

Using Visual Q-Methodology to Explore Danish Children's Outdoor Play Preferences

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Citation: Hempel, A. C. (2021). Using visual Q-methodology to explore Danish children's outdoor play preferences. *Children, Youth and Environments*, 31(1), 88-115. Retrieved from <http://www.jstor.org/action/showPublication?journalCode=chilyoutenvi>

Abstract

The aim of this pilot study was to gain new understanding about what types of outdoor play experiences children prefer, and the environmental qualities that enable these activities. Using an application of visual Q-methodology, children ranked their preferences among a set of paintings depicting play scenarios. Factor analysis revealed four distinct typologies of children, each of whom respond to different environmental affordances: Nurturers, Active Children, Creators and Forest Children. Findings suggest that this innovative method is an effective and enjoyable technique for gaining insights about the environmental affordances that foster play in natural and urban settings, from the subjective perspectives of diverse groups of children.

Keywords: visual Q-methodology, environmental affordances, play preferences, outdoor play, child-friendly cities, landscape perception

Introduction

Across the globe, children have been withdrawing indoors to the compelling virtual landscapes of computer games and television; concerns are widespread that today's children may not develop the physical skills, resourcefulness, independence and emotional capacities that are associated with outdoor activities. Safety concerns prohibit many parents from allowing children to spend unsupervised time exploring and playing, circumstances that have been labelled a crisis by play researchers (Whitebread, 2015). An additional concern is the loss of suitable play environments, particularly access to natural landscapes. Opportunities for children to have immersive experiences in wild, pristine nature become more limited with each generation.

Widespread attention has been given to "nature deficit disorder": the societal problems attributed to the decline of play in nature (Louv, 2005). Active engagement in the outdoor landscape enhances independence and promotes physical and emotional well-being for people of all ages; it is beyond a doubt that frequent access to natural landscapes has a positive effect on children's health and the development of skills and capacities (Chawla, 2015). However, wild landscapes are not the only environments that afford opportunities for children to explore, play and thrive. In the future, the majority of children will grow up in cities where opportunities for frequent immersion in pristine nature are limited; urban landscapes must also afford rich play experiences where active engagement can foster physical and emotional development, build social bonds and support natural connectedness.

According to the UN Convention on the Rights of the Child, children should have access to environmental resources that allow them to flourish, and the voices of children should be sought in matters that affect them (UNOHCHR, 1989). New methods are needed that improve children's ability to express their preferences, contribute to environmental shaping and affect decision-making (Bishop & Corkery, 2017; Driskell, 2002), but subjective information is challenging to incorporate into these processes. Which scenarios will motivate diverse groups of children to play? What is the relationship between an individual's preferred play activities and the environments that compel them? We know that a key aspect of play is that it is experienced as joyful (Zosh et al., 2017). Joy, however, is subjective; why is roughhousing so enjoyable for some yet miserable for others? Is painting a picture fun, or a tedious chore?

Without understanding play preferences from a child's perspective, we will not understand how environments can best motivate an individual. Are there general patterns or typologies to which designers can respond when planning for diverse groups of children, in diverse environments? What methods are well-suited to gain insights from children themselves?

Q-methodology (Q-M) reveals subjective attitudes using a set of statements or visual stimuli that is ranked in order of preference by participants. Data analysis provides rich qualitative and quantitative information even with a relatively small sample size. The method is described as child-friendly and the approach well-suited

for children's participation (Ellingsen, Thorsen & Storksen, 2014), but visual Q-M studies with elementary school-aged children are very rare.

This research has two objectives: a) to explore the types of environmental affordances that will motivate and enable diverse groups of children to play outside, and b) to explore if visual Q-methodology (VQ-M) is a suitable research method to reveal information about outdoor play preferences from a child's perspective.

Background

Play is an essential part of human development; while engaged in play, children are learning to learn while developing important cognitive and emotional capacities (Zosh et al., 2017; Pellegrini, 2009). Different skills and capacities are associated with unique types of play, including physical play, play with objects, symbolic play, pretend play, and games with rules (Whitebread et al., 2017). Physical play is active and supports the development of gross and fine motors skills, develops co-ordination, endurance and builds strength. Play with objects helps children explore, reason, and promotes problem-solving skills. Symbolic play activities help children express their ideas, and include activities such as art creation, music, and language activities. Pretend play includes role-playing and fantasy and is associated with social growth and role-modelling. Games with rules assist with social development, sharing, and appreciating the perspectives of others. Play can include both indoor and outdoor experiences, from guided and structured play to unstructured activities where children have agency to explore and discover with few constraints. This study focuses on children's perceptions of unstructured outdoor play.

The places where children play and explore with increasing independence, usually between the ages of 7 and 11, have been called "primal landscapes"; experiences during this period have a profound formative effect on people's lifelong environmental attachments and perceptions (Gayton, 1996). The attributes of primal landscapes deserve careful scrutiny; places that have a high level of environmental quality are those that support a variety of skill-related behaviors (Chawla, 2015).

Natural landscapes are renown for supporting active recreation, learning, and restoration; health benefits include physical dimensions (e.g., access to fresh air, sunlight, and exercise) as well emotional dimensions (e.g., psychological restoration, stress reduction, and spiritual well-being) (Cooper Marcus & Barnes, 1999; Ward Thompson, 2011; Spirn, 1984). More than 50 years ago, Ian McHarg wrote about damage to both human and ecological health resulting from loss of natural landscapes to urban development (1969); in the decades since, the decreasing role of nature in children's lives has been a central concern of ecologists, geographers and psychologists (Chawla, 2015). Immersion in nature provides opportunities for exploration, learning, creative play and rich sensory experiences that are considered fundamental to the healthy physical, cognitive and emotional development of young children (Ernst, 2018; Soga & Gaston, 2016; Muñoz, 2009); the benefits that arise from contact with nature outdoors "is as important for health and wellbeing as are daily food and sleep for children" (Elliot, 2010, p. 62).

Access to nature is generally associated with rural landscapes, while social amenities are associated with urban places, but this characterization is simplistic. Both rural and urbanized environments can provide access to nature, support active recreation and restoration, foster learning, and support socializing and inclusiveness. Both rural and urban youth identify natural features as important, and environmental affordances that support inclusion and socializing are important to both groups (Nairn, Panelli, & McCormack, 2003). Children show a strong affinity for natural features as well as human-constructed interventions, and they dislike places that are "boring" whether natural or not (Mahadin & Maulan, 2012). It remains unclear how social factors interact with environmental influences, such as access to greenery and nature, or the prevalence of urban amenities (Björklid & Nordstrom, 2007).

Straightforward theories explaining landscape perception are generally regarded as scarce or incomplete, and the topic is rarely approached from the child's perspective (Horelli, 2007). There is no consistent, all-encompassing theory that explains why people prefer certain landscapes; rather, there are theories in planning and landscape architecture that address different aspects and mechanisms of environmental perceptions (Hempel, 2017). People's subjective values, emotions, and cultural orientations affect their cognition of objective physical environmental qualities and features in a "transactive" way (Zube, Sell, & Taylor, 1982). For example, viewing an urban skyline might trigger a personal memory that affects whether it is perceived positively or negatively (Relph, 1976). Societal values also play a significant role in how we view "natural" beauty; preferences for orderly or tame environments (e.g., neatly mown lawns and trimmed hedges) or wild environments (e.g., tangled gardens, or dramatic mountain vistas) are influenced by cultural learning (Nassauer, 1995).

