

Gaming for Active Nature Engagement

Animal Diplomacy Bureau: designing games to engage and create player agency in urban nature.

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Abstract: As humans migrate into cities, nature-based interactions diminish. City based nature encounters increasingly occur in human managed wildlife areas, e.g. city parks, offering polarised perceptions of biodiversity. The ‘extinction of experience’, arises when people reduce active engagement in nature, resulting in a lack of comprehension or impacts towards local wildlife. Ensuing in demands to reconnect people to nature. The Animal Diplomacy Bureau (ADB), feature designed game experiments providing agency to participants.

Experts believe increasing people’s ‘*nature engagements*’ can lead to regenerative cultures, potentially affecting participants’ mind-sets. Games empower players to attain knowledge about local wildlife in city parks, creating a discussion platform for a ‘more-than human city’. Expert peers informed gaming methods, design led research and public engagements. ADB’s framework, transformed research tools into instruments of agency giving players the knowledge to understand and reimagine of a more wildlife friendly resilient city/society through gameplay.

Keywords: Designing for resilience, Engaging Nature, Sustainability, Gaming, Public Engagement

1.1 Introduction

Authors frame ‘designed nature engagements’ through accessible spaces, attainable to the public. In *Our Place*, Cocker presents a world where “wildlife will not be steered or controlled by us” however we can steer our human approach, comprehension and behaviour towards it reducing our impact and increasing our resilience (Cocker, 2018). The Royal Society for the Protection of Birds (RSPB)

discovered “only one in five UK children [are] connected to nature” (RSPB, 2013), over the “last decade, research has [reviewed] the benefits of children's nature and outdoor experiences. Positive impacts include; physical health, emotional wellbeing and social skills” (RSPB, 2013). *The Last Child In The Woods* highlights “if experiences with nature continue to fade from the current generation of young people, where will future stewards of the earth come from?” (Louv, 2008). The book coins ‘Nature Deficit Disorder’ and the importance of nature’s educational and societal benefits to learn by taking risks.

Miller comments “increased urbanisation has a homogenizing effect on nature, with native habitats reduced” (Miller, 2005). Urbanisation is one factor leading to ‘Shifting Baseline Syndrome’, “describ[ing] a gradual change in the accepted norms for the condition of the natural environment, due to a lack of human experience, memory and/or knowledge of its past condition” (Papworth, Rist, Coad, & Milner-Gulland, 2009). As norms continue to “downgrade, there is a greater acceptance for environmental degradation” (Papworth *et al.*, 2009). The World Wide Fund for Nature published, “the number of wild animals on Earth has halved in the past 40 years” (Carrington, 2014). Conservationist Chris Packham, states, “Britain is becoming an ungreen and unpleasant land” (Barkham, 2018a) culminating in the ‘*people's manifesto for wildlife*’ (Packham. C, Barkham P., Macfarlane R, 2018) with proposals including; “school ‘edible playgrounds’, every citizen empowered to defend nature, pesticide taxes” and more (Packham. C, Barkham P., Macfarlane R, 2018). Nature engagements nurture well-being as “children are happiest when searching for bugs and tadpoles” (Easedale, 2013). RSPB CEO, states “75% of young Londoners are disconnected from nature” (L. Moss, 2013) supported by *The State of Nature Report*, combining data and expertise from 50 plus organisations. The 2016 report, uncovered “between 2002 and 2013, 53% of species [have] declined, with 7% of urban species threatened with extinction from Great Britain” (Burns *et al.*, 2013). Muller *et al*, identify “With two-thirds of a larger world population predicted to be living in urban areas by 2050, urban-biodiversity will play an important role due to its global reduction” (Nurse, 2017). *The Companion Species Manifesto* defines existing relationships with wildlife and how “living with these animals means inheriting all of their conditions” (Müller & Werner, 2010).

1.2 Research Aim

Deploy lo-fi technologies (aligned to financial constraints of NGOs and schools) to evolve public mind-sets toward, local wildlife resilience and sustainable behaviour.

