

# FROM ADVERTISING TO DECISION-MAKING: THE TRAJECTORY OF CONSUMER VISUAL ATTENTION RESEARCH

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**ABSTRACT** *This paper offers an integrative bibliometric review of consumer visual attention research, with a particular focus on studies using eye-tracking and related methods. Drawing on 1,278 articles indexed in the Web of Science Core Collection between 1989 and 2022, the study examines publication trends, thematic structures and their evolution, and how issues of distraction and hybrid digital–physical environments challenge traditional views of consumer decision-making. Keyword co-occurrence analyses, combined with thematic mapping across five time periods, are used to identify core research clusters and their interrelations. The results show a strong and accelerating growth of the field since 2014, alongside a marked dispersion of research across journals and countries, confirming visual attention as an established and interdisciplinary area within consumer research. Three enduring thematic pillars emerge: visual attention in multi-attribute decision-making, visual attention in advertising and communication, and applied domains such as nutrition information, health warnings and retail environments, while recent work highlights attentional competition and points to emerging questions around distraction and hybrid digital–physical spaces. The paper makes three main contributions. First, it provides a conceptually oriented overview that places visual attention, rather than specific tools, at the center of analysis. Second, it shows how previously separate streams in decision-making, advertising and health communication converge around shared questions of attentional dynamics in complex environments. Third, it develops a future research agenda that explicitly foregrounds distraction and attentional competition in hybrid digital–physical consumer spaces and links these phenomena to emerging technologies and theory-driven studies of attention.*

## KEY WORDS

CONSUMER BEHAVIOR, VISUAL ATTENTION, EYE-TRACKING, TRENDS, DISTRACTION

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## INTRODUCTION AND THEORETICAL BACKGROUND

In both academic research and practice, visual attention plays an important role in shaping consumer decision-making and purchase intentions and has become a topic of significant interest, as documented by Ladeira et al. (2019). A fundamental attribute of attention is its selectivity, a concept explored by Desimone and Duncan (1995). This selectivity is intrinsically connected to the notion of attention as a limited resource, emphasizing its scarcity and value. In today's hybrid digital-physical world, as outlined by Šimůnková (2019), consumers navigate simultaneously in online and offline realms, primarily due to advancements in mobile technology. Due to the digital era's expansion, there is an exponential increase in the stimuli impacting consumers, thereby rendering attention an even more precious asset. Attention, a complex and multifaceted system, is influenced by multiple factors. For a detailed exploration of these factors, one might refer to comprehensive reviews such as those by Ladeira et al. (2019) and Orquin and Loose (2013). The acknowledgement of these facets of attention has led to a heightened competitive landscape in the pursuit of consumer attention and gaze patterns. As a result, firms have invested heavily in attention research, reflected in the widespread adoption of eye-tracking methods, a trend noted by Knof et al. (2023). Therefore, understanding how visual attention works in consumer behaviour is crucial.

The use of eye-tracking technology has become increasingly important in consumer research, primarily owing to its capability to accurately measure and quantify visual attention. This provides detailed insights into consumers' decision-making processes. The technology's core strength lies in its ability to track where and what a respondent visually focuses on, thus uncovering the subconscious reactions (Wedel & Pieters, 2008). The precision of eye-tracking yields detailed and reliable data, which makes it a key method for analyzing consumer behaviour. Nevertheless, it is crucial to acknowledge certain limitations inherent in this approach. As Gelderblom and Menge (2018) highlighted, the direction of eye movements, while indicative of where visual attention is directed, does not necessarily imply a direct correlation with cognitive processing or the conscious recognition of the stimuli. Furthermore, the eye-tracking approach can be perceived as intrusive to some extent and often necessitates controlled experimental environments. This requirement potentially restricts its effectiveness in more naturalistic, real-world settings. Despite these challenges, the insights provided by eye-tracking, which are difficult to obtain with other methods, confirm its important role in consumer research (Duchowski, 2003).

In the endeavor to comprehensively map the field of consumer visual attention, it is fundamental to define the key terms involved precisely. In this context, the concept of visual attention, especially when correlating eye fixations with attention, often relies on the eye-mind assumption postulated by Just and Carpenter (1980). This assumption is based on the idea that within a visual scene, an individual perceives and processes the stimuli at which their gaze is currently fixated. While some consumer studies draw a connection between visual attention and eye fixations on a specific stimulus based on

this assumption, this perspective is not without its critics. Orquin and Holmqvist (2018) caution that when interpreting data from eye-tracking studies and drawing conclusions based on eye-tracking experiments, it is crucial to remember that the stimulus being fixated upon does not always necessarily equate to paying attention to it. This is particularly pertinent since the eye-mind assumption originated from *reading research* and, although later explored in other research domains, its validity needs to be carefully considered in the context of the specific research being conducted. Consequently, for the purpose of the present integrative review, it is advisable to include not only the keywords 'eye-tracking' and 'visual attention' but also 'gaze behavior' in the search criteria.

Research on consumer visual attention has shown that gaze behaviour is influenced by various factors that direct attention towards different targets such as a product, elements within an advertisement (Gidlöf et al., 2017; Ladeira et al., 2019), features on retail websites (Boardman & McCormick, 2022), or online advertisements (Lu et al., 2018). Gidlöf et al. (2017) classify these influencing factors into two broad categories: external and internal, which collectively and often concurrently affect consumer gaze behavior. Among the external factors, the visual appeal of the stimulus, notably its 'pop-out' effect, as described by Milosavljević et al. (2012), plays a crucial role. The visual appeal of a stimulus depends on attributes such as its color, shape, or size, as noted by Orquin et al. (2018). Importantly, size, in the context of visual appeal, does not exclusively imply the largest product but rather its size in comparison to adjacent stimuli. An element may stand out due to its contrasting, sometimes smaller, size or conspicuous nature compared to others. Conversely, internal factors are tied to the consumer, encompassing individual preferences or specific objectives (Gidlöf et al., 2017). When examining consumers' visual attention, factors influencing gaze behavior also include the positioning of an element within a visual field (e.g., in advertising or shelves in supermarkets) (Atalay et al., 2012; Tatler, 2007) or distractions originating from the environment, like background music in shopping venues (Day et al., 2009) or media multitasking when watching commercials on television (Brasel & Gips, 2011). Overall, visual attention in consumer behaviour is a broad and complex field of study.

Several bibliometric integrative studies have been conducted focusing on eye-tracking in various contexts, including tourism (Atabay & Güzeller, 2021), medicine (Zammarchi & Conversano, 2021), and language studies (Aryadoust & Ang, 2021), etc. Specifically, bibliometric studies focused on eye-tracking in consumer research have provided valuable insights, yet their scope is often restricted to specific contexts like tourism (Atabay & Güzeller, 2021), print advertising (Vadalkar et al., 2021), out-of-home (OOH) advertising (Wilson, 2024), or advertising in general (Alsharif et al., 2021). On the other hand, despite the presence of broader bibliometric analyses in consumer behavior and marketing with respect to eye-tracking, as illustrated in studies by Alsharif et al. (2021), Muñoz-Leiva et al. (2022), Oliveira et al. (2022), and Zuschke (2020), there is a noticeable trend towards a tool-oriented approach. These analyses primarily emphasize neuromarketing tools such as EEG, GSR, PET, MEG, and other neurological instruments rather than a conceptual focus on consumer visual attention. Thus, the aim of this paper is to provide a synthesized overview of consumer visual attention, charting the research

areas and topics within this field, including their evolution and potential future directions for research.

