

## PERSPECTIVE

# Incorporating smell into children's museums: Insights from a case study in Norway

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**Abstract**

We report on how we integrated smell into the classic children's story 'The Three Little Pigs' to enhance a public children's museum exhibition. The study employed Wenger's (1998) social theory of learning as its conceptual framework. It aimed to enhance children's sensory experience in a local Norwegian museum through a collaboration between academia and the industry. We used five abstract smells that were included in five wooden boxes and strategically placed around an adventure trail inside the museum (science factory). In this article, we reflect on the exhibition choices and findings, and recommendations for future children's exhibitions combining odors and narrative.

**KEYWORDS**

children, community, olfaction, participatory approach, smell

## INTRODUCTION

When children visit museums, they exercise their participatory rights in public life as cultural citizens (Mai & Gibson, 2011). While children's responses to museum exhibits, particularly for children under the age of six, have been little explored in museum studies of the past decade (Hackett et al., 2020), a recent review of studies published between 2000–2020 and focused on 0- to 8-year-old children's museum experiences, suggests a burgeoning interest in this age group (Flewitt et al., 2023). In particular, playful and sensory experiences with museum exhibits that stimulate children's creativity and imagination, are at the forefront of the latest studies and museum designs.

A child's typical developmental trajectory proceeds from a minimally linguistic but highly multisensorial engagement to advanced language and strategic sensory processing. Consequently, for all children but for young children in particular, museum visits are highly

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multisensorial: “As they enter museum buildings, breathing in the distinctive smell, hearing the echo of their footsteps and voices, and feeling dwarfed by the size of the rooms and the artworks, young children have the opportunity to engage in active sensory, aesthetic and cognitive experiences in extraordinary surroundings” (Wallis & Noble, 2022, p. 2). Museum curators use various interactive techniques to stimulate children's multisensory participation, especially under the umbrella of inclusive and universal museum design.<sup>1</sup> Nevertheless, despite the growing attention towards providing children with multisensory museum experiences, there remains a lack of research on the sense of smell in museum studies, and museums generally do not provide olfactory experiences specifically designed for children under the age of eight. Our project aimed to engage with this gap in a productive way to generate insights for both museum professionals and researchers.

## The importance of smell

The sensory turn in children's qualitative research (Hurdley & Dicks, 2011) marked a departure from the largely cognitive, visually-dominated approach to children's museum experiences to the interplay of all *six* senses (visual, auditory, haptic, olfactory, gustatory, and proprioceptive senses). In a summary article drawing on findings from four edited volumes concerned with “sensuous scholarship”, Hurdley and Dicks (2011) highlight the significance of non-verbal aspects, such as visual and sensory elements in ethnographic studies and describe how children's interactions with museum exhibits influence not only what they learn about science but also how they played and interacted with others. Thus far, the distinct role of the “silent senses” of smell, taste, and proprioception has been little explored in museum studies. While many references to children's multi-sensory museum experiences are made in recent literature (Flewitt et al., 2023), these typically define multi-sensory engagements in terms of vision, hearing, and touch. Our specific interest in the sense of smell is both theoretical and practical. Theoretically, smell is implicated in vital mind functions with accumulated neuroanatomical evidence that links the human perception of smell with emotion and memory processing (Herz, 2016; Speed & Majid, 2020). Practically, the loss of smell is indicative of several illnesses, including the recent COVID-19 disease (Aziz et al., 2021). Smell is thus a vital sense for both preventing ill health and enjoying the full spectrum of emotions and experiences in life. Kucirkova (2022) proposed that children's olfactory awareness can be stimulated in informal learning environments and in this study, we explored how museums can act as spaces to facilitate children's olfactory experiences with fictional stories.

For adult visitors, permanent exhibits that include smell, have been around since 1967 (for example the JORVIK Viking Centre in York, UK where visitors can explore the sights, sounds, and smells of Viking-Age). Some recent examples from Europe include:

- Museum Ulm, Ulm, Germany, olfactory guided tour, Follow Your Nose, April, 2022
- Prado Museum in Madrid, Spain, visitors could inhale the smells of a Brueghel Painting, 2022
- Bodleian Library, Oxford, UK, Sensational Books with books in all senses including smell, 2022
- Astrup Fearnley Museet, Oslo, Politics of Smell exhibition by Sissel Tolaas, 2022.

