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Eye-Tracking in Consumer Behaviour Research: A Systematic Review of Marketing Stimuli and Cognitive Responses

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Abstract: Eye-tracking is widely used in marketing research as an objective, real-time measure of visual attention, typically operationalised via fixations, dwell time, and Areas of Interest (AOIs). However, the fast-growing literature in consumer behaviour is fragmented across heterogeneous stimuli, diverse cognitive/affective constructs, and inconsistent reporting. This study presents a PRISMA-informed systematic review focusing on marketing stimuli and cognitive responses measured with eye-tracking. We map dominant stimulus categories, the most frequently used eye-tracking metrics, and the extent of methodological triangulation with complementary methods (e.g., surveys, interviews, EEG/fMRI). The review identifies recurring validity and reporting challenges (e.g., calibration/data loss and luminance confounds in pupillometry) and derives practical recommendations to improve comparability and inference. We conclude with research opportunities for integrating visual attention with cognitive and affective processing in contemporary digital marketing contexts.

Keywords: eye-tracking; consumer behaviour; marketing stimuli; visual attention; cognitive responses; systematic review

JEL Classification: M31; C91; M37

1. Introduction

Consumers increasingly decide under information overload, short attention windows, and highly optimised digital interfaces, making behaviour hard to infer from self-report alone because much processing is rapid, partly automatic, and not fully introspectable. In marketing, this is often framed via the stimulus-organism-response model, where stimuli affect internal “black box” states that drive attitudes, intentions, and choice. Eye-tracking helps probe this black box by capturing where, when, and for how long attention is allocated; eye movements offer high temporal sensitivity and are often outside conscious control, revealing unfolding cognition beyond reliable recall (Carter & Luke, 2020).

In consumer and marketing research, eye-tracking tests whether key stimulus elements are noticed (e.g., brand, price, claims/disclosures), how attention is distributed across competing cues, and how these patterns relate to decisions (Alsharif & Isa, 2024). Typical outputs include fixation metrics (e.g., time to first fixation, dwell time) and AOI analyses, often visualised via heat maps and gaze plots (Duchowski, 2002). This is especially relevant in marketing communications, where small design changes can shift what is encoded and remembered (Chaudhuri et al., 2025). Evidence also indicates that emotionally salient cues can strongly capture attention, with effects depending on appeal–product congruence and varying across groups. Increasingly, studies combine eye-tracking with proxies of cognitive/affective intensity - particularly pupillometry - linked to cognitive load and arousal but sensitive to luminance and other confounds (Carter & Luke, 2020; Calderón-Fajardo et al., 2024; Chen et al., 2025).

Pupil-based metrics can complement fixation measures by extending inference from "what is looked at" toward "how demanding or arousing processing may be" (McInnes & Sung, 2024; Nakashima et al., 2023). However, evidence indicates that pupillometry is used less often than fixation metrics in mainstream consumer behaviour research, and its theoretical interpretation remains inconsistent across contexts (Riswanto et al., 2024). More broadly, eye-tracking applications are dispersed across online shopping, advertising effectiveness, usability/website optimisation, retailing, and social media influence (Moreno-Arjonilla et al., 2024). For example, a recent systematic review and meta-analysis synthesised eye-tracking dependent variables in online shopping across interface factors (brand, endorser, product, text), while also documenting substantial heterogeneity in operationalisation and reporting (Li et al., 2024). In retail research, scholars highlight an ongoing imbalance between lab experiments and field studies with higher ecological validity (Nordfält & Ahlbom, 2024). Eye-tracking has also been used diagnostically to optimise career websites for Generation Y, showing how information visibility and accessibility shape perceived attractiveness and decision processes (Mičík & Kunešová, 2020).

