

Children's Wayfaring Experiences at an Olfaction-Enhanced Three Little Pigs Story Exhibition

Natalia Kucirkova

Abstract

This study draws on data from a public exhibition that was purposefully designed to engage children's sense of smell in relation to an adapted version of The Three Little Pigs story at a children's museum. Twenty-eight children attended the exhibition before official opening and their experiences were documented through researcher-led interviews, children's drawings and researcher fieldnotes. Narrative hermeneutical analysis revealed that children's olfactory engagement with the story was associated with the portrayal of good and evil and was fostered through the exhibition's multisensory display. Children asserted themselves in the identity of wayfarers and engaged with the olfactory elements by criss-crossing personal, shared, literary and olfactory boundaries. The power of olfaction to stimulate idiosyncratic emotional responses came to the fore in children's appropriation of the story narrative and the shared exhibition space.

Keywords: olfaction; story; children; hermeneutics

Smell evokes memories connected to specific places and personal experiences and thus constitutes a unique resource for museum studies. However, smell's potential to enhance young children's responses to museum exhibits has been under-researched. Furthermore, most children's museums are designed to make children familiar with natural and science phenomena but less to engage children in fictional stories. This study draws on a research project that followed an open-minded enquiry into children's experiences with a purposefully designed olfactory exhibition. There are two elements that add novel insights to the literature: the focus on pre-school children's museum experiences of a fictional story and the focus on olfactory elements that engage children's sense of smell. The exhibition was put together by a team of researchers, curators and subject matter experts and the process is described in detail in Kucirkova and Stray Gausel (2023). In this paper, I focus on the specific contribution of smell to children's museum experiences and the value of the theoretical framing of wayfaring to studying children's olfactory experiences in museums. Given the exploratory nature of the public exhibition and the novelty of a fictional fairy-tale enhanced with specially-designed olfactory boxes, I follow a case study methodology with a detailed documentation of children's experiences.

Museum studies with pre-school aged children

Children's museum studies can be broadly divided into two key strands that correspond to two main traditions in thinking about childhood and early education. One strand is nested in the education studies that aim to develop extra-curricular experiences that expand or supplement school-based learning. In this strand of work, museums are conceived as community cultural institutions that offer opportunities for experiential education, which can promote learning, for example children's understanding and interest in science (Paris *et al.* 1998). For example, Sobel *et al.* (2022) studied the learning experiences of 60 six- to nine-year olds in a museum in the USA and found that children were especially engaged in the exhibition when they could create their own goals for exploring the exhibition. The more children could exercise their own

agency at the museum, the longer they engaged with the exhibition (Sobel *et al.* 2022). The impact of museum learning opportunities is often difficult to measure in relation to children's long-term academic achievement given that most interventions are short-term and one-off. Addressing this limitation, Lacoë *et al.* (2020) examined the long-term impact of students' participation in a community museum in relation to academic and behavioural outcomes, as well as longer-term outcomes in high schools. Tracing students from two inner-city public elementary schools and their concurrent and future test scores, the authors found small short-term gains in children's academic scores, and positive effects on behavioural outcomes for students who participated in the museum activities. Although there were no long-term effects, the findings provide robust quantified evidence for supporting children's time in interactive out-of-school activities in museums.

The second strand of children's museum studies is typically rooted in arts-based education and post-human and sociological theories with a strong emphasis on children's embodied experiences communicated through multiple linguistic and non-linguistic modes. For example, drawing on the theoretical framework of van Leeuwen, Kress and Bezemer's social semiotics (Van Leeuwen 2005; Kress 2009; Bezemer and Kress 2015) and a multimodal analysis that acknowledges the importance of each mode for meaning-making, Hackett (2014, 2016) has offered the concepts of 'children in places' and 'lines of movement as lines of meaning making' in museums. She suggests that children move through the museum space in various configurations (independently, in groups or with adults), at various speeds (running, stopping, exploring, turning back, retracing their steps) and engage in complex multimodal meaning-making. It is through this movement that children learn about the space and their role in it, Hackett (2014) argues. Hackett and Somerville (2017) followed British and Australian children's vocalizations, drum playing and marching in museums and illustrated that the places acted as sites of embodied and tacit knowledge that enabled children to experience the world in ways that neither research nor the formal education systems have sufficiently acknowledged.

The rationale for this study was informed by studies located in the first strand of literature but the study's conceptualization and implementation are more closely aligned with the second strand, which highlights children's embodied and sensory experiences in museum interactions. In particular, I connect to Hackett's notion of children as 'wayfarers' (originally used by Ingold (2016) in an analysis of lines), who move in the museum space with creativity and playfulness.

Children as wayfarers

Hackett (2016) observed that children's embodied movements in the museum were repeated every time they visited the exhibition and proposed that this repetition of movement demonstrated the 'imagined and collectively remembered nature of these [embodied] practices' (Hackett 2016: 174). According to Hackett (2014), children's walking and running is a place-making activity and their way of communicating how they embody, emplace and experience the world. While visual methods are particularly well-suited to capture children's non-verbal communicative practices and place-based meaning-making (Hackett and Yamada-Rice 2015), capturing children's lines of movement in relation to multisensory engagement remains to be explored.

Ingold (2021) offers a refreshing perspective on overly functionalist and mechanistic approaches to interpretations of movement by proposing a 'linealogical' approach to understanding interactions. In this approach, lines generated through activities (e.g. drawing) as well as bodily movements (e.g. children moving across the space) constitute lived meaning-making experiences. Instead of studying interactions through blocks, assemblages or chains of activities, Ingold (2015) has studied the correspondences and orientations of individual links between and among people. Some lines may not be visible or inscribed anywhere: for example, hunters are connected to their prey by threads of scent that travel through the air (Ingold 2021). Nevertheless, the traces of hunters and prey connected through smell remain in their shared memory and become registered through the movement on the ground. Extrapolating from Ingold, Hackett (2016) demonstrated how children learn about

the museum space by moving through it and how tracing children's steps provides insights into their authentic experiences of the space. Connecting to both Ingold's (2015, 2016) theorizations and Hackett's study (2016), I argue for the need to mobilize all our senses to explore children's wayfaring museum experiences. Children's wayfaring experiences can be stimulated with various sensory resources and, in our project, were prompted by resources specifically designed to engage children's sense of smell. I thus focus on the sense of smell as a line that binds children's interactions in public exhibitions.

