

Scent-Driven Storytelling - An Olfactory Interaction Prototype for Reflective Journaling

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This paper presents Scent-Driven Storytelling, an olfactory interaction prototype designed to support personal journaling by reducing writer's block and encouraging emotionally rich reflection. Grounded in research on olfactory memory and emotional recall, the system introduces curated scent cues to act as non-verbal prompts during writing. We conducted an exploratory user study including both scent-guided and non-scented journaling conditions. Results indicate that scent-guided journaling supported more spontaneous writing, increased narrative flow, and was perceived by participants as more vivid and emotionally engaging. These findings suggest that engineered olfactory cues can function as effective interaction elements for reflective writing and creative wellbeing applications.

CCS CONCEPTS • **Human-centered computing** • **Applied Computing**

Additional Keywords and Phrases: Olfactory interaction, Reflective journaling, Scent-driven design

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1 INTRODUCTION

Journaling is widely used for reflection, emotional processing, and creative expression, yet many people struggle to begin or sustain reflective writing. Common difficulties include writer's block, uncertainty about where to start,

and repetitive or surface-level entries. Existing journaling tools typically rely on textual or visual prompts to address these challenges, which can feel effortful or prescriptive. Other sensory modalities remain largely unexplored in this context. This paper investigates whether olfactory interaction can support journaling by lowering the barrier to entry and encouraging more spontaneous, meaningful reflection. We explore this through the design and evaluation of a scent-guided journaling system and address the research question: How might olfactory interaction support more spontaneous and emotionally meaningful journaling experiences compared to non-cued journaling?

To address this question, Scented Storytelling was developed as a functional olfactory journaling prototype that integrates scent as an interactive element rather than a supplementary stimulus. Rather than providing users with a written prompt, the system introduces a curated scent cue that remains present during the writing process. The intention is to cultivate a reflective atmosphere and facilitate associative memory recall while maintaining an open-ended, user-driven writing experience. The prototype is employed as a brief ritual, beginning with a deliberate initiation action followed by gradual scent diffusion throughout the journaling session. This approach is significant from an interaction design perspective because it repositions scent from a source of information to an atmospheric support mechanism. The concept was evaluated through a small exploratory user study, comparing journaling sessions with scent cues to those without. The evaluation focused on qualitative outcomes such as narrative flow, emotional depth, and perceived vividness, rather than metrics like speed or task completion.

2 BACKGROUND

In journaling, memory and emotion are closely intertwined, as individuals reconstruct experiences using available cues, current emotional states, and personally salient details. Because autobiographical memory is cue-dependent, external prompts can facilitate the recall of experiences, emotions, and contextual detail. Olfaction is uniquely connected to these processes due to its direct neural pathways to limbic regions associated with emotional learning and episodic memory, including the amygdala and hippocampus (Daniels & Vermetten, 2016). In addition, certain odors engage the trigeminal system, producing bodily sensations that can influence arousal and attention. Together, these mechanisms help explain the Proust effect, in which smells evoke memories that are experienced as sudden, vivid, and emotionally intense (van Campen, 2014). Empirical studies have shown that odor cues elicit autobiographical memories that are more emotional and vivid, and often originate from earlier life periods, compared to those triggered by visual or verbal prompts (Willander & Larsson, 2006). These properties underpin the use of scent in wellbeing and grounding practices to regulate emotional state (Daniels & Vermetten, 2016). However, despite this body of research, the role of olfactory cues as interaction elements in everyday reflective practices such as journaling remains underexplored.

3 RESEARCH QUESTION

The central research question of this study is: How can olfactory interaction support more spontaneous and meaningful journaling experiences? In this context, meaningful refers to increased emotional depth, clearer memory recall, and a smoother writing flow during reflective writing. Journaling provides a suitable context for studying olfactory interaction because it relies on internal memory, emotion, and sustained attention, all of which are known to be influenced by sensory cues. To examine this, we compare journaling experiences under scent-prompted conditions with non-scented control conditions, evaluating differences in writing process and perceived quality.

4 LIMITATIONS

This study acknowledges several limitations encountered during the development process, which are extremely important to consider when interpreting the results. Firstly, the study was conducted with three small groups over a short period. Therefore, the outcomes cannot be broadly applied beyond this setting and must be viewed as an indicator of potential solutions to scent journaling, rather than making strong claims.

