

BERGISCHE UNIVERSITÄT WUPPERTAL
FAKULTÄT FÜR WIRTSCHAFTSWISSENSCHAFT
SCHUMPETER SCHOOL OF BUSINESS AND ECONOMICS

Introducing Smartphone Swiping to Advertising Research:

Three Articles on Motoric Human–Smartphone Interaction
and Advertising Effectiveness in Social Media

Inauguraldissertation
zur Erlangung des akademischen Grades
eines Doktors der Wirtschaftswissenschaften
(doctor rerum oeconomicarum)

vorgelegt von
Stefan Rohrbach
aus München

Wuppertal, im Dezember 2024

Table of Contents

Table of Contents	I
List of Figures	VI
List of Tables	VII
List of Appendices	VIII
A General Introduction	1
I Smartphone Swiping: The Neglected Factor in Advertising Research	1
II Smartphone Swiping in the Context of the Buyer Response Steps Model	2
III Research Gaps in Smartphone Swiping and Social Media Ad Effectiveness 6	
IV Purpose of the Thesis and Research Framework	8
V Structure of the Thesis	13
B The Vampire Effect of Smartphone Swiping: How Atypical Motor Actions Increase Ad Attention but Impair Brand Recall (Authors: Stefan Rohrbach, Daniel Bruns, and Tobias Langner)	16
I Introduction	17
II Theoretical Background and Hypotheses Development	19
1 Motoric Human–Smartphone Interactions	19
2 Visual Attention and Embodied Cognition Theory	20
3 Duration of Exposure and Brand Recall	21
4 Memory of Motor Actions and Processing Depth	22
III Pre-study: Identifying Typical and Atypical Smartphone Swiping	22
1 Method.....	23
1.1 Participants	23
1.2 Study Design.....	23
1.3 Procedure	23
1.4 Data Analysis.....	24

2	Results.....	24
2.1	Taxonomy of Motoric Human–Smartphone Interactions.....	24
2.2	Typical and Atypical Smartphone Swiping in Social Media	26
3	Discussion.....	30
IV	Experiment: An Eye-Tracking Study to Analyze the Impact of Atypical Swiping on Attention and Brand Recall	30
1	Method.....	30
1.1	Participants	30
1.2	Study Design.....	31
1.3	Procedure	31
1.4	Measures	32
2	Results.....	32
2.1	Impact of Typicality of Swiping Styles on Attention toward the Ad	32
2.2	Impact of Typicality of Swiping Styles on Brand Recall	33
3	Discussion.....	34
V	Conclusion.....	36
1	Implications for Practice.....	37
2	Limitations and Future Research	38
C	The Carousel Effect: Leveraging Sideways Swiping for Enhanced Ad Effectiveness in Social Media (Authors: Stefan Rohrbach, Daniel Bruns, and Tobias Langner)	41
I	Introduction.....	42
II	Previous Research and Hypotheses Development.....	44
1	Carousel Ads in Social Media	44
2	Impacts of Carousel Ads on Attention and Recall.....	44
3	Impacts of Carousel Ad Length on Attention.....	46
4	Impacts of Brand Attitude on Carousel Ad Activation	47
III	Study 1: Qualitative Interviews on the Perception of Carousel Ads	47
1	Method.....	48
1.1	Participants and Study Design.....	48
1.2	Procedure and Data Analysis.....	48
2	Results.....	48

2.1 Evaluation of Carousel Ads	48
2.2 Idiosyncratic Analysis	50
2.3 Cross-Case Analysis	51
3 Discussion.....	53
IV Study 2: Eye-Tracking Experiment to Measure Attention	53
1 Method.....	54
1.1 Participants and Study Design.....	54
1.2 Procedure and Data Analysis.....	54
2 Results.....	55
2.1 Attention to Carousal Ads and Brand Recall.....	55
2.2 Effects of Longer Carousel Ads on Attention	56
3 Discussion.....	57
V Study 3: Videography Study and the Role of the Brand	57
1 Method.....	58
1.1 Participants and Study Design.....	58
1.2 Procedure and Data Analysis.....	58
2 Results.....	58
3 Discussion.....	59
VI Conclusion.....	59
1 Implications for Practice	60
2 Limitations and Further Research.....	60
D Before the Hype, Comes the Swipe: How to Design Carousel Ads that Get Activated (Authors: Stefan Rohrbach, Daniel Bruns, and Tobias Langner)	63
I Introduction.....	64
II Theoretical Background	66
1 The Carousel Ad Format	66
2 Advertising Effects of Carousel Ads	67
3 Stopping Power of Carousel Ads: Physically Intense Stimuli to Elicit Bottom-Up Processing	68
4 Activation of Carousal Ads: Emotional and Cognitive Elements to Stimulate Top-Down Processing	69
5 Emotional Stimuli.....	70

6	Cognitive Stimuli.....	70
III	Study 1: The Carousel Effect on Engagement.....	71
1	Method.....	71
2	Results.....	72
2.1	Engagement of Carousel Posts vs. Other In-Feed Formats	72
2.2	Longer Carousel Posts Drive Increased Engagement.....	72
3	Discussion.....	72
IV	Study 2: What Makes Consumers Swipe Carousels	72
1	Method.....	73
1.1	Design and Participants	73
1.2	Procedure	73
2	Results: Qualitative Part	74
2.1	Stopping Power of Carousel Ads.....	74
2.2	Activation of Carousel Ads	74
3	Results: Quantitative Part	77
3.1	The Role of the Brand	77
3.2	The Role of Emotional and Cognitive Elements.....	77
4	Discussion.....	79
V	General Discussion	80
1	Contributions to Advertising Theory	80
2	Contributions to Advertising Practice	81
3	Limitations and Future Research	81

E Final Concluding Discussion	82
I Summary of the Findings	82
II Implications for Research and Practice	87
III Limitations and Future Research.....	91
References	94
Appendix	113
I Article 1.....	118
II Article 2.....	133
III Article 3.....	152

List of Figures

Figure 1: Research framework based on the Buyer Response Steps model	3
Figure 2: Research framework and focus of Article 1	9
Figure 3: Research framework and focus of Article 2	10
Figure 4: Research framework and focus of Article 3	11
Figure 5: Taxonomy of motoric human–smartphone interactions	25
Figure 6: Experimental setup in participants’ homes.....	31
Figure 7: Effect of typicality on gaze duration and number of fixations	33
Figure 8: Effect of typicality on brand recall	34
Figure 9: Example carousel ad with five cards at Facebook	45
Figure 10: Stages of the carousel ad experience	50
Figure 11: Experimental setup of the mobile eye-tracking device.....	55
Figure 12: Means by ad format for gaze duration, fixations, and brand recall	56
Figure 13: Example of a carousel ad at Instagram	66
Figure 14: Consumer response steps toward carousel ads	68

List of Tables

Table 1: Overview of the three articles with research focus and studies	12
Table 2: Statements related to typical and atypical motoric smartphone interactions	29
Table 3: Ad format evaluations.....	49
Table 4: Selected interview statements related to carousel activation	75
Table 5: Motivators (green) and inhibitors (red) of carousel activation	78
Table 6: Overview of the three articles with key findings and contributions	91

List of Appendices

Appendix 1: Carousel ad formats across different social media platforms.....	113
Appendix 2: The 2.5-seconds attention memory threshold.....	114
Appendix 3: Media consumption of users aged 16 to 64 years	114
Appendix 4: The world's most used social media platforms	115
Appendix 5: Favorite social media platforms	115
Appendix 6: Ad spend outlook 2023/24	116
Appendix 7: Related studies on hand movements in human-smartphone interaction	117
Appendix 8: Participants in the pre-study of Article 1.....	118
Appendix 9: Participants in the main experiment of Article 1	119
Appendix 10: Tobii Pro Glasses 2.....	120
Appendix 11: Ego-perspective eye-tracking with Tobii Pro Glasses 2	120
Appendix 12: Ego-perspective view of thumb and index swiping	121
Appendix 13: Statements from the Article 1 pre-study on smartphone swiping	122
Appendix 14: Interview guide used for the Article 1 pre-study.....	123
Appendix 15: Interview guide used for the experiment of Article 1	128
Appendix 16: In-feed ad formats with samples for Instagram and Facebook	133
Appendix 17: Carousel ad indicators: Format and card count	134
Appendix 18: Participants of Article 2 - Study 1	135
Appendix 19: Participants of Article 2 - Study 2	136
Appendix 20: Participants of Article 2 - Study 3	137

Appendix 21: Selected statements about carousel ads	138
Appendix 22: Selected statements about image ads.....	138
Appendix 23: Selected statements about video ads	139
Appendix 24: Selected statements about collection ads.....	139
Appendix 25: Interview guide used for Article 2 - Study 1	140
Appendix 26: Interview guide used for Article 2 - Study 3	146
Appendix 27: List of participants of Article 3 - Study 2.....	153
Appendix 28: T-Test for number of likes of carousel versus non-carousel posts.....	154
Appendix 29: Carousel activation by category as analyzed for Study 2.....	154
Appendix 30: Category system for physical, emotional and cognitive elements	155

A General Introduction

I Smartphone Swiping: The Neglected Factor in Advertising Research

Swiping on a smartphone is something we do countless times every day, but it's more than just a simple motion—it shapes how we interact with social media and advertisements. It is far more than a mechanical gesture; it determines the pace and direction of media consumption and directly impacts content exposure and subsequent advertising effectiveness. Smartphone swiping serves not only as an integral consumer behavior but also determines how advertising is being processed. As consumers swipe quickly through their social media newsfeeds, ads are often bypassed entirely, sometimes without being noticed. Despite its significance, the role of smartphone swiping in advertising research has been largely neglected.

Understanding smartphone swiping is crucial due to its direct impact on advertising effectiveness, particularly in the dynamic and competitive social media environment where capturing consumer attention is an ongoing challenge (Beuckels et al. 2021; Duff and Segijn 2019; Nelson-Field, Riebe, and Sharp 2013). On platforms like Instagram, users look at ads for only 1.8 seconds on average (Borgmann, Kopka, and Langner 2022), far below the 2.5-second threshold necessary to create a lasting brand impact (WARC 2022).

The widespread adoption of smartphones has fundamentally transformed how consumers engage with social media. Over 5 billion people now own a smartphone, with 93% of individuals aged 16–64 years actively using social media (DataReportal 2024). This shift has profoundly altered media interactions, particularly with advertisements, as technological advancements and evolving consumer behaviors redefine how content is consumed (Voorveld 2019). In this context, the physical act of swiping—how consumers use their hands to navigate content on their smartphones—plays a pivotal role in filtering social media exposure and attention.

Platform design, such as infinite-scroll newsfeeds (Echauri 2023), and ad formats shape smartphone swiping. Advertisers can choose between four different ad formats in the newsfeed:

single image, video, carousel, and collections ads. Carousel ads are unique because they are the only ad format that can change the continuous upward swiping motion to a sideways swipe into the ad itself. This unique interaction allows carousel ads to break the standard swiping flow, potentially increasing exposure and fostering deeper engagement. Carousel ads, that are swiped sideways, offer an opportunity for longer viewing times and detailed brand storytelling, catering to consumers seeking more immersive brand experiences. Despite their prevalence across social media platforms (Appendix 1) and frequent use by brands, carousel ads remain underexplored in academic research (De Keyzer, Dens, and De Pelsmacker 2023).

While consumers are constantly using their hands to interact with the smartphone, smartphone swiping has been neglected in advertising research so far. Whether it is the motoric interaction of swiping that directly determines exposure and ad effectiveness or ad formats, such as carousel ads, that potentially benefit from breaking the standard upwards swiping flow, smartphone swiping is important for ad effectiveness in social media.

II Smartphone Swiping in the Context of the Buyer Response Steps Model

The pivotal role of smartphone swiping in advertising can be understood through the lens of the Buyer Response Steps model (Rossiter, Percy, and Bergkvist 2018; Bergkvist and Langner 2023). This purchase funnel framework outlines four key steps: (1) ad exposure, (2) ad processing, (3) brand communication effects, and (4) consumer actions. Smartphone swiping influences each of these steps (Figure 1).