The aim of this integrative review is to conduct a systematic exploration of the area of consumer visual attention. This involves providing a comprehensive overview of the subject matter and addressing several key research questions:

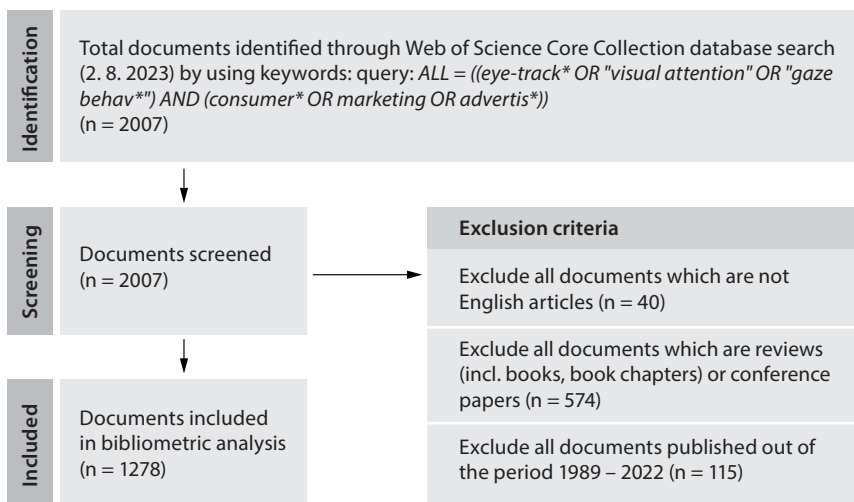
- >What are the publication trends within the field of consumer visual attention? (RQ1)
- >What are the topics within the field of consumer visual attention, and how have they evolved over time? (RQ2)
- >What are the opportunities for future research in the field of consumer visual attention with respect to the contemporary environment? (RQ3)

This will be achieved through a bibliometric analysis of a dataset comprising scholarly publications indexed in the Web of Science Core Collection database. This work is intended to serve as a foundation for understanding the topic of consumer visual attention and to highlight potential directions for future research in this context.

## METHODS

This integrative review utilized data sourced from the Web of Science Core Collection as of August 2, 2023. The focus of the study was on analyzing academic articles within the domains of eye-tracking, visual attention, gaze behavior, consumer behavior, marketing, and advertising. The initial query resulted in 2,007 documents. Subsequent filtering based on specific criteria – document type (articles only), language (English), and publication period (up to and including the year 2022) – led to a final dataset comprising 1,278 articles (see Figure 1). The Web of Science Core Collection was selected because of its rigorous journal inclusion criteria and its broad coverage of high-impact outlets in marketing, psychology, and related disciplines, which makes it particularly suitable for reconstructing the intellectual structure and thematic evolution of an established field rather than compiling an exhaustive census of all possible documents.

Table 1 provides a comprehensive overview of the dataset utilized for our integrative review. It encapsulates key metrics spanning from 1989 to 2022, including the variety and number of sources, the total count of documents analyzed, and relevant growth rates. Additionally, it offers insights into the average age and citation metrics of the documents. The table also details the extent of keyword usage, both from Keywords Plus and authors' keywords, and provides a breakdown of authorship patterns, including the number of authors, instances of single-author documents, and the average number of co-authors per document. A notable aspect highlighted is the percentage of international co-authorships, reflecting global collaboration in the field.



▲ Figure 1.

PRISMA Flowchart

Note. The analysis concluded with the year 2022 to encompass complete annual data. Additionally, it was noted that variations in the search term 'eye-track' (including 'eye-track\*' and 'eye track\*') did not markedly affect the volume of articles retrieved.

Table 1. Dataset Overview

| Description                      | Results   |
|----------------------------------|-----------|
| Timespan                         | 1989:2022 |
| Sources                          | 529       |
| Documents                        | 1,278     |
| Annual Growth Rate %             | 17.2      |
| Document Average Age             | 5.54      |
| Average citations per doc        | 22.41     |
| References                       | 46,422    |
| <b>Document contents</b>         |           |
| Keywords Plus (ID)               | 2,432     |
| Author's Keywords (DE)           | 3,579     |
| <b>Authors</b>                   |           |
| Authors                          | 3,420     |
| Authors of single-authored docs  | 49        |
| Single-authored docs             | 52        |
| Co-Authors per Doc               | 3.59      |
| International co-authorships (%) | 30.28     |

For the comprehensive analysis, a dataset containing metadata of the 1,278 articles, including records of cited articles, was downloaded. The data file was subsequently analyzed using the software R – version 4.3.1 (R Core Team, 2023) and the ‘bibliometrix’ package – version 4.0.0 (Aria & Cuccurullo, 2017). This approach facilitated a robust bibliometric assessment of the selected corpus, enabling an in-depth exploration of trends, patterns, and influential works in the specified research domains.

Beyond the calculations of absolute and relative frequencies in relation to publication trends and the analysis of abstracts to delineate the most influential topics based on the most influential authors and documents in the dataset, as determined by citations, this study also incorporated an advanced analytical method from graph analysis: co-occurrence network analysis. This technique was applied to identify themes and track their evolution over time. For keyword analysis, the study employed Keywords Plus metadata. Unlike author-defined keywords, which can be limited by subjective selection, local terminology, and the specific interests of the authors, Keywords Plus generates keywords from the titles of cited works and thus offers a broader and more standardized perspective on the conceptual context and interrelations of the topic (Garfield & Sher, 1993). For a study whose primary aim is to map how key themes in consumer visual attention have developed and connected over time, this property is particularly advantageous, because it captures latent thematic linkages that extend beyond individual authors’ self-descriptions of their work (Tripathi et al., 2018; Zhang et al., 2016). In this sense, Keywords Plus provides a robust basis for identifying the main thematic structures and long-term developmental trajectories of the field.

In the thematic analyses utilizing keywords, words that define the general research area were omitted (stop words, e.g., ‘attention’ or ‘eye-tracking’). Additionally, synonyms were identified and subsequently consolidated under a single keyword (e.g., ‘advertisements’ and ‘ads’). This approach not only refined the dataset but also enhanced the precision of thematic identification and trend analysis within the research.