Yet, for children, scent-oriented museum exhibitions are rare. Exceptions include the Boston Museum of Science “What's the Message Exhibit”, which had the smell of smoke, and The Field Museum in Chicago, which had scented T-rex dinosaur breath. In both adult and child-oriented exhibits, smell was used as an add-on to visitors' overall experience of an exhibition. To the best of our knowledge, no museum exhibit has thus far integrated smell with children's

fictional stories. It is this gap that provided impetus for our project. We were keen to incorporate scents and odors in a children-oriented exhibition in a way that would be fully integral and not incidental to children's multisensory experience in museums.

## METHODS

### Theoretical framework: Community of Practice

To activate community resources and members of the community in the project, we followed the principles of Wenger's (Wenger, 1998) and Wenger and Wenger-Trayner (2020) social theory of learning. According to the theory, social participation constitutes the process of learning and knowing, and it is the responsibility of the group to collectively ensure the quality of the final product. Wenger's (1998) concept of a Community of P (CoP) refers to a group that shares some common indicators, including: 'Sustained mutual relationships – harmonious or conflictual; Shared ways of engaging in doing things together; The rapid flow of information and propagation of innovation' and others (see Cox, 2005, p. 531). In our case, the museum context brought together a CoP with academic, industry, and practice representatives in a small town in Norway. We followed a flat leadership structure, where all participants were encouraged to interrogate and transparently report on the progress of a joint project.

The social learning framework has been successfully applied in collaborative university-museum projects before; for example, Ampartzaki et al. (2013) applied the social learning theory to actively involve museum educators and academic researchers in a knowledge co-construction project in the USA. Similarly to our project, the individual community members demonstrated through action what they know and what they do not know, and other community members could thus meaningfully step in to achieve the final result. Such a process is often followed in effective academia-industry partnerships but is less known in museum academia collaborations so we elaborate on it more in the following section.

### Academia-industry-practice collaboration

In operationalizing the model of social learning, trusting partnerships between academia, the industry, and the public sectors needed to be established right at the start of the project. The university team took the initiative in these partnerships by reaching out to the local science center and museum (called Vitenfabrikken in Norwegian, "The Knowledge Factory" in English), and inviting a librarian, a museum education officer, children's publishers, media and early childhood specialists, a chemistry professor and an olfactory expert, to join the project. We organized a workshop where the project participants, CoP members, physically met together and agreed the project parameters (see workshop set-up in Figure 1). Active participation from all participants was perceived as the catalyst for reconciling the design-research-practice contributions and for advancing the aesthetic, educational, and creative goals of the project. The workshop resulted in plans for the user journey and choice of olfactory stimulations at the exhibition.

Adults' active participation was complemented with insights from kindergarten children. This was achieved through a research-practice collaboration preceding the exhibition, where the children spontaneously shared their stories, and the researcher, together with the kindergarten teacher, documented their responses in a journal article (Kucirkova & Kamola, 2022). The insights from all project team members informed the choice of smells, story, and exhibition layout.



**FIGURE 1** A photo from our workshop focused on smells. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/cula.12713)]

## Procedure and protocols

The exhibition was launched in Norway in June 2022 at Vitenfabrikken. Vitenfabrikken is an engaging and interactive museum and science center located in Sandnes, in southwest Norway, and part of a larger museum organization called Jærmuseet. Due to popular demand, the exhibition was extended until December 2022. The exhibition was limited to 3- to 7-year-olds and located on the second floor of the science factory. The entrance to the exhibition was narrow and the actual space and resources child-sized, making it clear that the exhibition was intended for the youngest visitors.

To understand children's responses to the exhibition, we conducted a research week before the official opening of the exhibition, details of which are reported separately. In this Perspective article, we focus on insights relevant for museum practice. In particular, we focus on the use of 'specific tools, representations, and other artifacts' (p. 125), which, according to Wenger (1998), indicates that the CoP's members interact and locally co-create knowledge. Three tools were central to this project: the story that constituted the narrative arc for the exhibition, the smell boxes that created the smell stimulation for children's multisensory engagement, and the actual exhibition space in the museum.