First, at the ad exposure stage, the pace and direction of individual motoric human–smartphone interactions determine whether and how long an advertisement appears on the smartphone screen. This exposure can be measured using eye-tracking metrics such as gaze duration. Second, smartphone swiping affects the processing of the ad content, where cognitive and emotional engagement play vital roles in how the ad is internalized. Third, the processing

leads to brand communication effects, which may manifest in increased brand awareness and positive brand attitudes. Finally, these brand communication effects and subsequent consumer actions can, in turn, influence swiping behavior. For instance, favourable brand attitudes or a consumer's intent to seek more information might encourage consumers to swipe sideways into carousel ads, further deepening their interaction (Bergkvist and Langner 2023).

Before the three articles of this thesis are linked to this framework (Section III), the theoretical foundations of smartphone swiping will be further explored, and key gaps in current advertising research will be addressed (Section II).

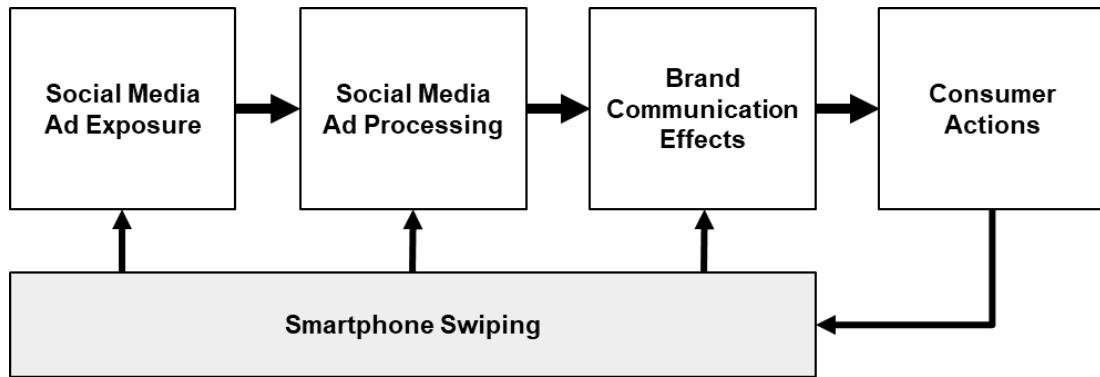


Figure 1: Research framework based on the Buyer Response Steps model

(adapted from Rossiter, Percy, and Bergkvist 2018)

Human interactions with objects through hand movements have been a focus of many studies across various fields, including touch (Krishna, Luangrath, and Peck 2024), haptics (Feix, Bullock, and Dollar 2014; Klatzky, Lederman, and Metzger 1985; Napier 1956), and human–computer interaction (Bevan and Fraser 2016; Ciman and Wac 2018; Kim and Jo 2015; Tsai, Tseng, and Chang 2017; Wang, Gohary, and Chan 2024). Over time, humans have developed advanced fine-motor skills, enabling precise interactions with objects and tools (Luangrath et al. 2022). These motoric interactions typically involve a holding grip and input fingers

to control movement. Lederman and Klatzky (1987) observed that individuals establish consistent hand movements for exploring everyday objects. People develop motoric preferences for such interactions, leading to typical motoric patterns when using everyday objects like a pen or a mug (Norman 1988). In this context, smartphones have become the most widely used everyday object of our time, and their standardized design—featuring large touchscreens with minimal buttons—has further shaped these typical motoric interaction pattern (Luangrath et al. 2022).

Human-smartphone interaction studies reveal that users generally favor their dominant hand, typically the same one used for writing, and rely on either their thumb or index finger for input (Miyaki and Rekimoto 2009; Shin et al. 2016). While these studies provide valuable insights into factors like finger choice (Kim and Jo 2015), grip variations (Lee et al. 2016) and handedness (Chen, Zhu, and Yang 2023), they focus on controlled laboratory settings. Laboratory research also highlights age-related differences, with children and younger adults outperforming older users in gesture operations (Tsai, Tseng, and Chang 2017). However, these studies do not reflect the nuanced and dynamic characteristics of real-life social media smartphone usage.

With the average person spending approximately 2.5 hours daily on social media (DataReportal 2024), typical smartphone swiping becomes automatic and efficient through extensive practice (Land et al. 2013; Fontani et al. 2007). Conversely, atypical smartphone swiping resulting from unfamiliar motoric interaction is likely to occur more slowly and consciously, potentially increasing attention and higher levels of content processing. Visual attention, in turn, is critical for assessing ad exposure (Frade, Oliveira, and Giraldi 2023), as consumers perceive ads through their eyes while swiping with their hands. Advertising effectiveness, evaluated through metrics like brand recall and attitude formation (Van Raaij 1989), requires sufficient exposure time and cognitive processing (MacInnis and Jaworski 1989; Wilson and Till

2012). Longer ad exposures enhance learning and brand recall (Pieters, Warlop, and Wedel 2002; Singh and Cole 1993; Newstead and Romaniuk 2010), while greater attention leads to improved recall outcomes (Bergkvist and Langner 2023; Guitart, Hervet, and Hildebrand 2019). Swiping, as a key determinant of exposure, directly influences these processes.

Advertising in social media is inherently interactive (Muntinga, Moorman, and Smit 2011), but the degree of interactivity varies by ad format. Any in-feed advertisement, such as single image, video, carousel or collection ads, can be liked, commented on or shared. The carousel ad format, however, is the only advertising format that encourages consumers to actively change the direction of their swiping (Figure 13). Social media platforms like Instagram and Facebook are predominantly designed around infinite-scroll newsfeeds, where users constantly swipe upwards (Echauri 2023). Carousel ads, requiring sideways swiping, disrupt this continues scrolling pattern, offering users greater control over engagement depth and pace. This sideways interaction fosters a sense of empowerment and reduces irritation, similar to skippable video ads (Frade, Oliveira, and Giraldi 2023). Unlike passive media consumption, such as television commercials, social media swiping actively empowers users to control content flow, making it a critical determinant of ad outcome. The unique multi-card structure of carousel ads can create immersive experiences (Phillips and McQuarrie 2010; Van Laer et al. 2014), potentially promoting deeper cognitive processing. To be activated, carousel ads must first capture attention and encourage users to swipe through their cards. Building on research on attention-capturing tactics (Kopka, Borgmann, and Langner 2024; Langner and Klinke 2022; Rossiter, Percy, and Bergkvist 2018), this research investigates how design elements can motivate or inhibit carousel activation.

How consumers use their hands to hold and interact with their smartphones is essential for understanding advertising effectiveness in social media. Smartphone swiping plays a crucial role in how consumers navigate social media platforms, influencing the speed, direction, and

depth of their engagement with content. Understanding how consumers swipe in real-life settings is critical, as these motoric actions directly influence ad exposure, processing and brand communication effects. Despite advances in human–computer interaction research, this critical factor has not yet been introduced to advertising research.

III Research Gaps in Smartphone Swiping and Social Media Ad Effectiveness

Through an analysis of the literature on haptics, touch, human-computer interaction and advertising in social media, several research gaps have been identified that form the basis for the research presented in this thesis:

The neglected impact of smartphone swiping in advertising research. While human-computer interaction research has explored the relationship between motoric actions and technology use (Kim and Jo 2015; Tsai, Tseng, and Chang 2017), the impact of smartphone swiping on advertising effectiveness remains underexplored. Swiping, as a primary mode of interaction, influences how consumers are exposed, process, and respond to brand communication. This thesis investigates how smartphone swiping influences social media advertising, providing a new lens to advertising research.

Underexplored impact of the carousel ad format. Carousel ads, characterized by their unique sideways swiping feature, disrupt continues upward scrolling pattern, presenting an innovative tool for enhancing consumer engagement (Echauri 2023). Despite their growing prevalence on platforms like Instagram and Facebook, carousel ads remain underexplored in terms of their effectiveness (De Keyzer, Dens, and De Pelsmacker 2023). Existing studies have suggested that carousel ads encourage deeper consumer engagement through their interactive and immersive design (Wahid and Gunarto 2022; Oltra, Camarero, and San José Cabezudo 2022). However, it remains uncertain whether carousel ads effectively enhance advertising effectiveness, such as increased attention and brand recall, or what strategies advertisers can employ to

enhance the likelihood of consumers activating carousel ads. This thesis explores the effectiveness of carousel ads compared to other formats, such as static images or videos. Studying how carousel ads leverage user interactivity to enhance ad outcomes provides valuable insights for advertisers seeking to optimize their strategies in competitive social media environments.

Limited understanding of carousel activation drivers. In order for carousel ads to get activated, consumers must engage by swiping into the ads. Although existing literature highlights the importance of physical intense as well as emotional and cognitive stimuli in getting and holding attention (Dukes and Liu 2024; Koivisto and Mattila 2020; Langner and Klinke 2022; Lin and Lu 2011), little is known about the design elements that use such stimuli to drive carousel activation. This research identifies key motivators and inhibitors that influence carousel activation. By uncovering these drivers, the thesis advances the understanding of how to design carousel ads that encourage consumer interaction.

Lack of observational studies on real-life social media behavior. Most existing research in human-computer interaction on the usage of smartphones is conducted in controlled laboratory settings (Appendix 7). While these approaches provide valuable insights, they often fail to capture the nuanced, fleeting, and self-directed interactions characteristic of real-life social media usage (De Pelsmacker 2021). Traditional methodologies struggle to observe implicit behaviors, such as habitual swiping, which play a significant role in affecting advertising outcomes. This thesis addresses this methodological limitation by employing ego-perspective eye-tracking of real-life social media smartphone consumption in participants' homes. These methods enable unobtrusive, real-time observation of consumers engaging with actual content on their personal devices. This research analyzes the natural consumer interactions with social media feeds and provides an externally valid understanding of smartphone swiping and its implications for advertising effectiveness.

IV Purpose of the Thesis and Research Framework

The purpose of this thesis is to understand how smartphone swiping impacts advertising effectiveness in social media, addressed through three interconnected articles.

Understand the role of atypical smartphone swiping. Article 1 investigates how typical and atypical smartphone swiping behaviors shape ad exposure, attention, and cognitive processing. It also evaluates whether atypical swiping can be a viable tactic for enhancing advertising effectiveness.

Evaluate carousel ads' effectiveness. Article 2 investigates whether carousel ads enhance attention and brand recall compared to other in-feed formats. By leveraging sideways swiping, carousel ads disrupt the continuous upward scrolling motion, creating immersive and memorable brand experiences.

Identify motivators and inhibitors for activating carousel ads. Article 3 focuses on what motivates or inhibits consumers from activating carousel ads by swiping into them. It identifies key emotional and cognitive stimuli that influence carousel activation. Together, these three articles provide an understanding of how smartphone swiping impacts advertising effectiveness in social media, advancing both theoretical insights and practical applications.

Article 1: The Vampire Effect of Smartphone Swiping: How Atypical Motor Actions Increase Ad Attention but Impair Brand Recall

Article 1 explores how typical and atypical motoric interactions with smartphones influence ad exposure, processing, and brand communication effects (Figure 2). A pre-study observed 30 participants in their homes using their personal smartphones, capturing real-life social media interactions and conducting think-aloud interviews to identify typical and atypical swiping behaviors (Figure 5).

Building on these insights, the main experiment used mobile eye-tracking with 36 participants in their natural home environments, employing their own devices and personalized newsfeeds to assess ad exposure and brand communication effects.

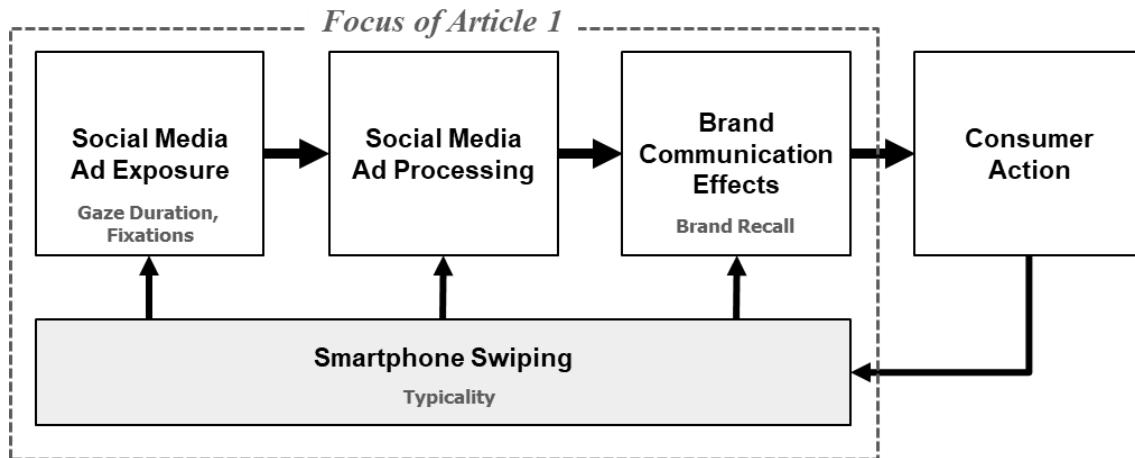


Figure 2: Research framework and focus of Article 1

Article 1 lays the groundwork for understanding how smartphone swiping influences ad exposure. It first identifies typical and atypical smartphone swiping on social media, to then assesses whether inducing atypical swiping can effectively enhance attention (gaze duration, number of fixations) and brand recall. This is operationalized through two primary hypotheses:

H1: Atypical swiping leads to (a) longer total gaze durations and (b) more fixations on social media ads than typical swiping.