Others argue that innate processes and evolutionary instinct play a more significant role than learned experiences in our responses to environments. For example, people are attracted to landscapes that provide a view or prospect, and enclosed places that provide shelter, because these are conducive to survival; from these environments people could see predators or prey, and find refuge (Appleton, 1975). Wilson (1984) hypothesized that people's desire to connect with living plants and animals, "biophilia," is instinctive. Kaplan and Kaplan (1989) proposed that people prefer environmental qualities that are conducive to exploration and gathering of information (legibility, comprehension, mystery and complexity) because of pre-cognitive processes. Gibson (1979) theorized that people are instinctively attracted to environmental affordances that suggest opportunities such as sustenance, protection, or movement, explaining that preferences are rooted in safe or fertile environments or habitats that can be accessed by actions of the perceiver. An affordance is "what the environment offers the animal, what it provides or furnishes" (Gibson, 1979, p. 127).

Kyttä uses the concept of affordances to study child-friendly environments, describing them as "the functionally significant properties of the environment that are perceived through the active detection of information" (2002, p. 109). They may include properties from both the environment and the acting individual. For

instance, a smooth slope affords coasting or skateboarding, shelter affords hiding and a climbable feature affords climbing. Other spaces provide opportunities for socializing, such as those that support being noisy or "playing war" (Kyttä, 2002).

Research on children's play identifies preferences that echo adult attraction to physical typologies: open spaces that afford view and freedom, natural areas with bushes and trees, hard surfaces that afford speed and movement, "cozy" spaces that provide enclosure and privacy, water features, the presence of animals (Burke, 2005). Environmental affordances are interpreted in a complex way by children: grass might be beloved for its complex texture and detail, but also because a child can do cartwheels and handstands; pets are described as important play "spaces," and landscape features may be preferred because they trigger memories that relate to play and friendship (Burke, 2005). Trees afford places to climb, but also afford interest in the details of trunks and leaves (Mahadin & Maulan, 2012).

An assessment of the adequacy of environmental affordances must depend on what individuals wish to do, a concept described as person-environment compatibility (Kaplan, 1983). A nuanced understanding of child-friendliness would consider the congruity of the environment with the subjective viewpoints of individual children (Kyttä, 2004). Haikkola and Horelli (2004) undertook an exploration of affordances and person-environment fit from the child's perspective. At a community or governance level, planning is not aimed at individuals, but at diverse groups of individuals; Horelli (2007) suggests that a more ideal model for child-friendly communities is "collective environment fit" for diverse groups of families and children (p. 283). The present research uses a unique methodological approach to explore whether there are groups of children who share preferences for environmental affordances that motivate play.

Methodology

It is well established that children should be able to express their own preferences and opinions about their preferred play spaces, although methods to involve children in research and planning are still evolving. An excellent review of child-friendly methods can be found in Chawla's thorough overview (2015). Innovative research work in early explorations of child-environment relationships was conducted in the 1970s; researcher-led methods included interviews of children, observations of children's behavior outdoors, surveys, photo elicitation, and interviews of parents. Child-led methods include tours of familiar landscapes, or the use of materials created or supplied by children such as photographs, drawings, diaries, maps and models. Methods that include child-supplied photographs have provided rich qualitative information about their preferred environments (Briggs, Stedman, & Krasny, 2014; Mahadin & Maulan, 2012). Visual methods are especially suitable for studies with children, particularly where there are language barriers; a variety are described in Thomson (2008).

Ellingsen and colleagues (2014) describe research exploring young people's experiences and emotions using Q-M, including a study with adolescents using statements, and a study with 5-year-old children using images. In her doctoral dissertation, the author of the present study undertook a VQ-M study using

watercolor paintings to explore landscape preferences with adult participants (Hempel, 2017), and determined that a similar methodology was highly suitable for this child-oriented exploration.

Introduction to Q-Methodology

Q-M is considered an innovative foundational tool for analyzing the beliefs and values of participants in a scientifically interpretable form, providing the richness and diversity associated with qualitative approaches in addition to statistical insights associated with quantitative analysis. Although increasingly applied in social science research it is still considered an emergent technique. Q-M was developed by William Stephenson in 1936 who described the methodology in detail in the book *Study of Behavior* (1956). The method was also described by Stephen Brown in *Political Subjectivity* (1980). A detailed explanation of the methodology and instructions for conducting a Q-M study are outlined in Watts and Stenner's comprehensive guidebook (2012); overviews are available in other books and articles (Addams, 2000; McKeown & Thomas, 1988).

In most Q-M studies, participants express their viewpoints on a topic by ranking a collection of statements in order of preference. The results are analyzed using statistical processes to look for common patterns or archetypes among participants, and places where value systems diverge. It is essentially a data-reduction technique; a key expectation of Q-M research is the belief that there is "finite diversity" in the subjective belief systems and values among a group of participants (Addams, 2000). Researchers follow a standardized set of procedures when developing a Q-M project. In Step 1, the range of opinions and sentiments on the topic being studied, or "flow of communication" (McKeown & Thomas, 1988), are reviewed and defined as a *concourse* (Brown, 1993). In Step 2, from the concourse, a Q-set, or sample of statements, is generated to represent the range of opinions collected from the defined concourse. In Step 3, participants perform a Q-sort by ranking these statements in order of preference into a grid. It is recommended that during this step, the researcher gathers additional information from participants in the form of an interview or questionnaire that will increase the quality of the data and aid interpretation (Watts & Stenner, 2012). In Step 4, statistical processes called Q factor analyses are used to detect patterns or commonalities in participants' value orientations. Finally, in Step 5, the researcher interprets the results by examining the Q factor analyses. Information from the qualitative interviews or questionnaires are used to illustrate and enlighten the results, especially to describe the participants' viewpoints detected in the analysis.

Development of a VQ-M Research Instrument

The goal of this study was to understand how different types of environments motivate different types of children to play outdoors. The step-by-step process used in the present study, described below, follows that recommended by Watts and Stenner (2012) using images, instead of statements, to represent play scenarios.

Step 1: Development of the Concourse

The first step was to define the concourse by detecting a full range of sentiments expressing preferences for diverse outdoor play activities and environments. This

review began with the development of a conceptual framework from relevant literature that established initial thematic guidelines. There are three main ways to apply a conceptual structure in a Q-M study, as outlined in Addams (2000). Theory may be used in a highly structured way to test a hypothesis; in this application, themes are established from a priori knowledge, and this information is used to guide the review of an opinion domain. Alternatively, in a naturalized approach, the review is conducted in an unstructured way (for instance, statements are taken directly from a set of participant interviews) in the hopes that theoretical insights will emerge a posteriori from the data. The third approach, chosen for this project, is to apply a conceptual framework in a semi-structured way, providing focus for the initial review, while remaining open to new discourse that emerges.

To understand the range of scenario preferences, I began with a review of play types, skill development types, and environmental typologies (Table 1).