## RESULTS

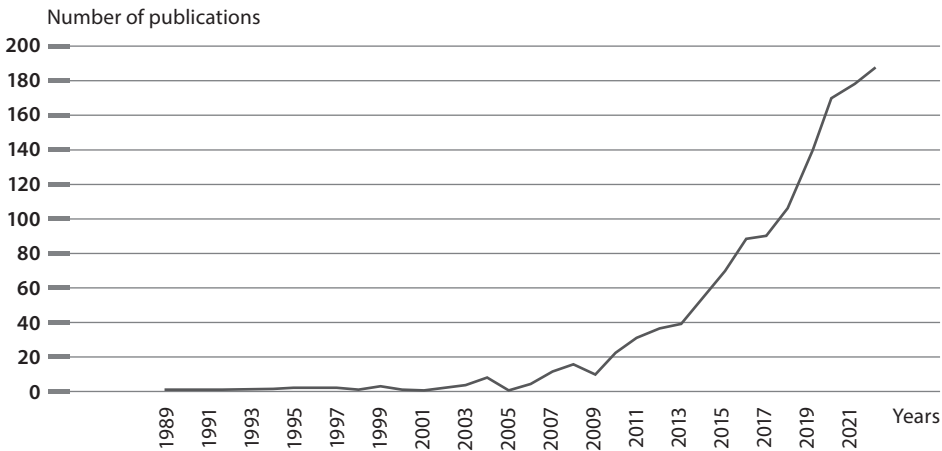
### Overall publication trends

In addressing our research question, RQ1, pertaining to the publication trends within the topic of consumer visual attention, we delineated the scholarly landscape based on several metrics. Firstly, we present the annual publication output, which serves as an indicator of the field’s growth and popularity over time. Secondly, we spotlight the journals that have significantly contributed to the literature, examining their annual publication record to identify key outlets for this subject matter. Thirdly, we shift our focus to the most prolific authors, highlighting their yearly contribution to the corpus of knowledge. Lastly, we explore the annual publication contributions from various countries to shed light on geographical diversity and its implications for the field. Each of these four metrics not only furnishes a comprehensive view of the current state of research on consumer visual attention but also offers insights into its evolution over time.

### *Trends of annual publications*

The longitudinal data reveals a notable escalation in scholarly interest in consumer visual attention over the span of 33 years, from 1989 to 2022. The academic contributions in this domain were relatively sporadic and sparse during the initial years, with only a single publication appearing in 1989, followed by minimal or no activity until the mid-1990s. Specifically, the annual publication output remained largely stagnant, rarely exceeding two articles per year until 1999.

The scholarly output on consumer visual attention exhibited a modest increase in the early 2000s, with 2–8 articles annually between 2000 and 2006. A significant surge began in 2007, reaching 11 articles annually, and continued to grow steadily, doubling to 23 articles by 2010. Post-2014, there was exponential growth, with 70 articles in 2015 and a remarkable increase to 187 articles in 2022. This underscores the growing significance of research in consumer visual attention, reflecting an expanding scholarly community and diverse areas of inquiry in this specialized field.



▲ *Figure 2.*

Trends in the number of annual publications

### *The annual production of the top journals (number of published articles)*

The academic landscape of publishing in various research fields has evolved significantly over time, with some journals making notably consistent contributions. Based on the available data, there has been a relatively recent but dramatic surge in the number of articles published by different journals. The following table shows the number of publications of the most prominent journals, with the highest total number of publications (Table 2).

Table 2. The number of publications by the top journals per year

|              | Food Quality and Preference | Frontiers in Psychology | Journal of Business research | Appetite  | Journal of Retailing and Consumer Services | Sustainability | Computers in Human Behavior | Journal of Marketing Research | International Journal of Advertising | Journal of Advertising Research |
|--------------|-----------------------------|-------------------------|------------------------------|-----------|--|----------------|-----------------------------|-------------------------------|--------------------------------------|---------------------------------|
| 1994         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 0                           | 0                             | 0                                    | 1                               |
| 1995         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 0                           | 0                             | 0                                    | 0                               |
| 1996         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 0                           | 0                             | 0                                    | 0                               |
| 1997         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 0                           | 0                             | 0                                    | 0                               |
| 1998         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 0                           | 0                             | 0                                    | 0                               |
| 1999         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 0                           | 1                             | 0                                    | 0                               |
| 2000         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 0                           | 0                             | 0                                    | 0                               |
| 2001         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 0                           | 0                             | 0                                    | 0                               |
| 2002         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 0                           | 0                             | 0                                    | 0                               |
| 2003         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 0                           | 0                             | 0                                    | 0                               |
| 2004         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 0                           | 0                             | 0                                    | 0                               |
| 2005         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 0                           | 0                             | 0                                    | 0                               |
| 2006         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 0                           | 0                             | 0                                    | 0                               |
| 2007         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 1                           | 0                             | 0                                    | 0                               |
| 2008         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 0                           | 0                             | 3                                    | 0                               |
| 2009         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 1                           | 1                             | 0                                    | 0                               |
| 2010         | 0                           | 0                       | 0                            | 0         | 0  | 0              | 0                           | 2                             | 0                                    | 1                               |
| 2011         | 1                           | 0                       | 0                            | 1         | 0  | 0              | 2                           | 0                             | 0                                    | 0                               |
| 2012         | 0                           | 0                       | 0                            | 1         | 0  | 0              | 1                           | 1                             | 0                                    | 2                               |
| 2013         | 1                           | 0                       | 0                            | 0         | 1  | 0              | 0                           | 0                             | 1                                    | 1                               |
| 2014         | 2                           | 3                       | 0                            | 1         | 1  | 0              | 1                           | 1                             | 0                                    | 0                               |
| 2015         | 5                           | 3                       | 1                            | 1         | 2  | 0              | 2                           | 2                             | 1                                    | 1                               |
| 2016         | 5                           | 0                       | 2                            | 1         | 2  | 0              | 3                           | 3                             | 1                                    | 3                               |
| 2017         | 3                           | 4                       | 1                            | 1         | 1  | 2              | 2                           | 0                             | 2                                    | 1                               |
| 2018         | 4                           | 2                       | 0                            | 4         | 1  | 2              | 4                           | 2                             | 1                                    | 1                               |
| 2019         | 6                           | 4                       | 1                            | 5         | 3  | 5              | 1                           | 0                             | 3                                    | 2                               |
| 2020         | 9                           | 7                       | 18                           | 2         | 4  | 4              | 0                           | 2                             | 3                                    | 1                               |
| 2021         | 5                           | 9                       | 5                            | 5         | 5  | 4              | 0                           | 4                             | 1                                    | 1                               |
| 2022         | 7                           | 11                      | 5                            | 1         | 3  | 6              | 3                           | 1                             | 3                                    | 1                               |
| <b>Total</b> | <b>48</b>                   | <b>43</b>               | <b>33</b>                    | <b>23</b> | <b>23</b>                                  | <b>23</b>      | <b>21</b>                   | <b>20</b>                     | <b>19</b>                            | <b>16</b>                       |

Note. Years 1989–1993 have been removed due to no publications in the top 10 journals (by total cumulative number of publications)

For instance, *Food Quality and Preference* started to publish articles related to the field in 2011, and its output has been increasing steadily since, with a peak in 2020 with nine articles. Similarly, *Frontiers in Psychology* initiated its contributions in 2014 and has shown a significant upward trend, marking 11 articles in 2022. *Journal of Business Research* displayed an unusual surge in 2020 with 18 articles but has since returned to moderate levels. It is important, however, to give special attention to the *International Journal of Advertising*, which started contributing as early as 2008 with three articles. Although there were fluctuations in its yearly output, the journal displayed consistent contributions to the field. Notably, in 2019 and 2020, it had an output of three articles each year, which was followed by another three articles in 2022. The persistent contribution by this journal has been instrumental in shaping the research landscape, displaying a commitment to fostering quality scholarship. *Computers in Human Behavior* and *Journal of Marketing Research* also started their contributions in the late 2000s but have maintained a somewhat irregular trend. Meanwhile, journals like *Sustainability* and *Journal of Retailing and Consumer Services* have initiated their contributions more recently and are still in the initial stages of establishing a significant presence in the field. Other journals, such as *Appetite* and *Journal of Advertising Research*, have been contributors since 2011 and 1994, respectively, but have produced articles in a more sporadic fashion.