H2: Atypical swiping leads to higher brand recall than typical swiping.

Article 2: The Carousel Effect: Leveraging Sideways Swiping for Enhanced Ad Effectiveness in Social Media

Article 2 examines the advertising effectiveness of carousel ads. It compares carousel ads to other in-feed formats, such as image, video, and collection ads, in their ability to capture attention and enhance brand recall.

The research comprises three studies. Study 1 uses qualitative interviews with 22 participants to explore perceptions and experiences of carousel ads compared to other formats. Study 2 employs mobile eye-tracking with 36 participants to measure visual attention (gaze duration, number of fixations) and brand recall within personalized newsfeeds. Study 3 combines videography and interviews with 31 participants to investigate how brand attitude influences carousel ad activation through sideways swiping.

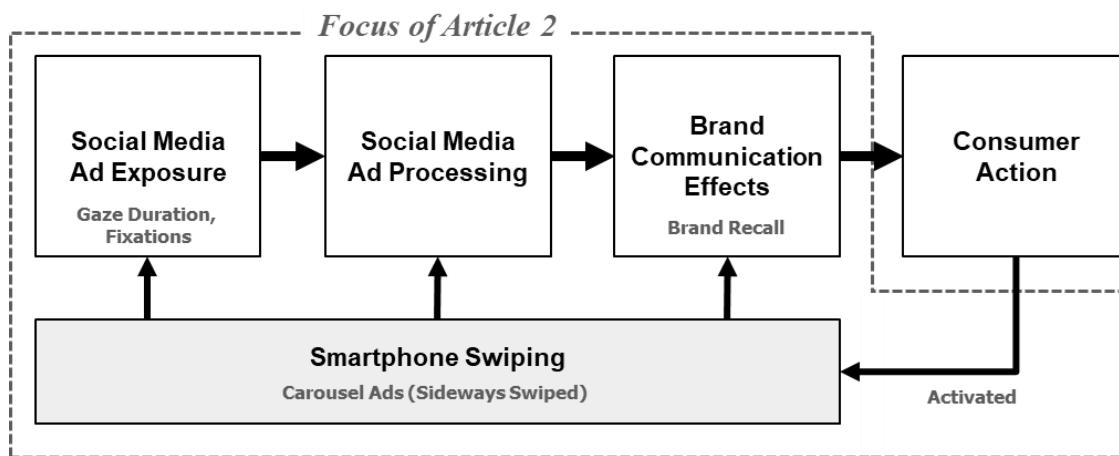


Figure 3: Research framework and focus of Article 2

Article 2 contributes to the framework by examining how activated carousel ads enhance advertising effectiveness (Figure 3). It evaluates carousel ads in real-world settings and explores their ability to disrupt continuous upward scrolling. The study addresses these objectives through a focused research question and hypotheses::

RQ: How do consumers evaluate and experience carousel ads compared to other in-feed ad formats in social media?

H1: Activated carousel ads elicit (a) longer gaze durations, (b) more fixations, and (c) better brand recall than other ad formats.

H2: The more cards an activated carousel ad contains, the (a) longer the gaze duration and (b) higher the number of fixations.

H3: Better attitudes toward advertised brands increase the likelihood that carousel ads are activated.

Article 3: Before the Hype, Comes the Swipe: How to Design Carousel Ads that Get Activated

Article 3 focuses on the drivers of carousel ad activation. While Article 2 establishes the effectiveness of activated carousel ads, this article delves into what motivates users to actively swipe sideways into carousel ads. The study combines mobile eye-tracking and qualitative interviews with 64 participants to identify design elements that encourage sideways swiping into carousel ads (Figure 4).

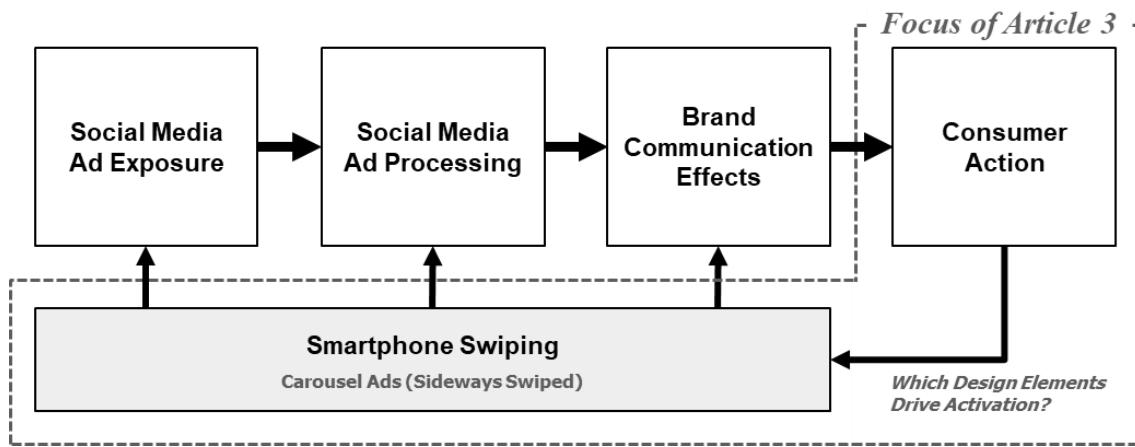


Figure 4: Research framework and focus of Article 3

Article 3 aligns with the research framework by examining the motivators and inhibitors of carousel ad activation. It addresses the objective of uncovering design elements that drive consumer interaction, addressed through the following two research questions:

RQ1: What role do physically intense elements play in making consumers stop for carousel ads?

RQ2: What role do emotional and cognitive elements play in making consumers activate carousels?

The three articles collectively advance the understanding of smartphone swiping in advertising research. Article 1 defines typical and atypical swiping, establishing a foundation. Article 2 examines how carousel ads leverage sideways swiping to enhance attention and brand recall. Finally, Article 3 identifies motivators and inhibitors of carousel activation. Together, these articles address critical gaps in the advertising literature and provide a framework for understanding the role of smartphone swiping in social media advertising. Table 1 provides an overview of the three articles, their respective research questions, hypotheses, and studies.

Table 1: Overview of the three articles with research focus and studies

Title	Article 1	Article 2	Article 3
Hypothesis / Research Questions	<ul style="list-style-type: none"> ▪ H1: Atypical swiping leads to (a) longer total gaze durations and (b) more fixations on social media ads than typical swiping. ▪ H2: Atypical swiping leads to higher brand recall than typical swiping. 	<ul style="list-style-type: none"> ▪ RQ: How do consumers evaluate, and experience carousel ads compared with other in-feed ad formats in social media? ▪ H1: Activated carousel ads elicit (a) longer gaze durations, (b) more fixations, and (c) better brand recall than other ad formats. ▪ H2: The more cards an activated carousel ad contains, the (a) longer the gaze duration and (b) higher the number of fixations. ▪ H3: Better attitudes toward advertised brands increase the likelihood that carousel ads are activated. 	<ul style="list-style-type: none"> ▪ RQ1: What role do physically intense elements play in making consumers stop for carousel ads? ▪ RQ2: What role do emotional and cognitive elements play in making consumers activate carousels?
Studies	<ul style="list-style-type: none"> ▪ Pre-study: In-home Videography with Qualitative Interviews (n = 30) ▪ Experiment: Eye-Tracking (n = 36) 	<ul style="list-style-type: none"> ▪ Study 1: Qualitative Interviews (n = 22) ▪ Study 2: Eye-Tracking (n = 36) ▪ Study 3: Videography, Interviews (n = 31) 	<ul style="list-style-type: none"> ▪ Study 1: Data Scraping (955 posts) ▪ Study 2: Eye-Tracking, Qualitative Interviews and Content Analysis (n = 64)

V Structure of the Thesis

This thesis is organized into five chapters, each systematically contributing to a comprehensive understanding of how smartphone swiping impacts advertising effectiveness in social media.

Chapter A (General Introduction) establishes the central theme of the thesis: the pivotal role of smartphone swiping in affecting advertising outcomes in social media. Section I explores the importance of motoric human–smartphone interaction in determining advertising effectiveness within fast-paced social media environments. Section II introduces the research framework to explain the role of smartphone swiping in social media. Section III identifies key research gaps. Section IV outlines the purpose of the thesis and aligns the three interconnected articles to the research framework. Section V concludes the chapter with an overview of the thesis structure.

Chapter B (Article 1: The Vampire Effect of Smartphone Swiping) investigates how typical and atypical smartphone swiping influences advertising effectiveness. Section I introduces the concept of motoric human–smartphone interactions and their impact on ad exposure. Section II reviews the literature on embodied cognition, motoric interaction, and visual attention, framing the hypotheses for the study. Section III describes a pre-study that identified typical swiping behaviors. Section IV details the main experiment, where mobile eye-tracking was used to analyze the impact of atypical swiping on attention and brand recall in naturalistic settings. Section V summarizes the findings, highlighting their implications for theory and practice and identifying future research opportunities.

Chapter C (Article 2: The Carousel Effect) examines the unique characteristics of carousel ads and their effectiveness in disrupting continuous upwards scrolling patterns. Section I introduces carousel ads as a distinctive interactive format within social media newsfeeds. Section II reviews theories on interactivity and immersion, presenting hypotheses on carousel ads' potential to enhance attention, engagement, and brand recall. Section III describes Study 1,

conducted to understand general perceptions of carousel ads compared to other formats. Section IV details Study 2, employing eye-tracking to measure the impact of carousel ads on key advertising metrics. Section V explains Study 3, which utilizes videography and interviews to explore how brand attitudes influence carousel ad activation. Section VI concludes with a discussion of theoretical and practical contributions, emphasizing carousel ads' potential as an effective ad format.

Chapter D (Article 3: Before the Hype, Comes the Swipe) focuses on the motivators and inhibitors of carousel ad activation. Section I introduces the importance of understanding design elements that drive consumer interaction with carousel ads. Section II provides the theoretical foundation, exploring the role of physically intense, emotional, and cognitive stimuli in shaping engagement behaviors. Section III presents a large-scale data scraping analysis of Instagram posts, examining whether the carousel format drive more "likes" than other in-feed ad formats. Section IV describes a mobile eye-tracking study to identify specific design elements that motivate or inhibit carousel activation. Section V concludes with actionable insights for advertisers and discusses the broader implications for theory and practice.

Chapter F (Final Concluding Discussion) synthesizes the findings from the three articles, integrating their contributions to understand the impact of smartphone swiping on advertising effectiveness. Section I summarizes each article's key results, linking them to the research objectives and framework. Section II explores the broad implications for advertising research and practice. Section III addresses the limitations of the research and proposes avenues for future research. The chapter concludes with a reflection on how the three articles collectively address the central research question: *How does smartphone swiping impact advertising effectiveness in social media?*

Article 1

The Vampire Effect of Smartphone Swiping: How Atypical Motor Actions Increase Ad Attention but Impair Brand Recall

The Version of Record of this manuscript has been published and is freely available in the International Journal of Advertising, 2. June 2024, <https://www.tandfonline.com/doi/full/10.1080/02650487.2024.2354081>.

