason for this could also be because of coronavirus people are less willing to interact with interventions. Another implication could be that people weren't willing to dig their hands in the soil to plant the seed bombs whilst wandering around the city. I could overcome this by having a sign that lets people know they are welcome to take a seed bomb away. This, however, makes it hard for me to know if people have actually planted them, which is why I decided against this idea. These findings will allow me to design my interior space with eye-catching visual aids such as art pieces, without educational writing as my analysis has shown that posters don't influence behavioural change but only attract.



CONCLUSION

The methods researched in this chapter have helped identify ways to influence behavioural change. This was achieved through the focus of engaging people with nature through design. The Map of London probe/survey discovered that people are already aware of the lack of green spaces within cities. This method of research allowed me to engage with the population within towns. The Seed Bomb experimentation successfully created a sustainable solution to the lack of plants within urban areas which challenged designer Matilde Boelhouwer's concepts. The survey results inspired the intervention. Seed bombs were placed alongside the intervention which hoped people would help increase plants within the city. The second aim for this intervention was to find out whether visual aid has an impact when influencing change. This intervention showed that 10% of passers participated by planting a seed bomb; however, it was also clear that more people were attracted when visual aid was incorporated. These methods have allowed me to directly compare people's opinions on the number of green spaces in towns with their willingness to help increase these. This analysis will be used when designing an interior space to influence change by incorporating visual aids to capture attention.



3. DESIGN RESEARCH MATERIAL EXPLORATION

showcasing the similarities between bees and humans

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INTRODUCTION

Some of the main topics discussed in the first chapter of this research portfolio were the similarities between bees and humans, specifically in architecture, cities and living. One of the main aims was to showcase these similarities through interior design to raise awareness of bees' abilities. This goal led me to experiment with building materials and honey. Building materials being something humans have produced over many years in combination with a product made by bees. Through this material research, I hoped to create an aesthetic material which allows me to showcase bees and honey through an interior environment and in a unique way to provoke an interest in the bee decline.



(Taylor, 2004)



Figure 2
DAY 1



DAY 3



DAY 5

EXP 1
1 tbs liquid honey
1 scoop of concrete
Hay

EXP 2
1 tbs liquid honey
1 scoop sawdust
Silicone glue

EXP 3
Strong adhesive
glue
1 tbs honey

EXP 4
1 tbs set honey
Scoop wood shavings
Strong adhesive
glue

EXP 5
1 scoop concrete
2 tbs set honey
1 sawdust
Silicone glue

EXP 6
Silicone glue
Set Honey

Mixing Honey With Building Materials material exploration

When exploring through materials, I hoped it would help me better understand the possibilities of creating a new material with honey which would allow me to showcase how people and bees are similar within the built environment. An article in the International Journal of Design, 'material driven design' states that researching through materials is a way to create new material and study how this material makes people feel and react, which was my aim for this project. (Karana et al., 2015) I was also greatly influenced by Genevieve Dezso's master thesis research. She conducted an anthropological study in 2015, researching the use of honey within Maya architecture. During her research, Dezso interviewed an individual from Mexico named Ramon, who stated that honey has been 'used in architectural construction in the past: "The brick and mortar constructions are made of honey because there was no cement in ancient times. They mixed the honey with the sascab from the earth. They put the honey in it, they stir it, and they beat it. It remains very hard, like glue."' (Dezso, 2015)(Figure 1) This insight motivated me to carry out my research experiments with different combinations of building materials and honey to recreate my version of this technique.

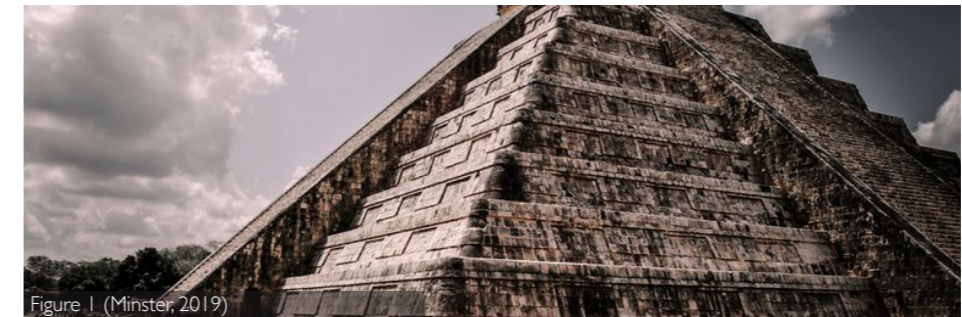


Figure 1 (Minster, 2019)

Initially, I experimented with six different varieties. (Figure 2) I started by using different building materials such as concretes with hay, wood shavings, and sawdust to incorporate with honey and attempt to set a strong enough mixture to use as a building material. In some, I combined different types of glues, such as silicone glue and Copydex, a strong adhesive bond. I chose to do this to create a material that designers could use to showcase bees' abilities and how people could benefit from bees and their honey in a new unique way. It can be argued that if there was a way to showcase bees' abilities to people, they might have a better interest in helping save them, which is why I wanted to create this material. Each material experimentation was mixed in a silicone case which allowed me to remove them quickly and observe them over a couple of days.