Table 1. Preliminary themes used to structure review

Play Types	Capacity Development	Environmental Affordances
Physical play	Emotional skills	Human constructed
Play with objects	Cognitive skills	"Tame" nature
Symbolic play	Physical skills	Wild Nature
Pretend play	Social skills	Biophilia
Games with rules	Creative skills	Habitat
		Mystery/complexity Comprehensibility/legibility Prospect-refuge

To collect images for the concourse, I reviewed material including illustrated children's books, children's movies and advertising material, as well as conducted field observations. Images that corresponded to thematic types were copied and collected using photography or by downloading images or capturing frames from movies. Each image was inserted into the concourse and tagged with relevant keywords and source material. As the concourse grew, I gathered images with similar keywords and themes into sub-catalogues with new headings. Many images were tagged with more than one keyword type, and therefore might be placed in more than one sub-catalogue.

Representation emerged that did not fit pre-established themes or types, adding new dimensions to the ideas that initially shaped the concourse. Significantly, there were many examples depicting characters engaged in contemplation or meditation, capturing an experience distinct from other play types. As Hart observed in 1979, "Children spend a lot of time alone quietly resting, watching or dabbling in sand or water... such activities have been given little recognition in those reports of

children's play prepared for environmental planners" (p. 335, cited in Chawla, 2015). Kaplan (1983) suggested that activities classified as reflection or contemplation may be considered less significant than other types of activities, but "reflective moments that permit one to organize thoughts and feelings" play a substantially important role in cognitive clarity, restoration and human motivation (p. 317). Thus, in this study I added a sixth play type, "contemplation," to the original five key types of play identified by Whitebread and colleagues (2017) and listed in Table 1 above.

Figure 1. Images of contemplation in children's illustrations: Left: Pumba, Timon and Simba gaze at the stars in wonder (Allers et al., 2003). Middle: Children contemplating a distant horizon in the Danish picture book "V" (illustration by M. Laugesen; Eken, 2016). Right: Thoughtfulness and relaxation in the snow in graphic novel *Lou! Laser Ninja* (Neel, 2009)



I considered the concourse to be complete, containing 356 images, when it seemed that no new themes were emerging. After analyzing the imagery, I developed a full matrix (Table 2) to cover the range of outdoor play types revealed in the concourse, based on established themes as well as new sub-themes that emerged from the review.

Table 2. Full thematic matrix

Play Types	Skill Development	Environmental Affordances
Physical play <ul style="list-style-type: none"> • High risk (flying) • High speed – vehicles • High speed – running • Low speed (hiking/walking) • climbing • Rough play • Throwing • Swimming • Jumping Play with objects <ul style="list-style-type: none"> • Play with weapons • Construction tools • Trading cards • Musical instruments • Art objects • Fishing rods • Play with pets • Flying kits • Play equipment - swings Symbolic play <ul style="list-style-type: none"> • Drawing/painting • Music performance • Music (alone) • Storytelling • Drama/dance performance Pretend play <ul style="list-style-type: none"> • Domestic tasks (cooking) • Shopping (market) • Hunting/fishing • Nurturing plants/animals • Friendship/partnering • Fighting/war • Detective play Games with rules <ul style="list-style-type: none"> • Physical games (soccer, baseball, basketball) • Board games • Solo puzzles (Rubik's cube) • Solo physical games (hopscotch) • Trading games Contemplation <ul style="list-style-type: none"> • Star gazing • Immersion in nature • Groups (campfires) • Wonder • Exploration 	Emotional skills <ul style="list-style-type: none"> • Empathy • Attention • Bravery • Patience Cognitive skills <ul style="list-style-type: none"> • Puzzles/games • Physical games/strategy • Reading • Investigation • Exploration (urban) • Exploration (natural) • Trading • Music (listening, playing) • Watching people Physical skills <ul style="list-style-type: none"> • Balance • Strength • Speed • Fighting skills • Fine motor skills (artwork) • Musical skills • Stillness • Co-ordination Social skills <ul style="list-style-type: none"> • Friendship/loyalty • Dancing • Group building projects • Games with rules • Sportsmanship Creative skills <ul style="list-style-type: none"> • Street art • Music performance • Costumes/drama • Imagination/fantasy • Tinkering (small scale) • Building (larger scale) • Collecting Contemplative skills <ul style="list-style-type: none"> • Alone in nature • Isolation • Wonder with others • Meditation 	Urban <ul style="list-style-type: none"> • City roads/highways • View over city • Bustle/business Tame <ul style="list-style-type: none"> • Country roads/paths • Park-like environments Natural <ul style="list-style-type: none"> • View over nature • Forests (dangerous) • Forests (benign) • Seascapes Sublime <ul style="list-style-type: none"> • Urban (night scenes) • Weather/atmosphere • Wild forests • Wild animals • Storms Biophilia <ul style="list-style-type: none"> • Love/care of plants • Immersion in forest/trees • Bonds with tame animals • Bonds with wild animals Habitat <ul style="list-style-type: none"> • Water • Food (found in nature) • Food (urban market) • Shelter from elements Enclosed (shelter) <ul style="list-style-type: none"> • Built spaces (forts) • Natural enclosures • Urban rooms Open (prospect) <ul style="list-style-type: none"> • View from above (flying) • Open meadow • View from hill/cliff • View of road Wayfinding <ul style="list-style-type: none"> • Roads and paths (forests) • City roads Complexity/mystery <ul style="list-style-type: none"> • Natural (tangled garden) • Urban complexity • Investigation • Fascination Comprehension/Legibility <ul style="list-style-type: none"> • Open field • Open roadways • Paths

Step 2: Creation of the Q-Set

The Q-set can be considered as a collection of “carpet tiles” that represents the range of ideas revealed in the concourse (Watts & Stenner, 2012). I created a preliminary set of illustrations to represent the range of sentiments in the concourse, with the aim of achieving a balanced representation of the matrix described in Table 2 with a limited number of images.

VQ-M researchers frequently use selected photographs as stimuli; although photos can express sentiment and emotion, they are often presented as objective or factual (Hempel, 2017). Thus, for this study, I chose to use watercolor paintings to illustrate the sentimental quality of play experiences. With paintings, the characters and the iconic environmental types can be intentionally designed. Because of the author's previous painting experience, this was also practical solution. Children relate to paintings, such as those used in children's books, as subjective and therefore they encourage an emotional response.

