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ORIGINAL RESEARCH

Unpacking olfactory marketing: initial evidence for the positive effects of scented parcels on post-order consumer responses in e-commerce

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Abstract

Can the scent of a parcel influence post-order consumer responses in e-commerce? This study presents initial evidence for the untapped potential of olfactory marketing in online retail. We conducted an incentivized laboratory experiment in which participants received either scented or unscented parcels containing a product from a fictional outdoor sports brand. The results demonstrate that scented parcels significantly improve the unpacking experience, product evaluation, and brand perception, including green brand equity. Furthermore, scented parcels increase post-order willingness to pay. Our findings lay the foundation for exploring olfactory marketing in digital retail settings and offer practical insights for online retailers. We conclude our report by discussing potential moderating factors and identify further research questions.

Keywords Olfactory marketing · E-commerce · Sensory marketing · Scent

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1 Introduction

Olfactory marketing constitutes a promising strategy to shape and enhance consumer experiences across various contexts. Specifically, the strategic use of scents in physical retail and service settings has profound effects on consumer responses (Roschk & Hosseinpour, 2020; Sarstedt et al., 2023) in a variety of environments such as retail stores (Madzharov et al., 2015), hotels (Anguera-Torrell et al., 2021), and restaurants (Moore, 2013). However, despite its widespread use in physical retail, little research has explored the effectiveness of olfactory marketing in e-commerce, which is projected to account for 17.31% of global retail revenue by 2024 (Statista Market Insights, 2024). Incorporating scents into parcels might be a feasible approach to integrate olfactory marketing into the e-commerce landscape.

Consumer decisions in e-commerce are organized in two stages: the initial decision to order the product and the post-order decision to keep or return the item (Wood, 2001). Our study explores the impact of scented parcels on key consumer responses in the post-order stage. The unpacking moment is critical to the overall customer experience as it influences perceived product quality (Wallenburg et al., 2021), shapes brand image (Moreau, 2020), and ultimately affects the decision to retain or return the product (Wood, 2001; Zhou et al., 2018). Although unpacking parcels often represents the first physical touchpoint with e-commerce brands (Heller et al., 2019), it remains largely underexplored in research on online retail environments (Moreau, 2020) and multisensory packaging (Krishna et al., 2017). Existing research on olfactory cues in e-commerce has primarily focused on online shopping experiences in scented environments (Kim & Shin, 2017; Vinitzky & Mazursky, 2011), artificial scents in end-user applications (Petit et al., 2019), and on evoking scent imagination through pictures in online shops (Sharma & Estes, 2024). While innovative, these approaches have rather limited practical relevance to current e-commerce practices.

In contrast, scented parcels are an opportunity to disseminate scented marketing materials (Bradford & Desrochers, 2009) during the post-order stage, without wasting resources on additional scented brochures or ads. Therefore, we conducted a laboratory experiment to investigate their impact on the unpacking experience, product evaluation, brand perception, and consumer decision-making. Importantly, the unpacking moment in our study creates a unique sensory situation where olfactory and visual information are perceived simultaneously, rather than sequentially as in most product-scent contexts (Biswas et al., 2021).

Previous research highlights the importance of scent congruence in shaping consumer responses (Bosmans, 2006; Errajaa et al., 2021). Given that congruence, rather than pleasantness alone, drives effectiveness (Rimkute et al., 2016; Roschk & Hosseinpour, 2020), our initial investigation examines the effect of a pleasant, brand- and product-congruent scent. We will return to these important moderators in the discussion.

2 *Unpacking* experience

Research indicates that pleasant ambient scents can enhance customer experiences in various contexts, including public transportation (Girard et al., 2019), supermarkets (Leenders et al., 2019), and hotel stays (Anguera-Torrell et al., 2021). For example, Girard et al. (2019) demonstrate that even unconsciously processed scents can significantly enhance customer experiences by improving perceptions of service quality and atmosphere. **H1:** Pleasantly and congruently scented (vs. unscented) parcels improve unpacking experiences.