## The story

The choice of the narrative was discussed by all team members, who considered both fictional and non-fictional stories, traditional and modern fairy tales as well as local and international narratives. Through joint deliberation, the team agreed to focus on the traditional fairy tale *The Three Little Pigs*, which is a popular story for kindergarten-aged children in Norway but also in many other countries. We had an initial assumption that children visiting the exhibition would already be familiar with the story. However, we intentionally designed the exhibition to be accessible even to those who were not familiar with the plot beforehand. To explore potential adaptations to the traditional version of the story, a workshop was conducted involving a librarian, a museum education officer, and members of the university team, who collectively brainstormed various ideas (see Figure 2).

At the exhibition, the final version of the story was presented in a condensed, rhythmic format, which was provided in both written and spoken forms. To create the spoken version, the



**FIGURE 2** A photo from our workshop focused on story selection. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/cura.12573)]

children's librarian recorded the story, along with expressive sound effects of the wolf's whining, at the university studio (as depicted in [Figure 3](#)). The story text was displayed on vibrant posters placed near each story station or smell box area, featuring a QR code that visitors could scan to listen to the audio narration directly on their smartphones.

## The smell boxes

Olfactory museum curators have the choice of concrete (object-, plant- or food-related) and abstract smells. Building on the research evidence concerning the lack of language and awareness of the one trillion smells perceptible by the human nose (Robinson, 2020), we decided to stimulate children's interaction with abstract odors. The choice of fragrances was based on their role in the Three Little Pigs Story, and their physical characteristics such as stability over time, volatility (ability to be airborne to be smelled), safe and sustainable ingredients, as well as their particular connection to one of the story characters, colors, tone or mood and sequence in the story plot (see [Table 1](#) for details).

Each of the five smells was placed inside a wooden box with a perforated plate, which was specially designed for the exhibition (see [Figures 4](#) and [5](#)). Six small balls of cotton dipped with the target fragrances were placed under each plate. The plate was securely attached to the underside of the box, ensuring that the balls remained hidden from view and inaccessible to the children. The colors of the plates on the box inside and on the handles of the box were the same and represented the color scheme outlined in [Table 1](#).



**FIGURE 3** A photo of the sound recording in the university studio. [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

## The exhibition space

The university team, the visitor facilitators, and curators working at Vitenfabrikken and interactive museum were instrumental in deciding the spatial layout of the exhibition (see [Figure 6](#) for a sketch of the exhibition space). The format of an adventure trail / story walk was agreed in order to integrate the individual story points and their olfactory enhancements in a playful way. Each piglet's house was represented with a child-sized house made of the three materials represented in the story (straw, wood, and bricks) and was placed on a trail decorated with various props (e.g., plastic pine trees, birds, wooden child furniture including a stove, kitchen table and chairs, pictures, lights and flower pots in the brick house). [Figure 7](#) shows the brick house at the end of the adventure trail. The smell boxes were screwed to stationary elements of the exhibition so that they could not be moved around. For fragrances number 3 and 4, the smell boxes were attached to the tables inside the piglets' houses, while for fragrance number 1, 2 and the unpleasant smells of the pigpen and wolf, the smell boxes were screwed to a tree stump.

The wolf's presence was supposed to be perceived but not seen anywhere in the exhibition area. The wolf's implied, rather than real, presence seemed to have played a role in children's response to the exhibition, as elaborated in [Kucirkova \(2023\)](#). While the individual piglets were visually represented with drawings of their faces above each house and soft toys, the wolf was not depicted in any of the materials. Both the piglets' pink and the wolf's red sticker footsteps were on the floor of the exhibition area, guiding children on the adventure trail. The wolf's paws (real-size animal paws made of fur) were placed on top of a small tree above the dedicated smell box. In addition, the wolf's whines played from a loudspeaker attached to the ceiling and were the only sound constantly present in the exhibition, interrupted only if an adult activated the story retelling through their smartphone.