Olfaction in museum research and practice

The primary senses targeted by museum exhibitions have traditionally been the visual, auditory and haptic senses. This is not surprising if we consider the volatile nature of smells and taste and the official museums' mission to conserve cultural and natural heritage (International Council of Museums 2016). Similarly to adults' exhibits, museum exhibitions for children are grounded in experiences that connect images, visual displays, music, sounds and hands-on experiences (Gong 2022). However, as highlighted in multisensory museum studies, visitors' active engagement in a museum setting can rely on the full sensorium including the lower senses of olfaction, gustation and proprioception. Indeed, an interdisciplinary approach to museum studies shows that the hierarchy of senses that is followed by mainstream education systems and public communication does not need to be followed in museum practices (see Levent and Pascual-Leone 2014).

Olfaction – the sense of smell through which aromas, scents and smells (odours) are detected – is neuroanatomically closely connected to gustation (taste) in the form of chemosensation (Mucignat-Caretta *et al.* 2012) and the two senses are often studied together. Our exhibition specifically targeted olfaction, without engaging children's sense of taste. Olfaction is a little researched, but increasingly relevant, sense in museum studies. In his description of the museum as a 'smellscape', Drobnick (2014) outlines the value of olfaction in conveying both political messages (e.g. smell of debris and cigarettes to indicate environmental concern) and artistic ideas (e.g. enhancing an artistic artefact through pleasant fragrances). Most recently, olfaction has been used to intensify the aesthetic experience of visitors to the main Spanish national art museum, The Prado Museum. At the new exhibition of paintings by Jan Brueghel and Peter Paul Rubens, ten essences aligned with the two artworks are diffused in the air through *Air Parfum* technology.¹ Olfaction can stimulate affective responses to heritage (Bembibre and Strlič 2017) and evoke unique responses to objects or areas of exhibition (Spence 2020). In this study, I explored children's responses to an olfaction-enhanced story exhibit following The Three Little Pigs folktale.

Fiction in children's museum research and practice

Children's museums are generally considered to be informal learning environments that can enhance children's learning opportunities with natural, historical and scientific resources (Gong 2022). A typical exhibition brings to a condensed space the possibility for children to explore artefacts and traditions from previous centuries or to apply scientific concepts in practice. An overly didactic approach to museum exhibits has been criticized for its adult-centredness and rejected in favour of a focus on children's physical and embodied responses to unmediated art (Weiner 2004). Others have argued that children should have ample multisensory opportunities to explore the museum exhibits hands-on, perform actions and have fun with the exhibit (see Dudley 2010). The design of the exhibition in our project accords with these ideas and focuses on children's hands-on, playful experiences with fictional stories.

Fiction is part of art and cultural heritage. The aesthetic experience of fictional worlds can be expressed through textual and audio narratives but also through whole-body experiences, such as, for example, with the Magic Cottage prototype that provides semi-immersive virtual reality (Patera *et al.* 2008) or the Magic Book Project (Billinghurst *et al.* 2001), where the reading experience is augmented with 3D virtual models. Fiction enjoys

a special place in olfactory museum studies given the tradition of cultural heritage, which considers fairy tales to represent not only socio-historic and cultural values (Honeyman 2013) but also information about smells and scents available in the past (Friedman 2016). Latest olfactory museum studies have focused on the relationship between olfaction and fiction with artificial intelligence (AI) techniques; for example, Massri *et al.* (2022) deployed AI text mining techniques to examine the relationships between smells and emotions in fairy tales. The authors created a machine learning model capable of classifying sentences as either smell-related or not, and to determine which ones applied to which old European fairy tales. Their approach pioneers the use of AI to extract textual information about 'past olfactory realms and the emotional valence linked to odours long absent and forgotten' (Massri 2022). There are many fairy tales that explicitly refer to aromas, either directly through the story text, or indirectly, through the portrayal of various aroma-laden story settings. In this study, the team selected the traditional fairy tale *The Three Little Pigs*.

The Three Little Pigs story

The origin of *The Three Little Pigs* traces back to pre-seventeenth century European folktales that were transmitted through the oral culture of storytelling, with the first print version documented in *The Nursery Rhymes of England* (London and New York, c. 1886), by James Halliwell-Phillipps. As with many old traditional stories, the fairy tale follows archetypical good and bad characters and symbols representing villains' violence and heroes' wit. With its rich metaphors, the story has been widely employed in early childhood curricula. Rader and Rader analysed *The Three Little Pigs* from a postmodern perspective and suggested a list of pedagogical recommendations for using the story as a narrative bed for stimulating classroom discussions around integrity, identity, and circumstances.² Recently, Neumann and Merchant (2022) conducted a case study in an English early childhood classroom and analysed the teacher's mediation strategies of children's interactions around a story book app of *The Three Little Pigs*. The *Three Little Pigs* story was also used to inspire children to persist with a difficult design and build resilience (Cantu 2015) and in an arts-based project in a Reggio Emilia early childhood classroom, to encourage children's art- and meaning-making across texts and genres (Rhoades 2016). The story's main themes of learning through trial and error and the theme of a house as a place of safety and protection from outside threats, map neatly onto the informal learning space of children's museums. To the best of my knowledge, the story has not been considered in relation to its olfactory character and as a resource for a museum exhibition for children – a gap filled by our study.

Study context

This study is part of a community-oriented project in which we adopted a participatory approach to examine children's olfactory engagement with stories. In conceptualizing and creating the exhibition, we involved a community of users, including the local children (see Kucirkova and Kamola 2023) and an olfactory expert, who designed tailor-made 'smell boxes' for the exhibition. In this article I focus on the experiences of a group of children during and after their visit at the exhibition.

Design of the exhibition space

When creating the exhibition (described in detail in Kucirkova and Stray Gausel 2023), we considered odours as an element that can augment a story and children's experiences in a public museum. We partnered up with a local public makerspace (Vitenfabrikken) that enabled us to make the final exhibition open to all children. Vitenfabrikken is a nonprofit educational and cultural institution, dedicated to stimulating children's interests and expanding children's experiences at home and in schools with a curiosity-driven approach. As such, Vitenfabrikken

meets the definition criteria of the Association of Children's Museums, and plays a vital role in the community's local and extracurricular activities.

In public communication about the exhibition, we considered several olfaction-related terms in our research team, including aromas, scents, smells, odours and fragrance. We decided to use the positively laden word 'scent' for public-facing materials and 'olfaction' for academic descriptions. I therefore refer to the smell-related elements of the study as *olfactory*.