3 Product evaluation

In e-commerce, product evaluations can influence customer lifetime value (Blattberg et al., 2009) and return rates (Ahsan & Rahman, 2022; Wood, 2001), so understanding if the positive effects of scents observed for product evaluations in physical retail extend to e-commerce is crucial. As such, research provides converging evidence that pleasant ambient scents improve product evaluations (Bone & Jantrania, 1992; Bosmans, 2006; Roschk & Hosseinpour, 2020). **H2:** Pleasantly and congruently scented (vs. unscented) parcels improve product evaluations.

4 Brand perception

Pleasant scents can improve brand evaluations in laboratory settings (Morrin & Ratneshwar, 2000) and physical stores (Madzharov et al., 2015). Nonetheless, the impact of scents on brand perception has received relatively little attention (Chatterjee, 2022) and remains underexamined (Girard et al., 2019). This gap is particularly significant for e-commerce, where brands are even more critical than in offline environments (González-Benito et al., 2015). We propose that scented parcels as a brand touchpoint can enhance brand perceptions in three ways. First, we hypothesize that the heightened sensory stimulation of scented parcels fosters multi-modal processing, leading to more vivid and pronounced brand personality perceptions (Errajaa et al., 2021; Roy et al., 2016). Second, we test whether congruent scents can improve perceptions of green brand equity, as, given the natural scent blend used in our study, the scent may act as a priming stimulus (Chen, 2010; De Luca & Botelho, 2020). Finally, building on findings that pleasant scents can boost recommendation intentions in physical retail (Chatterjee, 2022), we hypothesize a similar effect for brand recommendation intent in e-commerce. **H3**: Pleasantly and congruently scented (vs. unscented) parcels (a) alter consumers' perception of the brand personality, (b) increase perceived green brand equity, and (c) increase brand recommendation intentions (this prediction was not preregistered).

5 Consumer decision-making

In physical retail, scents can enhance purchase likelihoods (Spangenberg et al., 1996) and increase consumer expenditures (Roschk & Hosseinpour, 2020) and willingness to pay (*WTP*) (Fiore et al., 2000). In e-commerce, the initial purchase decision is made online, but the final decision to keep the product is made during parcel unpacking (Wood, 2001). In the post-order stage, consumers therefore have to gauge their desire to actually own the product contained in the parcel and might also reevaluate the initial price paid (Peck & Wiggins, 2006). Crucially, a post-order decline in customers' *WTP* vis-a-vis the fixed price of the initial order has been identified as a central factor for product returns (Saarijärvi et al., 2017). **H4:** Pleasantly and congruently scented (vs. unscented) parcels (a) increase customers' desire to own the product and (b) increase post-order *WTP*.

6 Materials and procedures

In line with Deer et al. (2025), the experiment was preregistered (https://aspredicted.org/YBG_T5M), and the data, as well as experimental materials and analysis scripts, are available on *OSF* (https://osf.io/g2cyv/?view_only=011ef75cb86f45fb882ddc54d8d1a36b).

For our experiment, we developed a fictional brand, *Pine Peaks*, positioned as an outdoor sports and hiking label and engraved the brand's logo on aluminum bottles (cf. Figure 1).

In the scope of a laboratory experiment, participants received the branded *Pine Peaks* water bottle either in a scented or an unscented parcel.

To ensure scent congruence (Bosmans, 2006; Errajaa et al., 2021), we ran a pre-study to select a scent congruent with the product and the brand. The pre-study

Fig. 1 Pine peaks logo & branded aluminum bottle

revealed that across the six scents tested, participants considered a blend of sandalwood, mountain pine, and lime as the scent most congruent with the *Pine Peaks* brand and branded bottle, which was thus chosen for the main experiment. Details on the pre-study can be found in Appendix B.