In summary, the landscape of academic publishing across various research fields has seen a dynamic evolution, with different journals contributing in distinct patterns and timelines. While some journals like *Food Quality and Preference* and *Frontiers in Psychology* have recently emerged and are rapidly increasing their output, others like the *International Journal of Advertising* have provided a sustained and consistent contribution for over a decade, signifying their commitment to fostering academic excellence. On the other hand, journals such as *Computers in Human Behavior* and *Journal of Marketing Research* have displayed irregular trends, and newcomers like *Sustainability* and *Journal of Retailing and Consumer Services* are still building their presence. Despite the variability in their publishing patterns, the collective contributions of these journals have helped shape research on consumer visual attention within their respective fields.

#### ***The annual production of the top scholars (number of published articles)***

The following table (Table 3) provides an analysis focusing on the most influential authors in the field of consumer visual attention research from 1997 to 2022. The table quantifies the scholarly output of each author by year, offering an insight into the evolving landscape of this specialized area of study. Additionally, the table incorporates both global and local citation counts to gauge the authors' impact and reach within the academic community. It serves as a comprehensive overview that not only showcases the frequency of publications but also encapsulates the extent to which each author's work has been cited, thereby highlighting the dual dimensions of productivity and influence. By capturing these metrics, the table aims to identify key contributors whose work has significantly shaped the discourse and methodology in the realm of consumer visual attention.

Table 3. The number of publications by the top scholars per year

|                   | Pieters R. | Ares G. | Wedel M. | Khachatryan H. | Behe B. K. | Antúnez. L. | Giménez A. | Siegrist M. | Bigné, E. | Grebitus C. |
|-------------------|------------|---------|----------|----------------|------------|-------------|------------|-------------|-----------|-------------|
| 1997              | 2          | 0       | 1        | 0              | 0          | 0           | 0          | 0           | 0         | 0           |
| 1998              | 0          | 0       | 0        | 0              | 0          | 0           | 0          | 0           | 0         | 0           |
| 1999              | 2          | 0       | 1        | 0              | 0          | 0           | 0          | 0           | 0         | 0           |
| 2000              | 1          | 0       | 1        | 0              | 0          | 0           | 0          | 0           | 0         | 0           |
| 2001              | 0          | 0       | 0        | 0              | 0          | 0           | 0          | 0           | 0         | 0           |
| 2002              | 2          | 0       | 1        | 0              | 0          | 0           | 0          | 0           | 0         | 0           |
| 2003              | 2          | 0       | 2        | 0              | 0          | 0           | 0          | 0           | 0         | 0           |
| 2004              | 1          | 0       | 1        | 0              | 0          | 0           | 0          | 0           | 0         | 0           |
| 2005              | 0          | 0       | 0        | 0              | 0          | 0           | 0          | 0           | 0         | 0           |
| 2006              | 1          | 0       | 1        | 0              | 0          | 0           | 0          | 0           | 0         | 0           |
| 2007              | 2          | 0       | 2        | 0              | 0          | 0           | 0          | 0           | 0         | 0           |
| 2008              | 3          | 0       | 3        | 0              | 0          | 0           | 0          | 0           | 0         | 0           |
| 2009              | 1          | 0       | 1        | 0              | 0          | 0           | 0          | 0           | 0         | 0           |
| 2010              | 3          | 0       | 3        | 0              | 0          | 0           | 0          | 1           | 0         | 0           |
| 2011              | 1          | 0       | 1        | 0              | 0          | 0           | 0          | 0           | 0         | 0           |
| 2012              | 1          | 0       | 1        | 0              | 0          | 0           | 0          | 0           | 0         | 0           |
| 2013              | 0          | 3       | 1        | 0              | 2          | 3           | 3          | 0           | 0         | 0           |
| 2014              | 0          | 3       | 0        | 0              | 1          | 2           | 3          | 0           | 0         | 0           |
| 2015              | 0          | 3       | 0        | 1              | 2          | 2           | 2          | 2           | 0         | 0           |
| 2016              | 0          | 4       | 0        | 1              | 1          | 2           | 2          | 1           | 1         | 1           |
| 2017              | 0          | 0       | 0        | 1              | 1          | 0           | 0          | 4           | 1         | 1           |
| 2018              | 1          | 2       | 0        | 3              | 1          | 0           | 0          | 0           | 0         | 2           |
| 2019              | 0          | 4       | 0        | 2              | 0          | 1           | 0          | 1           | 0         | 2           |
| 2020              | 1          | 1       | 1        | 3              | 2          | 0           | 0          | 0           | 1         | 0           |
| 2021              | 1          | 1       | 1        | 1              | 0          | 0           | 0          | 0           | 3         | 2           |
| 2022              | 0          | 1       | 0        | 0              | 1          | 0           | 0          | 1           | 3         | 1           |
| Total (freq)      | 25         | 22      | 22       | 12             | 11         | 10          | 10         | 10          | 9         | 9           |
| Total (TC global) | 3070       | 835     | 2827     | 200            | 264        | 423         | 558        | 367         | 267       | 133         |
| Total (TC local)  | 481        | 219     | 380      | 12             | 87         | 148         | 201        | 86          | 22        | 15          |

Note. Years 1989–1997 have been removed due to no publications by the top 10 scholars (by total cumulative number of publications)

In the realm of consumer visual attention research, a few scholars have made a particularly significant impact based on the frequency of their publications and the extent to which they have been cited. Pieters, R. stands out as the most prolific author, with 25 publications spanning from 1997 to 2022. With a global citation count of 3,070 and a local citation count of 481, his work undeniably serves as an academic cornerstone in the field. Ares, G. and Wedel, M., each with 22 publications, also make significant contributions; however, it is noteworthy that Wedel, M. has accumulated a substantially higher global citation count (2,827) compared to Ares, G. (835). Authors such as Khachatryan, H. and Behe, B. K. have a more moderate level of publications, 12 and 11 respectively, but their influence, as reflected by their global citation counts, varies considerably. Antúnez, L., Giménez, A., and Siegrist, M. have each contributed 10 publications, yet Giménez A. leads in global citations with 558. Lastly, Bigné, E. and Grebitus, C., although having fewer publications (nine each), demonstrate a noteworthy uptick in recent years, particularly in 2021 and 2022 for Bigné, E. These authors collectively contribute to the dynamic landscape of consumer visual attention research, enriching it with diverse methodological approaches and theoretical frameworks.

#### *The annual production of the top countries (number of published articles)*

Table 4 shows the publication output of various countries in the domain of consumer visual attention research spanning from 1989 to 2022. This analysis assesses production based on the *authors' appearances by country affiliations*, offering a nuanced perspective on collaborative research dynamics. For each article, every author's country affiliation contributes equally to the publication count for that country. For instance, an article co-authored by researchers from the USA, Spain, and Italy would augment the publication tally for each of these nations by one. Consequently, the cumulative production metric surpasses the total number of individual articles, especially given the collaborative nature of modern scientific efforts.