Fragmentation creates three practical problems (Štefko et al., 2025). First, stimulus taxonomies (by channel/format/mechanism) (Yin et al., 2025), second, outcome constructs with no shared interpretive framework (Gil-López et al., 2023; Alsharif et al., 2023), and high sensitivity to methodological choices (notably AOIs, calibration, participant constraints, and luminance control for pupil measures) (Carter & Luke, 2020). A marketing-focused synthesis linking eye-tracking measures to cognitive responses is therefore timely (Pšurný et al., 2024), since prior reviews are often narrow or subsume eye-tracking under broader neuromarketing, offering limited guidance on dominant stimuli, measure-to-construct mapping, and which findings are robust versus method-dependent (Rodrigues et al., 2025).

This paper aims to systematically review and synthesise empirical eye-tracking research in consumer behaviour and marketing, focusing on (1) marketing stimulus characteristics and (2) the operationalisation and reporting of cognitive responses, including visual attention measures and, where applicable, pupil-based indicators of cognitive load or arousal. Accordingly, we address the following research questions:

- RQ1: How can eye-tracking research in consumer behaviour be thematically structured based on bibliometric clustering of keywords and authors?
- RQ2: Which categories of marketing stimuli are most frequently examined using eye-tracking methods in consumer behaviour research?

- RQ3: How are cognitive responses operationalised in eye-tracking studies (e.g., fixation-based attention metrics, pupillometry), and which measures dominate the field?
- RQ4: To what extent do existing studies link eye-tracking measures to downstream consumer outcomes such as attitudes, trust, or behavioural intentions?
- RQ5: What methodological limitations and reporting gaps recur across the literature and constrain comparability and validity of findings?

By answering these questions, the review provides an integrative map of the field and a practical foundation for designing and reporting eye-tracking studies that are understandable and useful beyond specialist communities, linking observable gaze behaviour to interpretable marketing and psychological constructs.

2. Methodology

2.1. Research Design

This study applies a two-stage review design that combines bibliometric clustering analysis with a PRISMA-guided literature review. The procedure follows the framework proposed by Völkl (2024) and Krtička and Soukal (2025) and is adapted to eye-tracking research in consumer behaviour, focusing on marketing stimuli and cognitive responses.

Stage one uses keyword co-occurrence and clustering to identify dominant themes. Stage two synthesises studies within clusters to summarise methods, research foci, and gaps. Figure 1 presents the VOSviewer network, mapping the structure of eye-tracking research in consumer behaviour and marketing; it yields two clusters, addressing RQ1 and highlighting dominant themes for RQ2.

The search was conducted in the Title, Abstract, and Keywords fields using terms related to eye-tracking and consumer behaviour/marketing contexts. The core search string (adapted to database-specific syntax) was: (marketing AND „eye tracking“ AND behaviour). To improve coverage of specific marketing applications, additional targeted searches included disclosure, native advertising, packaging, sustainability claims, usability, and Generation Y / millennials. Reference lists of key review and methodological papers were also screened via backward and forward citation tracking.

2.2. Bibliometric Clustering Analysis

The first analytical stage involved bibliometric mapping and clustering using VOSviewer software. Following the procedure described by Krtička and Soukal (2025), keyword co-occurrence networks were generated separately for Web of Science and Scopus datasets.

Units of analysis consisted of author keywords and index keywords; in cases of sparse keyword usage, terms extracted from titles and abstracts were used to enhance robustness. A minimum occurrence threshold was set based on the dataset size to exclude weakly connected terms and avoid unstable clusters. The exact threshold value and counting method (full counting) are reported to enable replication. The output of this stage consisted of color-coded thematic clusters representing dominant research streams. These clusters guided the subsequent systematic review and interpretation.

2.3. Systematic Literature Review (PRISMA-guided)

In the second stage, a PRISMA-guided systematic literature review was conducted to ensure a transparent and replicable process of identification, screening, eligibility assessment, and inclusion. After duplicate removal, records underwent a two-step screening: (1) title/abstract screening against predefined criteria, followed by (2) full-text assessment with documented exclusion reasons.

Studies were included if they reported empirical eye-tracking research (screen-based or mobile/wearable) in consumer behaviour or marketing, provided at least one eye-tracking metric (e.g., fixation, scanpath/AOI, pupil-based measures), and were published as peer-reviewed journal articles or indexed conference proceedings. Studies were excluded if they were purely technical, conceptual, or lacked sufficient methodological detail to extract stimulus characteristics and eye-tracking operationalisation. The selection process followed a PRISMA flow diagram.