Additionally, frequency and quality of scent journaling are subjective and difficult to measure. The dataset focuses on qualitative results, heavily relying on observations and feedback from the participants, which introduces bias, making comparison of results across participants complex and resistant to comparison (Zahle, 2025). In addition, olfaction is highly personal, perceived differently based on the user's background, individual history, and previous experiences connected to the scent (Mantel et al., 2021). This proposes another limitation where scents may bring personal memories, which may vary across participants significantly minimising the possibility of replicating the data and reducing the control over the project. Additionally use of olfactory scents raises the possibility of unexpected responses, which may introduce the chance of discomfort during journaling. Ultimately, it is important to mention that the final prototype suffered from a limitation in its construction. Variation in scent intensity and overlap introduced constraints, causing participant experiences to differ, reducing consistency and test conditions.

5 ETHICAL CONSIDERATIONS

The study was carried out with extremely careful considerations of users' privacy and comfort, targeting to eliminate possible risks associated with olfactory interaction. Participants shared any concerns before joining the study, were well-informed about the purpose of the experiment, the application of olfactory cues, and the additional information about the journaling. Contributors were aware of the potential side-effects of interaction with smell, such as evoking personal or sensitive memories, and this was carefully considered during the testing process.

Individuals participated in the study voluntarily and had the possibility of withdrawing from contributing to the research. In order to respect personal information, attendees were not required to share any private information, contents of the journals or any written-documents were not acquired. Provided feedback was made anonymous and only targeted the research development. Alongside this, the selection of scents was picked carefully in order to not overwhelm or harm people involved, while being advised to inform them of any discomfort during the tests.

In summary concluded tests were taken in a respectful manner, removing any possibility of risk, whether associated with personal information or well-being. All of the measures were taken seriously in order to ensure safe engagement in the journaling experience, while maintaining the study's high standard.

6 METHODS

This study used a small-scale, exploratory mixed-method approach that combined within-subject and between-subject comparisons to explore the impact of scent cues on journaling. The independent variable was the presence or absence of olfactory prompts, while the dependent variables focused on qualitative aspects of journaling, such as emotional depth, narrative flow, and memory recall. Participant A completed a control phase without scent followed by a phase using scent cues, allowing for direct comparison. Participant B added scent into an existing journaling routine to explore how it could enhance an already established habit rather than replace it. In addition, four participants took part in short-term comparative testing over several days, with two journaling without scent

as a control condition and two using scent cues. Due to the small sample size and exploratory nature of the study, the findings focus on qualitative insights rather than statistical generalisation.

6.1 Participants

A total of six participants between the ages of 22 – 30 years old were recruited for the study. Two participants (Participants A and B) took part in an extended two-week observation period, while four additional participants were recruited for short-term comparative testing conducted over several days. Participants represented a range of journalling experience, from novice writers to regular journalers.

Participant A was a novice journal writer with no established routine and completed a two-phase study consisting of one week without scent (control) followed by one week with scent cues. This structure allowed for direct comparison and supported analysis of how scent cues influence habit formation, motivation, and writing depth. Participant B was a daily journaler who integrated scent into an existing journalling routine over two weeks, enabling evaluation of scent as an augmentative layer within a well-established practice.

The remaining four participants took part in rapid testing over a period of three to five days. Within this group, two participants formed a short-term control condition and journalled without scent, while two participants used scent cues during each journalling session. This split allowed for comparison between scented and non-scented journalling experiences within a consistent timeframe. Although the testing duration was shorter than the main study, repeated sessions enabled participants to move beyond initial novelty and provide more reflective feedback.

6.2 Materials and Stimuli

Two bespoke scent blends were used: an energizing morning scent (lemon verbena and blood orange) and a calming evening scent (lavender and sandalwood). Initially, scents were delivered via cotton swabs in labeled jars, allowing participants to control exposure. Participants used their own notebooks to maintain a natural writing environment. In the final stage, the fully functioning prototype provided automated scent delivery to the four rapid testers. Testing with the final prototype showed greater promise in maintaining writing flow, as the automated release reduced interruptions caused by manual scent activation and helped sustain a more immersive journalling experience.