Table 4. The number of publications by the top countries per year

|      | USA | Germany | Netherlands | China | United Kingdom | Denmark | Italy | Spain | Australia | Korea |
|------|-----|---------|-------------|-------|----------------|---------|-------|-------|-----------|-------|
| 1989 | 1   | 0       | 0           | 0     | 0              | 0       | 0     | 0     | 0         | 0     |
| 1992 | 0   | 1       | 0           | 0     | 0              | 0       | 0     | 0     | 0         | 0     |
| 1993 | 1   | 0       | 0           | 0     | 0              | 0       | 0     | 0     | 0         | 0     |
| 1994 | 4   | 0       | 0           | 0     | 0              | 0       | 0     | 0     | 0         | 0     |
| 1995 | 2   | 0       | 0           | 0     | 0              | 0       | 0     | 0     | 0         | 0     |
| 1996 | 1   | 0       | 2           | 0     | 0              | 0       | 0     | 0     | 0         | 0     |
| 1997 | 0   | 0       | 3           | 0     | 0              | 0       | 0     | 0     | 0         | 0     |
| 1998 | 5   | 0       | 0           | 0     | 0              | 0       | 0     | 0     | 0         | 0     |
| 1999 | 2   | 0       | 5           | 0     | 0              | 0       | 0     | 0     | 0         | 0     |

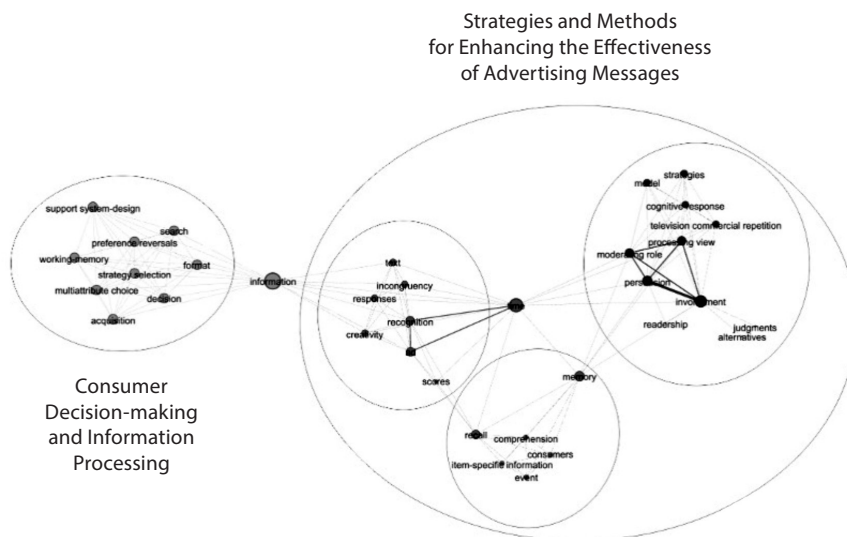
|                | USA  | Germany | Netherlands | China | United Kingdom | Denmark | Italy | Spain | Australia | Korea |
|----------------|------|---------|-------------|-------|----------------|---------|-------|-------|-----------|-------|
| 2000           | 1    | 0       | 3           | 0     | 0              | 0       | 0     | 0     | 0         | 0     |
| 2002           | 3    | 0       | 6           | 0     | 0              | 0       | 0     | 0     | 0         | 0     |
| 2003           | 8    | 0       | 2           | 0     | 0              | 0       | 0     | 0     | 0         | 0     |
| 2004           | 11   | 0       | 2           | 2     | 5              | 0       | 0     | 0     | 0         | 0     |
| 2006           | 5    | 0       | 1           | 0     | 2              | 0       | 0     | 0     | 0         | 0     |
| 2007           | 10   | 0       | 4           | 4     | 2              | 3       | 2     | 2     | 0         | 0     |
| 2008           | 21   | 0       | 8           | 2     | 3              | 0       | 0     | 0     | 0         | 0     |
| 2009           | 7    | 0       | 8           | 3     | 8              | 0       | 0     | 0     | 0         | 0     |
| 2010           | 27   | 6       | 6           | 0     | 0              | 1       | 0     | 3     | 4         | 10    |
| 2011           | 38   | 0       | 8           | 4     | 4              | 4       | 2     | 8     | 2         | 7     |
| 2012           | 40   | 9       | 5           | 9     | 3              | 6       | 0     | 0     | 0         | 1     |
| 2013           | 35   | 5       | 3           | 9     | 6              | 5       | 2     | 7     | 10        | 3     |
| 2014           | 59   | 17      | 3           | 15    | 14             | 6       | 0     | 4     | 17        | 3     |
| 2015           | 66   | 20      | 24          | 15    | 17             | 5       | 7     | 11    | 8         | 3     |
| 2016           | 116  | 6       | 8           | 10    | 18             | 4       | 8     | 12    | 18        | 3     |
| 2017           | 99   | 25      | 13          | 26    | 19             | 8       | 10    | 11    | 18        | 10    |
| 2018           | 145  | 28      | 11          | 41    | 16             | 10      | 9     | 12    | 11        | 30    |
| 2019           | 97   | 37      | 8           | 55    | 28             | 22      | 34    | 26    | 30        | 2     |
| 2020           | 173  | 37      | 32          | 93    | 16             | 12      | 18    | 45    | 35        | 14    |
| 2021           | 129  | 33      | 10          | 92    | 21             | 17      | 20    | 48    | 22        | 19    |
| 2022           | 111  | 37      | 27          | 156   | 33             | 10      | 39    | 40    | 40        | 22    |
| Sum            | 1217 | 261     | 202         | 536   | 215            | 113     | 151   | 229   | 215       | 127   |
| Relative Share | 37%  | 8%      | 6%          | 16%   | 7%             | 3%      | 5%    | 7%    | 7%        | 4%    |

Note. Table shows 10 countries by total cumulative number of publications

The data reveals the USA leading the cohort with 37% of the relative share, which underlines its influence in this area. However, emerging players like China, with a 16% share, underscore shifting academic landscapes and the increasing globalization of research in consumer visual attention. The diverse spread of countries, from traditional academic powerhouses to emerging research hubs, signifies the global interest and multi-dimensional approach to understanding and advancing this specialized field.

### The topics within the visual attention of consumers and their evolution

Topics were defined based on a co-occurrence network analysis using Keywords Plus by R (*bibliometrix* package). The keywords were then divided according to modularity class into clusters that were further interpreted into main topics. Within these clusters, subtopics were also defined in different time periods (time period groupings: 1989–2002, 2003–2007, 2008–2012, 2013–2017, and 2018–2022).

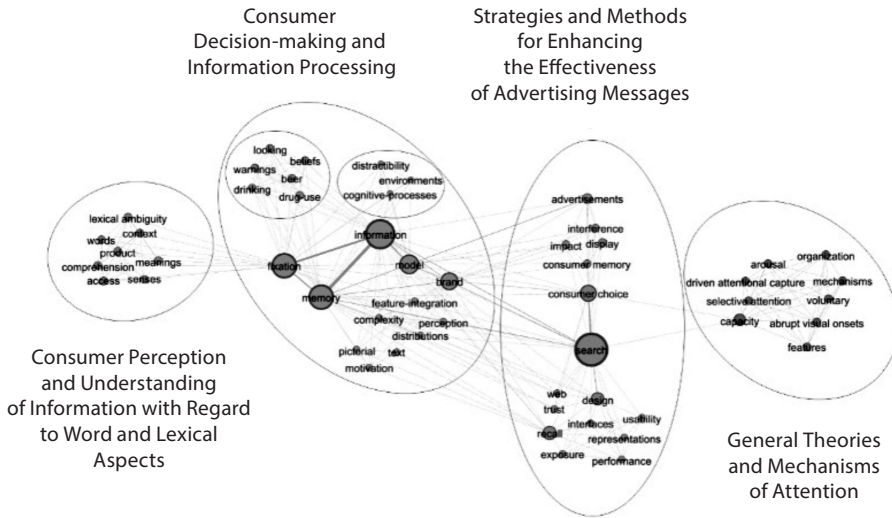


▲ Figure 3.