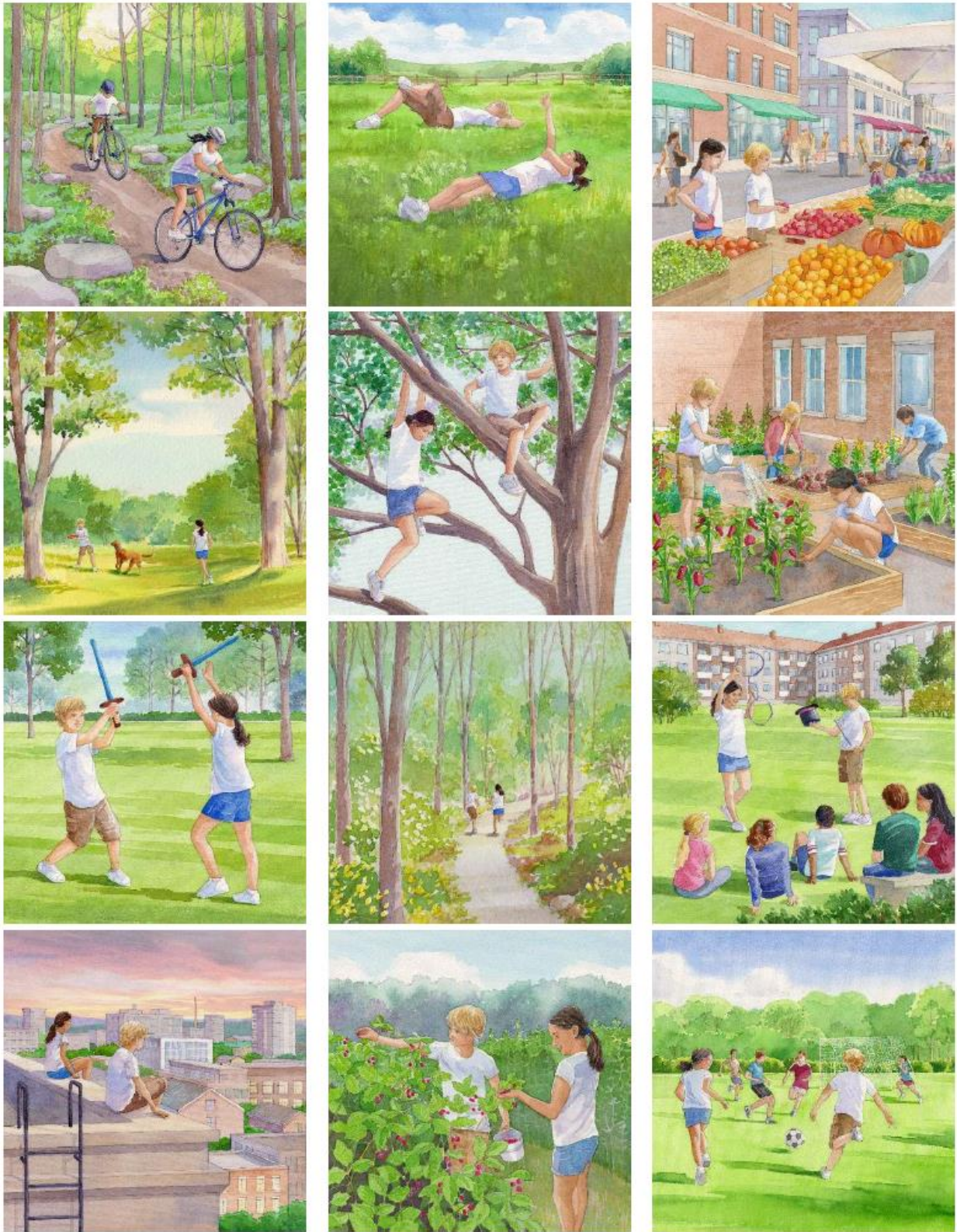
Figure 2. Left: images from the concourse that were collected into a catalogue, noted with keywords. Right: illustration summarizing the sentiments depicted in the images.



Sources, clockwise from top left: Stiller, 2013; Hardwicke, 2005; Ellemose & Ellemose, 2017; Groening et al., 2003; Ramsey, 2012; Danslund, 2013

As Watts and Stenner advise, “getting other people to *look* at the items in some fashion is very important” (2012, p. 61). I shared the design of the Q-set to other researchers familiar with the topic, to ensure adequate coverage of relevant material. After evaluation, the author selected and painted 22 final images (Table 3). I produced a package that included a printed book of larger images, a smaller deck of cards for sorting, and a Q-sorting sheet with a preference ranking pyramid.

Table 3. The Final Q-set. Original illustrations by author





Step 3: Data Collection

The case study area is located in the province of Jutland in Denmark. The region hosts a mix of mid-sized cities, small towns, farms and forested landscapes. Several large international companies located in the region contribute to a culturally diverse population. A sample of 49 children participated in this study: 24 boys and 25 girls. Most were between 6 and 11 years old. All participating children reside in the case study region, but the study sought participants with varied cultural backgrounds. Thirteen participants have non-Danish parents and moved to the area from other countries. An additional 10 were born in Denmark but have at least one non-Danish parent. The q-sorts were administered in several locations, and children were recruited from several sources including schools, the public library, at social gatherings for international residents, at local shops, and referrals from other participants. Several teachers facilitated the study administration process by providing space, arranging times, and coordinating parental consent.

Figure 3. Left: A 6-year-old participant considers the Q-set. Right: A 12-year-old child performs a Q-sort on a pyramid-shaped sorting grid. The participant places "most preferred" on the far right, and "least preferred" on the far left.



Left: S. Kierkegaard; Right: C. Hempel

After reviewing a printed book displaying the set of images (printed in random order), participants were asked which images looked like fun; a key aspect of the play experience is that it is joyful. Participants were given a deck of smaller images to sort in order of preference. Two researchers independently administered the Q-sorts (one Danish speaking and one English speaking). The interviewer suggested that the children sort the images into three piles at first (favorite, medium, and least favored) and then arrange individual images from these piles from +4 (most preferred on the right side) to -4 (least preferred on the left side) using a Q-sorting sheet. Afterwards, the interviewer asked the participating children to explain their most preferred and least preferred images, whether there were any images they felt were missing, and to provide any other comments about the project that they would like the researchers to know.

Children expressed interest in the subject, understood the objectives of the study, and grasped the ranking process quickly. They seemed to have little difficulty making decisions about their play preferences, and usually completed the sorts in less than 15 minutes, with an additional 5-10 minutes for a brief verbal questionnaire. Two children did not speak English or Danish but were able to understand and complete the Q-sorts without verbal instruction; additional information was added to the questionnaire with the help of a parent translator. The process was engaging for the researchers and participants. Both researchers reported similar positive reactions from the children, parents and teachers.

Although ethical reviews can become cumbersome when researchers work with young participants, the subject matter, the questionnaire and the presentation of picture-book materials designed for this pilot study were determined to be low-risk by the ethical review board. Parental permission was obtained for each participant, data was stored securely, and confidentiality guaranteed. Parents and children have approved the use of their photos published in this paper.

Step 4: Data Analysis

Factor analysis is used in Q-method research in order to reduce a larger set of data into smaller groups (factors) that share patterns or commonalities. The data was analyzed using PQ-method software (Schmolck, 2012), initially producing eight factors with statistical validity that passed the Humphrey's rule test embedded in the software. The most significant factors were selected from these by using a screen test to plot the Eigenvalues; the first four factors provide the most information, where values changed significantly. A centroid analysis was performed on these four factors, and the factors were rotated using Varimax. The factor matrix is displayed in a text file (Table 4) with defining sorts automatically highlighted with an X. Each column represents a factor, hereafter referred to as a "group." The viewpoint of each group can be represented by an idealized or archetypal Q-sort; the software provides a factor array that describes this sort. It bears a "family resemblance" to all defining Q-sorts in a group of participants. The archetypal sorts are shown in the interpretation section below, Figures 5-8.

