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GENDER DIFFERENCES IN VISUAL ATTENTION AND STATED PREFERENCES DURING EVALUATION OF BATTERY ELECTRIC VEHICLES: AN EXPLORATORY EYE-TRACKING STUDY

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Resume
In this exploratory study were examined the gender differences in visual attention and stated preferences during the evaluation of battery electric vehicles (BEVs) using eye-tracking. Thirty-two participants (18 men, 14 women) viewed static images of the ten top-selling BEVs in Slovakia while eye movements were recorded across four predefined Areas of Interest (AOIs). Vehicle design attracted the greatest absolute dwell time in both groups. No gender difference reached conventional statistical significance (all $p > 0.05$), yet medium effect sizes were obtained for brand ($d = 0.69$), acceleration ($d = 0.67$), vehicle equipment ($d = 0.60$) and trunk capacity ($d = 0.53$), all rated higher by women, whereas men more often cited driving range as the main reason for model choice. The findings are hypothesis-generating and motivate confirmatory research with larger, purposively balanced samples.

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1 Introduction

The European Union's ambition to achieve climate neutrality by 2050 has accelerated the transition towards electromobility, positioning battery electric vehicles (BEVs) as a cornerstone of sustainable transport policy. In 2023, BEVs accounted for 14.6% of new car registrations in the EU, up from 12.1% in 2022 [1]. Despite this momentum, consumer hesitancy remains a structural challenge, particularly in Central and Eastern European markets characterised by lower average incomes, limited charging infrastructure, and high price sensitivity.

Slovakia presents a particularly instructive case. With only 2,227 newly registered BEVs in 2024, a 2.38% market share, Slovakia remains one of the lowest BEV-penetration markets in the EU [2]. Structural constraints, including underdeveloped public charging networks and fragmented policy incentives, impede mass-market adoption [3].

Affective responses play a central role in electric vehicle evaluation [4], and gender is among the most consistently identified moderators of automotive consumer behaviour [5]. Heterogeneity in consumer preferences, including pro-environmental orientation, is well established in vehicle-choice modelling [6], and European research documents systematic differences between male and female consumers in the attributes they prioritise when selecting a vehicle and in their responsiveness to brand and emotional cues [7]. However, the application of biometric methods, particularly eye-tracking, to examine gender-specific patterns within the BEV context has received limited attention.

This study is an extension of a prior research by the present authors [8], which identified overall visual attention patterns in BEV evaluation without disaggregating findings by gender. In the present study, the gender was treated as the primary analytical

variable, combining the eye-tracking data with a structured interview to reveal how men and women differ both in how they visually process commercial BEV imagery and in what attributes they prioritise when making model choices. Given the convenience sample and its size, the study was explicitly exploratory: its purpose is to estimate the direction and magnitude of gender-related differences and to generate hypotheses for subsequent confirmatory testing, rather than to test pre-specified hypotheses. No hypotheses were formulated in advance and no analysis plan was pre-registered.

2 Literature review

Research relevant to this study spans market-level analyses of electromobility adoption, behavioural work on the determinants of BEV choice, and the smaller literature applying biometric methods to consumer evaluation. Gender recurs across all three as a moderator, but rarely as the primary variable, and almost never in combination with eye-tracking in a Central European market.

2.1 Electromobility and the European market context

Electromobility has emerged as a structural priority within the EU's Green Deal framework, driven by binding CO_2 reduction targets and the proposed 2035 ban on new internal combustion engine vehicle sales [1]. The environmental case for electrification is the strongest in high-mileage applications: replacing a conventional ride-hailing vehicle with a BEV delivers approximately three times the emission-reduction benefit of replacing a privately used car [9]. Empirical analysis confirms that EU-level CO_2 targets for passenger cars are both technically achievable and economically feasible [10]. At the same time, the transition entails systemic sustainability challenges that extend beyond vehicle sales, notably end-of-life battery waste and recycling capacity [11]. Nevertheless, adoption trajectories diverge substantially across member states, reflecting heterogeneity in GDP per capita, fiscal policy, infrastructure density, and consumer readiness. Comparative analysis of BEV and PHEV market development across European countries indicates that electrification trajectories are linked not only to fiscal and infrastructural conditions but to the diffusion of vehicle automation technologies, as well [12].

Slovakia's BEV adoption remains structurally constrained. As of end-2024, only 15,476 BEVs were registered on Slovak roads, a 53% year-on-year increase, yet still representing a marginal fleet share [2]. The Slovak market remains highly price-sensitive: official new-BEV sales are among the lowest in the EU, and individually imported vehicles account for the majority of BEV additions [2]. Prior Slovak research on electromobility has primarily addressed infrastructure and policy frameworks [13], leaving consumer-level behavioural research underexplored.

2.2 Consumer behaviour in BEV adoption

Consumer decision-making in BEV contexts is shaped by a combination of instrumental, hedonic, and symbolic factors [14]. National fiscal policies strongly steer consumers' powertrain choices [15], while the price and range per charge consistently emerge as the most frequently cited functional barriers across European consumer studies [10, 16]. Charging speed and infrastructure availability are identified as the secondary but increasingly prominent concerns [17]. Beyond functional attributes, affective and symbolic dimensions play a significant role. Moons and De Pelsmacker [4] demonstrated that emotional responses towards electric vehicles are among the strongest predictors of BEV usage intention. Brand perception functions as a powerful heuristic cue, conveying implied quality and reducing perceived purchase risk [18]. Recent research confirms that design aesthetics, brand equity, and consumer trust jointly mediate BEV purchase intention [19].