1.3 Nature's Value

Nature is priceless, with prolonged impacts e.g. “Mexico’s mangrove forests provide an annual \$70 billion, to their economy through storm protection, fisheries support, and ecotourism” (Sukhdev, 2018). *The Natural Choice: Securing the Value of Nature* presents nature's economic values include “ecotourism, the fifth largest industry in the UK support[ing] 2.2 million jobs, contributing £97 billion to the economy” (State for Environment, Food and Rural Affairs, 2011). Negative impacts on nature also cause economic consequences. 2001 brought the United Kingdom an epidemic of Foot and Mouth disease, with “2,000 reported cases” (Bates, 2016). During the outbreak “overseas visitors to the UK dropped by 10%” impacting tourism, adventure sports and manufacturing, highlighting ‘nature and human interdependencies’ (Bates, 2016).

What Has Nature Ever Done For Us advocates for Natural Health Service(s), Soil care, pollination, the oceans and business cases including, “25-50%, proportion of \$640 billion pharmaceutical market is

based on biodiversity” (Juniper, 2013). Juniper highlights “Statins [antidepressants] cost £9,500 per year, while exercise-based activity costs £440”, twenty times less, offering a ‘National Nature Healthcare Service’ (Juniper, 2013). Juniper emphasises that “children with Attention Deficit Disorder have shown significant improvements if they play in natural areas, or even have views of trees and grass outside their home” (Juniper, 2013). Findings are supported by *Natural Childhood Report* by The National Trust, which demonstrates nature’s positive effects, such as health benefits, mental health solutions, reduction in ADHD. The report also highlights nature engagements could “save the health service £2.1 billion per annum in England alone” (S. M. Moss, 2012).

1.4 Perspectives on Nature

Authors cannot cover the vast interdependencies and complexities of ‘nature or wildlife’. However a contextual example Ragwort (a common English weed) prolific in; “abandoned urban areas, roadsides, countryside and gardens” (British Horse Society Scotland, 2018). In “2003, the Ragwort control act was created to restrict the weeds’ spread” (London Stationary Office, 2003). If eaten by “horses or livestock, ragwort can be poisonous with long term irreparable liver damage” (World Horse Welfare, 2018). The plant “provides nectar for numerous butterfly species”, thus favoured by wild gardeners, permaculture experts and rewilding projects (Nikon, 2018). Historically the weeds’ presence has divided expert communities. Everyone’s perspectives are not consistent, they are contextual. Designing within ‘active natural engagement’ requires balance and expert contextual comprehension. The last ‘Living planet report’, “published in 2016, estimated that the world’s wildlife populations had halved over the last 40 years”. This assessment “suggests since 1970, [wildlife] populations have declined by an average of 58%” (Morelle, 2016).



Figure 1. Ragwort, mature plant, Image credit: Author

Authors are designers not nature experts, but have pooled expertise from leading authorities, peers and perspectives based on contextual surroundings. As Cocker states in *Can we Save Britain's Wildlife Before it's Too Late* “the overarching goal is to radically change the ethic and methods by which nature is governed”, if informed by local populi, it could influence behaviour and comprehension over time (Cocker, 2018). Miller comments, “more effort should be invested in making the natural world part of people’s lives” (Miller, 2005).

1.5 Nature Engagements

Annually ‘*Securing Nature for Future Generations*’ conference questions “What role should the natural environment play in the UK’s future”, commenting directly that “climate change, consumption, population growth, changing land use and competing resources are already impacting nature heavily” (British Ecological Society, 2018). Cornell presents *Deep Nature Play* as “play is a great learning tool that energizes us, fosters creativity and helps build relationships” (Cornell, 2017). Deep (immersive) play “awaken[s] enthusiasm, focus[es] attention, offer[s] direct experience and inspiration”, something nature engagements should embed (Cornell, 2017).

Miller, defines Pyle’s *Extinction of Experience* as “the loss of neighbourhood species endangers our experience of nature. If a species becomes extinct within our own radius of reach (smaller for the very old, very young, disabled, and poor), it might as well be gone altogether, in one important sense. To those whose access suffers by it, local extinction has much the same result as global eradication” (Miller, 2005).