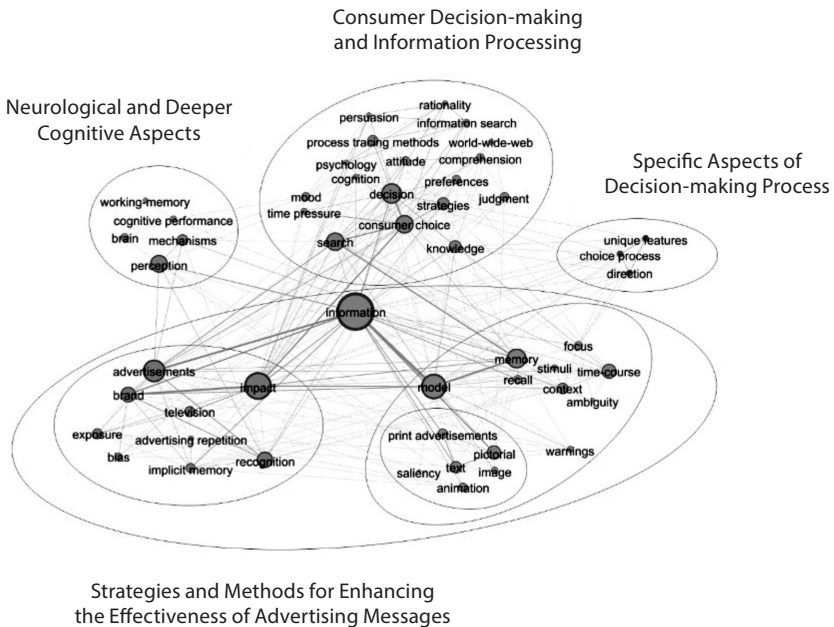
Topics in the period 1989–2002 (pioneering period)

The period 1989–2002 marks the emergence of consumer visual attention research using eye-tracking, as scholars began to exploit its potential for studying consumer behavior. Two core research themes can be identified. The first focuses on visual attention in consumer decision-making and information processing, examining how gaze guides information search, strategy selection, and product choice. The second centers on advertising effectiveness, emphasizing how cognitive processes such as recognition, memory, and involvement shape consumers' responses to advertising stimuli and how visual strategies are used to attract and sustain attention.

In the period 2003–2007, the field diversified as the number of thematic clusters increased. The growing centrality of the keyword 'search', linked to 'information', reflects the rising importance of the internet for consumer shopping and information acquisition. This shift corresponds to the expansion of online environments and heightened interest in how consumers allocate visual attention when interacting with digital information sources. New topics emerged in consumer decision-making, including visual attention to warning information and environmental influences on information processing, such as distractibility. In advertising research, attention increasingly turned to web-based contexts, focusing on website design, usability, and visual interference from distracting elements (e.g., banners). Alongside these applied themes, studies also addressed general attentional mechanisms and verbal information processing, linking theories of attention with psycholinguistic perspectives in marketing communication.



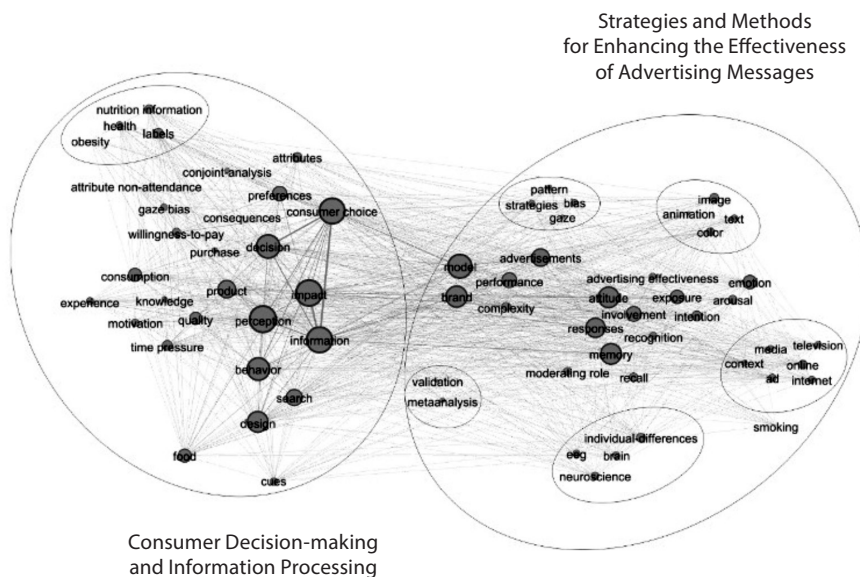
▲ Figure 4.  
Topics in the period 2003–2007



▲ Figure 5.  
Topics in the period 2008–2012



pay' across traditional and digital media. Second cluster address product-related design features and attention capture, with a prominent sub-cluster devoted to health-related contexts, including 'nutrition information' and 'health warnings'. A third major cluster centers on visual attention in consumer decision-making, emphasizing strategic choice models, gaze-related biases, and situational influences such as 'time pressure'. A smaller, distinct cluster addresses psychological correlates of visual attention, particularly 'emotion' and 'arousal'.



▲ Figure 7.  
Topics in the period 2018–2022

In the most recent period, research on consumer visual attention consolidates into two highly interconnected core areas (Figure 7). The first concerns visual attention in consumer decision-making, encompassing general decision processes and contexts, emerging work on multi-attribute choice, and sustained interest in health- and nutrition-related decisions. The second core area focuses on visual attention in advertising, examining psychological mechanisms underlying 'advertising effectiveness' and the use of neuroscience-based measures across different media channels and communication formats. This cluster also includes a growing emphasis on meta-analytic and validation studies. Together, these themes further integrate visual attention with strategic perspectives on consumer decision-making.

## Opportunities for future research of consumer visual attention with respect to the contemporary environment

Theories of consumer behavior and decision-making should reflect the contemporary environment in which consumers make choices. In this context, the term 'hybrid space' is mentioned, stemming from the assumption that the modern environment is rich in distractors, omnipresent particularly due to the characteristics of digital technologies and mobile phones, leading to a constant distraction of the consumer (Šimůnková, 2019). Based on the analysis of themes in the period 2003–2007 (see Section 2.2), a cluster of keywords indicating the influence of environments on information processing ('environments', 'distractibility') was identified. An interesting finding is that this cluster, representing distraction, did not appear in subsequent periods, prompting us to investigate further.

First, based on Keywords Plus, Authors' keywords, and article titles from a database created for the purpose of previous bibliometric analysis, those containing a mention of distraction (search query: *distract\**) were generated. The total number of articles related to distraction was 26 out of a total of 1,278. For the purpose of analyzing potential gaps in research on consumer visual attention concerning distraction, we delineated the contexts and sources of distraction (distractors) in the articles (see Table 5). Based on the provided data, it is evident that the study of distraction in consumer behavior spans a variety of contexts, each characterized by distinct sources of distraction.