Table 4. Data analysis output by PQ Method software

QSORT	Loadings			
	1	2	3	4
1 01M9J	0.0363	0.1653	0.2550	0.7956X
2 02F11A	-0.1797	-0.0896	0.6648X	0.2499
3 03M11S	0.2085	-0.0495	-0.2258	0.8807X
4 04F6A	-0.2321	0.6170X	-0.0565	0.3872
5 05M8D	0.0416	0.4860X	-0.1406	-0.3791
6 06F12I	0.2989	0.3580	0.0508	0.2446
7 07M13S	-0.2395	0.2866	-0.4890X	0.0618
8 08F10S	0.6073X	0.1634	-0.2693	0.3373
9 09F9E	0.4288X	-0.0115	0.2315	-0.0013
10 10M6M	-0.0701	-0.1129	-0.1180	0.4474X
11 11F5E	-0.1512	0.5339X	0.2527	0.2013
12 12M7J	-0.0294	0.1097	0.4377X	-0.0963
13 13M9B	0.1849	0.1796	-0.1511	0.5695X
14 14M7L	0.3843	-0.0913	0.0362	0.2574
15 15F6J	0.5117	-0.4251	0.0405	0.6778X
16 16M9M	0.0553	-0.3019	-0.0395	0.1481
17 17F9C	0.5665X	0.1422	0.1669	0.2822
18 18F9E	0.8212X	0.0381	0.2637	0.1927
19 19M9A	0.4441	-0.1880	-0.0558	0.4585
20 20M8I	-0.0806	0.3982	-0.0061	-0.0696
21 21F9K	0.3707	-0.0238	-0.1770	0.3974
22 22M8S7	-0.0025	0.0137	-0.5297X	-0.0006
23 23F7C	0.5390X	-0.1861	-0.2829	0.0117
24 24F9C	0.3069	0.1907	-0.1887	0.1099
25 25F6R	0.6493X	-0.1716	0.1945	-0.3388
26 26F7L	0.4714	0.3047	0.1491	0.4393
27 27M10A	-0.1685	0.7593X	-0.0442	-0.4400
28 28F6S	0.4003	-0.0166	0.4883X	0.2518
29 29F10S	0.2220	0.6027X	-0.0928	0.1583
30 30M7N	-0.2662	0.2884	-0.0112	0.3144
31 31M6R	-0.2724	0.1315	-0.1665	0.6610X
32 32M7N	0.0026	0.4537	-0.3921	0.2845
33 33M6V	-0.5777X	0.0104	0.2282	0.1732
34 34M12M	0.1863	0.1006	0.6834X	0.4695
35 35F7A	0.1278	-0.4680X	0.2702	0.0617
36 36F11A	0.7049X	0.1717	0.0115	0.0219
37 37M8M	0.3277	-0.1031	0.3816	0.0728
38 38M9S	0.1744	0.0522	0.2748	0.4302X
39 39F8M	0.1758	-0.0344	-0.1969	0.2659
40 40F8E	0.5662X	-0.2272	0.1521	-0.1760
41 419Mt	0.1513	0.3188	0.2073	0.0770
42 42F9C	0.1077	0.0003	-0.4154	0.1607
43 43M6V	0.2236	0.6848X	-0.0726	0.2086
44 44F9E	0.1804	0.4069	0.2313	0.7194X
45 45M11W	-0.1505	0.5360X	0.2061	0.3031
46 46F10A	0.1145	-0.0115	-0.6971X	0.3390
47 47F9L	0.5488X	-0.0520	-0.2940	0.0319
48 48M10S	0.0565	0.3062	0.3229	-0.1212
49 49F11J	0.6857X	-0.0836	0.0143	0.1937
% expl.Var.	13	9	8	13

Step 5: Interpretation of Results

Instructions for data input and analysis is embedded within the free software and is quite uncomplicated, but interpretation is more complex. As noted by Watts and Stenner, "there is material to be found on the principle and theory that tells us what and why we are interpreting, but there is very little that tells anyone *how* to

do the job effectively" (2012, p. 148). I followed their very thorough guide for this project and for previous VQ-M research (Hempel, 2017), but I began by creating an image of each defining Q-sort (highlighted with an X; see Table 4) identified in each group, and then reviewed the information from each participant's interview. It is important to note that the research was enriched by qualitative information provided by all children, but only the defining sorts were scrutinized in detail in order to focus on commonalities. Figure 4 displays the 10 individual defining sorts in Group 1.

Figure 4. Individual Q sorts that comprise Group 1

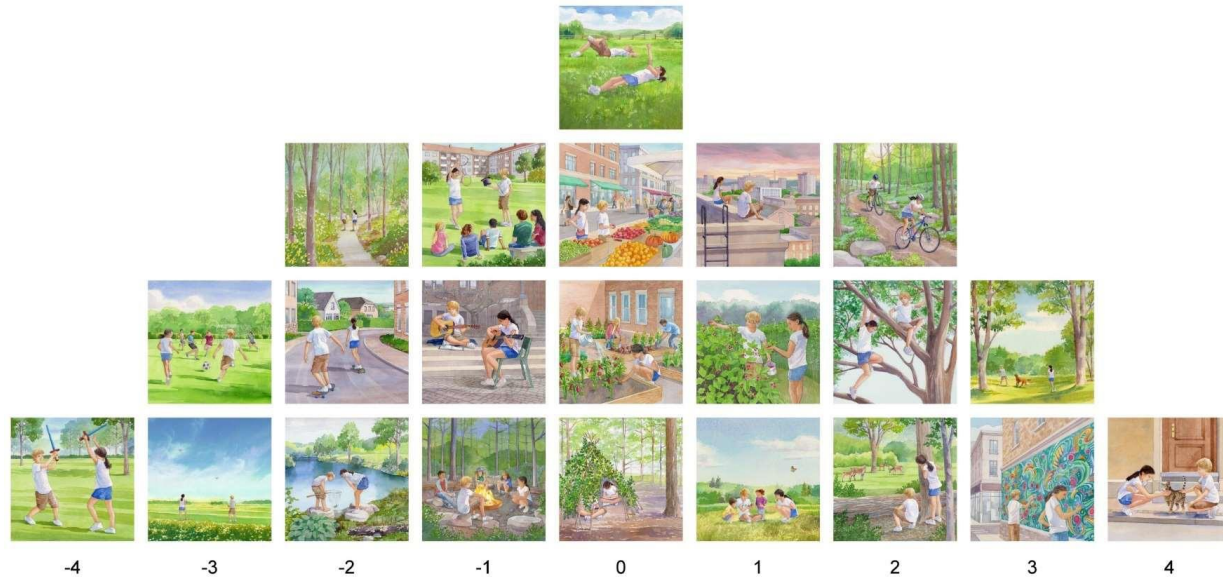


It is standard for Q-M researchers to provide a name for each group to help summarize key traits; it arises from the researcher's interpretation and is supported by qualitative information provided by participants. The preferences held by each group will be discussed in the section below. Again, the researcher's interpretation of the viewpoint was supported by comments made by the children interviewed during the administration of the Q-sort.

Group 1 - Nurturers

Preferences for the Nurturer group of children include settings and activities that are contemplative, creative, tactile and gentle. They value sentimentality, friendship and caring; they enjoy playing the role of a nurturing adult and display empathy for others. Significantly, and unlike other factors, all Nurturers in this study are girls. Out of a total of ten, three were born in Europe outside of Denmark. The age range is 6-11, average age of 8.9.

Figure 5. Affordances for Group 1 - Nurturers



The Nurturer loves animals, watching or studying them, actively playing with them, or most of all, touching them: "I have cats at home and I love to pet them." However, the image of the children playing in the creek was not preferred. As one explained, "I feel sorry for the animals that they come into a net." Activities such as picking berries, growing plants and food, and shopping at a market were more highly valued than for other groups, as was the meadow scene that includes two younger children. Two described making jam from berries with a parent or grandparent, and several expressed that they loved to paint and wished for more places in the city to paint, like the one in the picture. Participants who identified the rooftop scene as more preferred selected it because of the depiction of friendship and coziness (*man hygger*) or because the participants appreciated the beauty of the sky.