In *Lifelong Kindergarten: Cultivating Creativity Through Projects*, Resnick presents that, young people’s “development has much to do with the environment in which they are raised and the opportunities they are given” (Resnick, 2017). Resnick elaborates that lifelong learning nurtures “projects, passion, peers and play” (Resnick, 2017), three characteristics that influenced the ADB Game. *Sustainable Education, Revisioning Learning and Change* demonstrates that we must evolve “educational culture which both develops and embodies the theory and practice of sustainability in a way which is critically aware” (Sterling, 2001).

Soga & Gaston presents *Shifting Baseline Syndrome* a “psychological and sociological phenomenon whereby each new human generation accepts as natural or normal the situation in which it was raised. With on-going local, regional and global deterioration in the natural environment, this results in a continued lowering of people’s accepted norms for these environmental conditions” (Soga & Gaston, 2018), due to our lack of interaction with nature...

We don't notice when things slip. These literary/expert perspectives frame the need to use play, experience and foster practical embodiment of sustainable learning to teach resilience. The authors reframe ‘designed engagement(s)’ for our mutual engagement and understanding, potentially leading to behaviour change through education.

Observational engagements

An example of wildlife viewing is Project Wild Thing (Bond, 2013) a documentary increasing children’s engagement with nature, post-premiere “the film generated £22,305 box office gross” (British Film Institute, 2014). The RSPB is pioneering engagements including ‘The Big Wild Sleepout’ (RSPB, 2018b), “encouraging anyone to spend a night immersed in nature” (RSPB, 2018) and ‘The Big Garden Birdwatch’ “with 600,000 participants in 2011” demonstrating the public’s motivation (RSPB, 2014).

Equipped engagements

Quitmeyer’s work creates ‘Digital Naturalists’, “helping ethologists design and build personal computational tools, extend[ing] their tool-making traditions into the digital realm” (Quitmeyer, 2017). Digital Naturalists empower experts with computational tools to investigate local content. The ADB game sits within equipped engagements.

1.6 Decline in natural interactions

Longitudinal Studies by the World Health Organisation on adolescent screen time, show a “steep increase between 2002 and 2014 in the number of children using technology for more than two hours each weekday” (Quitmeyer, 2017). A recent study of 4,500 children highlighted that “limiting children's recreational screen use has been linked with improved cognition” (Therrien, 2018). This combination is leading to *A Growing Disconnection From Nature Is Evident in Cultural Products*, as “these findings are cause for concern, not only because they imply foregone physical and psychological benefits from engagement with nature, but also because cultural products are agents of socialization that can evoke curiosity, respect, and concern for the natural world” (Kesebir & Kesebir, 2017). Finally, the National Children’s Bureau, emphasizes “the importance of children taking a hands-on approach to nature: touching, picking and collecting, and occasionally being bitten or stung” (S. M. Moss, 2012).

Haraway comments, “better companion species relations [are] needed to be formed all around, among the humans and the non-humans” (Haraway, 2003). These cases highlight the need to increase engagements with the nature for mutual sustainability and resilience. Existing wildlife engagements include; capturing footprints (Johnson, H., Thomas, E, 2015) moth traps (Butterfly Conservation Trust, 2018) bat detectors, (Bat Conservation Trust, 2018) and trail cameras (Scubla, 2018). This presents a design space for engaging audiences, unaware of their impacts on surrounding wildlife. The joining of; experience, open outdoor space, physical activity and a designed intervention, provide agency with a unique opportunity for engagement among familiar settings that, post gaming provide participants with agency. Authors see a research gap of ‘nature gaming’, forming **Animal Diplomacy Bureau’s vision**:

Participant(s) actively engaging in the natural world (outside of formal organisations or scientific practices), for the purposes of learning through games, yielding participatory ‘mind-set change’ for a more resilient community.