2.3 Gender as a determinant of BEV preferences

Individual difference variables are established predictors of behaviour and outcomes across transport contexts: occupational stress and personality traits, for example, differentiate incident involvement among professional drivers [20]. Gender consistently moderates BEV adoption behaviour. Sovacool et al. [21] analysed data from five Nordic countries and found that gender significantly shapes electric mobility preferences: the male consumers exhibited stronger interest in performance-related attributes, such as acceleration and top speed, while the female consumers expressed greater concern about practical utility and environmental benefits. Haustein and Jensen [7] corroborated these findings in a Danish-Swedish sample, identifying BEV owners as predominantly male, highly educated, and higher-income.

More recent market research underscores the commercial significance of the gender gap. A 2024 industry study found that only 30% of women were familiar with BEVs compared to 55% of men, and that men comprised 71% of BEV owners [22]. Research on female new energy vehicle consumers reveals that brand loyalty, trust, and perceived performance drive female purchase intention [5], while men engage more extensively with technical specifications during the

Table 1 *Participant characteristics by gender*

Characteristic	Category	All n	All %	Women, n (%)	Men, n (%)
Gender	Female	14	43.8	-	-
	Male	18	56.3	-	-
Age group	18-28	9	28.1	4	5
	29-44	12	37.5	3	9
	45-60	9	28.1	7	2
	61-79	2	6.3	0	2
BEV experience	Yes	18	56.3	7 (50)	11 (61)
	No	14	43.8	7 (50)	7 (39)
Trips >200 km	Weekly	10	31.3	2 (14)	8 (44)
	Monthly	9	28.1	5 (36)	4 (22)
	Quarterly+	13	40.6	7 (50)	6 (33)

Note: Percentages may not sum to 100 due to rounding.

pre-purchase research [22]. Marketing communication itself influences EV purchase intention only indirectly, through perceived value and brand preference [23]. Range anxiety remains a central psychological barrier that also shapes willingness to pay for charging [24], and industry evidence indicates that women face a broader set of adoption barriers than men [22].

2.4 Eye-tracking in consumer and marketing research

Eye-tracking is a well-established biometric methodology in neuromarketing and consumer psychology, providing objective, real-time data on visual attention allocation [25]. Key metrics include fixation count, dwell time, first fixation duration, entry time, and revisit frequency [25-26]. Studies consistently demonstrate that certain visual elements, particularly brand logos and price information, capture attention rapidly [27]. Research in virtual retail environments confirmed that dwell time and fixation count are robust indicators of consumer engagement [28].

Research on gender differences in visual processing has revealed systematic variations in gaze patterns. A study found that men and women differ in how they allocate visual attention to advertising stimuli [29]. Neurophysiological research confirmed that female participants show longer visual attention to aesthetically rich stimuli [30]. In FMCG advertising contexts, gender-differentiated eye-tracking scan paths were found to shape attention capture and perceived trustworthiness [31]. The integration of eye-tracking with post-experimental structured interview methods provides methodological triangulation that captures both unconscious, bottom-up attentional processes and top-down deliberate evaluation [8]. More broadly, instrumental and sensor-based measurement methods have become increasingly established across transport research applications [32].

3 Methodology

The study combined two measurement modes applied to the same participants within a single session: an eye-tracking recording of visual attention to commercial BEV imagery, and a structured interview capturing the attributes that participants said mattered to them. The recording always preceded the interview, so that the questions could not direct attention during stimulus viewing.

3.1 Participants

A total of 32 participants took part in the study, comprising 18 men (56.3%) and 14 women (43.8%). Participants were recruited on a voluntary basis from the university and surrounding community without financial compensation. Fifty-six percent reported prior BEV experience. Men showed higher weekly travel frequency exceeding 200 km (44.4% vs. 14.3% of women). Detailed sample characteristics are presented in Table 1.

3.2 Stimuli and apparatus

Participants were shown the high-resolution static images of ten BEV models representing the best-selling electric vehicles in Slovakia during Q1 2024: Tesla Model Y, Tesla Model 3, Volvo EX30, MG 4, Volkswagen ID.4, Volkswagen ID.3, Skoda Enyaq, Volvo EX40, BMW iX1, and Audi Q4 e-tron. Each stimulus presented the vehicle image alongside the key commercial information (brand logo and name, range per charge, price, and vehicle specifications). Each image was displayed for 10 seconds on a 24-inch monitor at a viewing distance of approximately 65 cm. Eye movements were captured using the SMI RED remote eye-tracker with data recorded via SMI BeGaze software [33].

The five models subjected to gender-disaggregated

analysis, Audi Q4 e-tron, Skoda Enyaq, Volvo EX40, BMW iX1 and Tesla Model 3, were the five most frequently nominated models in a post-exposure structured interview asking which vehicle participants would realistically choose if making a purchase decision (n = 8, 7, 5, 5 and 3 respectively; Table 3). All five also featured in the European and national H1 2024 BEV sales rankings [34-35]. The remaining models attracted two or fewer nominations each (Tesla Model Y, n = 2; MG 4 and Volvo EX30, n = 2, in total) and were not analysed separately, because subgroup statistics based on so few preference-consistent responses would not be interpretable. This selection aligns the analysed stimulus set with both market relevance and participant purchasing intent. It was, however, applied after the data collection and is derived from the same participants whose gaze data are analysed; the resulting constraint on interpretation is addressed in the limitations.