One of the unique design concepts discussed under the subsection 'designing for change' within the first chapter of this design research portfolio was the project 'Please Stand By' by designer Marlène Huissoud. She designed a series of furniture pieces to be used as a shelter for city-dwelling bees and other insects, made from natural materials such as unfired clay, natural fibers and wood. Huissoud's concept was not only to help the city bees and other insects but also to raise awareness of their decline and their existence within the city. (Hitti, 2019) Through my material experimentation, I challenged her approach. I attempted to design my own material to be used to construct furniture or buildings to raise awareness through design.

I initially observed the six experiments over a week to see if they were solid enough to be taken out of the moulds. At the end of the week none of the materials were at a consistency which allowed me to take them out and observe them. This led me to leave the experiments to set over a couple of weeks. Three weeks after the initial experimentation, I went back to these and observed that two of the material investigations had set, allowing me to take them out of the cases. The first successful experiment was experiment 1, consisting of a scoop of concrete, 1 tbs of liquid honey, and a hay pinch. (Figure 3) The second successful attempt was experiment 5, which consisted of 1 scoop concrete, 2 tbs set honey, some sawdust and silicone glue. (Figure 4) The two successful samples felt very strong and weren't bendable or easily breakable. These were the only two experiments in which I used concrete within which could be one of the main reasons why these two set completely compared to the other attempts. All other 4 experiments were still liquid and didn't set over the 3 weeks, which leads me to believe the bond used in them wasn't strong enough to bond the honey consistency.

The two successful experiments have allowed me to create materials, much like Marlène Huissoud, which can be tested and used to construct design. Marlène Huissoud's design is different from my approach as it raises awareness and at the same time, helps the bee colonies seeking shelter. The next step could be to further explore these new materials by creating insect shelters within the urban environment to support the city-dwelling bees. These materials will also allow me to showcase new ways to benefit from bee produce while provoking interest in the bee decline within the urban environment.



Figure 3 Successful Sample 1



Figure 4 Successful Sample 2

ATTEMPT 1



Figure 5

ATTEMPT 2



Figure 6

ATTEMPT 3

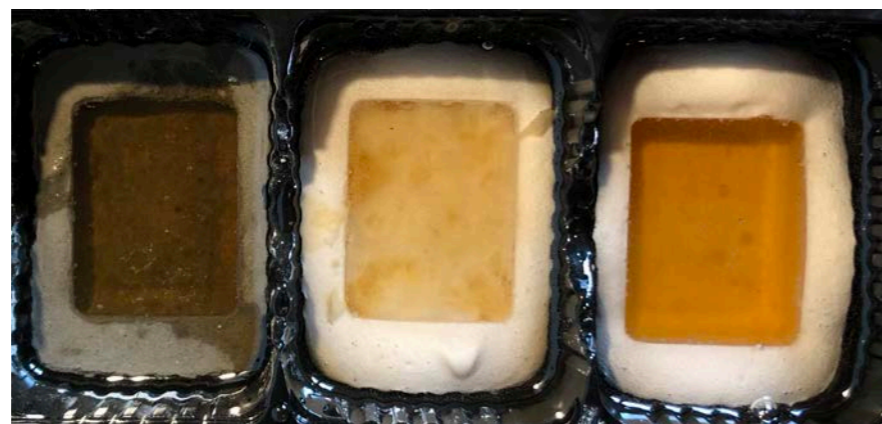


Figure 7

PORING IN THE RESIN



Figure 8



Showcasing Honey Within A Material

material exploration

It can be proclaimed that honey is a precious ingredient which should be showcased instead of incorporated as a building material which led me to experiment with ways in which honey can be showcased within a building material instead. I was greatly inspired by the unique design concept by Culdesac, a Spanish based design studio which was discussed in the first chapter of this design research portfolio. They designed a series of methacrylate capsules that highlight the nuances and differences between honey types. They enclosed them in futuristic glass cases to showcase the different kinds of honey. (Angelopoulou, 2019) This experiment aimed to create a product which showcased the different types of honey within an interior space, much like Culdesac's concept. This would show people the beauty of honey and display the main ingredient people would have to live without if bees became extinct.