The search was conducted in Web of Science. Only English-language publications were included, the timeframe was limited to 2023-2025, and records were restricted to predefined Web of Science research areas; items outside these criteria were excluded.

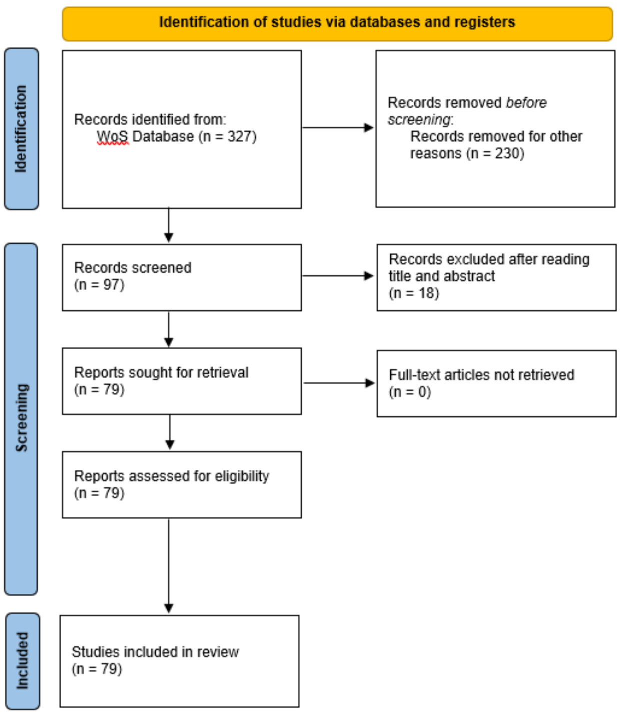

Figure 1. Publication search process according to PRISMA

- Identification – 327 records identified in Web of Science
  - Records removed for other reasons: 230 *(Reason: application of criteria – years 2023-2025, English language, selected Research Areas – Business Economics, Computer Science, Communication, Social Sciences, Other Topics, Psychology and Behavioral Science)*
- Screening – assessment of titles and abstracts: 97, excluded 18
- Eligibility – full texts: 79, excluded 0
- Included – Included in the review: 79

2.4. Data Extraction and Coding

A structured data-extraction and coding protocol was applied to all eligible studies to ensure consistency and reproducibility. For each record, we extracted key bibliographic and design characteristics (publication year, outlet type, sample size, participant profile where reported, setting, and eye-tracking configuration). Studies were then coded by primary marketing stimulus category, including digital advertising, e-commerce/product pages, websites/UX, social media/influencers, email marketing, packaging/labels/claims (including sustainability cues), and retail/point-of-sale displays.

To operationalise "cognitive responses," we coded the reported eye-tracking measures and analytical decisions, focusing on fixation-based metrics, scanpath/saccade indicators (where available), and the transparency and logic of Area-of-Interest (AOI) specification (e.g., theory-driven vs. post-hoc, number/granularity, and boundary reporting). For pupillometry studies, we extracted preprocessing and control procedures relevant to validity (e.g., baseline correction and luminance control). Outcomes were coded at two levels: (1) proximal cognitive/affective constructs (e.g., attention allocation, cognitive load, arousal proxies, comprehension/memory) and (2) downstream marketing outcomes (e.g., attitudes, credibility/trust, intentions, choice). We also recorded whether studies triangulated methods (e.g., surveys, interviews/retrospective protocols, behavioural measures, neurophysiological methods).

2.5. Reproducibility and Data Availability

To enable replication and future extensions, the review preserves the full search strings, PRISMA screening records, VOSviewer settings, and the coded extraction dataset. Where deposited in a public repository, the dataset will be cited in the manuscript as a publicly available dataset following APA 7th edition standards.