## DISCUSSION

### Lessons learned and recommendations for future

The team's own evaluation of the exhibition was guided by the principles of the social learning theory, with conversations around the materials, visitor interactions, and overall community

TABLE 1 Five smells used in the exhibition with a description of their characteristics.

Nr.	Olfactory associations	Location of smellbox at the exhibition	Story character	Color	Odor symbolism	Hedonic quality	Place in the story
1	Pigs, mud, domestic livestock yards	Pigpen (hog house)	Mother Pig	Yellow	Farm/Belonging	Negative	Beginning
2	Berries, cookies	Straw house	The Pretty Pig	Pink	Sweetness/Vanity	Positive	Middle
3	Pine tree, old books	Wood house	The Reading Pig	Green	Reflection/Pause	Neutral	Middle
4	Chocolate, cinnamon, cocoa	Brick house	The Clever Pig	Brown	Warmth/Safety	Positive	Middle
5	Wet animal fur, wet dog	Centrally under a tree	The Bad Wolf	Black	Unease/Fear	Negative	End



FIGURE 4 The smell boxes (open). [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/cura.12713)]



FIGURE 5 The smell boxes (closed). [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/cura.12713)]

impact. We summarize our fieldnotes and reflections in relation to the three main materials in the exhibition (smell boxes, story, and exhibition space), followed by the participants' role in delivering the final exhibition. Our reflections are a combined evaluation of the team members who visited the exhibition on several occasions, as part of the research week but also during public opening hours, with and without child and adult visitors.

## The exhibition space

While the exhibition was designed as an adventure trail that follows the story from the Mother Pig to the other stations, not all children experienced the narrative in this sequence. The order in which they engaged with the individual stations depended very much on the guidance provided by adults accompanying the children. Teachers and family caregivers who read or played the sound of the story guided the children in experiencing the smells



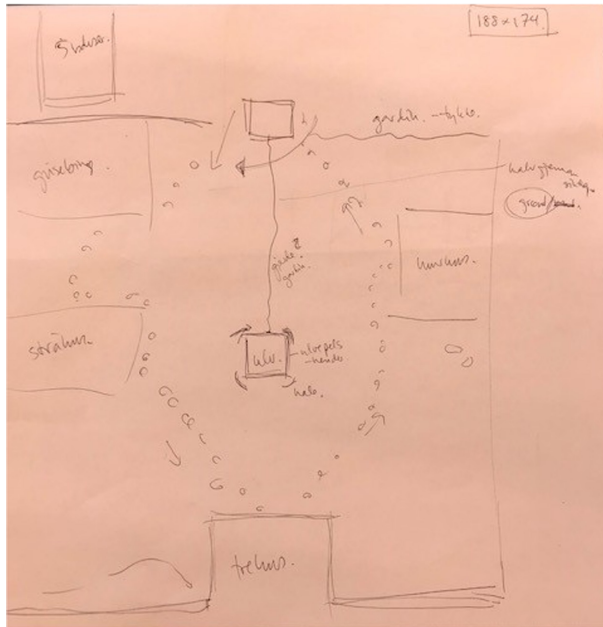


FIGURE 6 A hand-drawn sketch of the overall exhibition space. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/cuja.12573)]



FIGURE 7 The piglets' houses and exhibition props. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/cuja.12573)]

from station 1 to station 6, while children whose caregivers let them explore the area without any interaction tended to start with smells placed in the middle or randomly with any smell boxes found in the exhibition area. This difference in experience seemed to be reflected in children's overall perception of the pleasantness of individual smells. Children who started with the unpleasant smell of the pigpen subsequently perceived all smells as unpleasant and

opened the boxes with an expectation to smell the pig's farm. Another priming effect was noted during kindergarten visits, when children attended in groups, and when often, one child's declaration that the boxes smelled bad, influenced the interpretation of other children, who then assumed all the boxes smelled unpleasant without actually smelling them. This contagious response led to playful and humorous dynamics, as the children eagerly opened and closed the boxes, exclaiming and laughing that they smelled like fecal matter. Our observations map on the primacy effects of smell, which have been demonstrated in adult smell studies, where olfactory stimuli smelled first are perceived as stronger and better recalled (Biswas et al., 2014). Based on this literature and our own findings, we recommend that olfactory exhibitions that contain more than one smell and target children, present the smells in a fixed order. We recommend starting with pleasant smells that are not too strong, so that children are not overwhelmed. This will make them more interested and willing to explore the exhibition.