Culdesac's design and my aim for this experiment gave me an idea of how to approach this material research. I wanted to create a layer of material and let it set completely. Then pour liquid honey on this material and seal it off with a layer of clear resin to showcase the honey much like studio Culdesac's concept. The first material which was used as the bottom layer was concrete. The reason behind using concrete was because it's easily accessible and visually appealing. My first attempt at making the concrete bed was unsuccessful due to the concrete not being fully dry when taking it out of the mould. (Figure 5) This resulted in the concrete breaking. During the second attempt, I sifted the rock chunks out of the concrete and attempted to create the layer again in a smaller pot. This also proved unsuccessful as when taken out the mould the concrete split. (Figure 6) I reduced the scale once again, and the fine concrete was poured into smaller moulds. This was a successful experiment as it set well and came out of the mould without breaking. (Figure 7) I then poured honey within the cove I created whilst the concrete was setting and then topped it off with a resin layer. I left this to dry for 24 hours.

Plaster of Paris was used as an alternative material to concrete as a more sustainable option. This material was straightforward to use as it set quickly and was easy to mould into shape. I created the same shape moulds as the previous experiment. I poured honey on top of those and resin and left them to dry for 24 hours. I made one sample with liquid honey and one sample with set honey to experiment with different setting times and different colour combinations. (Figure 8)

SUCCESSFUL SAMPLES



Figure 9



After leaving both the concrete, honey and resin experiment and plaster of Paris experiment to set for 24 hours, I cut away the plastic mould to observe if the samples had set. Once taken out of the mould, the samples kept their shape and proved very successful. However, over the next two days, I noticed that the honey was disappearing inside the samples. Both the concrete and plaster were absorbing the honey, which led me to experiment further. In Culdesac's design, the honey was showcased in airtight glass cases that allowed the honey to be displayed, and the materials did not absorb it as the concrete and plaster did. The reason why these materials absorbed the honey could be because both of them require to be mixed with water to set and adding liquid honey can cause the same effect. I created the same moulds in my further experiment, but instead of pouring the honey straight onto the plaster and concrete, I poured a resin layer first, then the honey and then topped it off with another layer of resin. These proved very successful, and the materials no longer absorbed the honey. (Figure 9) Suppose I were to do these experiments again. In that case, I'd use other base materials such as glass or other materials that don't require water to set, allowing the honey to sit within the material better. This experiment allowed me to create a sample which showcased honey within a building material and has taught me that there is a way to showcase both bee produce and human construction. The aim of this was to directly show the similarities between bees and humans, which this experiment has helped me achieve.



CONCLUSION

The similarities between bees and humans, specifically through architecture and the built environment, were explored in the design contextualisation, which influenced this material exploration. These material experimentations found ways to showcase the similarities by mixing a bee made material; honey with human-made building materials. These experiments challenged Marlène Huissoud's designs and were inspired by Studio Culdesac's concept. They are inventions of unique materials which could be used as both building materials and statement pieces in interior spaces. The 'mixing honey with building materials' experiments shows that concrete is a strong enough material to bond honey, and creates a strong construction material. Whilst researching and experimenting with ways to showcase honey within a building material; I discovered that this is possible in a range of ways. One of my most successful trials was pouring honey in plaster of Paris and enclosing this with a layer of resin. This research has successfully created and analysed new ways to incorporate nature within the built environment to connect people in cities with nature. The next possible step is to increase the scale of these new materials and display them in common interior spaces such as cafes in the aim to influence environmental concern.



Successful Samples Stacked



Display Box Design

CONCLUSION

Of Design Research Portfolio

The main issue discussed and analysed through this design research portfolio was the declining number of honeybees within cities due to lack of good foraging locations. The disconnect between people and nature in urban environments was also a primary focus in this document which was researched through both design and factual data. There was a sense of urgency for intervention when discussing the honeybee decline as bees are responsible for a third of all food consumed by people.

The purpose of this research paper was to find ways in which to showcase the similarities between bees and humans through design to increase environmental concern and influence a happy cohabitation within cities. This was achieved through the success of a range of material explorations. Two of which created a new material incorporating honey, concrete and other natural binding materials. This was also achieved by showcasing honey within a building material. This material experimentation showcased bees produce between a layer of plaster of Paris and resin, creating a new unique way to show different honey types.

The second aim was to study the connection between people and nature as well as increase the abundance of plants within the urban environment, to better sustain bee colonies. This goal was influenced by factual data discussed in the design contextualisation chapter, which stated that there aren't enough good food sources to maintain bee colonies in London. Through research which engaged the population, it was evident that people are aware of the lack of green spaces in cities; however, when given the opportunity to make a difference only 10% of passers took part.

If we cannot help sustain bee colonies within cities through research and design, honeybees will surely diminish, causing great danger to our existence. This research portfolio proposes a range of ways to help sustain bee colonies in cities by showcasing the similarities between bees and humans through the built environment and reconnecting people with nature to influence change. However, more research and innovation are required in order to significantly improve the sustainment of honeybees within cities.

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BEE TOGETHER

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