3. Results

3.1. Keyword Co-occurrence Structure of the Field (VOSviewer Map)

Figure 2 shows the keyword co-occurrence network generated in VOSviewer, offering a concise view of the intellectual structure of eye-tracking research in consumer behaviour and marketing. The network reveals a two-cluster solution, addressing RQ1 and highlighting the dominant themes for RQ2.

Cluster A (green) is anchored in visual attention and the operationalization and measurement (e.g., eye tracking study/data, participant, technology, context, effectiveness) and alongside marketing outcomes-oriented terms (purchase, purchase intention). Here, eye tracking is primarily used to quantify attention allocation to marketing stimuli and relate gaze patterns to behavioural or intention-based outcomes (Cenizo, 2025; Li et al., 2024; Riswanto et al., 2024; Carter & Luke, 2020).

Cluster B (red) centers on consumer theory and decision process constructs and connects to field-positioning terms (advertising, review, article). The presence of neuromarketing and EEG points to a stream that embeds eye tracking within broader cognitive and neuro-oriented approaches, often using multi-method designs to enrich inference beyond gaze location alone (Carter & Luke, 2020; Clithero et al., 2023; Pšurný et al., 2024; Yfantidou et al., 2024).

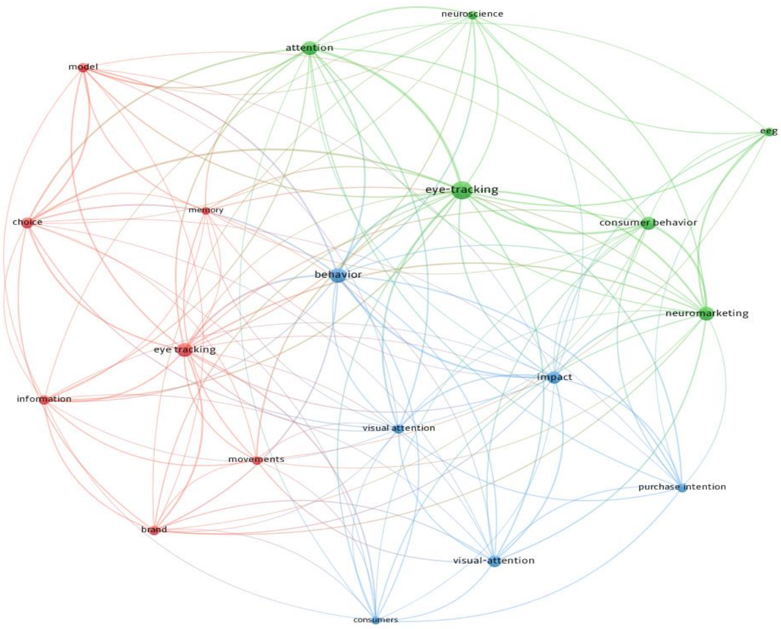

Figure 2. Keyword co-occurrence network (VOSviewer)

Cluster C (blue) captures methodological and analytical foundations: data processing and measurement (analysis, method, measure, technique) and frameworks that turn raw gaze data into interpretable indicators (fixation - and AOI-based metrics) and standardized reporting for cross-study comparability (Carter & Luke, 2020; Li et al., 2024; Ruppenthal & Schweers, 2024). and reporting practices that support cross-study comparability, alongside instrumentation extensions (webcam-/VR-based eye tracking) with implications for data quality and validity. It also reflects a shift toward advanced analytics (e.g., machine learning) and complementary indicators such as pupillometry (Heck et al., 2023; Moreno-Arjonilla et al., 2024; McInnes & Sung, 2024; Liu et al., 2023; Rodrigues et al., 2025; Skala & Kim, 2025).