Authors:

Stefan Rohrbach (University of Wuppertal, Germany)

Daniel Bruns (University of Wuppertal, Germany)

Tobias Langner (University of Wuppertal, Germany)

B The Vampire Effect of Smartphone Swiping: How Atypical Motor Actions Increase Ad Attention but Impair Brand Recall
(Authors: Stefan Rohrbach, Daniel Bruns, and Tobias Langner)

Abstract: Consumers' swiping behavior largely determines their exposure to social media advertisements. According to embodied cognition and enactment theory, advertisers might leverage atypical swiping to increase attention and thus brand recall. To identify typical smartphone swiping, the authors develop a taxonomy of the motor actions consumers exhibit when browsing social media in real life. A mobile eye-tracking experiment then reveals how the typicality of smartphone swiping affects participants' advertising reception. The results indicate that atypical smartphone swiping increases consumers' visual ad attention but, surprisingly, decreases brand recall. These findings, observed under realistic viewing conditions, suggest a motoric vampire effect of atypical swiping: It appears to demand the allocation of cognitive resources to the odd motor action, which diverts cognitive resources away from the ad. Thus, atypical swiping poses a threat to advertising effectiveness, and advertisers need continued research to identify ways to mitigate these negative effects.

I Introduction

In recent decades, the Internet has transformed from a computer-mediated environment (Yadav and Pavlou 2014) to an environment facilitated by mobile devices (Wolf 2023). In the same period, the smartphone has become the most important advertising device available to marketers (DataReportal 2023; Ericsson 2021). Human–smartphone interactions largely rely on hand and finger movements, which in turn determine consumers' experience of social media as they move the displayed content in and out of the smartphone screen. Yet in the extensive research devoted to social media advertising (e.g., Boerman, Willemse, and van der Aa 2017; Gavilanes, Flatten, and Brettel 2018; Hollebeek, Glynn, and Brodie 2014; Knoll 2016; Voorveld 2019), we find little consideration of how people actually use their hands and fingers to hold and interact with their smartphones when browsing through their social media feeds and how these motions might affect attention to social media advertising.

Attention is a critical prerequisite of any advertising processing and its downstream brand effects, such as message conveyance or ad and brand recall (Pieters, Warlop, and Wedel 2002; Rossiter, Percy, and Bergkvist 2018). When consumers encounter advertising on social media through their smartphones, their attention tends to be exceptionally limited; for example, they view advertisements on Instagram for only about 1.8 seconds on average (Borgmann, Kopka, and Langner 2022). This attention toward social media ads also depends on their motor actions: Advertisements appear and disappear from the screen only when consumers use their fingers to swipe the display and navigate the feed. That is, ad exposure strongly depends on the speed of consumers' swiping. If they swipe fast enough, consumers might even scroll past ads without noticing them. In addition to traditional attention-getting tactics based on features such as the ad's size, pictorial elements, or color (e.g., Dukes and Liu 2024; Fernandez and Rosen 2000; Lohse 1997), we propose that user interactions, in the form of smartphone swiping, can determine consumers' attention to social media ads.

To increase ad attention, advertisers might distract consumers from habitual fast swiping by requiring *atypical* smartphone swiping interactions. Such atypicality can be induced, for example, by new ad formats (e.g., carousel ads) or new social media platform features that force consumers to engage in atypical swiping. Automatic movements and tasks, as result from typical smartphone interactions, take place faster (Fontani et al. 2007) and likely result in faster swiping speeds. Because atypical smartphone swiping involves motor actions that are not automated, they should result in slower swiping speeds and allow for more attention toward ads. Considering extant advertising research that indicates a positive effect of attention on recall (e.g., Boerman, van Reijmersdal, and Neijens 2015; Pieters, Warlop, and Wedel 2002), we posit that slowing down smartphone swiping also might increase ad and brand recall.

With this research, we seek to test this prediction by exploring the role of atypical smartphone swiping on consumers' advertising responses, and specifically whether atypical smartphone swiping enhances attention and brand recall. In turn, we make two main contributions to extant literature. First, we develop a taxonomy of the combinations of the holding grip and input finger that people use to browse social media, in a pre-study conducted under realistic viewing conditions (De Pelsmacker 2021) that involve participants in their own homes, using their own devices and social media feeds. In this taxonomy, we identify both typical and atypical human–smartphone interactions that occur during people's uses of social media. Second, we investigate whether and how atypical smartphone swiping affects consumers' attention to and brand recall for advertised brands. Building on the pre-study results, we conduct an eye-tracking experiment, again under realistic viewing conditions. The results confirm that atypical smartphone interactions increase the total gaze duration on social media ads, but in contrast with our prediction, they decrease brand recall. In this sense, we provide the first evidence of a motoric vampire effect of atypical smartphone swiping, which should inform both advertising

and psychological motor action research, as well as the practices and designs adopted by advertisers in social media settings.

II Theoretical Background and Hypotheses Development

1 Motoric Human–Smartphone Interactions

The way people use their hands to interact with the world has been the topic of studies in various fields, such as touch (Krishna, Luangrath, and Peck 2024), haptics (e.g., Feix, Bullock, and Dollar 2014; Klatzky, Lederman, and Metzger 1985; Lee et al. 2016; Napier 1956), and human–computer interactions (e.g., Kim and Jo 2015; Tsai, Tseng, and Chang 2017; Wang et al. 2019). Over the course of evolution, humans developed superior fine-motor skills, enabling them to use their hands to explore and interact with objects and tools (Luangrath et al. 2022). In general, motoric interactions consist of either holding grips to grasp an object or uses of input fingers to adjust it. Napier (1956) further classifies holding grips into a power grip for stability and a precision grip for sensitivity or accuracy. Lederman and Klatzky (1987) also identify typical hand movements that people use consistently to explore everyday objects. Over time, they develop motoric preferences for such interactions, leading to natural grip patterns when using handheld tools such as a pen, a coffee mug, or a phone (Norman 1988).

As human–smartphone interaction studies reveal, the index finger and thumb are the main choices exhibited by consumers (Shin et al. 2016), though they can use other fingers as well. Whether people use the fingers on their right or left hand generally is predetermined by their dominant hand (Miyaki and Rekimoto 2009), that is, the hand they use for writing. Although early model mobile phones varied significantly in design (e.g., clamshell phones, Blackberries with full keyboards), the iPhone has defined the general design of a modern smartphone: large touchscreen, reduced buttons, and size and weight dimensions that allow for single-handed navigation. How people interact with these largely standardized modern smartphones

also has attracted research in the human–computer interaction domain (e.g., Kim et al. 2006; Perry and Hourcade 2008; Wang et al. 2019). Laboratory experiments have sought to understand how users’ age (Tsai, Tseng, and Chang 2017), choice of input finger (Kim and Jo 2015), grip variations (Lee et al. 2016), or handedness (Chen, Zhu, and Yang 2023) can affect their gesture operations. Although these studies offer some insights, we know of no comprehensive overview of typical motoric smartphone interactions as they occur during real-life social media usage. Therefore, to understand typical versus atypical smartphone swiping, we conducted a pre-study in which we explore which grip and finger choices consumers make and prefer when browsing their social media newsfeeds on their smartphones. Building on these results, we then induce atypical smartphone swiping in an eye-tracking experiment, such that we can analyze whether atypical swiping influences people’s attention and brand recall.

2 Visual Attention and Embodied Cognition Theory

For an ad to work, it needs attention, but consumers’ attention is exceptionally limited in cluttered social media environments (Bergkvist and Langner 2023; Beuckels et al. 2021; Nelson-Field, Riebe, and Sharp 2013). Not only are attention spans decreasing, but more social media ads constantly join the battle for attention (Duff and Segijn 2019). While people are using their hands to swipe through their social media newsfeeds on their smartphones, they also are exposed to advertisements, primarily through their eyes, making visual attention an essential element (Van Raaij 1989) for assessing whether and how long ad exposure actually occurs (Frade, Oliveira, and Giraldi 2023).

Embodied cognition theory also asserts that attention is connected to bodily experiences and motor actions (Rizzolatti et al. 1987), and mental processes are influenced by physical experiences. That is, people direct their visual attention toward the location of their planned hand movement (Abrams et al. 2008). In turn, we argue that attention to social media ads on

smartphones is a mental process that also is affected by goal-oriented hand movements (Festman et al. 2013; Goldinger et al. 2016). Exposure times for social media ads depend on consumers' individual motoric interactions, but with extensive practice, motor commands and muscular activity patterns form that allow for skilled, fluent performance (Land et al. 2013). When movement control in skilled motor tasks becomes automatic, motor actions are usually performed faster (Fontani et al. 2007), so swiping on smartphones makes ads appear and disappear at different rates, with strong impacts on visual attention. Atypical swiping, which is not conducted automatically, occurs more slowly and consciously, which in turn should increase people's exposure to social media ads. Thus, we hypothesize:

H1: Atypical swiping leads to (a) longer total gaze durations and (b) more fixations on social media ads than typical swiping.

3 Duration of Exposure and Brand Recall

Measures of advertising effectiveness often rely on brand recall and attitude formation (e.g., Van Raaij 1989). Brand recall pertains to consumers' brand awareness, such that it represents their ability to remember an advertised brand (Rossiter, Percy, and Bergkvist 2018). In turn, it requires sufficient time and opportunity for the consumers to cognitively process the advertisement (MacInnis and Jaworski 1989; Wilson and Till 2012; Wilson, Baack, and Till 2015). Longer advertising exposures increase learning of the ad and brand (Pieters, Warlop, and Wedel 2002; Singh and Cole 1993; Newstead and Romaniuk 2010). Attention in turn is essential, such that a lack of attention is the main hindrance to advertising effectiveness (Liu-Thompkins 2019), whereas greater attention generally results in higher brand recall (Bergkvist and Langner 2023; Guitart, Hervet, and Hildebrand 2019; Rossiter and Percy 2017; Simmonds et al. 2020). Thus, longer exposures to an ad, due to atypical swiping (H1), should result in better brand recall.

4 Memory of Motor Actions and Processing Depth

Attention and brand recall also might be influenced by the motor actions (e.g., swiping) that consumers perform during an ad exposure. Macedonia et al. (2019) demonstrate that even if they just observe motor actions, people's processing depth increases, as revealed by fMRI scans that showed the recruitment of new cortical areas. Motor-action and learning theory also predicts an enactment effect, such that memory of self-performed motor actions is superior to other types of learning (Engelkamp and Zimmer 1994). Similarly, performing motor actions during encoding processes enhances people's memory of words, as Macedonia and Knösche (2011) establish by inducing students to make gestures while learning words in a foreign language. Evidence of drawing effects similarly indicates that drawing pictures during encoding boosts subsequent memory (Fernandes, Wammes, and Meade 2018; MacLeod and Bodner 2017).

Accordingly, we anticipate that information perceived during the performance of novel motor actions (e.g., atypical smartphone swiping) may benefit from the higher-level processing induced by the execution of these motor actions. If atypical swiping enhances the level of processing, it also might stimulate learning of social media ads encountered during atypical swiping sessions. In detail, we predict that atypical swiping increases both exposure time and the level of processing, which together stimulate greater learning (recall) of brand names advertised in social media ads.

H2: Atypical swiping leads to higher brand recall than typical swiping.

III Pre-study: Identifying Typical and Atypical Smartphone Swiping

With the pre-study, we seek to identify typical and atypical smartphone interactions people have when using social media in a real-world setting. Building on research into haptics and human–smartphone interactions, we specifically investigate dominant grip and finger choices

during social media smartphone interactions. In line with Norman (1988), we expect that consumers have developed a motoric preference for a specific dominant grip and finger choice. Therefore, we seek to derive typical and atypical smartphone interactions for individual consumers.

1 Method

1.1 Participants

Thirty participants, aged 19 and 69 years, took part (43% women, $M_{\text{age}} = 35.4$ years, $SD_{\text{age}} = 14.1$) and reported on 94 observed smartphone interaction episodes. Most participants were employed (60%), and the rest (40%) were university students. The participants received a 20 EUR Amazon gift voucher for their participation.

1.2 Study Design

The pre-study combines in-home videography to observe participants' hand movements with qualitative interviews, in which they verbally described their smartphone usage while swiping through their social media feeds.

1.3 Procedure

To start, we asked participants to use their smartphones as they normally would to browse social media. We required that they use their own smartphones to browse their own social media newsfeeds (e.g., Instagram, Facebook). These individual sessions were not restricted in time and lasted between 1:22 and 6:32 minutes ($M = 3:51$ minutes). We then engaged them in a think-aloud interview, in which they commented on their own video-recorded swiping behavior while watching the video. Following the interview, we posed open-ended questions such as "Please describe how you hold your smartphone and swipe or scroll when using [social media

platform],” and “When you use the same social media platform in different situations, e.g., during breakfast, in public transportation, while watching TV, do you hold and swipe differently?”