2.1 Design & Development Method

Play As a Method

Play theorist Thomas S. Henricks stated, “In play, people envision and enact the possibilities of living in their societies; and for that reason, play is an important agency of social and cultural change” (Henricks, 2014). A way to reconnect and make nature relevant to people is through envisioning different possibilities, supported by Cornell as “games heighten the physical senses” (Cornell, 1989). Play offers an engaging method of reintroducing the possibility of a connection with nature. In addition, play is a way of exercising personal agency and creating memorable physical experiences, Resnick states in *Lifelong Learning* “to develop creative thinkers: projects, passion, peers and play” are imperative (Resnick, 2017). As such, play and peers were chosen as cornerstones of ADB. An important aspect of ADB was bringing nature closer to city dwellers. It is important to show that cities are valid places for conserving and observing wildlife, e.g. London “has 8.4 million trees, which provide the city with 13% tree cover: enough to define the city as a forest by the UN’s own definition” (Chazdon *et al.*, 2016). These trees “deliver £132.7 million worth of ecosystem services to London each year” (Rogers, *et al.*, 2015).

In order to bridge this connection ADB brought players into urban parks and introduced them to urban wildlife. To do this, ADB utilised Pervasive Games (PG). PG can be defined as games “where the fictive world in which the game takes place blends with the physical world” (Nieuwdorp, 2007).

ADB's games use real-world locations (physical world), e.g. urban parks to build wildlife narratives (semi-fictional world), forming the game's species-specific basis, introducing players to local birds. ADB was scaffolded from Blast Theory's *Operation Black Antler* (Blast Theory, 2018) (*OBA*) an immersive theatre event combined with pervasive elements enabling participants to confront and question the ethics of surveillance through role-play. In *OBA* a blur between the real world and the 'stage', enabled audiences to be led by actors into real contextual locations. In a similar vein, ADB uses role-play (players become birds) to enable players to consider urban wildlife and the concept of 'multispecies cities'. Like *Operation Black Antler*, in ADB players were given simple missions players had to achieve. The process the player used to complete their missions were participant led. This enabled players to create an ownable, personal experience created through their own decisions, tying into Henricks's play theory, which describes play as a "process of self-construction and evaluation" (Henricks, 2014). Through role-play and the freedom to make decisions within a game framework, players were able to construct their 'bird-self' and evaluate what that meant to themselves. Bird, defines "the critical age of [nature] influence" as pre-teen (12 years old) as "contact with nature in all its forms, in particular wild nature, appears to strongly influence positive behaviour towards the environment" (Bird, 2007). Whilst the games focus was not solely pre-teens, it was designed to include them.