6.3 Procedure

Procedures were tailored to each participant. Participant A completed a two-week study: the first week served as a control (no scent), and the second week implemented the two-stage scent protocol, with inhalation before and during writing. Participant B integrated the evening scent into their existing nightly routine using the same inhalation method, testing the effect on an established habit.

6.4 Data Collection

Journal entries were analyzed for qualitative markers such as length, descriptive language, emotional valence, and narrative coherence. Semi-structured post-test interviews captured participants' subjective experiences, perceived changes in writing quality, and the role of the scent ritual.

7 EXPERIMENTAL SETUP

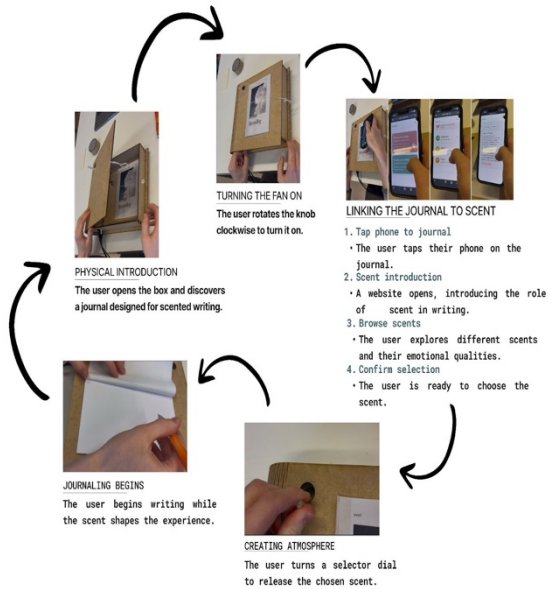


Figure 1: Video of the user flow and application interface.

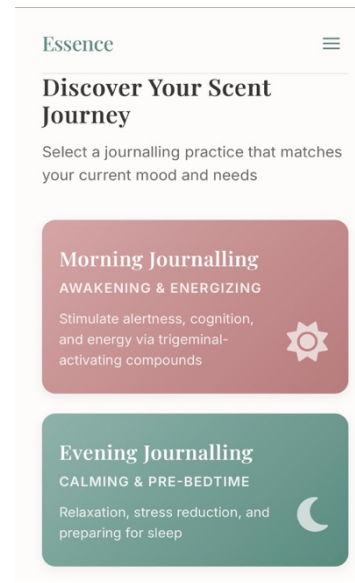


Figure 2: Image of the web app for scent-based journaling.

The experiment aimed to understand how smells influence reflective journaling within a physical interaction ritual. Instead of testing the technical performance of the prototype, the focus was on creating a calm and repeatable journaling experience where scent could act as a subtle, non-verbal cue. All sessions occurred in a quiet indoor space with few visual and auditory distractions.

Participants sat at a desk with the prototype placed right in front of them, along with a physical journal and a pen. The setup resembled a personal writing area rather than a lab, promoting privacy and introspection. Participants engaged with the system alone and were not watched while writing to reduce performance pressure. The prototype appeared as a journaling tool instead of a high-tech device. When participants opened the box, they found the journal as the main item to interact with. A simple rotating control activated the system, starting the journaling session.

This first action aimed to shift them from regular activities into a reflective mindset. Before writing, participants scanned the journal with their phones, which opened a website explaining how scent could aid journaling and letting them explore different scents and their emotional aspects. This step positioned scent as a reflective support rather than a direct prompt. After choosing a scent, participants returned to the prototype and used a selector control to release their chosen scent into the space.

The scent diffusion was gradual and ambient, avoiding strong or overwhelming exposure. The scent was not meant to grab attention but to gently influence the atmosphere while writing. Participants could start writing right after activation and continued journaling while the scent lingered. No specific guidelines were provided on what to write, emphasizing spontaneity over task completion. Scent curation based on the time of day was included where

appropriate. Scents were linked with energizing or calming qualities to match morning or evening journaling contexts. This curation was exploratory and sought to see if matching context influenced participants' engagement rather than imposing a strict structure.