1.4 Data Analysis

In total, we recorded 2 hours of typical smartphone usage, along with more than 14 hours of follow-up qualitative interviews. In a first step, one author analyzed the video material to identify how participants used their hands to hold the smartphone and their fingers to swipe through their social media feed. In turn, we could define interaction episodes comprised of holding grip and input finger combinations (e.g., holding the smartphone in the right hand and swiping the newsfeed with the thumb of the same hand; Figure 5). In the second step, we analyzed the interviews to identify how the participants experienced typical and atypical uses of their smartphone. Both steps were supported by MAXQDA.

2 Results

2.1 Taxonomy of Motoric Human–Smartphone Interactions

Participants used different holding grip and input finger combinations to swipe through their social media newsfeeds on their smartphones. In total, we observed 94 interaction episodes of holding grip and input finger combinations (e.g., holding the smartphone in the right hand and swiping the newsfeed with the thumb of the same hand), which we illustrate in Figure 5, according to a proposed taxonomy.

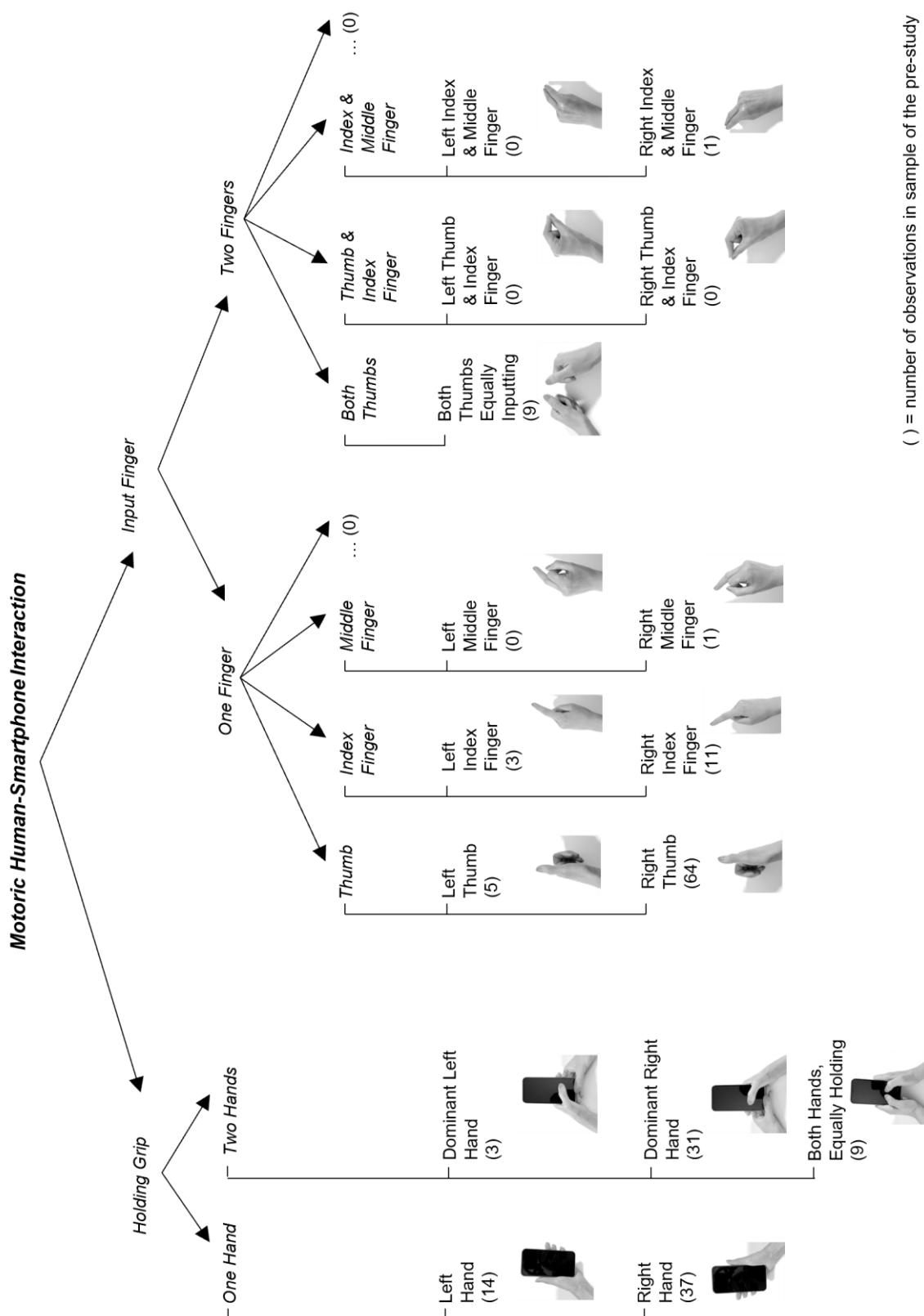


Figure 5: Taxonomy of motoric human–smartphone interactions

Holding grip. Participants held their smartphone either with one hand ($n = 51$ of 94 interaction episodes) or two hands ($n = 43$). In the case of one-hand grips, they clearly preferred the right hand ($n = 37$) over the left hand ($n = 14$). Participants who held the device with two hands exhibited either a dominant hand ($n = 34$) or equivalent holding between both hands ($n = 9$). If they used a dominant hand, in most cases, they held their smartphone in one hand and used the additional hand for support. Similar to the one-hand grip, the right hand was dominant more often ($n = 31$) in the two-hand grip than the left hand ($n = 3$). Holding the phone equally with both hands only occurred during texting, not when participants swiped through their newsfeeds. Rather, while swiping newsfeeds, they used either one hand or two hands with a dominant hand.

Input finger. Participants used one or two fingers to interact with their smartphones. One-finger input ($n = 84$) was far more common than two-finger input ($n = 10$). In most cases, the thumb ($n = 69$) was the primary choice for swiping, and the right thumb ($n = 64$) was used more often than the left thumb ($n = 5$). The second most commonly used finger was the index finger ($n = 14$), again primarily right ($n = 11$) instead of left ($n = 3$). One participant used the right middle finger for inputs, but no other one finger inputs occurred in our observation. Participants engaged in two-finger input ($n = 9$) used both thumbs at the same time for texting, while holding the phone with both hands. Only one participant jointly used the right index and middle finger at the same time for swiping. No other two-finger input combinations occurred in our observations.

2.2 Typical and Atypical Smartphone Swiping in Social Media

With these observations, we identify two basic types of smartphone interaction when swiping through newsfeeds: *thumb-swiping* while holding the phone in the same (dominant) hand or *index-swiping* using the dominant hand while holding the phone in the non-dominant hand. The clear preference for the right over the left hand for holding the smartphone and for proving

input to the device reflects participants' handedness. The various observed interaction types represent modifications of these two basic types. For example, for participants who used two hands, the additional hand functioned as support; the basic interaction type continued to entail holding the phone in the dominant hand and using the thumb for input, as explained by one participant (Table 2):

When I'm tired, I sometimes also use my left hand for support, but I still hold my phone in the right hand and swipe with my right thumb. (Participant 8, male, age 38)

The use of the right middle finger or the combination of the right middle and index fingers similarly can be categorized as holding the phone in the non-dominant hand and using a primary finger for inputs. Only in very rare cases ($n = 2$) did participants use their middle finger; most participants used their index fingers. Notably, some participants selected smartphone accessories to match their typical smartphone interaction, such that several thumb swipers installed so-called pop-sockets that support single-handed holding of the phone, and some index swipers chose a foldable phone wallet that helps them hold the phone in one hand and use the index finger for inputs. A participant explained the use of his smartphone accessory by noting:

I do have an extra case for my phone. My wallet case might be special. I swing it open and use it like this [holding it in the left hand and using the index finger for inputs]. I also call with the phone like this, and it holds all my credit cards. I just need to grab my phone [and case] and can go shopping and everything. I find this very convenient. (Participant 19, male, age 43)

When switching to texting movements, such as to write a comment, participants either kept the same interaction type and used one thumb or the index finger or switched to two-thumb typing. However, once they returned to browsing the newsfeed, participants switched back to their typical swiping types. Preference for either of the two basic types seems to be robust, such

that one swiping type usually represents typical swiping and the other represents atypical swiping for a particular individual. None of the participants changed between the two types during our study. Six participants indicated index swiping and 24 participants thumb swiping as their typical smartphone swiping when browsing social media. All expressed a clear preference, as exemplified in the following statements:

This is a very typical grip. My left hand is holding the phone. That's very typical for me, and I use the index finger of my right hand to do something on the phone. I use my [right] index finger also for texting. I really only work with one index finger. (Participant 20, male, age 58)

I always hold my smartphone in my right hand just like this. I hold it relatively straight up and I am a thumb-swiper. Also, when I am walking outside or riding the bus. I always have it in one hand and swipe with my thumb. (Participant 27 male, age 40)

In addition, one participant reported that his swiping does not feel familiar yet, because he just switched to a different phone model:

For two weeks I have a new phone now. This is a new phone. I wouldn't say it's much heavier, but a bit larger in size. Holding it and swiping still feels a bit unfamiliar. (Participant 3, male, age 36)

Table 2: Statements related to typical and atypical motoric smartphone interactions

<i>Participants</i>	<i>Statement related to Typical and Atypical Smartphone Interaction</i>	<i>Human–Smartphone Interactions</i>
P 02, female, age 19	I am left-handed. I always hold it in my left hand and swipe and write with my [left] thumb.	Holding grip, one hand, left hand
P 15, female, age 38	I do everything [on the phone] with one hand only. I actually hold it all the time like this. I thought again today of my poor right hand. So, I actually tried it briefly in my left hand, but immediately I switched back to my right hand. I'm just through and through right-handed there.	Holding grip, one hand, right hand
P 03, male, age 36	Yes, I am left-handed. I hold it in my left hand. For the moment, I also hold it with my right hand for support. I would say it's heavier, but larger. I actually hold it with two hands now.	Holding grip, two hands, dominant left hand holding
P 30, female, age 22	This is now my fourth generation iPhone. It only used to be like that with the narrower ones [holding it only in the right hand]. Since I have the larger one, because I just have small hands, I have to support with my left hand as well. And I also notice after a certain time it gets heavy.	Holding grip, two hands, dominant right hand holding
P 16, female, age 19	When I write, I always take the other hand to it and then I sort of hold it like that with both hands. Also, if I were to comment, then I would write like this [with both thumbs].	Holding grip, two hands, equally holding
P 03, male, age 36	The left thumb, yes. The left thumb is the thumb to control.	Input finger, one finger, left thumb
P 13, male, age 24	I always keep it this way. I never use the apps in landscape mode from the beginning. Always with the right hand. Even in bed, always in portrait mode with the right hand. And always with the right thumb.	Input finger, one finger, right thumb
P 22, female, age 29	Exactly, and also through the newsfeed. I actually scroll down most of the time. Now that wasn't unnatural, it's actually always like that, always with left index finger	Input finger, one finger, left index finger
P 09, male, age 41	Yes, that's how I prefer to do it. I hold it in my left hand and use my right finger [for input]. Because one-handed operation is always a bit uncomfortable with today's smartphone sizes. And that's why I try to use both hands whenever possible.	Input finger, one finger, right index finger
P 19 male, age 43	Yes, with the [right] middle finger. I do that everywhere, too. It's very, very typical. I think also because the middle finger is perhaps my longest finger. That's the most comfortable way. That's actually the most comfortable position.	Input finger, one finger, right middle finger
P 29, female, age 61	So, truth be told, it looks like my children told me I had to learn to text with both thumbs. Because I like my keyboard very fast, so they're like, no, you'll have to use two thumbs.	Input finger, two fingers, both thumbs, equally inputting
P 26, female, age 69	I usually do this with my middle finger [and index finger]. Like this from bottom to top.	Input finger, two fingers, right middle finger

Note: All interviews were translated into English using a back-translation approach.

3 Discussion

With a taxonomy of all grip–finger combinations, we can identify dominant motoric human–smartphone interactions that consumers typically use to browse their social media newsfeeds. By observing how consumers browse social media in real-life, we note their reliance on either thumb-swiping while holding the device in the same (dominant) hand or index-swiping, which involves using the dominant hand while holding the device in the non-dominant hand. All other interaction types represent modified versions of these two basic types. Moreover, consumers have developed a clear motoric preference for either one of these two basic interaction types. They learn how to navigate their smartphones and use one of the two basic types by default. Consumers stick with this preferred, typical swiping type and only seldom change to another, atypical swiping type (e.g., when tired). Similar patterns have been observed for handheld tools (Norman 1988), for which people develop a preferred usage style over time while learning how to use them.