3.3 Areas of interest and metrics

Four Areas of Interest (AOIs) were manually defined for each stimulus: (1) vehicle design: the visual representation of the car body; (2) brand: the manufacturer's logo and name; (3) range per charge: the displayed range figure; and (4) price: the retail price indicator. Figure 1 illustrates the AOI layout. Eye-tracking metrics extracted per AOI included dwell time, fixation count, first fixation duration, entry time, and revisit frequency. Tables 5 to 8 report the dwell time (in milliseconds and as a percentage of the 10 s exposure), fixation count, first fixation duration, and the number of revisits. First fixation duration denotes the length of the first fixation falling within the AOI; it does not indicate when that fixation occurred.

The four AOIs differed considerably in area and in position within the stimulus. The design AOI enclosed the whole vehicle body and occupied the central region of the image, whereas the brand, range, and price AOIs were small text fields located peripherally. Since both AOI area and eccentricity relative to the initial gaze position influence the dwell time and fixation count [25], absolute dwell times are not directly comparable between AOIs of unequal size, and the comparisons reported in Sections 4.3 to 4.6 should be read with this constraint in mind.

3.4 Post-experimental structured interview

Immediately after the eye-tracking session, each participant took part in an individual structured interview conducted by a member of the research team. The interview was governed throughout by a fixed questionnaire protocol and covered: (1) demographics; (2) mobility profile; (3) BEV experience; (4) importance ratings of nine EV selection attributes on a 7-point Likert scale (1 = not important, 7 = very important); (5) preferred model selection with up to three stated reasons, recorded as an open-ended response and subsequently coded into the attribute categories reported in Table 4; and (6) rated likelihood of choosing a BEV over an ICE vehicle (scale 1-10). All items except (5) had fixed response formats; the instrument is therefore described as a structured interview rather than an in-depth interview. The order of the two stages was fixed rather than counterbalanced: the eye-tracking measurement always preceded the interview, so that the questions could not direct participants' attention during stimulus viewing.

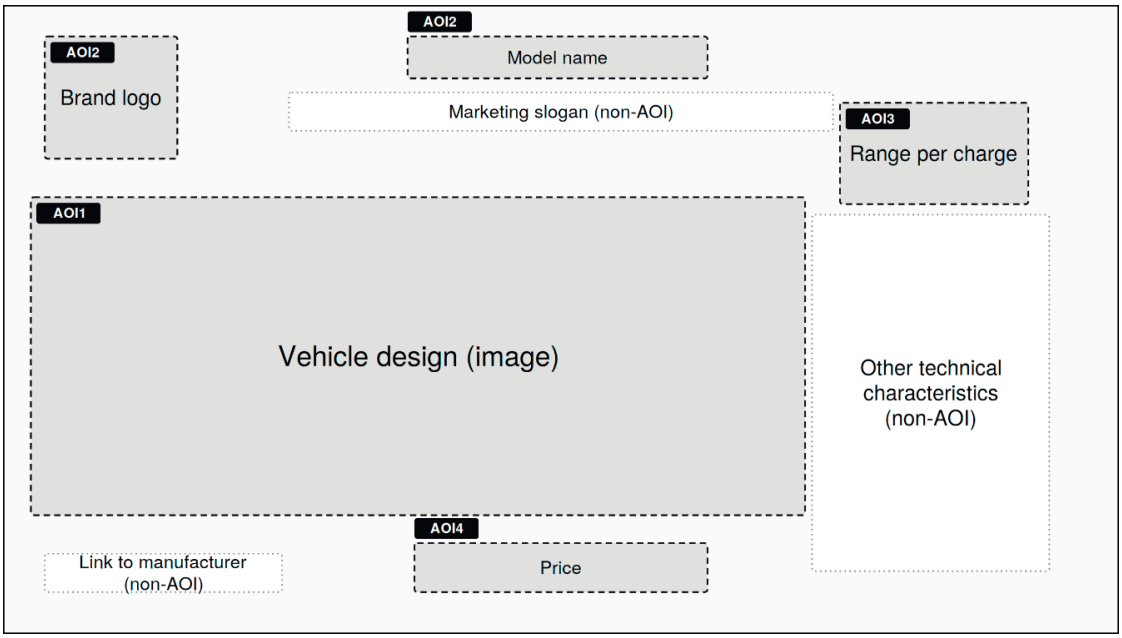

Figure 1 *Principal layout of the visual stimulus with the four defined AOIs*

3.5 Statistical analysis

Gender differences in attribute importance ratings (Table 2) were assessed using the Welch's independent-samples t-test, which does not assume equal variances and is robust to unequal sample sizes (n_2=14 women, n_1=18 men). Since the primary data export provided pooled and female subgroup statistics, the men's standard deviations were recovered algebraically from the pooled statistics (given n, M and SD of the total sample and the female subgroup, the male SD is uniquely determined); this recovery is exact, not an estimate. Effect size was quantified using Cohen's d, with conventional thresholds of 0.20 (small), 0.50 (medium), and 0.80 (large). Stated reasons for model choice were compared across genders by Spearman's rank correlation coefficient (ρ). Model preference distributions were examined using Pearson's chi-square test; where expected cell frequencies fell below five, results are reported descriptively. The significance threshold was set at α = 0.05 (two-tailed). Since the study is exploratory, the nine comparisons were not corrected for multiple testing; the p-values are consequently nominal and are reported for descriptive purposes only. Analyses were performed in SMI BeGaze 3.7.59 and MS Excel 365.