Olfactory part of the exhibition

Children's sense of smell was stimulated through purposefully created olfactory boxes that contained pleasant and unpleasant aromas. The olfactory boxes were made of wood and were all of equal size (16 x 16 x 16 cm) and colour. The boxes had handles painted in different colours and when opened, they contained coloured fragranced surfaces. The surfaces were placed above pellets filled with cotton wool infused with specifically selected, safe-to-use aromas. When reflecting on the presence of smells and scents in museums, Keller (2014: 169) shared the challenge of representing smells in a way that is stable and uniform for all museum visitors: 'Smells are unstable; they blur, overlap, and move around'. This is a challenge for museum curators (see also Drobnick 2014), which in our project was addressed by the use of olfactory boxes that could be opened and closed by the children and topped up by the museum curators. As such, the smell remained concentrated to five designated areas of the exhibition. The boxes were placed at five olfactory stations, which represented a pigpen, the wolf, and three houses built by the three little pigs.

Narrative part of the exhibition

To construct the narrative thread for the exhibition, the team, which included a children's librarian, reviewed several versions of The Three Little Pigs story written in English and our target language, Norwegian. We adapted the key elements of the version written and illustrated by Catarina Kruusval, by keeping the elements of 'good' represented by the three pigs and 'evil' represented by the big bad wolf. We also kept the story's focus on the values of perseverance and wit, as represented by the three little pigs. Our version of the story begins with the Mother Pig asking the exhibition visitors to help her find her three children (the three little pigs) who left the pigpen to build their own houses. The story continues with a Pretty Pig who built a house of straw because this pig was lazy and liked to spend time on pampering rather than housebuilding. The second house is that of a Reading Pig, who liked to read books and built a wooden house. The third, Clever Pig, built a brick house that the wolf could not blow down and where the three little pigs lived happily ever after (see Appendix for the full story).

Multisensory elements of the exhibition

In an exhibition targeting pre-school-aged children who might be vulnerable to cognitive overload (Klingberg 2013; Miller 2014), the stimulation of multiple senses needed to be carefully considered. Aware of the multisensory interplay and integration that occurs in natural interactions (Spence and Squire 2003) but also the limited cognitive resources available to process many sensorial stimuli simultaneously (Malhotra 1984), we decided to focus on the olfactory sense as the primary sense of the exhibition, together with visual and haptic senses.

Children's visual sense was supported with a colour scheme that united the moods represented by the olfactory boxes and the three pigs' identities: yellow for urine-like aroma of the pigpen and Mother Pig; pink for the lazy pig and fruit-like sweet fragrance; green for the reading pig and wooden smell; brown for the solid brick house and chocolate smell; and black for the bad smell of the wolf imitating pungent aromas of wet dog's hair. The colours of yellow, pink, green, brown and black appeared on the handles of the olfactory boxes and inside the boxes' fragranced surfaces, so they were indicated before the aroma was released and were directly part of the smelling experience when the boxes were opened. The individual

houses representing the three pigs were designed with this colour scheme in mind, including the accessories inside the house (e.g. pink pillows inside the Pretty Pig house).

Figures 1-3 illustrate the set-up of the pigs' houses at the exhibition.



Fig. 1. The entrance to the exhibition

Fig. 2. The house of the Pretty Pig with the olfactory box in the middle

Fig. 3. The brick house of the Clever Pig

The story was written on posters hanging above each of the olfactory stations. In addition to the text, visitors could listen to a narration of the story by activating a QR code on the posters. The narrator's voice could also be heard throughout the exhibition from an iPad's loudspeakers hidden in the ceiling. This recording was played in a loop and represented the wolf's voice, with the repeated sentences 'I will puff and huff and blow your house down!' The exhibition entrance and each of the four posters had illustrations of the main story characters (Mother Pig and the three little pigs), but the wolf was not depicted on any of the materials. The wolf was represented with a replica of paws and claws hung up on an artificial pine tree in the centre of the exhibition, with the wolf-related olfactory box positioned below the tree.



Fig. 4. The wolf's station showing the olfactory box

Theoretical and ethical frame for the study

In this study, I connect to Hackett's (2014) concept of children as museum wayfarers, and to the literature that foregrounds the contextual embeddedness of children's narratives (e.g. Puroila and Estola 2014). The key theoretical and ethical framework for my thinking about children's experiences at the exhibition was the proposition that children's creative selves are always situated, embodied and mediated by other human beings, socio-cultural signs and literary symbols. I draw on social justice approaches and the methodology of narrative hermeneutics, which can be considered both a theory and analysis, to guide 'the ethical complexity of the roles that narratives play in our lives' (Meretoja 2017: 11). In particular, the analytical foci of narrative hermeneutics encapsulate embedded and multimodal meaning-making through narratives and, as such, are different from traditional narrative analyses followed in intervention studies (e.g. Peterson *et al.* 1999). Unlike in narrative-focused interventions that target structural elements such as the linear progression of story beginning, middle and end, or chronological progress of the story sequence (e.g. Soto *et al.* 2009), narrative hermeneutics are sensitive to the embedded socio-cultural and historical biases in critical linguistic approaches to stories (see Toolan 2013). The concept of children as wayfarers and the tool of narrative hermeneutics guided my interrogation of the following research question: what can attention to children's identity as wayfarers in an olfaction-enhanced exhibition reveal about children's museum experiences?

Methodology

Participants and ethics

The data I draw on in this study was collected during a research week that occurred two weeks before the official opening day of the public exhibition. During the research week, the exhibition was attended by two groups of children from a local kindergarten, on two separate days. The groups consisted of 14 girls and 14 boys aged between 4.5 to eight years, accompanied by six teachers. The children's consent to participate in the study was given in writing by their parents prior to the research week. Following the ethical protocol obtained for the study, none of the photographs contained children's faces or identifiable information and all audio-recordings and fieldnotes were anonymized. When joining the study, children were allocated random numbers between 0 and 99 to avoid the use of their names during audio-recordings and drawing.

The children's own consent to participate was monitored throughout their participation at the exhibition by checking and verbally asking the children whether they were happy to, for example, open the olfactory boxes or have a photograph taken of their drawing. All children seemed very enthusiastic about the exhibition and, indeed, most children did not want to leave the exhibition after the allocated time and requested to visit the exhibition again. In this study, I only focus on children's responses to the exhibition resources, acknowledging that some of their responses were influenced by the teachers' and project members' presence at the exhibition.

Data sources

I relied on three sources of data for the present study: my interviews with the children, children's drawings and my fieldnotes. The interviews occurred between me, the researcher, and the children jointly inhabiting the space of the exhibition. The interviews were thus open to my spontaneous questions and the children's spontaneous answers and my subjective interpretation of the answers. After the initial request for the children's response, I took the role of a listener who does not interrupt or seek clarifications but lets children speak freely about their experiences. In alignment with the interpretive and explanatory nature of narrative hermeneutics, I was interested in the way in which the fictional story and children's own narratives foreground the social and meaning structures (Kvale and Brinkmann 2009). Some interviews were one-to-one with individual children, and some were with small groups of children, with a maximum of four children per group. The interviews were captured by a hand-held audio-recorder and the recordings were later transcribed by me and a project team member who was present at the research week. The transcriptions were in the original language (Norwegian) and selected quotes were translated into English.