Overall, dense cross-links suggest these strands co-occur rather than form isolated subfields. The map therefore supports three tightly related streams: (1) eye-tracking as a primary tool for evaluating attention to marketing stimuli and purchase-related outcomes (Riswanto et al., 2024; Cenizo, 2025; Chaudhuri et al., 2025; Li et al., 2024; Chen et al., 2024), (2) eye-tracking embedded in consumer decision-making and neuromarketing narratives emphasising cognitive-process explanation (Clithero et al., 2023; Alsharif et al., 2023; Wang et al., 2024; Pšurný et al., 2024; Isa et al., 2025), and (3) methodological and analytical frameworks underpinning eye-tracking applications (Carter & Luke, 2020; Ruppenthal & Schweers, 2024; Heck et al., 2023; Moreno-Arjonilla et al., 2024; McInnes & Sung, 2024).

3.2. Core Collaboration Pattern (Small-Network Author Map)

Figure 3 shows a compact author network with a limited number of nodes connected by multiple ties. The network topology indicates a closely interlinked collaboration core rather than several disconnected micro-groups. A small number of authors occupy relatively central positions with multiple links, suggesting a bridging function between otherwise separate co-authorship relations. This pattern is typical of methodological or application niches where knowledge accumulation is driven by recurrent collaborations and stable research teams, a dynamic frequently observed in specialized experimental methods such as eye tracking (Ruppenthal & Schweers, 2024; Bhardwaj et al., 2024; Balli, 2024; Russo et al., 2023).

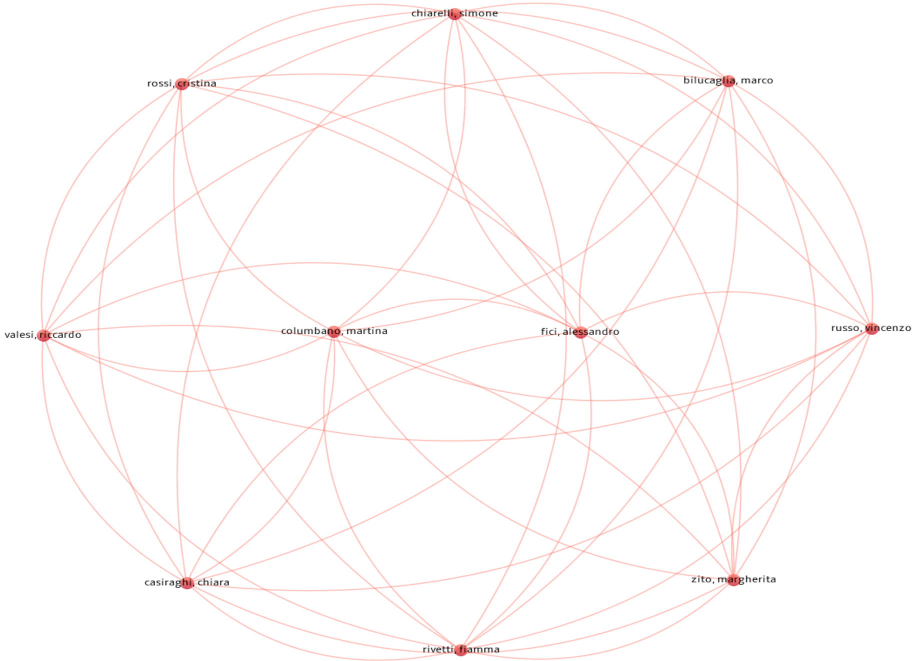

Figure 3. Author collaboration network (VOSviewer)

3.3. Broader Author Landscape and Research Communities (Large-Network Author Map)

Figure 4 extends the author-level analysis to a larger network and shows a more fragmented structure with multiple clusters, indicating distinct research communities. The pattern combines several medium-sized, internally coherent groups (suggesting topical or methodological specialisation) with many small, weakly connected nodes, consistent with an interdisciplinary domain in which eye tracking is applied across diverse marketing contexts and research designs (Ballı, 2024; Alsharif et al., 2023).

Several authors stand out by label size, which in VOSviewer typically signals higher weight (e.g., connectivity or publication/citation prominence). Their dispersion across clusters implies that influence is distributed across multiple communities rather than concentrated in a single dominant “school,” reflecting the application-driven spread of eye-tracking research across advertising effectiveness, e-commerce interface evaluation, social media/influencer settings, and broader decision-making frameworks (Biswas et al., 2023; Rohrbach et al., 2024; Chen et al., 2024; Chygryn et al., 2024; Cenizo, 2025; Tang et al., 2024; Isa et al., 2025).