4 Results

The stated and the recorded data are reported separately, so that what participants said mattered can be set against where they actually looked. In Sections 4.1 and 4.2 are presented the attribute importance ratings and the model preferences obtained in the interview. In Sections 4.3 to 4.6 are reported the eye-tracking metrics for each Area of Interest across the five models analysed in detail.

4.1 Gender differences in attribute importance

Table 2 presents importance ratings (M) and standard deviations (SD) for all nine BEV selection attributes disaggregated by gender, alongside the Welch t-test statistics, two-tailed p-values, and Cohen's d effect sizes. No comparison reached the α = 0.05 threshold. Nevertheless, two attributes exhibited medium-to-large effect sizes: Acceleration (d = 0.67, t(26) = 2.04, p = 0.052) and Brand (d = 0.69, t(30) = 1.99, p = 0.056). Two further attributes, Vehicle equipment (d = 0.60) and Trunk capacity (d = 0.53), showed medium effect sizes, while Vehicle design (d = 0.47) fell just below the medium threshold. The absence of

Table 2 *Importance ratings of BEV selection attributes by gender (Likert scale 1-7, sorted by overall mean)*

Attribute	Women M (SD)	Men M (SD)	Δ (W-M)	t (df)	p	d
Fast charging time	6.21 (1.63)	6.44 (1.41)	-0.23	-0.42 (26)	0.678	0.15
Acceleration (0-100 km/h)	6.71 (0.73)	5.89 (1.49)	+0.82*	2.04 (26)	0.052	0.67
Brand	6.21 (1.12)	5.33 (1.38)	+0.88*	1.99 (30)	0.056	0.69
Top speed	5.86 (1.70)	5.44 (1.43)	+0.42	0.74 (25)	0.464	0.27
Range per charge	5.50 (1.70)	5.50 (1.70)	0.00	0.00 (28)	1.000	0.00
Price	5.14 (1.35)	5.17 (1.92)	-0.03	-0.05 (30)	0.959	0.02
Vehicle equipment	5.29 (1.73)	4.28 (1.64)	+1.01	1.68 (27)	0.105	0.60
Vehicle design	4.71 (1.38)	3.94 (1.80)	+0.77	1.37 (30)	0.181	0.47
Trunk capacity	4.57 (1.40)	3.83 (1.39)	+0.74	1.49 (28)	0.148	0.53

Note: Δ = women minus men; d = Cohen's d (absolute value); * denotes 0.05 < p ≤ 0.10. None of the nine comparisons reached the α = 0.05 threshold. Acceleration (d = 0.67) and Brand (d = 0.69) yielded the largest point estimates, but at n = 32 the data do not distinguish between medium-sized gender differences and their absence. The p-values are nominal and are reported descriptively (Section 3.5).

Table 3 *Preferred BEV model by gender*

Model	All n	All %	Women, n (%)	Men, n (%)	Rank W/M
Audi Q4 e-tron	8	25.0	5 (35.7)	3 (16.7)	1st / 2nd
Skoda Enyaq	7	21.9	3 (21.4)	4 (22.2)	2nd / 1st
Volvo EX40	5	15.6	2 (14.3)	3 (16.7)	3rd / 3rd
BMW iX1	5	15.6	2 (14.3)	3 (16.7)	3rd / 3rd
Tesla Model 3	3	9.4	0 (0.0)	3 (16.7)	- / 3rd
Tesla Model Y	2	6.3	1 (7.1)	1 (5.6)	5th / 5th
MG 4 / Volvo EX30	2	6.3	1 (7.1)	1 (5.6)	5th / -

Table 4 *Frequency of stated reasons for BEV model choice by gender*

Attribute	Women n	Men n	Women rank	Men rank
Vehicle design	9	8	1st	4th
Brand	8	10	2nd	3rd
Price	7	11	3rd	2nd
Range per charge	5	12	4th	1st
Fast charging time	4	3	5th	5th
Vehicle equipment	3	3	6th	5th
Trunk capacity	3	1	6th	7th
Acceleration	1	1	8th	7th

Note: Participants stated up to three reasons; not all provided three, hence column totals (women n = 40, men n = 49) are below the theoretical maxima (42 and 54).

Table 5 *Eye-tracking metrics for AOI "Design"*

Model	Dwell Time, ms (%)	Fixations	First Fix. Duration (ms)	Revisits
Audi Q4 e-tron	2,668.5 (26.7)	9.8	176.0	2.2
BMW iX1	2,512.3 (25.1)	8.6	162.5	2.5
Skoda Enyaq	2,465.4 (24.6)	7.5	187.5	2.3
Volvo EX40	2,227.9 (22.3)	7.6	256.2	2.1
Tesla Model 3	1,645.7 (16.4)	5.8	204.2	1.8

statistical significance, despite the substantial effect sizes, reflects limited statistical power at n = 32; a post-hoc power analysis ($\alpha = 0.05$, $d = 0.65$) yields power ≈ 0.38, indicating the study was underpowered to detect these differences reliably. Fast charging time, Range per charge, and Price showed negligible gender differences ($d < 0.20$).