Table 5. Sources of distraction in various contexts in the field of consumer visual attention

| Article                 | Context                | Source of distraction (distractor) |
|-------------------------|------------------------|------------------------------------|
| Strick et al. (2010)    | advertisements display | emotional appeal (humor)           |
| Pelau et al. (2022)     |                        | celebrity                          |
| Beuckels et al. (2021)  |                        | media multitasking                 |
| Sullivan et al. (2017)  |                        | multimodal techniques              |
| Dukić et al. (2013)     | driving safety         | roadside advertising signs         |
| Topolšek et al. (2016)  |                        |                                    |
| Brome et al. (2021)     |                        |                                    |
| Wang et al. (2021)      |                        |                                    |
| Mustapić et al. (2021)  |                        |                                    |
| Meuleners et al. (2020) |                        |                                    |
| Costa et al. (2019)     |                        |                                    |
| He et al. (2018)        |                        |                                    |
| Jones et al. (2014)     |                        |                                    |
| Edquist et al. (2011)   |                        |                                    |
| Stavrinos et al. (2016) |                        |                                    |
| Belyusar et al. (2016)  |                        |                                    |



| Article   | Context           | Source of distraction (distractor)   |
|---|-------------------|--|
| Crundall et al. (2006)<br>Ojsteršek and Topolšek (2019)               |                   | mobile phones and wearables<br>multiple internal and external factors affecting driver |
| Wege et al. (2013)  |                   | car dashboard warning  |
| Day et al. (2009)<br>Grewal et al. (2018)<br>Atalay et al. (2017)     | in-store shopping | music (tempo)<br>mobile phones<br>voicemail listening                                  |
| Egger et al. (2022)   | video gaming      | brand placement  |
| Holmberg et al. (2014)<br>Wojdyski & Bang (2016)<br>Wang & Day (2007) | web browsing      | visual advertisement   |

The context of driving safety reveals a consistent concern regarding roadside advertising signs (e.g., Brome et al., 2021; Dukić et al., 2013; Topolšek et al., 2016; Wang et al., 2021), alongside distractions from mobile phones and wearables (Crundall et al., 2006), and various internal and external factors affecting the driver dividing distractors in this context into visual (advertisements and the natural environment) and cognitive (thinking, roadside advertisements) (Ojsteršek & Topolšek, 2019). These findings point to the significant impact of visual and technological distractions on driver focus and safety.

In the realm of advertisement displays, distractions are orchestrated through emotional appeals, such as humor (Strick et al., 2010) or the use of celebrities (Pelau et al., 2022). These distractors could cause a distraction from the primary advertising message, the so-called 'overshadowing effect' (Pelau et al., 2022) or the 'vampire effect' (Kuvita & Karlíček, 2014). The evolution of digital media consumption further complicates this landscape, with Beuckels et al. (2021) focusing on media multitasking and Sullivan et al. (2017) focusing on multimodal techniques as notable sources of distraction. These studies underscore the complexity of advertising environments, where diverse elements vie for consumer attention, often leading to diminished effectiveness of the intended message. Furthermore, the context of the in-store shopping experience introduces distractions through ambient factors such as music tempo (Day et al., 2009), mobile phone usage (Grewal et al., 2018), and voicemail listening (Atalay et al., 2017), which can affect consumer decision-making processes. In contrast, digital environments such as video gaming and web browsing present distractions through brand placement (Egger et al., 2022) and visual advertisements (Holmberg et al., 2014; Wang & Day, 2007; Wojdyski & Bang, 2016). These studies collectively reveal how digital and physical environments are intricately designed or incidentally prone to fostering distractions, impacting consumer attention and behavior. The evolving nature of these distractions, especially with the advent of digital technologies, necessitates a continuous examination of their effects on consumer behavior, highlighting the critical need for an adaptive and nuanced understanding of

consumer behavior theories to address the challenges posed by the hybrid space of modern consumer environments.

## DISCUSSION

This study set out to review the development of consumer visual attention research along three questions concerning publication trends (RQ1), thematic evolution (RQ2), and the role of distraction and contemporary (hybrid) environments as future research considerations (RQ3). In this section, we discuss the main findings in relation to these research questions and highlight their theoretical and methodological implications.

With respect to publication trends (RQ1), the results show a clear and sustained growth in scholarly output over the past three decades, with an acceleration after 2014. This pattern reflects the increasing recognition of visual attention as a key construct in understanding consumer behaviour and the diffusion of eye-tracking and related technologies across marketing, psychology, and applied behavioral fields. The dispersion of publications across journals such as *Food Quality and Preference*, *Frontiers in Psychology*, and the *International Journal of Advertising*, and across countries led by the United States but with substantial contributions from Europe and Asia, indicates that consumer visual attention has become an interdisciplinary and internationally shared research agenda rather than a niche methodological trend. This aligns with earlier process-tracing reviews that document the progressive integration of eye-tracking into mainstream consumer decision-making research (Zuschke, 2020).

Regarding the development of current themes (RQ2), the thematic analyses reveal a small number of enduring pillars that have diversified and become increasingly interconnected over time. One pillar concerns visual attention in multi-attribute decision-making, where eye movements are used to examine how consumers search, compare, and integrate product information under different levels of time pressure and task complexity, and how visual salience can bias choice when preferences are weak or cognitive resources are strained (Milosavljević et al., 2012). A second pillar centers on advertising and communication, where studies investigate how visual design, content positioning, and emotional or social cues guide gaze patterns and influence recall and persuasion in both traditional and digital media (Muñoz-Leiva et al., 2022). A third set of themes links visual attention to applied domains such as nutrition and health communication, sustainability cues, and retail environments, showing that attention is increasingly studied in contexts where information processing has direct behavioral and policy relevance. Taken together, these patterns suggest that the field is moving from isolated applications towards a more integrated view of how attention operates across decision contexts and media environments.

Beyond documenting descriptive publication and topic trends, the findings have several implications for theory-building in consumer research. The prominence of themes related to information search, choice strategies, and advertising effectiveness indicates

that visual attention is often treated as an input into otherwise stable models of consumer decision-making. However, the thematic networks identified here support the view that attention itself can reshape how consumers process information, integrate attributes, and respond to persuasive cues, especially in cluttered and competitive environments. This points to the need for theories that treat attention not only as a scarce resource to be allocated, but also as a dynamic mechanism that co-determines which decision rules, heuristics, and evaluation strategies are activated in specific contexts. Conceptual frameworks that connect attentional dynamics to bounded rationality, dual-process models, and theories of information overload would help integrate these insights and move beyond a purely instrumental view of attention as something to be captured and monetized.

The review also highlights important limitations in the methods employed by the analyzed studies and, more broadly, in the methodological quality of the field. The dominance of controlled laboratory experiments using static or highly simplified stimuli raises questions about ecological validity when results are extrapolated to hybrid online–offline environments characterized by multitasking, mobile device use, and rapidly changing content. Process-tracing work has shown that task complexity, task motivation, and contextual richness can substantially alter gaze patterns and decision processes, suggesting that results from simplified settings may not generalize straightforwardly to real-world consumer environments (Zuschke, 2020). These tendencies indicate that bibliometric prominence does not automatically coincide with methodological robustness and that future research should combine eye-tracking with complementary process measures and more transparent reporting standards.