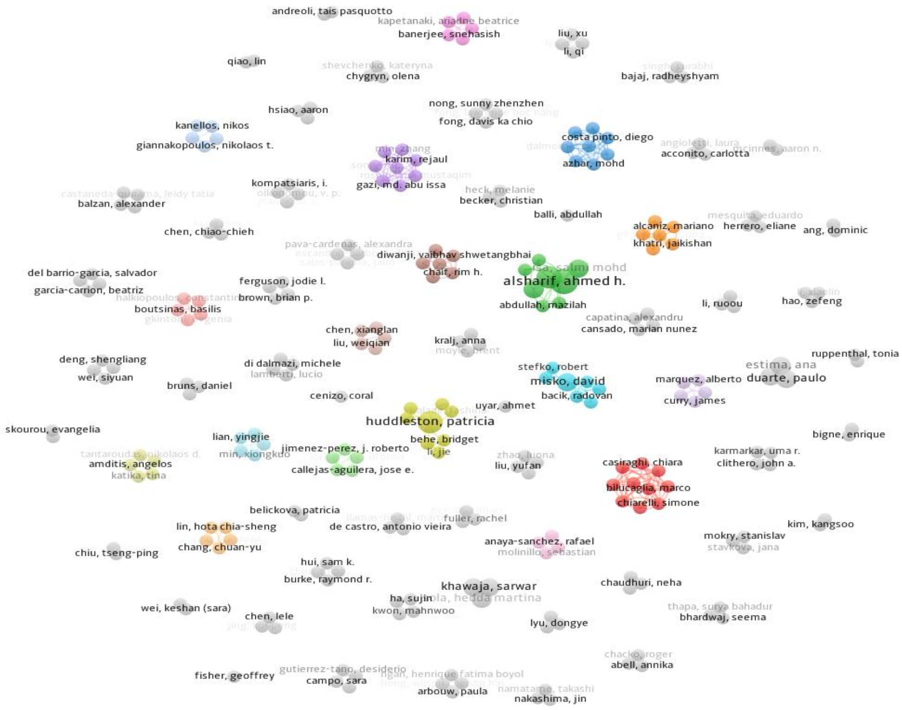

Figure 4. Large-scale author network (VOSviewer)

From the perspective of the study's research questions, the contrast between the dense collaboration core (Figure 3) and the multi-community landscape (Figure 4) underscores why the PRISMA-guided systematic review stage is necessary: the field is sufficiently heterogeneous that harmonising evidence requires structured extraction of stimuli, measures, and outcome linkages across diverse research communities and reporting practices (Krtička & Soukal, 2025).

3.4. Bibliometric Evidence in Relation to the Review Focus

Although the bibliometric stage is primarily intended to address RQ1-RQ2, the resulting maps also provide directional evidence that informs the subsequent systematic synthesis (Ruppenthal & Schweers, 2024). First, the prominence of marketing-communication and decision-process terms (e.g., advertising, purchase intention, and decision-proximity concepts) is consistent with a literature base strongly oriented toward marketing stimuli evaluation in communication-heavy environments (Rohrbach et al., 2024; Biswas et al., 2023; Chaudhuri et al., 2025; Cenizo, 2025; Riswanto et al., 2024). Second, the explicit presence of neuromarketing and EEG within the decision-process cluster indicates that a non-trivial subset of studies frames eye tracking within multi-method cognitive approaches, supporting the review's emphasis on documenting methodological triangulation and on evaluating how gaze measures are linked to downstream consumer outcomes (Clithero et al., 2023; Wang et al., 2024; Alsharif et al., 2023; Alsharif & Isa, 2024; Pšurný et al., 2024; Yfantidou et al., 2024).

In the next stage of the study (systematic review synthesis), these cluster-derived expectations are examined more directly through coded full-text evidence and quantitative summaries (frequencies, proportions, and cross-tabulations), complemented by inferential association tests where appropriate, as specified in the Methodology section (Krtička & Soukal, 2025).