4.2 Model preference and purchase rationale by gender

Table 3 summarises model preferences by gender. Table 4 presents the frequency of attributes cited as the three main reasons for model choice.

Audi Q4 e-tron was the most preferred model overall (n=8; 25.0%), with disproportionate female preference (35.7% of women vs. 16.7% of men). Tesla Model 3 was selected exclusively by three male participants, while no female participant selected it. A Pearson chi-square test on the five-model preference distribution did not reach significance ($\chi^2(4) = 3.54$, $p = 0.471$); however, expected cell frequencies fell below five for several cells (min. expected = 1.29), precluding reliable inference. Results should therefore be interpreted descriptively. Regarding the attribute-level purchase rationale (Table 4), a Spearman rank correlation between women's and men's attribute citation frequencies indicated strong rank agreement in the overall ranking pattern ($\rho = 0.73$), suggesting that both genders share a common attentional hierarchy while differing in the relative emphasis placed on design versus range. With eight attributes and tied ranks, the associated p-value is approximate and is therefore not reported as evidence of statistical significance.

4.3 Eye-tracking AOI results: design

Vehicle design attracted the highest visual engagement across all five analysed models (Table 5). Dwell times ranged from 1,645.7 ms (Tesla Model 3; 16.4%) to 2,668.5 ms (Audi Q4 e-tron; 26.7%), with a near-universal hit ratio of 93.8%.

Figure 2 shows the gender-disaggregated eye-tracking outputs for the Audi Q4 e-tron, revealing that female participants concentrated gaze on the vehicle's front facade and brand emblem, consistent with their higher importance ratings for design and brand. Male participants' gaze was more spatially distributed across the stimulus.

4.4 Eye-tracking AOI results: brand

Brand AOIs elicited moderate but consistent engagement (Table 6). Tesla Model 3 generated the highest brand dwell time (654.1 ms; 6.5%), attributable to high global brand recognition. Audi Q4 e-tron recorded the lowest brand dwell time (455.2 ms; 4.5%), suggesting that Audi's brand identity may be inferred from design cues rather than requiring explicit logo verification.