IV Experiment: An Eye-Tracking Study to Analyze the Impact of Atypical Swiping on Attention and Brand Recall

To analyze the impact of atypical swiping on attention and brand recall, we conducted an eye-tracking experiment with participants using their own devices and swiping their own social media newsfeeds in their living rooms. Informed by the pre-study, we required them to employ thumb or index swiping, which correspond with either typical or atypical swiping.

1 Method

1.1 Participants

Thirty-six participants, aged 21 to 58 years, took part (61% women, $M_{\text{age}} = 30.5$ years, $SD_{\text{age}} = 9.4$). Most participants (81%) were employed, and the remaining 19% were university students.

1.2 Study Design

With a within-subject design, we induced atypical smartphone swiping by directing participants to employ both basic smartphone swiping types (*thumb-swiping* while holding the device in the same hand and *index-swiping* using the dominant hand while holding the device in the non-dominant hand) in two distinct swiping sessions.

1.3 Procedure

The experiment was conducted between October and December 2022 in participants' homes, using a mobile eye-tracking device (Tobii Pro Glasses 2). We instructed the participants to browse their own social media newsfeeds (e.g., Instagram, Facebook) using their own smartphones as they normally would (Figure 6). The sessions lasted approximately 2 minutes each and were separated by a brief interview. We randomly assigned participants to two experimental conditions, in which they were required to use their thumb (index finger) in the first and their index finger (thumb) in the second session.

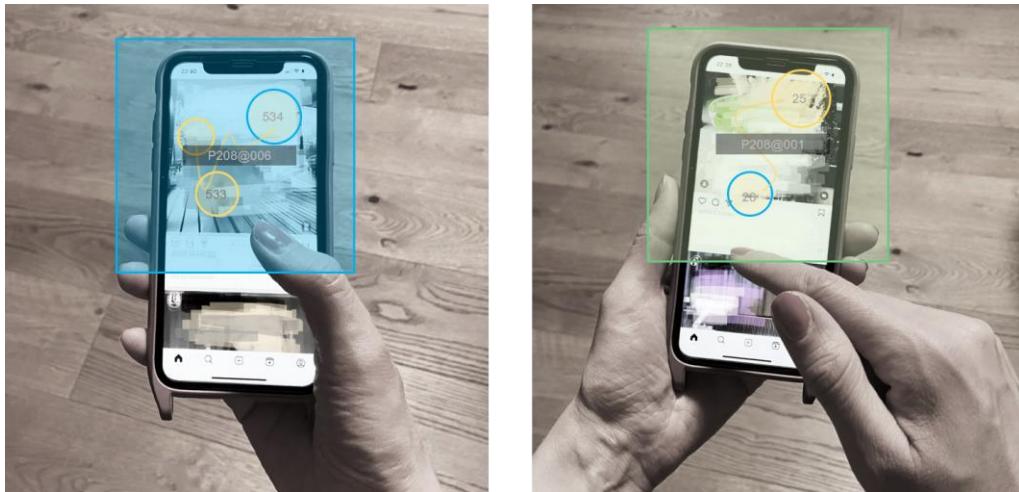


Figure 6: Experimental setup in participants' homes (left: thumb swiping; right: index swiping)

1.4 Measures

In the interviews that followed the two swiping sessions, participants rated the sessions, relative to their natural swiping behavior, on a scale from “not typical at all” [0] to “very typical” [+6]. A manipulation check revealed that in 68% of the cases, the difference in typicality scores was 4 or higher, indicating a successful manipulation and substantial differences in typicality between index and thumb swiping. For the unaided brand recall measure, we asked participants to state any brand names they recalled from the two swiping sessions, then compared those listed names with the recorded ads; verified brand names represented valid recalls. The recorded eye-tracking data were exported into iMotions software (version 9.3). In addition, we created individual areas of interest (AOI) for all sponsored posts, which we coded frame-by-frame to reflect the dynamic situation. A sponsored post was logged as viewable at the moment at least 50% of the stimulus entered the screen, until 50% of it left the screen (Trabulsi et al. 2021). Attention was measured by total gaze duration in milliseconds and fixations within each AOI. The minimum duration for a fixation was set at 80 milliseconds (Boerman and Müller 2022).

2 Results

2.1 Impact of Typicality of Swiping Styles on Attention toward the Ad

To understand how the typicality of smartphone swiping styles influences attention, we analyzed all cases of ad viewing while swiping through the newsfeed ($n = 411$). We winsorized one gaze duration value that exceeded 3 SDs from the grand mean by the closest inlier (Meyvis and van Osselaer 2017; Bellman et al. 2019). To estimate the effect of the typicality of consumers’ hand movements on their gaze duration and fixation frequency, we employed generalized linear mixed models (GLMM). Gaze duration was modelled to follow a Gamma distribution with a log-link (Rosbergen, Pieters, and Wedel 1997). For fixation frequency, a count variable, we used a Poisson distribution with a log-link (Pieters, Warlop, and Wedel 2002). By including

the session index as a control variable, we can control for potential primacy or recency effects, according to the order of the two sessions. In addition to fixed effects, we included random intercepts to account for variation in the outcome variable that might be attributable to the participant (Barr 2013; Judd, Westfall, and Kenny 2012; Quené and van den Bergh 2008).

We find significant negative effects of typicality on gaze duration ($b = -.070, p < .001$) and fixation frequency ($b = -.084, p < .001$), which indicate that the typicality of hand movements impairs attention toward the advertisement, in support of H1. Figure 7 shows the estimated marginal means of gaze duration and fixation frequency for low, medium, and high values of typicality. The planned contrasts of the estimated marginal means also reveal significant differences across all three contrasts ($p < .001$).

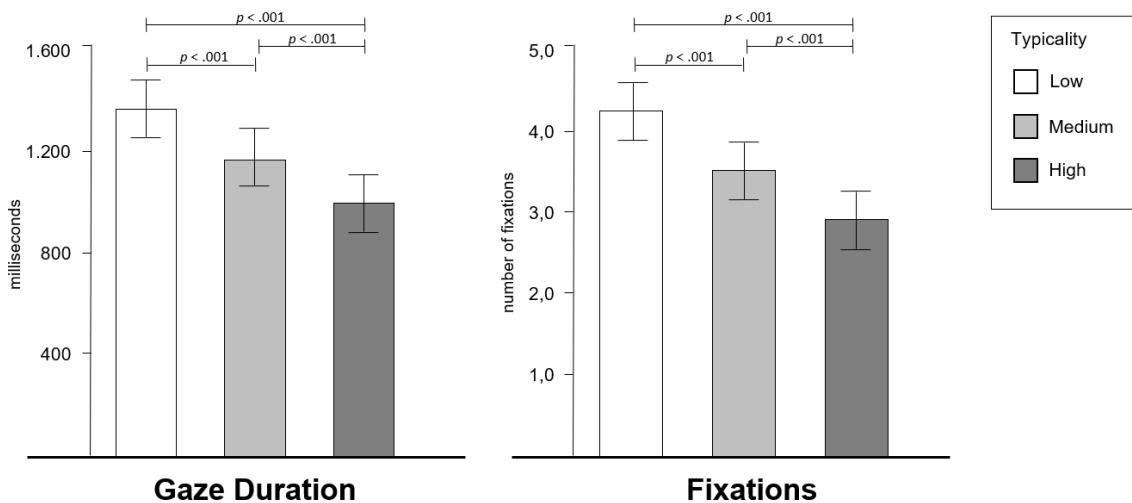


Figure 7: Effect of typicality on gaze duration and number of fixations

2.2 Impact of Typicality of Swiping Styles on Brand Recall

In generalized linear mixed effects logistic regressions, we controlled for session index and random effects related to the participants. Overall, 19 of 411 brands (4.6%) were recalled in the unaided brand recall test. The GLMM indicated a marginally significant positive effect ($b =$

.966, $p = .055$), such that typicality increased brand recall. Because we expected greater attention, due to a longer total gaze duration evoked by atypical swiping, we hypothesized a negative effect of typicality on brand recall, but instead, the planned contrasts of the estimated marginal means reveal only a marginally significant difference between high and low levels of typicality ($M_{\text{low}} = .001$, $M_{\text{high}} = .042$, $p = .086$). Figure 8 illustrates the estimated marginal means of brand recall for low medium and high values, which lead us to reject H2.

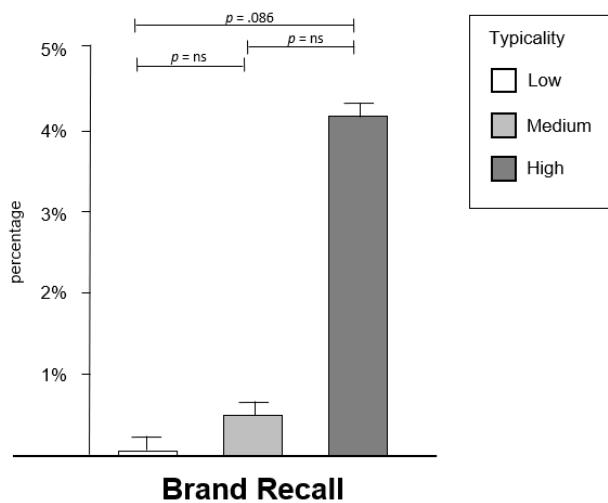


Figure 8: Effect of typicality on brand recall

3 Discussion

This experiment analyzed the effects of atypical swiping on visual ad attention and brand recall. When participants had to use a motoric smartphone interaction that they typically would not use, they swiped more slowly and spent more time looking at social media ads (longer gaze durations and higher numbers of fixations). These results confirm our predictions and align with previous observations showing that atypical motor actions are executed more slowly and less automatically (Fontani et al. 2007; Perry and Hourcade 2008).

We further hypothesized that performing atypical swiping actions would result in improved brand recall due to increased attention and processing depth (Pieters and Wedel 2004;

Singh and Cole 1993; Newstead and Romaniuk 2010). However, we find that atypical smartphone interactions impair recall of the advertised brand, despite the longer ad exposures. These findings contradict psychology research that identifies enhanced learning of words encoded while people either observe a new motor action (Macedonia et al. 2019) or perform it themselves (Macedonia and Knösche 2011). Notably, the motor actions that Macedonia et al. (2019) and Macedonia and Knösche (2011) required of their participants related semantically to the meaning of the words they were learning. The atypical motor actions performed by participants in our experiment, however, were not semantically related to the advertised brands. Thus, we posit that a moderator of the effects of atypical swiping might be the semantic relatedness of the motor actions. That is, perhaps positive effects hinge on a semantic link between the motor actions and the information to be memorized (Kormi-Nouri 1995; Li et al. 2022).

Considering the limitations of humans' cognitive capacities (Bryant and Comisky 1978; Lavie et al. 2004), we further posit that atypical smartphone swiping requires cognitive resources, devoted to executing the unfamiliar motor actions, such that consumers are left without enough resources remaining to process the advertisement and memorize the advertised brand. It seems that processing atypical swiping requires more cognitive capacities than typical swiping, and therefore, consumers have insufficient capacities to process and memorize brand-related information available in the ads. These findings suggest a new type of vampire effect: the *motoric vampire effect*, resulting from atypical motor actions executed to interact with the advertising medium itself. Vampire effects are well-known advertising consequences that can arise from using celebrity endorsers (Chan and Chau 2023; Erfgen, Zenker, and Sattler 2015; Evans 1988), influencers (Waltenrath, Brenner, and Hinz 2022), or humor (Eisend 2011)—other features that increase attention to an ad but potentially impair brand recall. In the joint processing of atypical smartphone interactions and brand advertising, performing motor actions

seems to hinder encoding of brand names, such that social media ads encountered during atypical swiping situations get processed only superficially, leading to lower brand recall.

This study accordingly extends prior research on media context (e.g., De Pelsmacker, Geuens, and Anckaert 2002; Yoon, Huang, and Kim 2023), in that it emphasizes the pivotal role of motoric interactions as a media context factor in the domain of social media advertising. Furthermore, the investigation contributes to the wider field of haptics, building on foundational works by Lederman and Klatzky (1987) and Norman (1988) to broaden the concept of typical motoric interactions to apply to modern smartphones. By delineating the impact of atypical swiping on advertising effectiveness, this study enhances our comprehension of consumer behavior in social media advertising settings while also shedding new light on the complex interplay of physical interaction modalities with cognitive processing mechanisms.