In addition to interview data, the project team member and I took photographs of children's drawings. Given the substantial literature on the value of children's drawings in representing and communicating children's imagination, sign-making and understanding (Jolley 2009), the drawing activity was intended to capture children's expression of ideas through a different, non-verbal, modality. The drawing activity occurred in an area separate from the exhibition area, which the children entered after they visited the exhibition. In the drawing area, children were provided with a black-and-white colouring sheet with the faces of the three pigs and the Mother Pig. The pigs' faces were the same as those on the posters above each olfactory station and the pigpen and pigs' houses. The children were encouraged to colour in 'the pig you liked most'. The children could use any of the coloured pencils we provided them with, but these were limited to the five colours of the olfactory stations and two additional colours of purple and orange. The choice of the colours was guided by the expert advice from one of the research team members who specializes in odour-colour synaesthesia (see Speed and Majid 2018). Mini replicas of the five olfactory boxes from the exhibition were also provided to the children and these were placed on the same table as the colouring materials (see Figure

5). This set-up was purposeful in order to comply with the objectives of the research week.



Fig. 5. The drawing area

The third data source was hand-written fieldnotes, which focused on observing children's natural interactions during the exhibition and insights that could be useful later for contextualizing the analysis. Some notes were written in Norwegian and some in English and were completed at the end of the observation period. To illustrate children's bodily positions at the exhibition, the research team at the University of Stavanger commissioned a professional illustrator who replicated children's positions at the exhibition with illustrations. This work was undertaken as part of the open exhibition component which promoted active involvement of the public in the exhibition.

Data analysis

The narrative hermeneutics analytical method is suitable for studying the complex interplay between action, narrative and personal meanings (Meretoja 2017). My analytical approach was closely related to Schorch's (2013) hermeneutic analysis of cross-cultural encounters in a museum setting, but with an explicit focus on children's sensorial, embodied and olfactory experiences.

In collecting and interpreting the data, I continuously and actively followed Watt's (2007) recommendations for deep researcher reflexivity in qualitative research. In particular, I reflected on the ethical issues noted in relation to interview and drawing techniques used with children for research purposes (Fargas-Malet *et al.* 2010), and the extent to which they can offer an authentic account of their experiences (Eldén 2013). The combination of several data sources, a theory-informed analysis, researcher reflexivity and awareness of my own positionality, was my attempt to provide a fair and multi-layered representation of children's experiences.

Findings and Discussion

A narrative hermeneutic analysis of children's interviews, drawings and movements across the exhibitions that I noted in my fieldnotes, revealed one key finding: namely, that children's olfactory engagement with the fictional narrative was strongly influenced by the binary framework of good and bad in *The Three Little Pigs* story. The good-bad binary seemed to have been the driver for children's responses and multisensory engagement at the exhibition. When I systematically reviewed the colours and patterns used by children in their drawings, I did not find any clear correspondence between the colour scheme of the exhibition and children's drawings, but there was a clear tendency to colour in the Clever Pig representing the brick house, followed by the Mother Pig representing the pigpen. Some children circled these two pigs' faces and put a cross across the other pigs. Perhaps, given the adults' and notably their teachers' presence at the drawing area, the children interpreted the activity as an exercise to check their understanding of the story and its main good characters. Another interpretation is that the children liked the Clever Pig most because of the safety it represented. This interpretation aligns with instances where children added drawings to the pre-designed pigs' faces. Here, children's drawings of the brick house and of the bad wolf were visible signs of what mattered to them most. The bad wolf was represented with a scary face and the brick house with warm colours and home-like elements.



Fig. 6. Selected children's drawings

My interviews with the children, but also observations of their movements across the exhibition, indicated children's strong preoccupation with the wolf character. Among several examples of this occurrence in the fieldnotes, this one stands out:

"Who will take on the wolf's role?", a girl asked but no one volunteered. The children ran to the house of the Clever Pig representing the house the wolf didn't blow away. "Where is the wolf, where is the wolf?" the girls shrieked. One of the boys opened the door and began walking around the exhibition area. Seeing me crouching in the corner, he asked: "Which [box] is the wolf?". He did not wait for an answer but began searching for the wolf by frantically opening each of

the five olfactory boxes.

(Fieldnotes excerpt nr.1)

Although all children were interested in the olfactory boxes, the focus of most children was on the wolf and the threat he represented. Children's feelings of fear may have been triggered by the combination of sounds and aromas that indicated, but did not reveal, the wolf's presence in the exhibition area. The lack of the wolf's physical presence seemed to have been intensified with the threatening refrain of huffing and puffing coming from the loudspeakers and the olfactory box capturing the wolf's smell. The wolf's smell was designed to grow in intensity when smelled repeatedly. It could be that this lingering and yet ephemeral nature of the wolf's presence at the exhibition was the most frightening element for the children.

It could also be that the sound references to the wolf's presence evoked children's olfactory response or vice-versa, in a synaesthetic way. Synaesthesia is a psycholinguistic phenomenon, in which 'ordinary activities (e.g. listening to music or reading) trigger consistent, extraordinary experiences (e.g. colours or tastes)' (Simner, 2007: 23). While the relationships between colour and sound are well-studied (e.g. Ward *et al.* 2006), perceptual and neurodevelopmental studies are only beginning to document the relationships between olfaction and sound (Di Stefano *et al.* 2022). Both the sounds and the smell stayed in the area as invisible traces that the children retrieved through their movement across the exhibition space. By attending to the olfactory cues, children produced a new place as they repeatedly walked in areas that they considered safe and free from the wolf and avoided areas that smelled bad and implied the wolf's presence. As Ingold (2008) and Hackett (2016) argue, it was the totality of wayfaring, both the places children favoured and the places they avoided, that constituted their experience of the olfactory exhibition. The following excerpt illustrates the children's awareness of the lingering nature of smell and its link to the wolf's character.

When leaving the exhibition, one of the boys felt it was important to convey to me that "wolves can smell very far". The boy pulled my hand and whispered that wolves can smell further than people, just like dogs. "Do you think the wolf can smell up to here, to the staircase?" I asked him. The boy silently nodded.

(Fieldnotes excerpt nr.2)

Pink's concept of sensory ethnography, which 'challenges the pre-set categories of multimodal analysis and breaks down the binaries between image and text' (Pink 2011: 274), made me attentive to the material properties of the olfactory boxes and children's engagement with them. In Kucirkova and Bruheim Jensen (2023), we described how fragranced areas in scratch-and-sniff books play a meta-function in reading, in that they transmit meanings that continue beyond the fragranced areas in the book. In the study here, the elusive nature and difficulty to control ambient smells that Pink (2015) alludes to, meant that smells remained feebly alive throughout the exhibition, along with the wolf's violent threats.