Among this group, the playfighting image was least preferred, along with the soccer game and playing with drones. It has been noted by other researchers that rough-housing and rough-and-tumble games are considered a positive play activity for boys, but not girls (Zosh et al., 2017), and the results in this study also show that for most of the girls, playfighting was one of the least preferred activities.

Some fear was expressed for activities that appear competitive or harmful, and although some Nurturers liked the campfire scene, most did not because it looked dangerous: "I am afraid of fire." The football scene was generally disliked because of its potential for harm: "I am not into football. I don't like balls—they hit me in my head," however one nurturer enjoyed soccer because of the friendship from teammates. Bicycling was not perceived by the participants as competitive, so it was preferred, and they also enjoyed climbing in trees.

Summary of Affordances for Group 1 - Nurturers

It is important that suitable spaces be provided so that caring relationships can be developed with people (peers, friends and relatives) and also to support bonding with pets, wild animals, and plants. Nurturers value connectedness with nature, but urban environments provide many affordances for social and environmental bonding. The concept of "caringscapes" is often used in research on child-friendly environments to describe the qualities of spaces in which adults care for children; it is easy to forget that children develop their own caring practices (Bowlby, 2017). Nurturers are more likely to be motivated to play by looking after a neighbor's dog or chatting with a friend in a treehouse than being enrolled in a soccer league.

Group 2 - Active Children

Active Children like to move, they enjoy physical play and they are "do-ers"; their preferences are strongly associated with activities and sports. Activities such as climbing, cycling, skateboarding, playing with drones, playing with animals, playing guitar, and play fighting were most preferred in this group. Nine participants in this study factor as Active Children, three girls and six boys. Five are Danish children and four are immigrants, with all children reporting travel experience in southern Europe. All three boys in the study who spent more than five years in the Middle East (two from Iran and one from Syria) align with this factor. Ages range from 5-11, with an average age of 8.25.

the place depicted. The forest scenes were ranked more negatively than any other group, although the reasons for this are unclear. It may be related to cultural influences rather than environmental affordances. Active Children who immigrated to Denmark and had previously spent less time in a wooded landscape preferred urban activity, while those who had grown up in the forested trails enjoyed activities in the forest. Open landscapes are preferred generally, and confinement or restrictions on activities and range will thwart the motivations of Active Children. This group is motivated by activities where they can display competencies and will undoubtedly benefit from agency, the freedom to explore, and a large physical range for independent mobility.

Group 3 – Creators

Creators are imaginative, creative, and enjoy fantasy play. They are visual and enjoy activities that foster artistic expression. The most distinctive preference of this group is their perception of creative art as a play experience. Four children in the study align with this factor, two boys and two girls. Three are Danish children and one immigrated from Poland. The group's age ranges from 6 to 12, with an average age of 9.

Figure 7. Affordances for Group 3 – Creators



Generally, Creators disliked competitive activities and sports, or running and biking scenes if they were perceived as racing: "I really hate football." Curiously, the playfighting scene was highly preferred, and interpretation of this ranking was aided by referring to comments made during interviews. Participants viewed the scene as role-playing or fantasy: "It's fun to imagine you are in a costume, like a warrior with weapons." The image of children playing with the drones was ranked highly because they imagined what could be seen from the high view: "It's fun to see the world from the sky," and similarly, climbing a tree was enjoyed because of

the associations with pretend games: "I like to pretend I am a monkey."

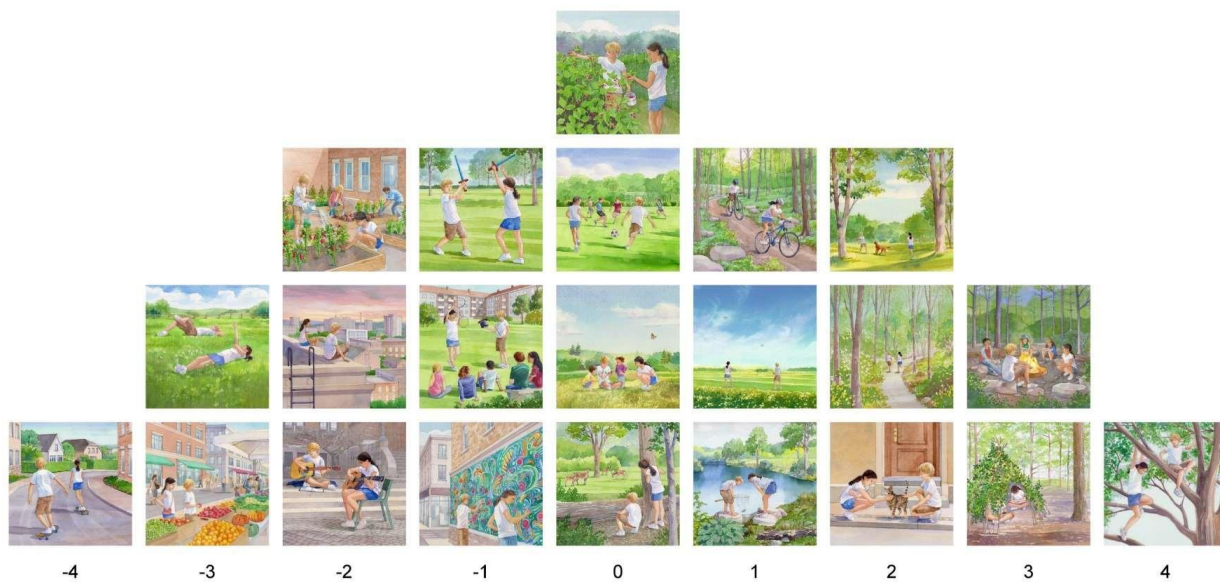
Summary of Affordances for Group 3 – Creators

Creators did not express preferences for distinct environmental typologies; the children enjoyed both open and sheltered landscapes, urban and natural. Environments that foster their desire to be creative are key: "I like to draw things and I wish there were more places to paint like this." Landscapes should provide opportunities for children to invent their own games and adventures. While Creators enjoy wooded settings where there are branches and sticks to construct a fort, a vacant urban junkyard with an enticing collection of refuse might be equally compelling.

Group 4 – Forest Children

Forest Children are highly influenced by their environment: they enjoy woodlands, natural landscapes, and play experiences with animals. Of the eight children in this group, most are Danish; two of the children had one Norwegian parent (but were not related to each other). There are six boys and two girls, with ages ranging from 6 to 11, and an average age of 8.12. Half of the participants in this group attend a local school that has a strong component of forest activity in the programming.

Figure 8. Affordances for Group 4 - Forest Children



Forest Children enjoy sedentary and physical activity in woodland settings: sitting around campfires, climbing trees, biking or running through the forest. They enjoy building and hiding in *hules* or woodland huts made of branches and brought up fond memories of both hiding in them and building them. They love animals: "I love the cat which is so soft—I am best friends with all of the cats here"; and have a particular affinity for trees: "It is really awful that somebody here has cut down

the trees where I live." The open landscapes of fields, meadows and raspberry patches were not as compelling as the forest canopy. Interestingly, danger was perceived in the image of skateboarding, or sitting on a rooftop—"you can fall down and hurt yourself a lot"—but biking downhill through a forest on a trail or climbing in a tree was familiar and not seen as dangerous.