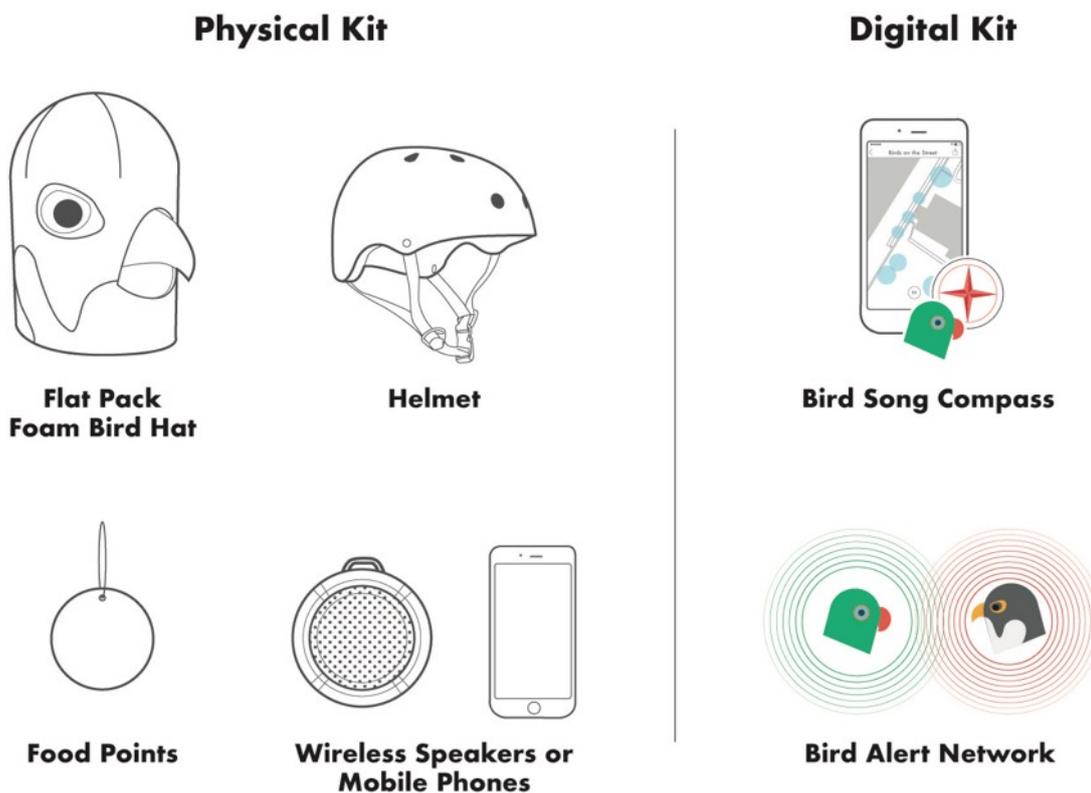


Figure 2. Full ABD kits/wearables, with different species local to the gaming context, Image Credit: Kaylene Kau

As part of creating their 'bird-self', ADB created a series of different bird wearables. These wearables helped facilitate play by creating a sense of playfulness. The wearables also helped players enter the "magic circle" (Zimmerman, 2012) (defined as when/where play happens) through the ridiculousness of embodying a giant bird. In addition, the wearables helped enhance a player's experience by limiting their field of vision; players reported an increase of tension and focus during

the game. It was important for ADB to create as objective and factually correct experience as possible. To do this, at each game site, prior to play, ADB validated its process with local birders. Local birders often have the most complete knowledge of species presence and sighting frequency in their local area. Local knowledge for ecology is celebrated as “to be successful it is absolutely necessary to make people active participants, not simply integrate and validate local knowledge” (Carvalho & Frazão-Moreira, 2011). ADB also consulted Ornithologists specialising in bird behaviour, their feedback helped the authors understand how certain birds think and how to encode bird behaviours into game formats. These discussions led to the development of key game mechanics such as the bird alarm network and mobbing.

2.2 Iterative Design: Refining and validating the game

ADB’s games were developed through an iterative design process at parks in London, run 16 times at four different locations (Table 1) with contrasting communities and demographics (83 individuals). Players were recruited through an open, online call. The first three games were played as a trial, where the author tested: the game mechanics, player enjoyment, feasibility of geocached birdsongs, number of bird songs and location types. After each trial, parts of the game were adjusted based on player feedback and the observations of the author. For example, it was found that simple game mechanics worked best, it was better to build and combine game rules from well-known games, in this case tag and treasure hunt.

Players struggled to distinguish between more than two different birdcalls, so birdcalls were reduced. The game was initially unbalanced, with the predator winning too easily, as a result, the bird alarm network was introduced. This allowed for prey to receive warnings when the predator was nearby, further emulating bird life. Another key factor was location, the trials initially took place on busy streets near parks. This was deemed too dangerous as it was too complicated to control the gaming area. In addition, it attracted Police who were concerned about players having their faces concealed. The game then moved fully into urban parks, where the game could be fully controlled, where the public could be more at ease.

The iterative design process helped create a good game-flow (based on player feedback). Initial games were front-loaded with facts; however players had a hard time retaining information. It was better to weave factual information into discussions at the end of each game. The game-flow split players up at the start of the game and brought them together at the end. This allowed them to share and discuss their individual experiences as a bird together. This post-game discussion became an important aspect of the game and helped players reflect on what it means to live in a multispecies city.



Figure 3. Observations of Gameplay, Image Credit: Yung-Chuan Lin and Gary Schwartz (c) QMUL 2018. Supported by EPSRC Fellowship EP/L020505/1

Transport and Set-Up

The transport and set-up of the game needed to be simple and non-invasive. All physical elements of the game needed to be portable. The food points needed to be easy to locate, secure and remove. The wearables needed to be transportable and designed for small-batch manufacture (with multiples of each bird). As a result, the wearables were designed to be flat pack and reusable, utilising durable EVA foam with applied graphics, directing the design.