V Conclusion

Despite substantial interest to understanding social media advertising, questions surrounding how people actually use their hands and fingers to browse the newsfeeds on their smartphones and how these hand and finger movements affect their responses to social media advertising have not been considered. We present the first investigation of consumers' motoric smartphone interactions and its impact on ad attention and brand recall in real-world settings, using a mixed methods approach of in-home videography and an eye-tracking experiment. We find that consumers' visual attention increases when the motor actions they execute to browse their social media newsfeeds are atypical. However, and contrary to our expectations and predictions that longer attention times translate into higher brand recall (Pieters and Wedel 2004), we find no evidence of a positive effect of atypical swiping on brand recall. Instead, despite their faster swiping and shorter gaze durations, consumers recall advertisements better when engaged in typical smartphone swiping. Thus, brands do not benefit from the increased attention that re-

sults from atypical swiping. On the contrary, our results suggest that atypical smartphone swiping triggers a motoric vampire effect, such that consumers devote additional processing capacities to action-relevant information rather than ad content. In this sense, atypical swiping can pose a threat to advertising effectiveness.

1 Implications for Practice

We anticipated that advertisers might induce atypical swiping by consumers, as a means to increase ad attention and thereby brand recall, but instead, a motoric vampire effect undermines the latter outcome. On the basis of our multimethod results, we offer several alternative implications for practitioners. First, inducing atypical motor actions may threaten advertising effectiveness. Adopting novel and still unfamiliar ad formats (e.g., when Instagram introduced carousel ads) might increase visual attention for ads, but it is unlikely to enhance brand memory. Advertisers therefore should be cautious about spending their media budgets in newly introduced new ad formats that require atypical smartphone swiping, at least until the gesture becomes typical to consumers.

Second, advertisers and social media platforms need to be aware that major platform changes (e.g., when Instagram introduced stories) may have strong impacts on how consumers not only navigate, but also process information. New platform features or changes will likely draw people's attention, which in turn can have negative effects on brand advertising.

Third, we investigate currently standard smartphone designs, as established mainly through the evolution of Apple's iPhone. New technology breakthroughs that allow for novel smartphone design (e.g., foldable screens) will likely affect existing motoric interactions or introduce new ones. Advertisers in turn should anticipate that any such design changes may alter consumers' motoric interactions and thus their advertising effectiveness.

Fourth, our study focuses on advertising in social media, but we anticipate that the findings might apply to other, related contexts, such as mobile shopping (e.g., new ad formats in

Amazon, 2022), in-game advertising, advergames (e.g., Goh and Ping 2014), and mobile applications in general. In these settings too, inducing atypical motoric interactions, such as new movements or unfamiliar navigation, may overshadow content and leave less processing capacity, unless those movements are semantically related with the focal content.

2 Limitations and Future Research

In the real-world experiment, we measured ad attention and recall for any advertised brands that appeared in the participants' actual newsfeeds. Thus, we could not control for the advertising content or brands across conditions or test any effects of typicalness with the same ads. A fully controlled laboratory experiment using standardized newsfeed content and ads could help corroborate our findings, as well as potentially explore brand recognition as a less challenging response that is also highly relevant for recognition-based purchase decisions (e.g., fast moving consumer goods purchased in a supermarket; Rossiter, Percy, and Donavon 1991). In addition, we acknowledge that atypical smartphone swiping can become more typical through extended usage, but we did not consider such potential learning effects over time.

Therefore, we encourage further research to investigate how interface designs can induce atypical motor actions, as well as explore motoric interaction types involving other screen-based devices (e.g., tablets, VR/AR headsets). Certain advertising formats also might alter consumers' motoric interactions with social media ads and distract them from habitual fast swiping. Furthermore, to mitigate the negative effect of atypical swiping, brands might attempt to create a semantic relation between swiping gestures and brand assets, such as by prompting consumers to trace the brand logo in a social media ad. With such an approach, brands arguably might benefit more from motoric smartphone interactions, in line with the drawing effect (Fernandes, Wammes, and Meade 2018; MacLeod and Bodner 2017) Schwartz and Plass 2014). Finally, atypical smartphone swiping occurs regularly in consumers' everyday lives, whether due to the

adoption of new devices, new ad formats, or changes in social media platform features. Therefore, we call for continued research that addresses specific applications and identifies ways to mitigate the negative effects on advertising effectiveness.

Article 2

The Carousel Effect: Leveraging Sideways Swiping for Enhanced Ad Effectiveness in Social Media¹

Authors:

Stefan Rohrbach (University of Wuppertal, Germany)

Daniel Bruns (University of Wuppertal, Germany)

Tobias Langner (University of Wuppertal, Germany)

¹ Article 2 is under review at the “International Journal of Advertising” for an ICORIA 2024 Special Edition.

C The Carousel Effect: Leveraging Sideways Swiping for Enhanced Ad Effectiveness in Social Media

(Authors: Stefan Rohrbach, Daniel Bruns, and Tobias Langner)

Abstract: Carousel advertisements prompt consumers to engage in sideways swiping, interrupting the typical upward newsfeed swiping and thereby deepening ad processing. Three studies assess this distinctive advertising format in real-life settings, addressing the carousel effect. To understand how consumers evaluate and experience carousel ads, compared with other in-feed ad formats, Study 1 consists of qualitative interviews. A mobile eye-tracking experiment then provides input for analyses of visual attention and brand recall; the Study 2 results show that activated carousel ads enhance consumers' attention and brand recall and that attention increases in line with the length of the carousel ads. Finally, Study 3 reveals that attitudes toward the brand determine whether consumers will activate carousel ads, such that popular brands benefit from more effective carousel ads than less popular brands. These results affirm that carousel ads offer a promising avenue for marketers seeking to enhance the effectiveness of their advertising efforts.

I Introduction

For an advertisement to be effective, it must capture consumers' attention. However, in busy, cluttered social media environments, where advertisements constantly compete for consumers' attention (Duff and Segijn 2019), attention represents an exceptionally limited resource (Bergkvist and Langner 2023; Beuckels et al. 2021; Nelson-Field, Riebe, and Sharp 2013). For example, on Instagram, users look at ads for only 1.8 seconds on average (Borgmann, Kopka, and Langner 2022) and more than 80% of ads fail to meet the 2.5-second attention threshold needed for lasting brand impact (WARC 2022).

Social media consumption generally takes place through smartphones, so attention to social media ads is strongly influenced by how consumers swipe through their newsfeeds on their phones. Therefore, to extend ad viewing time, marketers adopt various tactics, including carousel formats for their advertising, as is available on social media platforms, including Facebook, Instagram, TikTok, LinkedIn, as well as the Amazon shopping feed (Appendix 1). This distinctive in-feed advertising format encourages consumers to change the direction of their swiping, to sideways instead of up, to learn more about the offered content (Wei et al. 2021). In carousel ads, multiple visual, digital cards can be used to tell a story, communicate a brand's benefits, or showcase various products, which makes them particularly well-suited for communicating extensive content. Breaking down the content into multiple cards makes it easier for consumers to follow the progression of the content easily, which tends to enhance comprehension and foster stronger message connection (Oltra, Camarero, and San José Cabezudo 2022). The change of direction and distinctive consumer interactions with carousel ads in turn promise to enhance consumers' attention and other downstream advertising outcomes, such as brand recall.

Among the intensive research into online advertising effectiveness though (e.g., Briggs and Hollis 1997; Huang et al. 2020; Jung and Im 2021; Liu-Thompkins 2019), carousel ads

have been largely neglected thus far (De Keyzer, Dens, and De Pelsmacker 2023). In particular, it is unclear if carousel ads can enhance advertising effectiveness, in terms of increased attention and brand recall, or what marketers can do to increase the likelihood that consumers activate carousel ads. To address this gap, we propose investigating if and how carousel ads can increase attention and brand recall in social media in-feed advertising. Furthermore, rather than limit our assessment to laboratory settings (e.g., Cummins, Gong, and Reichert 2021; Smit, Boerman, and van Meurs 2015), we seek novel, viable insights by studying carousel ads in real-life contexts. In particular, this study combines qualitative interviews, eye-tracking, and videography studies, for which consumers use their own smartphones and view their own social media newsfeeds in their homes.

In turn, this research makes three key contributions to extant literature. First, it provides a framework of the different stages that consumers experience when interacting with a carousel format, including curiosity, convenience, self-control, and immersion. While moving through these stages, they develop greater preferences for this ad format and deeper processing of the advertised content (Phillips and McQuarrie 2010; Van Laer et al. 2014). Second, this study offers the first investigation of carousel ads in real-world settings, thereby revealing that it receives more attention on average than other in-feed ads. In detail, attention devoted to non-activated carousel ads is similar to that paid to image, video, or collection ads, but activated carousels strongly benefit and receive five times more attention than other in-feed ad formats. Furthermore, the amount of attention increases with the number of cards. Ultimately, brand recall for activated carousel ads is significantly greater than that of other ad formats. Third, our findings reveal that stronger brand attitudes increase the likelihood of carousel ad activation. Thus, popular brands particularly benefit from this ad format, in line with previous research into the impacts of brands on consumer behavior (Gresham and Shimp 1985; Rietveld et al. 2020).

II Previous Research and Hypotheses Development

1 Carousel Ads in Social Media

As social media networks emerged and expanded, infinite-scroll newsfeeds became the standard navigation method (Echauri 2023). These newsfeeds can deliver relevant content by establishing individual downward ranking posts per user (Facebook 2018), though in these formats too, marketers struggle to attract users' attention (Borgmann, Kopka, and Langner 2022). They can select among four main advertising formats: (1) *image ads*, featuring a single still image; (2) *video ads* that display moving picture content; (3) *carousel ads*, consisting of at least two swipeable cards; and (4) *collection ads*, which present a main image with smaller images below (Appendix 16). Because a carousel ad format requires sideways swiping, it can disrupt consumers' infinite upwards swiping. Furthermore, the format supports emotional, informative, and incentivized experiences, such that it offers a versatile tool for storytelling or product showcases. Studies confirm the benefits of carousel ads in different contexts, including their ability to generate likes for Indonesian university Instagram accounts (Wahid and Gunarto 2022) and promote strong calls-to-action in a forced exposure setting among a student sample (Oltra, Camarero, and San José Cabezudo 2022). In our initial attempt to understand how consumers evaluate and experience carousel ads, versus other in-feed ad formats, we conducted a qualitative study centered around a central research question: How do consumers evaluate and experience carousel ads compared with other in-feed ad formats in social media?

2 Impacts of Carousel Ads on Attention and Recall

Advertising on social media is inherently interactive, though the degree of interactivity varies (Muntinga, Moorman, and Smit 2011). Any in-feed advertisement might be liked, commented on, or shared, but the carousel ad format uniquely invites consumers to actively change their physical movement, by adopting a different swiping direction to explore more content. During

their regular newsfeed browsing, consumers see the first card of a carousel ad; they then must decide whether to swipe through (i.e., activate) or skip the ad and continue scrolling through their feed (see Figure 9). This interactive choice may make consumers feel more empowered and less irritated by carousel ads, similar to the different impacts of skippable versus non-skippable options on viewer satisfaction with online video ads (Frade, Oliveira, and Giraldi 2023).