Summary of Affordances for Group 4 - Forest Children

Forest Children flourish in woodland environments. There is a strong love for living plants and animals, or biophilia (Wilson, 1984), expressed by the participants, and a disinclination to urban and human-constructed settings. But, they ranked the activity of petting a cat highly despite the uncompromising hardscape and lack of greenery. For members of this group living in cities, access to wooded and well-treed areas will be highly beneficial, as well as contact with urban pets and wildlife. Many cities have strong campaigns to plant more trees, but an immersive, tactile and sensory connection is important for Forest Children, who need to touch the bark of trees and climb in the branches.

Conclusions

Insights on Affordances

Natural landscapes provide motivating play environments for all groups identified in this study, but it would be false to conclude that cities cannot provide spaces for all children to flourish.

Designed urban environments can provide a variety of landscapes that foster connectedness to nature, complemented by amenities that afford adventure and support a full range of skill and capacity development for each of the groups identified. For some children, the physical qualities of a setting are motivating factors for enjoying outdoor play, while for others the specific activity is most important, and any setting that affords preferred activities will suffice. Informal urban spaces support many preferred activities, such as petting animals, gathering with friends, cycling or climbing.

As motivating as such places are, activities will be curtailed if children lack access. The negative impact of adult-imposed restrictions on children's desire to play may be more substantial than the lack of access to pristine natural environments in which they can play. Children mentioned their desire for numerous play activities but lacked permission, e.g.: they are not allowed to playfight at school, painting on walls "isn't legal," pets are prohibited in their apartments, and parents would get them in trouble if caught climbing trees or visiting rooftops.

The image of tree climbing was one of the most highly ranked overall. Deep biophilic responses (such as enjoyment felt by touching the bark, or being among the green leaves) were reported by some, others liked the sense of refuge and seclusion offered by the tree, while others were drawn to the action of climbing, imagining tree forts, or attaining the view afforded by height. Some participants described their fond memories of a memorable and familiar tree—perhaps one in their grandmother's garden. But fostering biophilic connections may not require

vast stretches of pristine nature. Urban forest patches or even a single large specimen in the courtyard of an urban housing project can enable tactile connectedness for Forest Children, the enjoyment of nestling in greenery can be provided for Nurturers with ivy-covered walls, adventure playgrounds or abandoned lots can provide settings for Creators to build forts, and Active Children might climb and achieve a view on numerous urban structures.

Most of the participants love animals, but the naturalness of the setting in which they interacted proved less motivating than close, tactile connection; the image of petting the cat was highly ranked across all categories, despite the unflinchingly urban background (children preferred it to the activity of watching deer in a natural landscape). Where children preferred the pastoral scene of playing frisbee with a dog, none spoke specifically about the aesthetics of the park-like scene; they only commented about how much they love dogs. Even children who have grown up without access to animals desire a connection: "my mom and dad don't like animals in our house which is very sad because I'd love to have a dog." A community response to enhance biophilic connectedness might be to provide more opportunities for children to interact with urban animals.

Insights on Methodology

Visual Q-M is highly suited to research that seeks to understand children's preferences. Although intended for participants age 7-11, younger children easily grasped the sorting process, understood the activities represented in the imagery, and expressed their views eloquently and quickly. Older children were equally interested in the subject, considered the topic very relevant, and were happy to offer their time and opinions. Some participants did not speak either English or Danish but completed Q-sorts; they grasped the topic and the ranking process after being instructed with non-verbal gestures. Factors arising from the analysis of Q-sorts of a small number of participants has provided substantial insights into the topic, meaning that a robust study can be conducted with limited resources.

Some parents were interested in following up with the research and learning more about their own children's preferences. They responded that the insights were helpful, helping to explain and clarify a child's eagerness or reluctance for play activities that the parent had encouraged, or the differences between siblings.

Limitations of the Study

One of the problems with VQM is that the items in the Q-set can have two or more meanings—researchers are instructed to avoid "double-loaded statements" in Q-sets for text-based Q-M research. Fewer variables, such as having different activities portrayed in the same environmental type, or the same activity in different environmental types, would have produced clearer results, but would have required larger Q-sets and numerous distinct studies. This pilot exploration included a variety of settings and activities to achieve a Q-set that represented the concourse, although the items contain numerous sentiments. The interview questions were very important as they clarified what had generated the participants' responses.

Future Research

This pilot study suggests some fertile areas for future research. It is not the intention of Q-M research to be generalizable, but additional studies in different regions might show whether similar results occur in other places, leading to recommendations that might be more broadly applicable in community design or policy contexts.

Results suggest that cultural differences play a role in forming preferences, but more research would be needed to understand whether differences arise from environmental exposure and landscape familiarity, or whether they arise from social values, rules and/or teachings. Across the globe, cities' populations are increasing due to immigration from other countries and regions, and VQ-M may provide new insights that assist community builders in understanding what affordances motivate newcomers to play—and whether they differ from locals. Similarly, VQ-M studies might shed light on whether urban, rural or suburban upbringing influences children's outdoor play preferences.

The Nurturers in this study were all female, giving rise to questions about gender differences in play preferences, but the sample is too small to draw conclusions. Additional VQ-M studies may provide insights into gender differences and play motivations; research with very young children (age 3-6) or projects that focus on differences and similarities between siblings may provide additional insights about how preferences are influenced by innate responses or learned experiences.

Some differences between young children and older children arose from this study. It was only the older children who strongly disliked an activity due to self-described incompetence, while younger children seemed able to imagine themselves enjoying an activity in the future even if they have no current skills. Expanding the age range of the study to teenagers and adults might provide knowledge about how preferences evolve, and how learned experiences alter our ability to enjoy play at any age. As one Active Child commented, "The adults should themselves be outside a little bit more and participate in the game. They should try it and see how fun it is to play!"

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References

- Addams, H. (2000). Q-methodology. In H. Addams & J. Proops (Eds.), *Social discourse and environmental policy: An application of Q methodology* (pp. 14-40). UK: Elward Elgar Publishing.
- Allers, R. & Minkoff, R. (Directors). (2003). *The Lion King* [DVD video]. Walt Disney Home Entertainment.
- Appleton, J. (1975). *The experience of landscape*. New York: Wiley & Sons Ltd.
- Bishop, K. & Corkery, L. (2017). *Designing cities with children and young people: Beyond playgrounds and skate parks*. New York: Routledge
- Björklid, P. & Nordstrom, M. (2007). Environmental child-friendliness: Collaboration and future research. *Children, Youth and Environments*, 17(4), 388-401. <https://www.jstor.org/stable/10.7721/chilyoutenvi.17.4.0388>
- Bowlby, S. (2017). Children, young people and 'caringscapes.' In J. Horton & M. Pyer (Eds.), *Children, young People and care* (pp. 244-248). New York: Routledge.
- Briggs, L. Stedman, R. & Krasny, M. (2014). Photo-elicitation methods in studies of children's sense of place. *Children, Youth and Environments*, 24(3), 153-172. <https://doi.org/10.7721/chilyoutenvi.24.3.0153>
- Brown. S. (1980). *Political subjectivity: Applications of Q-methodology in political science*. New Haven, CT: Yale University Press.
- Brown, S. (1993). A primer on Q methodology. *Operant Subjectivity*, 16(3/4), 91-138.
- Burke, C. (2005). Play in focus: Children researching their own spaces and places for play. *Children, Youth and Environments*, 15(1), 27-53. <https://www.jstor.org/stable/10.7721/chilyoutenvi.15.1.0027>
- Chawla, L. (2015). Benefits of nature contact for children. *Journal of Planning Literature*, 3(4), 433-452. <https://doi.org/10.1177%2F0885412215595441>
- Cooper Marcus, C., & Barnes, M. (1999). *Healing gardens: Therapeutic benefits and design recommendations*. New York: John Wiley & Sons
- Donslund, A. (2013). *Skate Ramper* (M. Themberg, Illus.) Denmark: Gyldendal.
- Driskell, D. (2002). *Creating better cities with children and youth: A manual for participation*. London: Earthscan, UNESCO Publishing.
- Eken, C. (2016). V. Denmark: Høst & Søn Publisher.