2.3 Deployed Methodology

Animal Diplomacy Bureau: The Game

ADB's game starts with gathering players together and explaining the aim of the game, 'to be a successful bird'. Players are given a 10-minute introduction to the park and a background of the species of birds they are playing (three or four different species per game). The chosen species reflects the location the game. For London parks, the Rose-Ringed Parakeet is always present, as it is a very visible (and loud) example of an invasive species.



Figure 4. Gaming process. Image Credit: Kaylene Kau

Once the background has been established, players are then taught the game rules:

1. *The Goal*: Capture as many food points as possible. Food points are bright red (or green) wooden disks hidden throughout the park.
2. How to get food:
 - a. *Prey*: Prey must find the food points hidden throughout the park. Where there is food the players will hear a specific bird's call. Players are taught to recognise the specific bird's call.
 - b. *Predator*: Predators gain food points by tagging Prey birds with food points. Once tagged, the prey bird must surrender all points to the predator. Players are taught to recognise the predators warning call.
3. *Special Skills*: Bird Alarm Network: if the Predator is nearby all birds within the vicinity will hear the predators alarm call. Mobbing: prey birds can team up with another bird (any type) and scare away a predator by holding hands and making loud noises.
4. *Safety*: All players are asked to walk or fast walk, and avoid running, to avoid "slips and trips" (Mitchell, 2007). Players are also asked to respect the park and anybody using it. During gaming a gamemaster and support staff oversaw the game to resolve any potential conflicts and avoid accidents adhering to safety rules (Buck, 1988).

Gameplay: Once rules are explained and questions answered, 'bird-people' are set loose into the park to find as much food as possible. The game usually ends when the gamemaster and/or helper observes that most food points have been found. At this point, the gamemaster and/or helper will call all the players back to the starting point, where food points are counted and a winner announced.

Post-Game Discussions

Once the winner is announced the gamemaster engages players in a discussion about their experiences as birds and any transformation in their viewpoints, including experiences and perspectives about how they view their city in relation to wildlife. During the discussion the gamemaster prompts questions: What do you think would make the city a better place for wildlife? What would your perfect animal neighbour be? etc.

2.4 Bird Species Selection and Representation

Bird species were chosen based on game location. This process involved a 'birding session' and discussion with a local birder (Ralph Hancock in Hyde Park and John Cadera at Stave Hill). Another key consideration for bird selection was the bird's place in the food chain. The game requires one predator and at least two types of prey birds. Ideally, the prey birds share the similar food resources (e.g. Great Tits and Rose-Ringed Parakeets both eat seeds) (Holden & Abbott, 2018). This introduces to players how species compete. Likewise, the predator should be a bird large enough to take down the selected prey birds (e.g. peregrine falcons are commonly observed preying on parakeets) (Barkham, 2018b). All games so far have taken place in London, so though species chosen may vary slightly the game's dynamics remain the same.

2.5 Encoding Bird Behaviours and Bird to Bird dynamics within Game Rules

The game rules were designed to replicate the dynamics between bird species in a park, which centres on competition for resources. As such, obtaining food became the key game mechanic of the game. Predators obtained food from prey, and prey obtained food from their surroundings. Prey also compete with other prey species for food (thus the inclusion of at least two prey bird species in each game). Interestingly, for smaller games of up to five, the game worked best when there was only one predator. This emulates real life where there is a higher concentration of prey than predators (Stevens, 2012). The game rules also incorporated the strategies prey birds use to increase their chances of survival against predators. This strategy is called "Mobbing" (RSPB, 2018a), Prey birds often gather together to chase away a predator (RSPB, 2018a). This behaviour was adapted to the game: prey players could team up (regardless of species) and scare away the predator. Much like real birds, this allowed for players to choose different strategies when they encountered a predator.