8 TESTING

Each testing session began with a briefing explaining the study's aim: to explore how sensory rituals influence journaling and memory. Participants were encouraged to write freely, with no prescribed outcomes, effectively acting as a cultural probe into their journaling practices.

Participant A completed a two-week study: the first week served as a control (no scent), and the second implemented the two-stage scent protocol, with an initial exposure to "open" the session and a second exposure to "deepen" reflection. Participant B integrated the evening scent into their existing routine using the same inhalation protocol, testing its augmentative effect. Participants could engage with the scents freely at any time, allowing insights into natural interactions.

Data were collected from journal entries, analyzed for qualitative markers including length, descriptive language, emotional valence, and narrative coherence. Semi-structured post-test interviews captured participants' subjective experiences, perceived changes in writing quality, and the role of the scent ritual. Evaluation focused on engagement and ritual, writing process, cognitive and emotional effects, and habit formation or enhancement. Framing the sessions as a cultural probe allowed for rich, exploratory insights into how olfactory cues shape the journaling experience.

To complement the longer journaling trials, a short rapid testing phase was conducted to explore how scent journaling functions across repeated sessions within a shorter timeframe. Four participants took part and were divided into two sections where two participants journaled without scent cues as a control condition, while the remaining two journaled using the scent-based prototype. The testing period lasted between three and five days, with participants completing one journaling session per day when possible.

Participants were instructed to journal freely without a fixed prompt to evoke a natural reflective writing routine rather than task performance. Subjects with scent-based journaling followed the same interaction ritual used in the main study: participants initiated the prototype, explored the available scent options through the linked interface, selected a scent, and then wrote while scent diffusion remained ambient in the background. The non-scent group followed the same journaling format and timing but without any olfactory cues.

After the testing period, participants provided short reflections about their journaling experience, including how easy it felt to begin writing, their level of engagement, and whether the sessions felt more emotionally vivid or focused over time. Recommendations for improvement regarding the prototype itself was also of interest to the users. This rapid phase supported early comparison between conditions and helped evaluate whether scent remained meaningful beyond initial novelty.

9 ANALYSIS & DISCUSSION

A clear difference in writing style and volume was observed for Participant A between the control and scent weeks. The average journal entry length increased by approximately 40% during the scent-supported week. More significantly, the writing shifted in character as entries evolved from fragmented, list-like recordings of daily events to richer, more coherent narratives that described scenes, emotional states, and causal connections between memories. Participant B, an established journaler, reported no change in frequency but noted a subjective increase

in the quality and depth of entries when using the scent cue. Both participants highlighted the role of scent in creating a ritual, Participant A used the swab to mark the start of thinking time, while Participant B found it accelerated the transition into a reflective mindset. These findings indicate that scent cues can scaffold journaling for users at different experience levels.

Feedback from the four rapid testing participants broadly aligned with these findings. Participants assigned to the scent condition reported feeling more immersed in their writing and more emotionally engaged across multiple sessions, while those in the non-scented control condition described their journaling as more routine and task-focused. Although the shorter testing period limited the depth of analysis, repeated journaling over three to five days suggested that the presence of scent influenced how participants entered and sustained a reflective mindset.

Participant A also described enhanced spontaneity and memory recall, particularly with the evening blend, reporting memories that arose without conscious effort. This suggests that scents act as triggers for subconscious thought, helping produce more personal and original entries.

An unexpected finding was the minor disruption caused by manually opening jars to access scents, which temporarily interrupted flow. This observation validates the potential benefit of a seamless, automated scent delivery system, as implemented in the prototype. Despite this friction, participants demonstrated positive engagement overall, supporting the viability of scent-driven journaling as a tool for reflection and emotional exploration. We asked participants to map their emotional state prior to testing and after testing, the findings indicated that most participants shifted to a positive association with scented journaling.

The positive shift in emotional states post-journaling (Figure 3) and reports of increased vividness suggest scent-driven journaling may align with wellbeing applications, such as using scent for emotional grounding (Daniels & Vermetten, 2016). The system did not dictate emotion but created conditions—through curated calming or energizing blends and the ritual itself—that participants associated with a more positive and engaged reflective experience. This points to the potential of olfactory interaction not just for memory recall, but for structuring a positive emotional contour around a reflective practice.