That the children did not want the wolf's smell to linger in the space was noticeable when the children were encouraged to open several olfactory boxes but none of them wanted to open the one representing the wolf, as shown in this interview excerpt:

Me: So we should not open it? [pointing to the box with the black handle, representing the wolf]

Boy 1: No, we do not open it.

Me: Was that the wolf that had that smell? Or was it a pig?

Boy 1: Wolf!

Me: Ah, okay.

In another episode, a boy continued with the assertion that the bad wolf's smell is the worst smell of all, and should be kept away from other children:

Boy 1: We need to wash hands! Close the box, close the box! Don't open the box again!

Boy 2: It must not be so close to me – I do not like it.

The desire to close the box representing the wolf's smell corresponded to the children's quick and loud closing of the doors of the Clever Pig's brick house. The children did not want to let the bad wolf enter the house and used it as their hiding space from the wolf. Here is an excerpt from my fieldnotes made during an observation at the brick house of the Clever Pig.

The brick house was loud and crowded with five children. The children crouched inside the house and shouted at a child outside the house that he was the wolf. One of the girls grabbed a little lamp standing on the table inside the house and shouted: "the wolf doesn't like light!". She switched the light on and put it in front of the window of the house's door. "Go, hide you!" she instructed other children inside the house, who crouched into the corners.

(Fieldnotes excerpt nr.3)

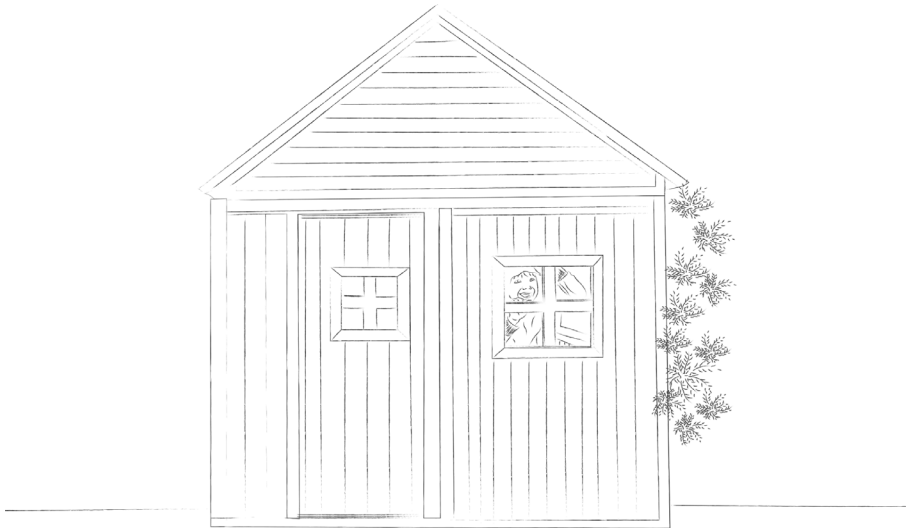


Fig. 7. Illustration of the brick house with a child inside it

The boundaries between reality and fiction and between ambient and concentrated olfaction may have blurred in children's experiences at the exhibition. The young children's first experience of the exhibition and the lack of adult mediation of this experience may explain this observation; namely, in traditional reading of stories, the adult's mediating role is essential for explaining story events, advancing children's story comprehension and explaining the moral of the story

(see Zevenbergen and Whitehurst 2003). This might be particularly important for stories that involve villainous characters. For example, Neumann and Merchant (2022) reported on how, when reading *The Three Little Pigs* story to children in the class, the teacher demonstrated how the wolf was scary and used affective, cognitive and technical techniques to scaffold children's understanding of the story. The following audio-recorded episode substantiates this point. In the exchange, I drew children's attention to the chocolate smell inside the olfactory box placed inside the Clever Pig's brick house.

Boy 1: Oh it smells.... it's a little scary.

Me: But tell me, how does it smell then?

Boy 2: It still smells like poop of the wolf. Go to the brick house! Come on everyone! [the boy calls other children present at the exhibition towards the brick house]

Me: If you open the box there [pointing to the box representing the chocolate smell], what does it smell like?

Boy 2: It smells like poop!

Me: Are you sure?

Boy 2: Come in and smell.

Me: Yes.

Girl: I smell it.

Me: Sure, does it smell like chocolate do you think?

Girl: I have to smell it.

Boy 1: But we have to close the door.

Me: You have to close the door?

Boy 1: You must close the door!!! [screams and shuts the door].

Smells could act as unifiers between experiences occurring in a house and a museum (Whiteley *et al.* 2017) but in my observation, olfaction seemed to have intensified children's experience of the story rather than the other way round. The fear of the wolf seemed to be the driving force behind children's experiences at the exhibition, but I also noted one exception: after the children's exhibition visit, a child in the drawing area expressed the desire to go back to the exhibition and defeat the bad wolf.

Me: Can [researcher's name] take a picture of your drawing?

Girl: [researcher's name]...[nods].

Boy 2: I'm not finished. [with the drawing].

Boy 1: I'm going out there and scare the wolf now. [boy gets up from the chair and heads back to the exhibition].

Similarly to the study by Franklin and Sansom (2018) in the Museum of New and Old Art (Mona) in Tasmania, from the outset of the study, children were the target audience for the exhibition and the curators wanted to facilitate children's creative and playful engagement in the museum. The moments of children's walking, running, creeping, crawling, crouching and hopping in the exhibition space were moments of creative play that configured their perception of the space and the main story characters that the space represented. The children inhabited the space within the fictional narrative frame of *The Three Little Pigs* and, to a large extent, took on the identities of the pigs who needed to escape the bad wolf. Their wayfaring became an active, embodied engagement with the story elements and this shared wayfarer identity continued with their engagement with the olfactory elements of the exhibition.

As olfactory wayfarers, children could touch, manipulate and smell the museum exhibits, revealing aspects of experiences that are difficult to capture with traditional observational methods (see Hjorth and Pink 2014). Without a doubt, the design of the olfactory boxes influenced the ways in which children could demonstrate their interest in, and knowledge of, the various odours. Price *et al.* (2022) analysed the bodily modes of interaction of families attending the Natural History Museum, London, and found that some design features of the museum resources could be directly traced back to certain types of interaction: 'the specific design elements of digital exhibits shaped family participation engagement, and collaboration, and their potential for supporting adults in scaffolding children's learning: engagement, activity and meaning making' (Price *et al.* 2022: 37). In another study, the meSch project, stories were designed to respond to the visitor's movement through the space by playing sounds and specific story sequences based on the selection of the user.³ Our olfactory boxes were not adaptive to children's movements, but children calibrated their experience by coming closer or further from the boxes, opening and closing the boxes' lids and repeating the interaction. The children used their whole bodies to come closer to the fragranced areas, placing their nose directly to the box or at a distance. As such, they used movement to respond to the olfactory trace in the air, thus creating olfactory areas inside the exhibition.