4. Discussion

This study integrates VOSviewer-based bibliometric clustering with a PRISMA-guided systematic review to map empirical eye-tracking research in consumer behaviour and marketing, focusing on marketing stimulus characteristics and the operationalisation of cognitive responses (Krtička & Soukal, 2025; Ruppenthal & Schweers, 2024; Carter & Luke, 2020). The discussion synthesises patterns from Figures 2-4 in relation to RQ1-RQ5 and situates them within prior methodological and marketing work on translating gaze indicators into interpretable marketing and psychological constructs (Li et al., 2024; Clithero et al., 2023; Alsharif et al., 2023; Nordfält & Ahlbom, 2024).

4.1. Cluster Structure in the Context of Prior Research

The keyword network (Figure 2) suggests two interlinked streams: an attention-focused stream connecting applied eye-tracking terms to outcomes such as purchase intention, and a decision-process stream that includes neuromarketing and EEG, positioning eye tracking within broader cognitive and neuro-oriented programmes (Ruppenthal & Schweers, 2024; Nordfält & Ahlbom, 2024; Yfantidou et al., 2024). Dense cross-links indicate that studies frequently connect "where consumers look" to constructs such as understanding, interest, and choice, reflecting the "black box" motivation in consumer research (Bačík et al., 2023; Carter & Luke, 2020). Across streams, "cognitive responses" are most often operationalised via fixation- and AOI-based measures, while the weaker prominence of pupil-related terms is consistent with pupillometry being less standardised due to stricter validity requirements (McInnes & Sung, 2024). The salience of advertising/communication terms also points to a dominance of digital, screen-based stimuli, while the presence of neuromarketing/EEG indicates growing uptake of triangulation to support interpretation beyond gaze location alone (Nordfält & Ahlbom, 2024; Yfantidou et al., 2024).

4.2. Practical Implications and Future Research

For practice, the two-stream structure implies complementary uses: attention-based diagnostics for stimulus optimization (e.g., layout and information hierarchy) and decision/neuromarketing designs for explanatory modeling of how attention relates to decision processes, as well as proxies of cognitive load or arousal, in some studies. Future research should strengthen (1) construct–metric alignment, (2) more transparent pupillometry under stricter controls, (3) ecological validity via mobile/field studies, and (4) mixed-method investigation of trust and disclosure cues in social media persuasion. Testing individual differences as moderators may further improve predictive value for segmentation and targeting.

4.3. Limitations

Interpretation is constrained by database coverage (Web of Science, Scopus) and English-only inclusion, which may underrepresent regional or non-indexed work. Bibliometric clustering depends on metadata quality and VOSviewer parameter settings; co-occurrence reflects thematic proximity rather than causality, so mapping should be complemented by full-text synthesis. Finally, time-window effects may reduce the visibility of emerging topics despite practical relevance.

5. Conclusions

This study synthesised empirical eye-tracking research in consumer behaviour and marketing by combining VOSviewer-based bibliometric clustering with a PRISMA-guided systematic review. The evidence supports two tightly connected streams: (1) attention-focused work linking gaze allocation to marketing outcomes (e.g., purchase intention) and (2) decision-making–oriented work embedding eye tracking within neuromarketing and multi-method designs. Across streams, cognitive responses are predominantly operationalised via fixation- and AOI-based metrics, whereas pupil-based measures and other physiological integrations are less consistently applied and more method-sensitive. The dense linkage between streams suggests a shift from descriptive gaze mapping toward explainable accounts connecting attention with comprehension, interest, credibility, and behavioural intentions. Further progress depends on stronger construct–metric alignment, more transparent reporting (e.g., AOI definitions, data-quality thresholds), and stricter control of confounds, particularly in pupillometry. Future research should prioritise higher-ecological-validity designs (mobile/field) and systematic tests of moderators such as stimulus congruence, disclosure cues, and individual differences.

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Conflict of interest: none

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