The possibility for children to use their entire bodies in exploring the story was a clear strength of the exhibition, as per our observations as well as the feedback we received from the public. In this respect, our findings concur with Hackett et al.'s (2018) descriptions of how children make unfamiliar familiar as they touch and move and engage their entire body in an exhibit and build a deeper connection with the content by directly interacting with it. In our exhibition, children were hiding inside the piglets' houses and running away from the imagined bad wolf chasing them. Some loose parts of the exhibition (e.g. cushions and mini-lamps inside the houses) were moved by the children during the visit and needed to be put back at the end of each day. Some children were rough on the exhibit, but no damage was reported, apart from the disappearance of the wolf's claws, which were later replaced at the museum's cost.

## The smell boxes

The color of the smell boxes unintentionally influenced children's perceptions of the odors they encountered. Although we expected the brown color in the brick house to remind children of chocolate and cocoa, it was rarely perceived as such. Many children refused to open the box anticipating a bad smell. The children who did open the box and smelled closely could distinguish the cocoa smell, but this was the case only for those children who were not primed with the black-colored unpleasant odor (fragrance nr.5). Smell-color associations are difficult to disentangle as they combine sensory and perceptual experiences and in some cases, they can be compounded by synaesthesia, whereby stimulation of smell causes involuntary stimulation of vision (or hearing and other sensory modality, see Majid et al., 2009). We recommend that museum curators test the color-smell associations where possible, so that unintended associations between bad smell and darker colors can be avoided early on in the exhibition design process.

All smells were intentionally kept subtle and the visitors' engagement with the smell-boxes was optional. Our intention was not to overwhelm the children and let them decide whether and how much they engage their sense of smell. However, this decision resulted in some children not realizing that they were supposed to open and smell the boxes. To address this issue, the museum curators attached an image of a human nose and the word "Smell!" to the lid of each box. Another unintended issue concerned the boxes' lid, which many children left open after they had smelled the box. That meant that some smells

became ambient smells and less intense. The exhibition facilitators thus often needed to close the smellboxes after the children had opened them. In this respect, the museum curators found the possibility to top up the fragranced areas valuable. With access to the fragrances and the smell boxes, the curators could adjust the intensity of individual odours according to children's responses but also according to the length of the exhibition and visitors' volume.

## The story

The story seemed to work well for the older (4- to 7-year-old) visitors but was perceived as too scary for the younger, 2- to 4-year-old, visitors. Although the Three Little Pigs story is commonly used in arts-based inquiry projects in early childhood classrooms (as mentioned by Rhoades, 2016), it is possible that the museum environment intensifies children's ability to actively participate in the narrative and assume the roles of the pigs and wolves. It could be beneficial to create stories that are less scary for the very young children, rather than relying on traditional fictional stories. Stories specifically written for olfactory experiences might have bigger potential to create museum spaces that are more flexible, are “responsive and adaptable to children” (Flewitt et al., 2023, p. 143), allowing for greater engagement and exploration.

## CONCLUSION

We concur with Levent and Pascual-Leone's (2014) call to re-imagine museum as a “sensory gymnasium” or a “school for the senses,” where aesthetics, art, and entertainment get combined for children's interaction and where children's stories can conjure up new imaginations for integrating smell in museum studies. We suggest that the sensory turn requires a re-orientation towards smell as a sense that adds value to children's museum experiences. Given their multimodal and participatory character, museums constitute a particularly suitable setting for exploring this value.

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## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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## ENDNOTE

- <sup>1</sup> The three museums identified by Bishop, 2017, for her study data collection.

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**Elisabeth Stray Gausel** is a research coordinator of the Sensory Books project that focuses on children's learning through stories and engagement of their sense of smell. Elisabeth led the collaboration between the University of Stavanger and Vitenfabrikken for the exhibition reported in this article.

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