The children's bodily position when smelling an olfactory box is illustrated in Figure 8 to indicate the ways in which children calibrated their perceptions of smell at the exhibition.



Fig. 8. A boy smelling an open olfactory box

Even though the boxes' size and placement at the exhibition were intended for individual engagement, the children rarely explored them individually. Figure 9 shows the children gathering around an olfactory box, which was the most typical way for children to move and position themselves around the olfactory materials.



Fig. 9. A group of three children smelling an open olfactory box

The hermeneutic concept of narrative identity, that is, the notion that identities are shaped by narratives humans create to make sense of their life, explains the children's desire to check, confirm and negotiate their understandings of the various odours with their peers. This shared identity constituted an opportunity to signal and perform a sense of belonging in the exhibition space. The children's responses that I analysed seemed to unify their personal and shared identities in relation to the literary and olfactory identities represented at the exhibition. Similarly to Schorch *et al.*'s (2015) documentation of secondary school children's cross-cultural encounters at a museum exhibition in Victoria, Australia, the children at our exhibition transitioned from abstract notions of identities of 'other' to more unified experiences of belonging as part of the shared fear of the wolf. The olfactory experience contributed to this identity-unification. The following extract from my fieldnotes offers an example of how the children shared their odour experiences with other children.

Inside the house of the Pretty Pig.

"It is sweets, smell it!" the girl shouted and opened the box. Another girl walked in and sniffed the fragranced surface.

(Fieldnotes excerpt nr.4)

In addition to olfactory wayfaring at the exhibition, children's personal and literary identities criss-crossed in the exhibition space. The following short exchange between two girls shows how children appropriated the literary characters by pretending to own the houses where the three pigs lived.

Girl 1: I want to be in your house! [emphasis added by me].

Girl 2: Come in then!

Birch (2018) theorized children's museum experiences from the perspectives of new materialist and post-humanist theories, highlighting ambiguous, open and playful experiences as part of children's sensory and bodily encounters in the museum. Her proposition of 'the child as an "experiencer" or one who bodily experiences is proposed, as a challenge to the common premise of the child as learner above all else' (Birch 2018: 517), had resonances with my observations of children's highly individualized and thus 'ambiguous and ungeneralisable' (Birch 2018) responses to the olfactory-literary museum resources.

The children's ambiguous and unique responses to the exhibition odours were compatible with the multisensorial nature of exhibition experiences. In his compelling account of the museum experiences of a visually-impaired girl, Hetherington (2003: 105) vividly describes how the focus on visual materials privileges certain types of knowledge that are not equally accessible or relevant to all:

The relationship between sight and representation in most western cultures tends to bias our understanding towards more distal forms of knowledge. My visit with Sarah suggested to me questions about different forms of knowledge, their representational economies, and the ways in which we are interpellated as subjects by our relations with materials arranged within social spaces.

An olfaction-focused exhibition offers new knowledge representations and has invited children's engagement with material resources in a way that followed their nose – both literally and figuratively. It is through such engagement that children's learning is stimulated and could be further supported by adults.

Bowers *et al.* (2015) outline how calling children's attention to specific exhibition elements supported children's appreciation of the cross-cultural exhibits at the National Museum of African American History and Culture. For example, in one activity, Bowers and colleagues (2015) encouraged the children to put on 'spy eyes' to spot Arabic letters. During my observations, teachers' mediation was minimal, which is easily attributable to the nature of the study: the teachers were informed that my focus was on children's spontaneous and unconstrained responses to the exhibition and with the exception of one teacher, they adopted the role of passive observers. In future work, it would be interesting to follow-up my observations with a study of teacher-mediated visits and explore whether and how teachers might mediate children's identification with the story characters and their response to odours associated with them.

Future research could also explore how different stories, or different adaptations of *The Three Little Pigs* story might influence children's responses. Athanasiou-Krikelis (2019) describes two modern versions of *The Three Little Pigs*, one where the three pigs do not build their three houses but write pages for their own book (Wiesner 2001), and Trivizas' (2003) version, titled *The Three Little Wolves and the Big Bad Pig*, which puts the traditional story on its head. Trivizas wittily subverts the pigs' roles of victims and positions the wolf as a harmonizer who, in the end, builds a house of flowers where the big pig can enjoy tea together with the other two wolves. It would be interesting to explore how the story reversal dovetails with olfactory correspondences and, indeed, whether a match and mismatch between good and bad odours and good and bad story characters might play out in children's museum's wayfaring.

In conclusion, the focus of the exhibition was motivated by the apparent lack of traditional fairy tales in children's museums and the inclusion of odours as a volatile, materially unstable, yet powerful resource for meaning-making. The findings illuminate the ethical role that stories play in children's lives by connecting to children's strong sense of good and bad that traditional fairy tales convey. The power of olfaction to evoke strong emotional reactions was unlocked with olfactory boxes, which, together with the strong narrative presence of the good and bad story characters, revealed children's strong identification with the fictional narrative. Although for the exhibition, the team adopted the plot of the traditional fairy tale and did not refer to the wolf's bad actions, the children were clearly aware of the wolf's threat to the pigs. The symbolism in the wolf's threatening actions and the safety of a house built of bricks served the purpose of anchoring children's experiences in an open-ended story experience enhanced with abstract and volatile odours. Overall, the provision of story-related

olfactory resources at the museum has opened up the space for children to play out their identity of capable olfactory wayfarers.

Notes

1. Prado Museum, 'The Essence of a Picture. An Olfactory Exhibition' 2022. <https://www.esmadrid.com/en/whats-on/essence-picture-olfactory-exhibition-prado-museum>, accessed 6 July 2022.
2. Dennis R Rader and Jan Rader, 'The Three Little Pigs in a Postmodern World', paper presented at the Mid-South Instructional Technology Conference (Murfreesboro, TN, 5-7 April 1998). <https://eric.ed.gov/?id=ED431395>, accessed 14 September 2023.
3. Daniela Petrelli, 'How Does the Form of the Interactive Object Affect the Visiting Experience?', Material Encounters with Digital Cultural Heritage (MeSch) 8 May 2019. <https://www.mesch-project.eu/how-does-the-form-of-the-interactive-object-affect-the-visiting-experience/>, accessed 6 July 2022.