We followed the suggestions of Sarstedt et al. (2023) concerning scent intensity. Therefore, the insides of the parcels in the experimental group were sprayed with three bursts of essential oil (totaling 0.3 ml) an average of 20 min before the experiment. To prevent scent contamination, the experimental and control groups were tested separately, with sessions randomized across all dates to reduce systematic error (Kirkup et al., 2006).

Guided by Roschk and Hosseinpour's (2020) meta-analytic range of small-to-moderate scent effects (adj. $r \approx 0.08–0.18$; $d \approx 0.20–0.35$), our power analysis for $d = 0.30$ ($\alpha = 0.05$, 80% power) showed that we required at least 276 participants, which were recruited from the economic experiment panel at the *Technical University of Munich (TUM)*. Individuals with scent allergies or respiratory issues were excluded from participation. After the 30-min experiment, each participant received a 12 € incentive.

Upon arrival, participants were seated at workstations with a parcel and a desktop computer displaying the questionnaire. Instructions were provided onscreen, and participants were told not to open the parcels before being asked to do so.

To enhance predictive validity (Schramm, 2025; Schramm & Lichters, 2024) of our behavioral measures (see Section1.4), we employed an incentivized, sealed second-price auction mechanism (Vickrey, 1961). Participants were informed that after inspecting the content of the parcel, they can submit bids for the item (i.e., the water bottle) from 0 to 12 € in 10-cent increments. Within each experimental session, two bottles were auctioned off. Both the highest and second-highest bidders received the bottle, and the amount of the second-highest bid was deducted from their compensation. If 3 or more participants tied for the highest bid, all received a bottle. After passing a question on auction rule understanding, participants were asked to unpack the parcel, inspect its content and place a voluntary bid for the bottle.

The subsequent questionnaire assessed product evaluation using eight items capturing Garvin's (1984) dimensions of product quality (Performance, Features, Reliability, Conformance, Durability, Serviceability, Aesthetics, Perceived Quality) on a Likert scale from "*Very bad*" (1) to "*Very good*" (5) ($\alpha = 0.87$). Next, Brand personality was measured using Aaker's brand personality inventory (Aaker, 1997), including 41 items along five dimensions: sincerity ($\alpha = 0.86$), excitement ($\alpha = 0.89$), competence ($\alpha = 0.86$), sophistication ($\alpha = 0.82$), and ruggedness ($\alpha = 0.76$).[1] Green brand equity was assessed using Chen's (2010) inventory (example item: "It makes sense to buy this brand instead of other brands because of its environmental commitments, even if they are the same"; scale anchors "*Strongly disagree*" (1) to "*Strongly*

[1] To assess discriminant validity of the brand personality dimensions, we refer to HTMT analyses (Henseler et al., 2015; Ringle et al., 2023) conducted on the Experimental data. These indicate satisfactory discriminant validity, with only one borderline case above the common threshold of 0.85 (sophistication–excitement), which is considered acceptable in the context of multiple comparisons.

agree" (5); $\alpha = 0.80$). Recommendation likelihood was assessed by the 11-point *Net Promoter Score* (*NPS*). To assess participants' desire to own the product, we asked if they wanted to join a raffle for the remaining bottles. Subsequently, the unpacking experience was measured using a single item ranging from *I did not enjoy unpacking the product at all* (1) to *I enjoyed unpacking the product a lot* (5). Attention checks were embedded to ensure data quality (Oppenheimer et al., 2009). Finally, participants provided demographic information and were thanked for their participation. After determining the winning bids and subtracting the price of the bottle from winners' compensations, participants were paid and left the lab.

7 Results

A total of 304 participants took part in the experiment. After excluding those who failed at least two out of three attention checks, 300 participants (Age: $M = 25$, $SD = 5$; 148 female, 150 male, 2 unspecified) remained for analysis, with 165 in the experimental group and 135 in the control group. Randomization checks showed no systematic differences between groups (cf. Appendix B).