- Ellemose, S. & Ellemose, M. (2017). *Rummet's Detective 3*. Dusørjægerens hævn. Denmark: Facet Publishers.
- Ellingsen, I., Thorsen, A., & Storksen, I. (2014). Revealing children's experiences and emotions through Q methodology. *Child Development Research*, 2014. <http://dx.doi.org/10.1155/2014/910529>
- Elliott, S. (2010). Children in the natural world. In J. Davis (Ed.), *Young children and environment: Early education for sustainability* (pp. 43-75). Melbourne: Cambridge University Press.
- Ernst, J. (2018). Exploring young children's and parents' preferences for outdoor play settings and affinity toward nature. *International Journal of Early Childhood Environmental Education*, 5(2), 30. https://naturalstart.org/sites/default/files/journal/ijecee_52_spring_2018_1.pdf
- Gayton, D. (1996). *Landscapes of the interior: Re-explorations of nature and the human spirit*. Gabriola Island, Canada: New Society Publishers.
- Gibson, J. (1979) *The ecological approach to visual perception*. London: Houghton Mifflin.
- Groening, M., Brooks, J. L., Simon, S., Clausen, A., Castellaneta, D., Kavner, J., & Cartwright, N. (2003). *The Simpsons* [TV series]. Twentieth Century Fox.
- Haikkola, L. & Horelli, L. (2004). Interpretations of environmental child-friendliness in a neighbourhood of Helsinki. In L. Horelli and M. Prezza (Eds.), *Child-friendly environments, approaches and lessons* (p. 120-139). Espoo: Helsinki University of Technology.
- Hardwicke, C. (Director). (2005). *Lords of Dogtown* [Film]. Sony Pictures Entertainment.
- Hempel, A. C. (2017). *Planning for change in rural Ontario: Using visual Q-methodology to explore landscape preference*. Dissertation, University of Guelph, Ontario. Retrieved from <https://atrium.lib.uoguelph.ca/xmlui/handle/10214/10311>
- Horelli, L. (2007). Constructing a theoretical framework for environmental child-friendliness. *Children, Youth and Environments*, 17(4), 267-292. <https://www.jstor.org/stable/10.7721/chilyoutenvi.17.4.0267>
- Kaplan, S. (1983). A model of person-environment compatibility. *Environment and Behavior*, 15(3), 311-332. <https://journals.sagepub.com/doi/pdf/10.1177/0013916583153003>

- Kaplan, R. & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. Cambridge, UK: Cambridge University Press.
- Kyttä, M. (2002). Affordances of children's environments in the context of cities, small towns, suburbs and rural villages in Finland and Belarus. *Journal of Environmental Psychology*, 22(1-2), 109-123.
- Kyttä, M. (2004). The extent of children's independent mobility and the number of actualized affordances as criteria for child-friendly environments. *Journal of Environmental Psychology*, 24(2), 179-198.
- Louv, R. (2005). *Last child in the woods: Saving our children from nature-deficit disorder*. Chapel Hill, NC: Algonquin.
- Mahadin, A. & Maulan, S. (2012). Understanding children's preferences of natural environment as a start for environmental sustainability. *Procedia – Social and Behavioral Sciences*, 38, 324-333.
- McHarg, I. (1969). *Design with nature*. New York: Natural History Press
- McKeown, B. & Thomas, D. (1988). *Q methodology*. Beverly Hills: Sage Publications.
- Muñoz, S-A. (2009). *Children in the outdoors: A literature review*. Sustainable Development Research Centre. Retrieved from <https://www.ltl.org.uk/wp-content/uploads/2019/02/children-in-the-outdoors.pdf>
- Nairn, K., Panelli, R., & McCormack, J. (2003). Destabilizing dualisms: Young people's experiences of rural and urban environments. *Childhood*, 10(1), 9-42.
- Nassauer, J. (1995). Messy ecosystems, orderly frames. *Landscape Journal*, 14(2), 161-169.
- Neel, J. (2009). *Lou! Laser Ninja*. [Graphic Novel]. Usharp Comics, an Imprint of Highland Books.
- Pellegrini, A. (2009). *The role of play in human development*. USA: Oxford University Press.
- Ramsey, P. (Director). (2012). *Rise of the Guardians* [Film]. DreamWorks Animation.
- Relph, E. (1976). *Place and placelessness*. London: Pion Limited.
- Schmolck, P. (2012). PQmethod (v. 2.35). GNU General Public License. Retrieved from <http://schmolck.userweb.mwn.de/qmethod/downpqwin.htm>

- Soga, M. & Gaston, K. (2016). The extinction of experience: The loss of human-nature interactions. *Frontiers in Ecology and the Environment*, 14(2), 94-101.
- Spirn, A. (1984). *The granite garden: Urban nature and human design*. New York: Basic Books.
- Stephenson, W. (1956). *Study of behavior*. University of Chicago Press.
- Stilller, B. (Director). (2013). *The Secret Life of Walter Mitty* [Film]. Twentieth Century Fox.
- Thomson, P. (2008). Children and young people: Voices in visual research. In P. Thomson (Ed.), *Doing visual research with children and young people* (pp. 1-19). New York: Routledge.
- United Nations Office of the High Commissioner for Human Rights (UNOHCHR) (1989). Convention on the Rights of the Child. Article 12.1. Retrieved from <http://www.ohchr.org/EN/ProfessionalInterest/Pages/CRC.aspx>
- Ward Thompson, C. (2011). *Linking landscape and health: The recurring theme. Landscape and Urban Planning*, 99(3-4), 187-195.
- Watts, S. & Stenner, P. (2012). *Doing Q methodological research: Theory, method and interpretation*. Thousand Oaks, California: Sage Publications.
- Whitebread, D. (2015). *Crisis in childhood: The loss of play*. Cambridge Primary Review Trust. Retrieved from <http://cprtrust.org.uk/cprt-blog/crisis-in-childhood/#comment-7049>
- Whitebread, D., Neale, D., Jensen, H., Liu, C., Solis, S. L., Hopkins, E., Hirsh-Pasek, K., & Zosh, J. M. (2017). The role of play in children's development: a review of the evidence (research summary). Denmark: The LEGO Foundation. Retrieved from https://www.legofoundation.com/media/1065/play-types-_-development-review_web.pdf
- Wilson, E. O. (1984) *Biophilia: The human bond with other species*. Cambridge: Harvard University Press.
- Zosh, J. M., Hopkins, E., Jensen, H., Liu, C., Neale, D., Hirsh-Pasek, K., Solis, S. L., & Whitebread, D. (2017). *Learning through play: A review of the evidence*. Denmark: The LEGO Foundation.
- Zube, E., Sell, J. & Taylor, J. (1982). Landscape perception: Research, applications and theory. *Landscape Planning*, 9, 1-33.