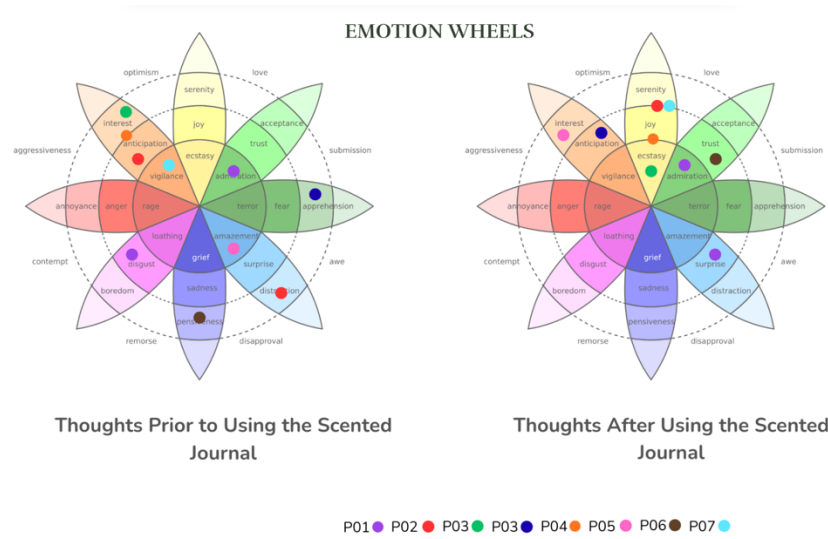


Figure 3: Image of Plutchik's Wheel of Emotions responses before and after being exposed to the scented journaling.

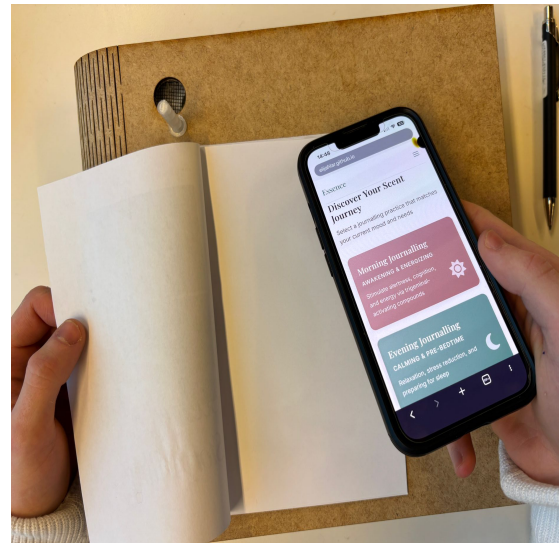


Figure 4: Image of the final prototype, the outside of the prototype can be seen in above left, the bottom left shows the link to the scent app and the bottom right shows the internal setup with the fan and Arduino.

CONCLUSION

This study investigated the research question: How might olfactory interaction support more spontaneous and meaningful journaling experiences? Our findings suggest that scent cues can enhance the journaling process by promoting emotional depth, richer memory recall, and more coherent narrative flow. Participant A demonstrated increased entry length and more associative writing when using scents, while Participant B reported improved quality within an established journaling habit. Both participants highlighted the role of scent in establishing a reflective ritual, supporting engagement and facilitating entry into a reflective mindset.

These results indicate that scent-driven journaling can be an effective tool for supporting creativity, emotional processing, and reflective practice. For interaction design, this work highlights the potential of olfactory cues as non-verbal prompts that scaffold user behavior and enhance experiential engagement. Beyond journaling, scent-based interactions may have applications in therapy, creative writing, and wellbeing interventions, particularly for practices requiring emotional recall or mindfulness.

Future work should explore larger, more diverse participant groups to validate these effects and examine cultural or individual differences in scent perception. Improvements to prototype fidelity, including automated scent release and intensity control, could further enhance the user experience. Additional research could also investigate long-term habit formation and the integration of multi-sensory cues into journaling and other reflective technologies. Overall, this study demonstrates the potential of olfactory cues to enrich personal expression and interaction design in everyday reflective practices.

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