Due to the large sample size, *t*-tests were conducted for all hypotheses despite some Shapiro–Wilk tests indicating non-normality ($p < 0.05$). Nonetheless, for cases of unequal variances (Levene's test < 0.05), Welch's *t*-test was used (Delacre et al., 2017).

The group receiving scented parcels reported a marginally better unpacking experience (H1 supported). Furthermore, bottles from scented parcels were evaluated more favorably (H2 supported). Similarly, if the parcels were scented, the personality of our fictional brand was strengthened on all dimensions (H3a supported), the brand was granted more green brand equity (H3b supported), and was more likely recommended to friends and family (H3c supported). Finally, even though the desire to own the product was only descriptively higher in the group receiving scented parcels (H4a not supported), post-order *WTP* for bottles from scented parcels was higher than for bottles from non-scented parcels (H4b supported). The detailed results of the statistical tests can be found in Table 1.

8 Discussion

This experiment investigated the impact of olfactory marketing in e-commerce by examining how infusing parcels with a pleasant and brand-/product-congruent scent influences key post-purchase consumer responses. Specifically, our findings provide initial evidence that employing such scents in parcels improves the unpacking experience (H1), product evaluation (H2), pronounces and improves brand evaluation and recommendation intent (H3), and also increases *WTP* (H4b), suggesting a potential price premium of 24%. Compared to other experimental studies in olfactory marketing, this expenditure increase is at the upper level of observed effects (Roschk & Hosseinpour, 2020).

Table 1 Hypothesis tests

Hypothesis	Construct	Statistical Test	Treatment	Control	Test Statistic	*p*-value	Effect Size
			M (SD)	M (SD)			
H1	Unpacking experience	Welch´s t-test (one-sided)	3.88 (0.96)	3.67 (1.20)	$t(254.74) = -1.65$	.050	.19 *d*
H2	Product Evaluation	Welch´s t-test (one-sided)	27.77 (4.75)	26.19 (6.41)	$t(241.4) = -2.385$	.009	.28 *d*
H3a	Brand Personality Perception	PERMANOVA (Anderson, 2001)			$F(1, 298) = 8.13$	.002	.01 Pseudo R^2
	Sincerity	t-test (two-sided)	34.88 (7.04)	32.16 (8.29)	$t(298) = -3.077$	.002	.36 *d*
	Excitement	t-test (two-sided)	29.58 (7.52)	28.04 (8.45)	$t(298) = -1.668$	.096	.19 *d*
	Competence	Welch´s t-test (two-sided)	25.19 (5.71)	23.56 (6.78)	$t(262.46) = -2.216$	.027	.26 *d*
	Sophistication	t-test (two-sided)	16.04 (4.61)	14.67 (4.79)	$t(298) = -2.502$	.013	.29 *d*
	Ruggedness	t-test (two-sided)	17.21 (3.58)	15.99 (3.97)	$t(298) = -2.782$	.006	.32 *d*
H3b	Green Brand Equity	t-test (one-sided)	11.81 (3.05)	10.64 (3.39)	$t(298) = -3.16$	<.001	.37 *d*
H3c	Brand Recommendation	Welch´s t-test (two-sided)	4.60 (2.43)	3.87 (2.55)	$t(298) = -2.510$	.013	.29 *d*
H4a	Ownership Desire	χ^2-Test	$n = 130$ (79%)[a]	$n = 96$ (71%)[a]	$\chi^2(N = 300) = 1.96$	.161	.08 V
H4b	*WTP*	t-test (one-sided)	3.96 € (3.29€)	3.19 €; (2.87€)	$t(252) = -1.969$	.025	.25 *d*

[a]Reflects the total number of raffle participants and their share within each group

9 Practical implications

Scents present a novel and largely untapped way to improve e-commerce packaging. Effect sizes of the scent interventions in this study were higher than average for olfactory marketing settings (Roschk & Hosseinpour, 2020), suggesting that scent marketing could be even more effective in e-commerce than in traditional retail environments. Our finding that scented parcels increase consumers' post-order *WTP* indicates a potential for companies seeking to reduce return rates.