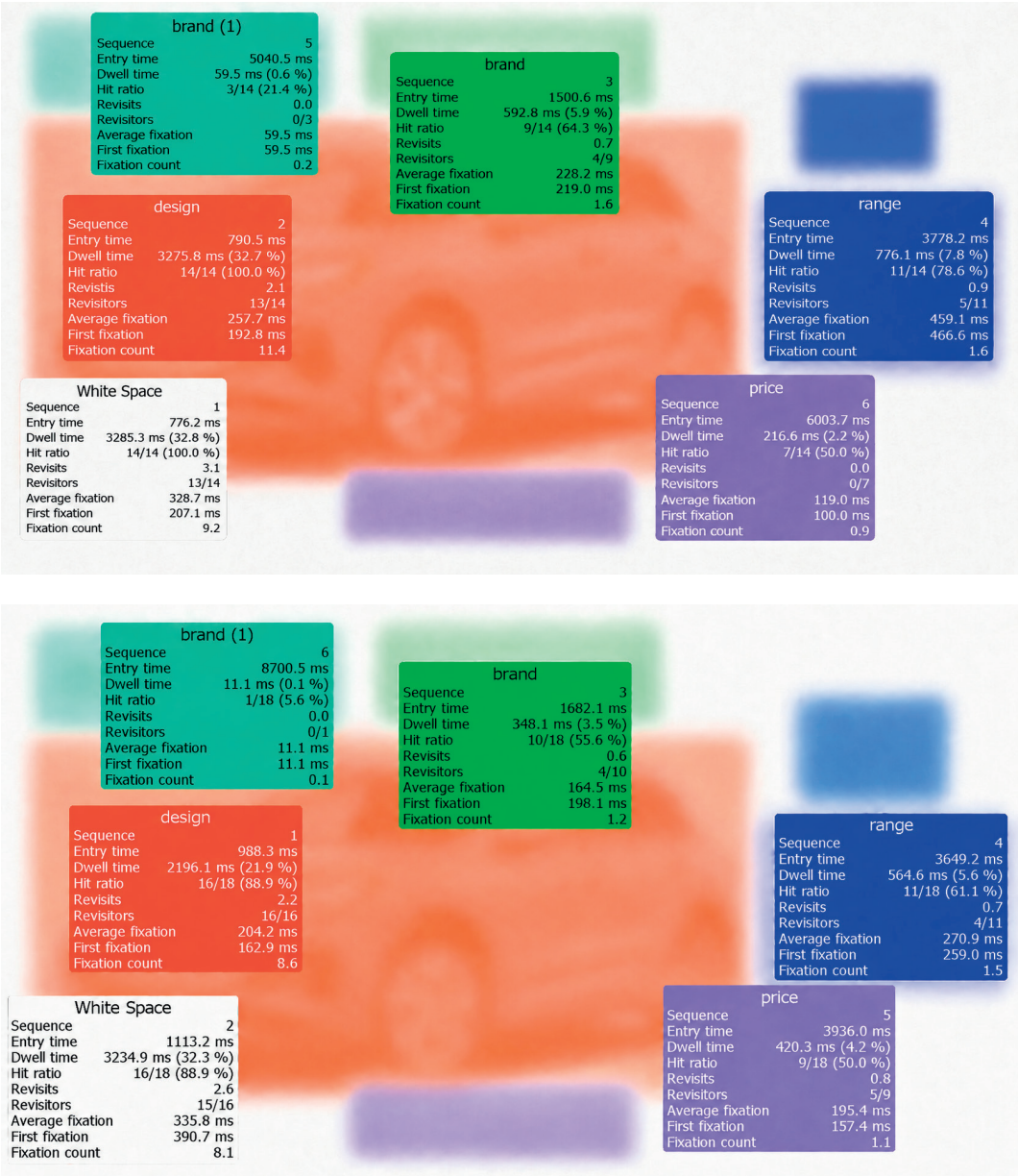

***Figure** 2 Eye-tracking outputs for Audi Q4 e-tron – women (n = 14, top) vs. men (n = 18, bottom). Source of eye-tracking output: SMI BeGaze*

***Table 6** Eye-tracking metrics for AOI "Brand"*

Model	Dwell Time, ms (%)	Fixations	First Fix. Duration (ms)	Revisits
Tesla Model 3	654.1 (6.5)	2.2	202.1	1.2
Skoda Enyaq	613.5 (6.1)	1.8	246.8	0.5
BMW iX1	519.8 (5.2)	1.5	213.5	0.8
Volvo EX40	517.6 (5.2)	1.5	248.9	0.7
Audi Q4 e-tron	455.2 (4.5)	1.3	207.3	0.6

4.5 Eye-tracking AOI results: range

Despite being rated as highly important (M=5.50), the range AOI attracted comparatively modest visual attention (Table 7). Volvo EX40 and Audi Q4 e-tron attracted the most engagement (672.9 ms and 657.1 ms respectively), while BMW iX1 registered the lowest (492.7 ms). One possible explanation is that participants inferred range from brand reputation rather than verifying the displayed figures; this was not tested directly.

Table 7 *Eye-tracking metrics for AOI "Range"*

Model	Dwell Time, ms (%)	Fixations	First Fix. Duration (ms)	Revisits
Volvo EX40	672.9 (6.7)	1.6	264.6	0.7
Audi Q4 e-tron	657.1 (6.6)	1.6	349.9	0.8
Skoda Enyaq	609.3 (6.1)	1.4	264.5	0.8
Tesla Model 3	564.5 (5.6)	1.1	307.3	0.3
BMW iX1	492.7 (4.9)	1.1	304.1	0.5

Table 8 *Eye-tracking metrics for AOI "Price"*

Model	Dwell Time, ms (%)	Fixations	First Fix. Duration (ms)	Revisits
Tesla Model 3	603.1 (6.0)	1.7	212.5	0.4
BMW iX1	387.4 (3.9)	1.6	115.6	0.9
Audi Q4 e-tron	331.2 (3.3)	1.0	132.3	0.4
Skoda Enyaq	263.5 (2.6)	0.9	123.9	0.2
Volvo EX40	171.8 (1.7)	0.6	131.2	0.2