The bird alarm network was another behaviour that was included to aid prey birds. The alarm network is based on how other birds know each other's alarm calls. When a predator is spotted by one bird, and that bird raises an alarm, other birds will also understand and spread this information (BirdNote, 2018). For ADB's game, this was adapted into an app on a phone (proximity alarm) or a wireless speaker worn by the predator. Players were taught to hear a predator's alarm call. Players needed to be taught how to find food. Unlike real birds, players are not familiar with where food would appear for birds. To aid players, food points were designed to be easily visible (bright red disks), and could be heard. Wherever there was a food point, a geocached bird call (a prey bird's normal call) or a wireless speaker would be emitting the call. Players were taught to recognise the prey birds alarm call. By encoding bird behaviour into game rules, players experience bird life, which allows them to understand bird relationships and how parks are utilised. The bird behaviours and their encoding into the game were created with and approved by bird behaviour expert Dr. Rose Thorogood, as a public facing introduction to bird life and how birds utilise information.

2.6 Game Locations

Table 1. Game locations and the rationales of their selection for gameplay spaces.

Location	No. Of Games in Demographic location	Audience	Rationale
Hyde Park, Kensington (W2 3XA)	3	13 Adults	Large size and varied terrain. Varied terrain allowed for a challenging game space for players. Location extremely biodiverse with a large variety of bird species including Peregrine Falcons (Barkham, 2018b).
Churchyard of the Holy Trinity Brompton Church (SW7 1JA)	2	6 Adults	Experiment on a mixed urban street and park scenario. Location was quiet and removed from cars.
Elephant Park (SE17 1UB)	4	9 Children 9 Adults	Invited as part of the LCC S*PARK Exhibition and a collaboration with Elephant Park, the newest park in London, during London Design Festival 2017
Russia Dock Woodland (SE16 6QW)	6	26 Children 20 Adults	Near Stave Hill Ecological Park as part of SoundCamp 2018. The park is built on reclaimed docklands offering open fields and forested areas.

2.7 Digital Version

The first set of games used mobile phones, a customised proximity app and the locative audio app Locosonic. These games were played with five mobile phones embedded within the wearables. As players walked near the locations the bird song would activate. The customised proximity app, allowed the designer to automatically set off a bird alarm call when players were a certain distance together. This formed the bird alarm network. The digital games offered the most immersive and seamless experiences of the games to date. They allowed players to clearly identify food locations and to hear the alarm network. However, the digital games had their own limitations. Mainly due to the restrictions of GPS, which has only a 10m diameter of accuracy, the digital games are suitable for larger parks, such as Hyde Park and too inaccurate for use in smaller parks. In addition, the digital games limited player numbers as it relied on equipping each player with a mobile phone.

2.8 Non-Digital Version

In order to scale the games, involving more players per game a non-digital version was developed and deployed at Soundcamp 2018. The non-digital version removed mobile phones entirely and instead embedded wireless speakers playing approved birdcalls in around the park, with wireless speakers temporarily placed in trees. The bird alarm network was similarly simplified, with the predator player wearing a wireless speaker. The removal of mobile phones significantly reduced cost (approximately one used mobile phone was £30 vs. £4.99 for one speaker), allowing the author to

double the number of players per game (from five to ten). The low-tech solution still retained all the elements of the original digital version at a reduced cost. The Non-digital version worked well, but not as well as the digital version. Players remarked that bird calls could not be heard as distinctly, the sound blended into the park environment. In addition, there were concerns from the local bird expert that the calls would negatively affect birds in the environment. We arrived at a compromise by choosing a gregarious, small bird's calls, the Goldfinch. Future renditions will need to think of an alternative, replacement call.

Demographics

48 adults (ages 21-45) and 35 children (ages 4-12) have played ADB's games to date. Participants were recruited through an open online call, posters and passers-by. The first eight games were played by adults and the digital version.

3.1 Insights

Transition Design: An Educational Framework for Advancing the Study and Design of Sustainable Transitions, comments mind-set changes are the "single most powerful leverage point for change..." (Irwin, Kossoff, & Tonkinwise, 2015). ADB uses play as a way to leverage mind-set change about wildlife in the city, introducing people to a wider range of urban biodiversity and how cities can be sanctuaries for wildlife.