The results are particularly relevant for practitioners, as entry barriers to adding olfactory cues to parcels are low. From a technical standpoint, implementing scent marketing in e-commerce is cost-effective and technologically feasible, as various packaging technologies support the integration of scent, providing options for all business sizes Packaging with Scents, 2024; PackScent, 2024). Due to a lack of volume for industry-scaled solutions, small businesses face the highest incremental costs at 0.29 € per parcel (PackScent, 2024). Given the 24% increase in *WTP*, these costs are justified from a cart value of 1.21 €.

Observations from practice suggest that attention to scent stability during shipping and potential interactions with packaging materials should be paid. Specifically, practitioners report that factors such as sealing, temperature, and material type can impact scent retention, highlighting the need to optimize these conditions in real-world logistics.

Managers should recognize that the unpacking experience in e-commerce is distinct from traditional post-purchase contexts. It represents a critical second stage in the consumer's purchase decision process, where customers reassess their choice to keep or return the product (Wood, 2001). Product returns impose significant environmental, economic, and personal costs on businesses and consumers (Pfrang & Spreer, 2022). Our research shows that scented parcels can enhance the unpacking experience, increase *WTP*, and improve product ratings—factors closely linked to lower return rates (Ahsan & Rahman, 2022; Saarijärvi et al., 2017; Zhou et al., 2018). Furthermore, reduced customer returns (Rintamäki et al., 2021) and improved customer experience (Blattberg et al., 2009) can result in higher customer lifetime values, making olfactory cues in e-commerce a promising method to achieve better business outcomes.

Moreover, scented parcels present an innovative approach for e-commerce brand management. Our findings show that brand evaluation and recommendation intent can be enhanced by olfactory cues, which offers a potential approach to branding challenges in e-commerce (González-Benito et al., 2015). Given the temporal and situational proximity of the scent to the branded unpacking moment, it is likely that participants implicitly associate the scent with the brand. As the positive effects of scent can be stable over time (Girard et al., 2019), this could affect repurchase intentions (Chen-Yu et al., 2016).

Furthermore, olfactory marketing could be particularly beneficial in reducing the negative effects of bracketing orders—a common practice where consumers purchase multiple variations of a product (such as different colors) with the intention of keeping their preferred item and returning the rest (Saarijärvi et al.,

2017). While not the primary focus of our study, it would be valuable for practitioners to investigate whether adopting scented parcels enhances product evaluations enough to encourage customers to retain more items from bracketing orders, thereby reducing return rates and associated costs. Hereby, the applicability of scented parcels may depend on the product type, packaging material, and scent delivery method, and we recommend their use only in contexts where the scent aligns with the entire product category, such as mono-brand outdoor retailers, rather than in mixed-product marketplaces.

10 Theoretical contributions

This study makes two key contributions to the existing literature by introducing scented parcels as a new approach of olfactory marketing in e-commerce and demonstrating its impact on consumer behavior during the unpacking process.

First, by focusing on the critical stage of parcel unpacking, this research offers new insights into how marketing can shape consumer perceptions and behavior at a pivotal touchpoint in online shopping. This study is among the first to explore the application of innovative multisensory approaches in online shopping scenarios (Errajaa et al., 2021), where sensory experiences are traditionally limited (Heller et al., 2019).

Second, while prior research on e-commerce packaging design has focused on interventions like color, branding, and return labels (Moreau, 2020; Wallenburg et al., 2021; Zhou et al., 2018), this study introduces a new sensory experience by showing how scents can shape consumer responses in e-commerce.