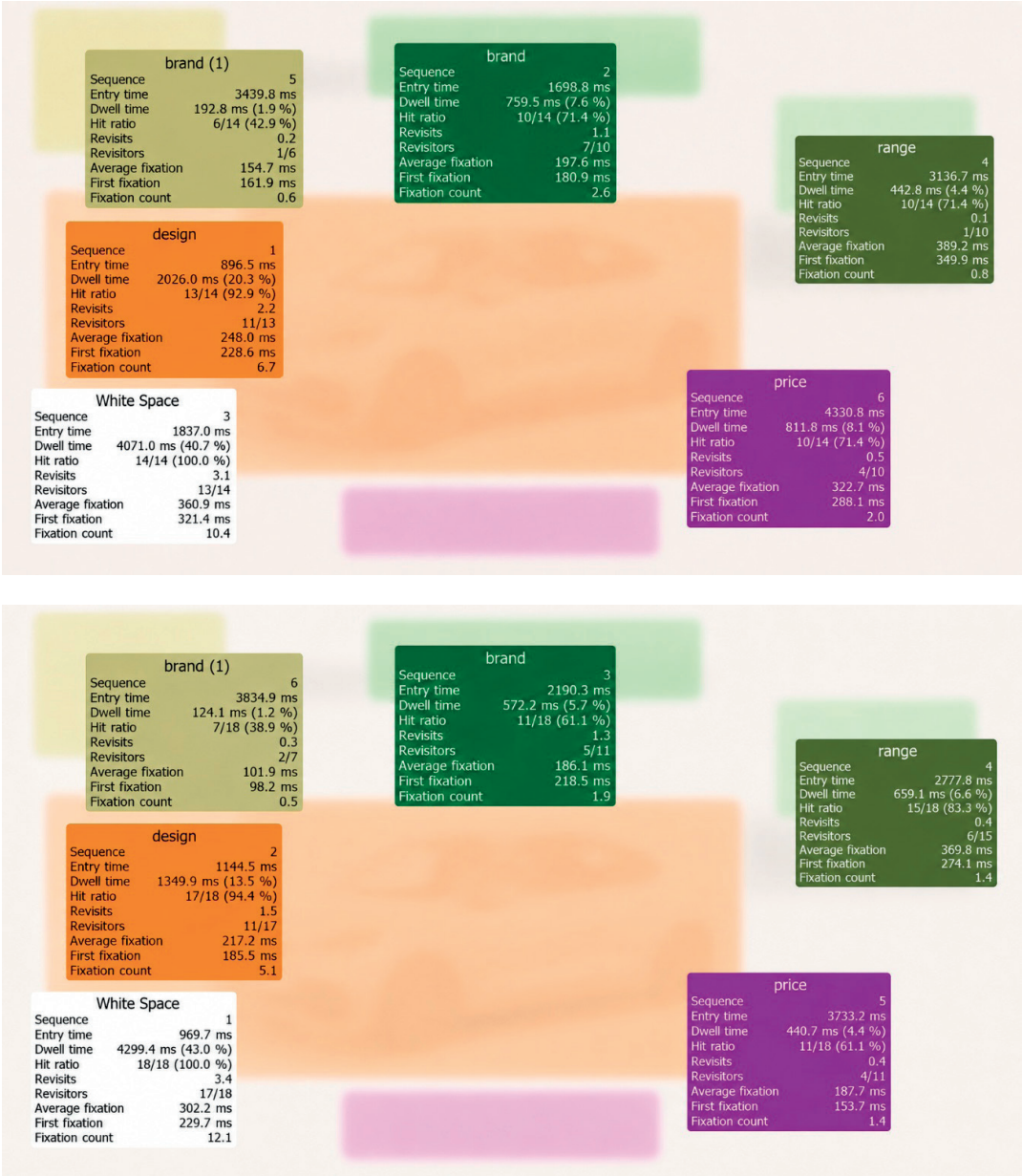

Figure 3 *Eye-tracking outputs for Tesla Model 3 – women (n = 14, top) vs. men (n = 18, bottom). Source of eye-tracking output: SMI BeGaze*

4.6 Eye-tracking AOI results: price

Price received the lowest visual engagement of all four AOIs despite being rated among the top three purchase reasons by both genders (Table 8). Tesla Model 3 generated the highest price-related dwell time (603.1 ms; 6.0%). Figure 3 illustrates gender-disaggregated outputs for Tesla Model 3, where female participants - who did not ultimately select this model - showed more diffuse attention across the stimulus, while male participants concentrated gaze on the vehicle body and brand.

5 Discussion

The dominance of vehicle design as the primary AOI across both genders aligns with the well-established primacy of aesthetic evaluation in consumer product assessment [19] and with recent market evidence: a 2026 survey of new-vehicle buyers found that interior and exterior design outrank brand, range, and charging performance as motivators of BEV choice [36]. It should also be noted that the design AOI was the largest region of each stimulus and the closest to the initial gaze position. Larger and more central regions accumulate dwell time and fixations partly for geometric reasons, so the observed ranking of AOIs is not attributable to informational content alone. The metrics reported here do not establish the time course of attention: first fixation duration measures the length of the first fixation within an AOI, not the moment at which it occurred. The present design does not permit a causal claim about the effect of design investment on consumer engagement, nor about the ordering of attentional and deliberative processes.

The gender-related tendencies observed in this sample are directionally consistent with international research but reveal potentially market-specific nuances. The female prioritisation of brand and design over range (reflected in stated reasons: design 1st vs. 4th for women and men respectively; range 4th vs. 1st) aligns with findings from Boscolo et al. [29] on gender differences in advertising attention and may suggest distinct entry points for targeted marketing communication. However, it should be noted, that these differences did not reach statistical significance (Brand: $p = 0.056$; Vehicle design: $p = 0.181$), and the limited sample precludes firm prescriptive conclusions. Replication with larger samples is warranted before these patterns are applied directly to commercial strategy.

The reversal of the expected acceleration preference - with women rating this attribute higher than men (6.71 vs. 5.89) - may reflect the age distribution: seven of fourteen women were aged 45-60, a group that may associate responsive acceleration with driving comfort and safety rather than performance signalling. This interpretation is consistent with evidence that gender shapes the weighting of instrumental and safety-related vehicle attributes: Lieven et al. [37] found that the female car buyers prioritise safety over performance symbolism, and Sovacool et al. [21] documented systematic gender differences in electric mobility preferences, with women placing greater emphasis on practical and safety-relevant attributes. This observation is a reminder that gender should not be treated as a monolithic segmentation variable, although a single non-significant comparison cannot itself support that conclusion.

The finding that Tesla Model 3 attracted zero female preference, while all male Tesla-preferring respondents cited brand, is compatible with the proposition that BEV brands may carry gendered associations, although it rests on three male and no female nominations and is reported as an observation only. Tesla's identity, centred on technological performance and minimalist design, appears more resonant with male participants in this study, consistent with prior work on symbolic vehicle attributes and gender [14, 37]. This is a descriptive observation based on small frequencies (n=3 male Tesla choosers, n=0 female), and should be treated as hypothesis-generating rather than confirmatory.