References

- Athanasίου-Krikelis, L. (2019) 'Picture-Book Retellings of "The Three Little Pigs": Postmodern Parody, Intertextuality, and Metafiction', *Children's Literature Association Quarterly*, 44 (2) 173-93.
- Bembibre, C. and Strlič, M. (2017) 'Smell of Heritage: A Framework for the Identification, Analysis and Archival of Historic Odours', *Heritage Science*, 5 (1) 1-11.
- Bezemer, J. and Kress, G. (2015) *Multimodality, Learning and Communication: A Social Semiotic Frame*, London, New York: Routledge.
- Billinghurst, M., Kato, H. and Poupyrev, I. (2001) 'The MagicBook – Moving Seamlessly between Reality and Virtuality', *IEEE Computer Graphics and Applications*, 21 (3) 6-8.
- Birch, J. (2018) 'Museum Spaces and Experiences for Children – Ambiguity and Uncertainty in Defining the Space, the Child and the Experience', *Children's Geographies*, 16 (5) 516-28.
- Bowers, B., Brightful, D., Heflin, C., Hindley, A., Kiehl, K.L., Pruckno, E. and Wolfe, J. (2015) 'Museums Providing Opportunities for Promoting a Positive Sense of Self in the Early Years', *Museum & Society*, 13 (2) 142-57.
- Cantu, D. (2015) 'Using Humor in Design: Using the Story of the Three Little Pigs to Understand Failure Analysis', *Children's Technology and Engineering*, 19 (4) 30-4.
- Di Stefano, N., Murari, M. and Spence, C. (2022) 'Crossmodal Correspondences in Art and Science: Odours, Poetry, and Music', in Nicola Di Stefano and Maria Teresa Russo (eds) *Olfaction: An Interdisciplinary Perspective from Philosophy to Life Sciences*, 155-89, Cham: Springer.
- Drobnick, J. (2014) 'The Museum as Smellscape', in Nina Levent and Alvaro Pascual-Leone (eds) *The Multisensory Museum: Cross-Disciplinary Perspectives on Touch, Sound, Smell, Memory, and Space*, 177-96, Plymouth: Rowman & Littlefield.

- Dudley, S. (2010) *Museum Materialities: Objects, Engagements, Interpretation*, London: Routledge.
- Eldén, S. (2013) 'Inviting the Messy: Drawing Methods and "Children's Voices"', *Childhood*, 20 (1) 66-81.
- Fargas-Malet, M., McSherry, D., Larkin, E. and Robinson, C. (2010) 'Research with Children: Methodological Issues and Innovative Techniques', *Journal of Early Childhood Research*, 8 (2) 175-92.
- Franklin, A. and Sansom, M. (2018) 'Aimless and Absurd Wanderings'? Children at the Museum of Old and New Art (Mona)', *Museum & Society*, 16 (1) 28-40.
- Friedman, E.C. (2016) *Reading Smell in Eighteenth-century Fiction*, Plymouth: Bucknell University Press.
- Gong, X. (2022) *Children's Museums as a New Informal Learning Environment in China: Practice, Impact and Implications*, London: Routledge.
- Hackett, A. (2014) 'Zigging and Zooming All Over the Place: Young Children's Meaning Making and Movement in the Museum', *Journal of Early Childhood Literacy*, 14 (1) 5-27.
- (2016) 'Young Children as Wayfarers: Learning about Place by Moving Through It', *Children & Society*, 30 (3) 169-79.
- Hackett, A. and Yamada-Rice, D. (2015) 'Producing Visual Records of Movement: Making Meaning of Young Children's Interactions with Place', in Eve Stirling and Dylan Yamada-Rice (eds) *Visual Methods with Children and Young People: Academics and Visual Industries in Dialogue*, 29-49, London: Springer.
- Hackett, A. and Somerville, M. (2017) 'Posthuman Literacies: Young Children Moving in Time, Place and More-than-human Worlds', *Journal of Early Childhood Literacy*, 17 (3) 374-91.
- Hetherington, K. (2003) 'Accountability and Disposal: Visual Impairment and the Museum', *Museum & Society*, 1 (2) 104-15.
- Hjorth, L. and Pink, S. (2014) 'New Visualities and the Digital Wayfarer: Reconceptualizing Camera Phone Photography and Locative Media', *Mobile Media & Communication*, 2 (1) 40-57.
- Honeyman, S. (2013) *Consuming Agency in Fairy Tales, Childlore, and Folkliterature*, London: Routledge.
- Ingold, T. (2008) 'Bindings Against Boundaries: Entanglement of Life in an Open World', *Environment and Planning* 40 (8) 1796-810.
- (2015) *The Life of Lines*, London: Routledge.
- (2016) *Lines: A Brief History*, London: Routledge.
- (2021) *Being Alive: Essays on Movement, Knowledge and Description*, London: Routledge.
- International Council of Museums (2016) *Strategic Plan 2016-2022*, ICOM. <https://icom.museum/en/about-us/missions-and-objectives/>.
- Jolley, R.P. (2009) *Children and Pictures: Drawing and Understanding*, London: John Wiley

& Sons.