11 Limitations and further research

This study has several limitations that should be acknowledged. First, laboratory experiments are inherently limited in external validity (Brewer & Crano, 2014). While the controlled environment allowed for precise manipulation, it may not capture how olfactory marketing affects consumers unpacking parcels at home, especially as home settings are often olfactory-rich environments influenced by situational (e.g., after cooking) or permanent (e.g., pets) factors. However, meta-studies show that effect sizes in olfactory marketing experiments are not significantly higher in laboratory than in field settings (Roschk & Hosseinpour, 2020), suggesting that similar effect sizes could be expected in the field.

Additionally, our focus on parcel unpacking during the post-order stage extends beyond the initial decision to order the product (Wood, 2001). While this may limit the implications of our findings to some degree, the purchase process is only completed after deciding to either keep or return an order. In the post-order stage immediately preceding this decision, consumers will often re-evaluate their initial purchases while the scented parcel can unfold its effect. Therefore, our finding that post-order WTP is increased by scented parcels suggests a more favorable re-evaluation of the price initially paid. Thus, consumers might be more

likely to keep the order. Our post-order WTP measure was capped at 12€ for practical reasons, but the small share of participants reaching this ceiling (< 3%) suggests minimal bias from truncation. Nonetheless, future research should replicate the effect in field settings to address these limitations, tracking key performance indicators such as return rates and repurchase probability directly.

Another limitation is that the study focused only on scent as parcel manipulation without considering how it interacts with other packaging interventions like branded boxes or colored packaging (Wallenburg et al., 2021; Zhou et al., 2018). Future studies could explore how olfactory and visual stimuli interact to impact consumer behavior in e-commerce, offering further insights to multi-sensory marketing in e-commerce.

The final limitation is that apart from gender (cf. Appendix C), our study did not examine potential moderators of the observed effect. Specifically, future research on olfactory marketing in e-commerce should explore the moderating effects of stimulus features, such as congruence, valence, and intensity, as well as responder characteristics, including affective state, scent awareness, and personal scent preferences (Chatterjee, 2022; Rimkute et al., 2016; Roschk & Hosseinpour, 2020; Sarstedt et al., 2023).

In a related vein, our study did not shed light on the psychological mechanisms behind the observed changes in consumer outcomes. While this allowed us to explore the effects of scented parcels more broadly, future research should explore underlying psychological mechanisms. One promising framework to explain the observed effects is the Feelings-as-Information Theory (Krishna & Schwarz, 2014; Schwarz, 2012), which posits that people often rely on their affective states as informational cues when making judgments, which can be induced by scent. Evidence from offline settings suggests that pleasant scents improve the evaluation of the environment (Chebat & Michon, 2003) and generally induce a positive mood in the customers (Herz, 2009; Leenders et al., 2019). However, Morrin and Ratneshwar (2000) concluded that neither mood nor arousal mediated the positive effects of brand evaluation. When it comes to more cognitive effects, these researchers argue that pleasant scents increase consumers' attention, which facilitates recall. At the same time, scents might, therefore, increase processing fluency, and the accompanying positive affective reaction might again influence consumers' reaction toward the product or brand. Moreover, Bosmans (2006) argued that the positive effect of scents is robust in conditions of high and low processing motivation, which also tentatively supports the idea of a heuristic judgment underlying the effects. Following this theorizing, scented parcels might elicit positive affective reactions which then enter judgments about the product in the parcel. Researchers could leverage affect misattribution paradigms to examine if participants who are led to discount the information conveyed by their affective responses show attenuated effects of scents. In any case, gaining deeper insights into the psychological mechanisms driving the effect of scented parcels will not only advance the scientific knowledge about consumer behavior but will also inform the successful application of this novel and promising approach to improve customer responses in e-commerce.

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Data Availability The data that support the findings of this study are available on the Open Science Framework (OSF) at the following link: https://osf.io/g2cyv/?view_only=011ef75cb86f45fb882ddc54d8d1a36b.

Declarations

Ethical approval The experiment received ethics approval from the German Association for Experimental Economic Research (https://gfew.de/ethik/eGwcXcav).

Informed consent All participants involved provided written informed consent before participation.

Conflict of interest The authors declare no conflict of interest.

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