The implicit-explicit discrepancy for price and range, highly declared importance ($M > 5.1$) but low visual engagement (dwell times below 700 ms), is consistent with research documenting divergence between explicit and implicit consumer responses [27-28]. A comparable divergence between self-reported and behaviourally derived measures has been reported in other assessment domains, where skill levels inferred from observed behaviour differed from participants' own self-assessments [38]; this suggests a general property of self-report methods rather than a domain-specific artefact. A plausible interpretation is that participants had pre-formed price and range expectations anchored to brand associations, reducing the need for direct visual inspection. A second, non-exclusive interpretation concerns the mode of data collection: the stated measures were obtained in a face-to-face structured interview rather than through an anonymous self-completed instrument, and stated importance is exposed to social desirability in a way that visual attention is not. This finding is consistent across both genders (price: $d = -0.02$; range: $d = 0.00$) and may reflect a general heuristic rather than a gender-specific pattern.

6 Conclusions

In this exploratory study, gender differences in the visual evaluation of battery electric vehicles were examined using eye-tracking technology and post-experimental structured interviews with 32 participants. The following principal conclusions are drawn:

(1) Vehicle design attracted the most visual attention in this sample. Across all five analysed models, the design AOI recorded the highest dwell times

and fixation counts in the pooled data, exceeding the commercial information fields by a factor of between 2.5 and 13 depending on the model and the field. This ranking should, however, be read alongside the difference in AOI area and position noted in Sections 3.3 and 5.

(2) Gender-related tendencies in attribute importance and model preference were observed, though without reaching conventional statistical significance. Women tended to assign higher importance to brand identity ($\Delta = +0.88$, $d = 0.69$, $p = 0.056$), vehicle equipment ($\Delta = +1.01$, $d = 0.60$, $p = 0.105$), and vehicle design ($\Delta = +0.77$, $d = 0.47$, $p = 0.181$) compared to men. Men cited range per charge as their primary stated purchase reason (66.7% of male respondents). The point estimates are compatible with the genuine gender differences of medium size, but the sample cannot discriminate between that possibility and the absence of any difference. Tesla Model 3 was chosen exclusively by men, while Audi Q4 e-tron was disproportionately preferred by women - a descriptive finding that warrants replication.

(3) Implicit attention and explicit preferences diverge for price and range. Despite both attributes being rated as highly important, they received the lowest visual engagement in the eye-tracking data. One plausible interpretation, not tested directly in this study, is that participants inferred price and range value from brand and design cues rather than verifying the displayed figures. If confirmed in subsequent research, this would have implications for the information architecture of digital BEV marketing environments.

(4) The exploratory findings suggest, but do not confirm, that gender-differentiated communication strategies may be effective in BEV marketing contexts. If the observed tendencies are borne out in larger, pre-registered studies, campaigns targeting female consumers could foreground brand heritage, design sophistication, and interior comfort, while campaigns targeting male consumers might provide transparent range comparisons and charging infrastructure assurances. Such strategies could contribute to broadening BEV appeal in Slovakia and comparable CEE markets, but this recommendation should be treated as hypothesis-generating pending confirmatory evidence.

Several limitations should be acknowledged. First, the sample size ($n = 32$; 14 women, 18 men) was relatively modest. Although this is consistent with sample sizes commonly reported in consumer eye-tracking research [25] and neuromarketing studies investigating gender differences (e.g., Vecchiato et al. [30], $n = 28$), where intensive within-subject measurement yields a large number of observations per participant, the post-hoc power analysis (power ≈ 0.38 for $d = 0.65$ at $\alpha = 0.05$) indicates that the study was underpowered to reliably detect medium-to-large gender differences in attribute importance. Consequently, the observed effect sizes should be interpreted as exploratory and require confirmation in larger samples. Second, the study was conducted in the context of the Slovak market, and the findings may therefore reflect market-specific characteristics that cannot be directly generalised to other countries or cultural settings. Third, participants viewed each stimulus for a fixed exposure time of 10 seconds. While this ensured identical experimental conditions across all participants, it may not fully capture longer and more deliberate visual attention processes associated with real-world vehicle purchase decisions. Fourth, the five models subjected to gender-disaggregated analysis were selected after data collection based on the participants' own stated preferences, rather than being specified in advance. This procedure keeps the analysed stimulus set close to participants' purchase intentions, but it makes the selection conditional on an outcome measured in the same sample. One consequence is that Tesla Model Y, the best-selling BEV in Slovakia in the reference period, was excluded despite its market position. Fifth, the AOIs were not equated for area or for eccentricity. The design AOI necessarily encompassed the whole vehicle and occupied the central part of the stimulus, whereas the commercial information fields were small and peripheral. Comparisons of absolute dwell time across AOIs are therefore confounded with stimulus geometry. The future research should employ larger and more diverse samples, extend the study to different national contexts, pre-specify the analysed models or analyse the full stimulus set, equate AOI areas or apply a spatial-bias correction, and further examine the robustness of the observed gender-related visual attention patterns using confirmatory research designs. Subsequent studies could also overcome the constraints of static, fixed-exposure stimuli by employing immersive virtual-reality showrooms or wearable eye-tracking glasses during on-road test drives, approaches that have proven feasible in virtual retail environments [28].

Overall, the present results should be read as exploratory evidence intended to inform the design of future confirmatory studies on gender-differentiated BEV marketing communication, rather than as prescriptions for practice.

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Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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