The evolution of topics related to distraction and hybrid spaces has direct implications for both theory and practice and speaks to RQ3. Traditional models of consumer information processing often presuppose relatively stable viewing conditions and single-task engagement with marketing stimuli, whereas emerging work on hybrid digital–physical contexts, mobile media, and cross-modal distractors points to environments in which consumers must continuously divide and reallocate their attention. Studies on visual salience and attentional competition already show that, under time pressure and cognitive load, visually prominent elements can exert a disproportionate influence on choice (Milosavljević et al., 2012). When such dynamics unfold in hybrid environments permeated by notifications, social media feeds, and ambient displays, they challenge long-standing assumptions about how information is encoded, evaluated, and remembered. By bringing together work on decision-making, advertising, and health communication, this bibliometric synthesis suggests that hybrid spaces and distraction should be seen not merely as boundary conditions but as central phenomena that can be used to refine or rethink existing theories of persuasion, media effects, and consumer policy.

The findings also point to unresolved conceptual and methodological questions that require further critical analysis. On the conceptual side, there is still limited integration between attention research informed by cognitive psychology and work grounded in socio-cultural or practice-based perspectives, despite the fact that hybrid consumer

environments are shaped by both technological infrastructures and everyday routines. Methodologically, the field has only begun to explore how emerging technologies such as virtual and augmented reality, mobile eye tracking, and AI-based classification of gaze and behaviour can be used to study attention in more ecologically rich settings (Zuschke, 2020). Without careful theorization, these tools risk reinforcing a purely descriptive mapping of where consumers look; with theory-driven designs, they could help test more nuanced propositions about how attention interacts with goals, habits, and social contexts.

This study has several limitations that should be acknowledged. First, the analyses are based solely on articles indexed in the Web of Science Core Collection and published in English, which means that relevant research appearing in other databases, languages, or publication formats (e.g., conference proceedings, books) may be under-represented. Second, the thematic structures identified in this review are derived primarily from Keywords Plus rather than authors' own keywords. While this choice reduces idiosyncratic variation and provides a broader, more standardized map of the conceptual landscape, it may also understate very recent or highly specialized topics that are visible only in author-supplied keyword lists. Third, as with any bibliometric analysis, the methods used here capture patterns of publication, co-occurrence, and citation but do not directly assess the internal validity of individual studies or the conceptual precision of the constructs employed. Future bibliometric work could therefore conduct comparative analyses that triangulate Keywords Plus with author-defined keywords and, where possible, full-text term extraction, and combine network analysis with systematic quality appraisal and meta-analytic techniques. Such designs would help clarify to what extent different keyword sources converge or diverge in representing the evolution of consumer visual attention research and how methodological quality shapes the visibility and impact of specific research strands.

## CONCLUSION

In light of the preceding discussions, this integrative bibliometric review examined the development of consumer visual attention research from 1989 to 2022, focusing on publication trends, thematic evolution, and the role of distraction and hybrid environments in consumer decision-making. Drawing on 1,278 articles indexed in the Web of Science Core Collection, the study mapped how visual attention has been conceptualized and operationalized across marketing, psychology, and related disciplines and how the field has responded to changing media and technological contexts.

The findings show a pronounced increase in publication activity and a growing dispersion of research across journals and countries, indicating that visual attention has become an established and genuinely interdisciplinary domain of consumer research (RQ1). Thematic analyses reveal three enduring pillars – decision-making, advertising, and applied domains such as nutrition information, health warnings, and retail environments – which have become increasingly interconnected over time (RQ2). At the same time, a

small but growing body of work on distraction and hybrid digital–physical spaces points to new conditions under which consumers must allocate attention in complex, multi-device environments, thereby challenging traditional assumptions about stable viewing conditions and single-task engagement (RQ3).

This study contributes to the literature in several ways. First, it offers a conceptually oriented overview that places visual attention, rather than specific neuromarketing tools, at the center of the analysis and shows how attention-related themes have co-evolved with changes in media, technology, and consumer contexts. Second, it synthesizes evidence on how research in decision-making, advertising, and health communication converges around shared questions of attentional dynamics and competition, identifying hybrid environments and distraction as key issues for future theory development and for the design of consumer policy interventions. Third, it highlights methodological blind spots in the existing literature – particularly regarding ecological validity, the interpretation of eye-movement measures, and the reporting of data quality – and outlines how comparative bibliometric and quality-focused reviews can complement traditional descriptive mappings.

Looking ahead, there is a need for research that examines visual attention in ecologically rich, hybrid settings, integrates mobile and AI-based attention metrics into theory-driven designs, and systematically evaluates the validity and reliability of attention measures across contexts and populations. Greater engagement with immersive technologies such as virtual and augmented reality, together with longitudinal and field-based studies, could help bridge the gap between controlled laboratory findings and the realities of everyday consumer life. By addressing these challenges, future work can move beyond descriptive accounts of where consumers look towards explanatory and predictive models of how they allocate attention and make decisions in increasingly complex and distraction-rich environments.

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# OD OGLAŠAVANJA DO DONOŠENJA ODLUKA: RAZVOJ ISTRAŽIVANJA VIZUALNE PAŽNJE POTROŠAČA

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**SAŽETAK** Rad donosi integrativni bibliometrijski pregled istraživanja vizualne pažnje potrošača, s posebnim naglaskom na studije koje koriste metodu praćenja pokreta očiju (engl. eye-tracking) i srodne metode. Na temelju 1278 radova indeksiranih u bazi Web of Science Core Collection u razdoblju od 1989. do 2022. godine istraživanje analizira trendove objavljivanja, tematske strukture i njihovu evoluciju te način na koji distrakcije i hibridna digitalno-fizička okružja dovode u pitanje tradicionalne poglede na donošenje potrošačkih odluka. Analize suodnosa ključnih riječi, u kombinaciji s tematskim mapiranjem tijekom pet vremenskih razdoblja, koriste se za identifikaciju ključnih istraživačkih klastera i njihovih međusobnih odnosa. Rezultati pokazuju snažan i ubrzan rast područja od 2014. godine, uz izraženu disperziju istraživanja po časopisima i zemljama, čime se potvrđuje da je vizualna pažnja etablirano i interdisciplinarno područje unutar istraživanja potrošača. Izdvajaju se tri trajna tematska stupa: vizualna pažnja u višekriterijskom donošenju odluka, vizualna pažnja u oglašavanju i komunikaciji te primijenjena područja poput nutritivnih informacija, zdravstvenih upozorenja i maloprodajnih okružja. Novija istraživanja naglašavaju kompeticiju pažnje te upućuju na nova pitanja vezana uz distrakciju i hibridne digitalno-fizičke prostore. Rad daje tri glavna doprinosa. Prvo, nudi konceptualno usmjeren pregled koji u središte analize stavlja vizualnu pažnju, a ne pojedinačne alate. Drugo, pokazuje kako prethodno odvojeni istraživački tokovi u području donošenja odluka, oglašavanja i zdravstvene komunikacije konvergiraju oko zajedničkih pitanja dinamike pažnje u složenim okružjima. Treće, razvija agendu budućih istraživanja koja eksplicitno stavljaju u prvi plan distrakciju i kompeticiju pažnje u hibridnim digitalno-fizičkim potrošačkim prostorima te povezuje te fenomene s novim tehnologijama i teorijski utemeljenim istraživanjima pažnje.

## KLJUČNE RIJEČI

PONAŠANJE POTROŠAČA, VIZUALNA PAŽNJA, EYE-TRACKING, TRENDOVI, DISTRAKCIJA

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