As Henricks writes, "...play represents a process of self-construction and evaluation, one that celebrates the role of agency in human affairs" (Henricks, 2014). Building on this, ADB's framework was designed to allow players to experience bird-life directly through agency and a platform to discuss their own perspectives on urban wildlife. In ADB's games players make their own decisions and interact with the parks affordances during the game. They construct and explore their own 'bird-self', and through a framework of rules, are given agency as 'bird-people'. This empowers players to have a say about how parks work for humans and animals. Players were often local community members. The game was enjoyed by adults and children, creating a dialogue within communities about the status of urban wildlife. Another key part for ADB's framework, was designing experiences emulating bird interactions between other birds and the urban environment. Behaviours, species traits and strategies were directly encoded into game rules. This allowed for players to discover, rather than be told, how birds live in the park, allowing for a richer and more memorable experience. Expert knowledge and local bird stories were woven into game introductions at each site, emphasising the importance of links between local parks and communities.

The final portion of ADB's framework was the open-ended discussions, post gaming. Players, having been out and about during the game, re-group and share individual experiences. This icebreaker format helped facilitate richer conversation among players and levelled the playing field. Players often shared their own encounters with urban wildlife, including frustrations and awe. The discussions allowed the gamemaster to introduce more complex topics such as multispecies cities and urban ecology. Players were often happy to listen and discuss these topics, as postgame they resonated more personally. By providing participants with agency and wildlife knowledge, players were enthusiastic about joining a post game discussion about urban nature. This highlighted a high level of player engagement and participants wanted to know more about their environment. Discussions were rich and often became consultation sessions, with players asking the gamemaster wildlife challenges players had previously experienced. The games worked well across friendship

groups, mixed groups of strangers and mixed age ranges (adults and children), suggesting wider scaling applications across different contexts (e.g. schools and festivals).

Participant comments included:

“Great way to engage people and start thinking”, *SoundCamp, 2018*.

“It got me thinking about how to create a good balance between accommodating animals in the city and also giving them their own space”, *SoundCamp, 2018*.

“But, I don’t know if I’d really like to be a bird—it must be stressful most of the time”, *SoundCamp, 2018*.

3.2 Scaling

ADB’s games have scaling potential, especially for classroom and forest school contexts. ADB’s games can be broken down into stages to become lesson plans for schools, Key stage 2 & 3 (World Class Teachers, 2018). Initial discussions with primary school teachers, suggested that the game be split into two sections: mask making (wearables) and play. The game would slot into existing curriculum about local wildlife and help to engage students by allowing them to make their own masks and actively explore the local park. The key challenge for integration will be adapting to the teacher’s current workflow and teaching methods. Another viable option for scaling would be to expand on player numbers. The games can be run with a larger number of players (potentially 20 plus) if there is a large playing area, enough equipment and support staff. There will need to be iterative design sessions in order to balance the game appropriately after player numbers increase. This large-scale approach is suitable as part of festivals, events or be built into wider activities for The National Trust or RSPB.

Alternate scaling directions embody ‘toolkits’ to be distributed among teachers and/or communities. These kits should clarify to the organiser basic bird knowledge, how to set-up the game, wearable’s and logistics. By creating toolkits for communities, ADB can have a larger impact and create stronger resilience within the community. The work would then benefit from a longitudinal study to document changes in behaviour or monitor activity. The framework and methods developed by the game are flexible, enabling repurposing for similar contexts where wildlife and cities collide, such as urban foxes or badgers in the UK or cougars in the USA. The game can act as a mediator between perceived ‘pest’ species and humans by providing humans with different perspectives, knowledge and agency to discuss alternatives.

4 Future Work

There is great potential to implement ADB’s framework onto species that are viewed as pests by humans, such as foxes or badgers. The larger value is the potential to sway perception and attitudes on pest species, as the current species selection (birds) are not so polarising. Exploring audiences that do not usually engage with this type of activity could unlock further potential. ADB’s current audiences are skewed to be more motivated to attend outdoor and group activities. A longitudinal study would warrant repeat experiences, monitoring health benefits and witnessing signs of behaviour change amongst particular geographies and demographics. Finally, exploring training others to be the ‘gamemaster’ and observe from a distance, forming a ‘toolkit’ allowing ADB’s frameworks to be used externally.

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