- Keller, A. (2014) 'The Scented Museum', in Nina Levent and Alvaro Pascual-Leone (eds) *The Multisensory Museum: Cross-Disciplinary Perspectives on Touch, Sound, Smell, Memory, and Space*, 167-76, Lanham, MD: Rowman & Littlefield.
- Klingberg, T. (2013) *The Learning Brain: Memory and Brain Development in Children*, New York: Oxford University Press.
- Kress, G. (2009) *Multimodality: A Social Semiotic Approach to Contemporary Communication*, London: Routledge.
- Kucirkova, N. and Bruheim Jensen, I. (2023) 'Parent-child Shared Reading of Scratch-and-sniff Books: The Communicative Affordance of Olfaction', *European Early Childhood*, in press.
- Kucirkova, N. and Kamola, M. (2023) 'The Significance of Children's Olfactory Experiences in a Norwegian Kindergarten: An Olfactory Researcher-practitioner Collaboration', *Educational Research*, 1-20.
- Kucirkova, N. and Stray Gausel, E. (2023) 'Incorporating Smell Into Children's Museums: Insights From A Case Study In Norway', *Curator*, in press.
- Kvale, S. and Brinkmann, S. (2009) *Interviews: Learning the Craft of Qualitative Research Interviewing*, London: Sage.
- Lacoe, J., Painter, G.D. and Williams, D. (2020) 'Museums as Classrooms: The Academic and Behavioral Impacts of "School in the Park"', *AERA Open*, 6 (3) 1-22. DOI: 10.1177/2332858420940309.
- Levent, N. and Pascual-Leone, A. (eds) (2014) *The Multisensory Museum: Cross-disciplinary Perspectives on Touch, Sound, Smell, Memory, and Space*, Plymouth: Rowman & Littlefield.
- Malhotra, N.K. (1984) 'Information and Sensory Overload. Information and Sensory Overload in Psychology and Marketing', *Psychology & Marketing*, 1 (3□4) 9-21.
- Massri, M., Novalija, I., Mladenčić, D., Brank, J., Da Silva, S.G., Marrouch, N., Murteira, C., Hürriyetoğlu, A. and Šircelj, B. (2022) 'Harvesting Context and Mining Emotions Related to Olfactory Cultural Heritage', *Multimodal Technologies and Interaction*, 6 (7). DOI: 10.3390/mti6070057.
- Meretoja, H. (2017) *The Ethics of Storytelling: Narrative Hermeneutics, History, and the Possible*, Oxford: Oxford University Press.
- Miller, L.J. (2014) *Sensational Kids: Hope and Help for Children with Sensory Processing Disorder (SPD)*, London: Penguin.
- Mucignat-Caretta, C., Redaelli, M. and Caretta, A. (2012) 'One Nose, One Brain: Contribution of the Main and Accessory Olfactory System to Chemosensation', *Frontiers in Neuroanatomy*, 6 46. DOI: 10.3389/fnana.2012.00046.
- Neumann, M.M. and Merchant, G. (2022) "'That's a Big Bad Wolf!": Learning Through Teacher-child Talk During Shared Reading of a Story Book App', *Early Childhood Education Journal*, 50 515-25.
- Paris, S.G., Yambor, K.M. and Packard, B.W. (1998) 'Hands-on Biology: A Museum-school-university Partnership for Enhancing Students' Interest and Learning

- in Science', *The Elementary School Journal*, 98 (3) 267-88. <https://doi.org/10.1086/461894>.
- Patera, M., Draper, S. and Naef, M. (2008) 'Exploring Magic Cottage: A Virtual Reality Environment for Stimulating Children's Imaginative Writing', *Interactive Learning Environments*, 16 (3) 245-63.
- Peterson, C., Jesso, B. and McCabe, A. (1999) 'Encouraging Narratives in Preschoolers: An Intervention Study', *Journal of Child Language*, 26 (1) 49-67.
- Pink, S. (2011) 'Multimodality, Multisensoriality and Ethnographic Knowing: Social Semiotics and the Phenomenology of Perception', *Qualitative Research*, 11 (3) 261-76.
- (2015) *Doing Sensory Ethnography*, London: Sage.
- Price, S., Jewitt, C. and Moussouri, T. (2022) 'Supporting Family Scaffolding and Collaboration Through Digital Interactive Tabletop Exhibits', *Visitor Studies*, 25 (1) 22-40.
- Puroila, A.M. and Estola, E. (2014) 'Not Babies Anymore: Young Children's Narrative Identities in Finnish Day Care Centers', *International Journal of Early Childhood*, 46 (2) 187-203.
- Rhoades, M. (2016) "'Little Pig, Little Pig, Yet Me Come In!' Animating The Three Little Pigs with Preschoolers', *Early Childhood Education Journal*, 44 (6) 595-603.
- Schorch, P. (2013) 'Contact Zones, Third Spaces, and the Act of Interpretation', *Museum & Society*, 11 (1) 68-81.
- Schorch, P., Walton, J., Priest, N. and Paradies, Y. (2015) 'Encountering the "Other": Interpreting Student Experiences of a Multi-sensory Museum Exhibition', *Journal of Intercultural Studies*, 36 (2) 221-40.
- Simner, J. (2007) 'Beyond Perception: Synaesthesia as a Psycholinguistic Phenomenon', *Trends in Cognitive Sciences*, 11 (1) 23-9.
- Sobel, D.M., Stricker, L.W. and Weisberg, D.S. (2022) 'Relations Between Children's Exploration in a Children's Museum and their Reflections about their Exploration', *Child Development*, 93 (6) 1804-18.
- Soto, G., Solomon-Rice, P. and Caputo, M. (2009) 'Enhancing the Personal Narrative Skills of Elementary School-aged Students Who Use AAC: The Effectiveness of Personal Narrative Intervention', *Journal of Communication Disorders*, 42 (1) 43-57.
- Speed, L.J. and Majid, A. (2018) 'Superior Olfactory Language and Cognition in Odor-color Synaesthesia', *Journal of Experimental Psychology: Human Perception and Performance*, 44 (3) 468-81. <https://doi.org/10.1037/xhp0000469>.
- Spence, C. (2020) 'Scenting the Anosmic Cube: On the Use of Ambient Scent in the Context of the Art Gallery or Museum', *i-Perception*, 11 (6) 1-26. DOI: 10.1177/2041669520966628.
- Spence, C. and Squire, S. (2003) 'Multisensory Integration: Maintaining the Perception of Synchrony', *Current Biology*, 13 (13) R519-21.
- Toolan, M.J. (2013) *Narrative: A Critical Linguistic Introduction*, London/New York: Routledge.

- Trivizas, E. (2003) *The Three Little Wolves and the Big Bad Pig*, illustrated by Helen Oxenbury, London: Mammoth.
- Van Leeuwen, T. (2005) *Introducing Social Semiotics*, New York: Psychology Press.
- Ward, J., Huckstep, B. and Tsakanikos, E. (2006) 'Sound-colour Synaesthesia: To what Extent Does It Use Cross-modal Mechanisms Common to Us All?', *Cortex*, 42 (2) 264-80.
- Watt, D. (2007) 'On Becoming a Qualitative Researcher: The Value of Reflexivity', *Qualitative Report*, 12 (1) 82-101.
- Weiner, K. (2004) 'Empowering Young Children In Art Museums: Letting Them Take the Lead', *Contemporary Issues in Early Childhood*, 5 (1) 106-16.
- Whiteley, L., Stenslund, A., Arnold, K. and Söderqvist, T. (2017) "'The House" as a Framing Device for Public Engagement in STEM Museums', *Museum & Society*, 15 (2) 217-35.
- Wiesner, D. (2001) *The Three Pigs*, New York: Houghton Mifflin Harcourt.
- Zevenbergen, A.A. and Whitehurst, G.J. (2003) 'Dialogic Reading: A Shared Picture Book Reading Intervention for Preschoolers', in Anne Van Kleeck, Steven A. Stahl and Eurydice B. Bauer (eds) *On Reading Books to Children: Parents and Teachers*, 177-200, London/New York: Routledge.