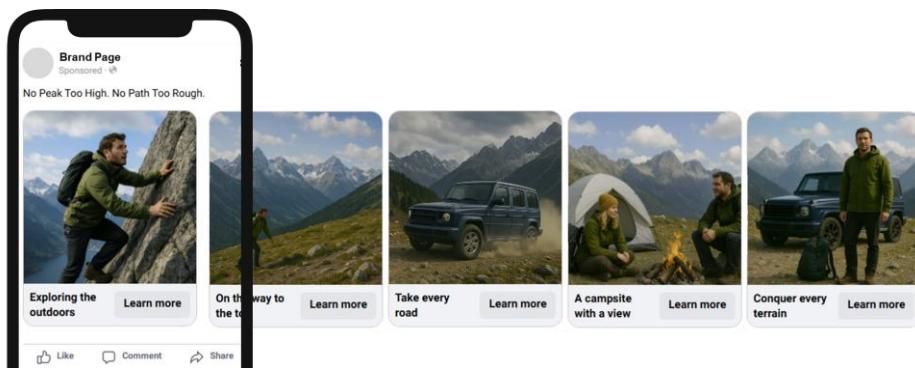


Figure 9: Example carousel ad with five cards at Facebook
(own visualization; images generated using ChatGPT, DALL·E)

Sideway swiping also might enhance immersion, such that consumers could become more deeply engaged and absorbed in the advertised product or content (Phillips and McQuarrie 2010; Van Laer et al. 2014). Psychologically, immersion involves a blend of attention, imagery, and emotion, and it results in heightened cognitive and affective processing. When immersion is strong, consumers form vivid mental images (Wang, Gohary, and Chan 2024). Because swiping creates direct interaction with the carousel ad, users also gain control over pace and direction. According to Liu et al. (2016), familiar interaction patterns, including swiping, can contribute to positive flow experiences and even increase purchase intentions. Considering that swiping has become a habitual action (Rohrbach, Bruns, and Langner 2024), swiping through carousel ads could become integrated seamlessly into this flow, promoting deeper processing. Therefore, we expect carousel ads to provide more interactive and immersive experiences than

single-image ads, which then may lead to greater attention that promotes enhanced brand recall (Guitart, Hervet, and Hildebrand 2019; Simmonds et al. 2020). Before consumers can remember an advertised brand (Rossiter, Percy, and Bergkvist 2018), they must experience sufficient exposure to cognitively process the ad (MacInnis and Jaworski 1989; Wilson, Baack, and Till 2015). Because the altered swiping flow should result in enhanced attention, we anticipate it also leads to better brand recall.

H1: Activated carousel ads elicit (a) longer gaze durations, (b) more fixations, and (c) better brand recall than other ad formats.

3 Impacts of Carousel Ad Length on Attention

Carousel ads can vary in the number of cards used, so some of them are longer than others. Each carousel ad features at least two cards, and the dots that appear below the images indicate the total number of cards. Most carousel ads use three to five cards, and some platforms cap them at ten cards (Appendix 1). Consumers swipe card by card, possibly until the last card. They can swipe past the content at any point, and do not always swipe through to the final card, but naturally, longer carousel ads offer more opportunities for interaction and potential to keep attention for a longer period. Observations of real-life smartphone usage by Heitmayer and Lahlou (2021) reveal that apps with swiping-based newsfeeds tend to sustain the longest interactions, because users fall into a continuous loop motion (Rixen et al. 2023). Lahlou (2007) describe such swiping as a “cognitive attractor,” because it offers small, satisfying interactions, with low effort and high stimulus salience. Thus, we expect carousel ads with more cards to capture more attention.

H2: The more cards an activated carousel ad contains, the (a) longer the gaze duration and (b) higher the number of fixations.

4 Impacts of Brand Attitude on Carousel Ad Activation

Brand attitudes have strong influences on consumer behavior (Gresham and Shimp 1985). Prominent brands in particular tend to exert positive impacts on digital engagement with social media posts (Rietveld et al, 2020). Moreover, positive attitudes direct attention among objects that enter the visual field (Roskos-Ewoldsen and Fazio 1992), such that brands with more positive attitude scores likely attract more initial visual attention than less popular brands. Consumers with a positive attitude toward a brand are more likely to interact with it, likely resulting in greater activation of carousel ads that feature popular brands. Formally, we predict that brand attitude affects activation, such that

H3: Better attitudes toward advertised brands increase the likelihood that carousel ads are activated.

Attention research frequently relies on laboratory studies (e.g., Cummins, Gong, and Reichert 2021; Smit, Boerman, and van Meurs 2015), but we explicitly sought to understand attention to carousel ads in a real-life environment. We therefore combine qualitative interviews, eye-tracking, and videography studies in which participants use their own smartphones and view their own social media newsfeeds while at home.

III Study 1: Qualitative Interviews on the Perception of Carousel Ads

With Study 1, we explore how consumers evaluate and perceive carousel ads compared with other in-feed ad formats in social media. Through qualitative interviews, we aim to establish consumers' awareness of different ad formats and also gain insights into their perceptions and evaluations of the formats.

1 Method

1.1 Participants and Study Design

Twenty-two participants, aged 20 to 72 years, took part (59% women, $M_{age} = 29.0$ years, $SD_{age} = 12.4$). Most of them were employed (64%), and the rest (36%) were university students. The interviews lasted between 20 and 40 minutes and took place in the participants' homes.

1.2 Procedure and Data Analysis

We used a semi-structured interview guide with probing ad examples, such that we asked participants to rate and discuss the format, not the ad example, which we explained was shown for reference only. The ad examples, sourced from Instagram and Facebook, represented each of the in-feed ad formats (image, video, carousel, collection). Participants indicated if they had come across and interacted with each format on a scale from “not at all” [0] to “very often” [6]. Next, we raised open-ended questions such as, “What do you think about this ad format?” or “What do you like/dislike about this format?” In total, we recorded more than 9 hours of qualitative interviews, all of which were transcribed using GoSpeech AI-transcription software and analyzed with thematic analysis (Naeem et al. 2023), with the support of MAXQDA software.

2 Results

2.1 Evaluation of Carousel Ads

Participants indicated frequent exposure and interaction with all four in-feed ad formats. In terms of favorability, they frequently expressed preferences for the carousel ad format, due to its less intrusive nature and allocation of more control and information to them (Table 3).

Table 3: Ad format evaluations

<i>Ad Format</i>	<i>Example Statements</i>	<i>Participants</i>
Carousel	I like it more than a video, because it's not so intrusive and doesn't suddenly make a lot of noise. And it's also a bit better than a picture, because the ad can put more information in there than in a picture.	P 15, female, age 25
	Good indeed. You have a mixture of both. Here, you have pictures that aren't annoying because they usually don't have any sound, and you can swipe them. At the same time, you have more information.	P 08, male, age 27
Image	It depends. I find it a bit annoying when it's very frequent, to be honest. Especially when it's advertising that I can't relate to, and I don't understand why it's being shown to me.	P 17, female, age 27
	I don't think it's good for getting information. Only if I'm really interested in the product would I click on it to see how much it costs or something. I'd say that I at least swipe over an image ad on social media quite often.	P 06, male, age 31
Video	That's the thing I skip the quickest ... yes, especially if it's sponsored advertising that you haven't subscribed to, then it quickly gets on your nerves. And, if you still have the sound on, there's stuff like that in the background [that annoys me].	P 15, female, age 25
	I find it more strenuous because you must watch a longer video. And I break that off relatively quickly. A photo or a simple picture is easier because you can read through it more quickly, and with a video like that you must linger longer, which I don't usually do anyway.	P 18, female, age 24
Collection	Somehow, it's a bit confusing with all these pictures. And depending on what it's about, I think it's a bit irritating.	P 19, female, age 24
	I would prefer swiping [a carousel ad] because then you make a conscious decision to do so. If I'm interested, I can of course swipe and if not, I just keep on swiping.	P 06, male, age 31

With regard to *image ads*, participants liked their simplicity but also found them annoying, due to their frequent exposure and unrelated content. *Video ads* evoke similar assessments, though participants also mention skipping this format most quickly. They appreciate that video ads can provide more information but dislike the linear, fixed viewing character and sudden interruptions of sound. One participant liked the additional information provided by the multiple images in *collection ads*, whereas most participants found this format confusing.

Finally, the participants consistently identified carousel ads as their preferred in-feed format. To understand the reasons for this preference and define what sets carousel ads apart, we conducted a deeper exploration of how consumers experience these ads, using a two-step

approach, involving both idiosyncratic and cross-case analyses (Fournier 1998; Rahman, Langner, and Temme 2021).

2.2 Idiosyncratic Analysis

Participants experienced a series of stages during their interactions with a carousel ad, starting with curiosity, moving through convenience and self-control, and then resulting in immersion, as illustrated in Figure 10.

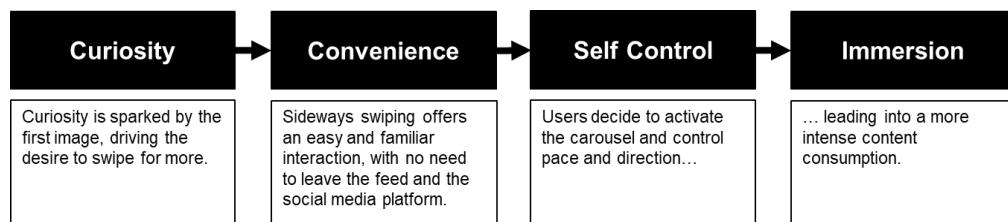


Figure 10: Stages of the carousel ad experience

For example, Participant 1 (male, age 22) noticed that a carousel interaction starts with the appeal of the first card, “it happens when the first image appeals to me,” which triggers his *curiosity* and desire for more information, “because then you want more information.” He prefers swiping over clicking too, claiming this behavior makes the interaction more *convenient*: “Instead of clicking on it, you have the option to swipe.... [so] the threshold for interaction is definitely lower.” Swiping also provides a convenience benefit, in that he does not have to leave the platform (e.g., Instagram) or “go to an external page to get more information and see even more.” Such convenience lowers this participant’s interaction barriers and accordingly increases the likelihood of an interaction.

Noting similar stages, P8 (male, age 27) describes *curiosity* initiating the interaction process, such that “out of curiosity, I tend to swipe to the side.” He also refers to the convenience of this format, such that “I interact with them the most and they are not distracting” and

“I rather tend to swipe to the side” (cf. clicking). Once the carousel begins, P8 also notes the appeal of *self-control*, such that he can swipe at his own pace, and the greater *immersion* with the ad content, achieved through more intense content consumption, in that “I interact with it [carousel ad] the most and spend more time with the content.”

2.3 Cross-Case Analysis

By combining the data across participants, we can establish deeper insights into the four stages of carousel ad experience. Overall, *curiosity* emerges as the main initiator of carousel ad activation. The first image in a carousel ad serves as the entry point to a sequence of cards, and users feel motivated by a desire to see what follows. This element of curiosity, combined with the potential for surprise, is distinctive to the carousel format, which

arouses a bit of curiosity, what else is coming? Because you can already see a bit of the next thing coming. And when you see the first image, you think maybe there's more. (P12, male, age 41)

I think if you're interested in the topic, then it's always exciting to see what's on the next page. Because that's a bit of a surprise, so to speak. (P4, female, age 17)

The *convenience* of sideways swiping then accelerates the interaction with carousel ads. Consumers, who already are acquainted with swiping navigation, find this interaction less inhibiting than actions like clicking a call-to-action button. Through sideways swiping, users can engage with the ad without leaving the social media feed and maintain a seamless experience within the same media environment. Once users begin swiping through a carousel, they appreciate the ease of comparing different elements, which can also add an element of enjoyment:

You get a good overview if you are interested and that you can swipe through the ad again and do not need to leave the page. I don't click on links or on the button for shopping, but I swipe carousels. (P6, male, age 31)

It's more fun to swipe left and right and then always have one product in focus and decide whether it's cool or not. (P7, male, age 25)

Such convenience aligns with the *self-control* users maintain, based on their ability to decide whether to engage with the ad and then the freedom to manage the speed and direction of interaction once they have swiped into the carousel. In addition to allowing users to navigate through the content at their own pace, it means they can choose how much detail to explore, which also enhances their overall interaction experience.

You can then decide for yourself how long you want to stay on a page or a photo from this carousel or to swipe away. (P4, female, age 17)

I think it's good that you can click through as quickly as possible ... so the speed at which you want to click through is up to you.... With video it goes on and on, of course you can stop it, but it's more complicated. And here you can swipe or stop within seconds. (P14, female, age 22)

Finally, participants reported a greater sense of *immersion* when engaging with carousel ads, such that they became more involved with the content. They even lost track of how many cards they had viewed and swiped through to the very last card. This deeper interaction led them to absorb more information, gain a better understanding, and learn more about the advertised content.

I've already caught myself looking at 10–20 things. You're more curious and spend more time intensely looking at it. (P12, male, age 41)

You get more insight into the product, from the features or images presented, than if you only have a single picture or a video. You can see the variety better. (P4, female, age 17)

Whether it's a product or a travel trip, you can then swipe through, take a look at it at your leisure ... and you can now learn more than just in one picture. (P20, female, age 27)

3 Discussion

Consumers are familiar with various in-feed ad formats but show a preference for carousel ads, due to their less intrusive nature and ease of interaction. Carousel ads effectively elicit curiosity and are convenient, particularly because sideways swiping is a familiar action for social media users, favored over interactions that require leaving the newsfeed and changing to another platform or website. Carousel ads also offer users greater control because they can decide when to activate the ad and manage the speed and direction of content consumption. This finding aligns with previous research (Frade, Oliveira, and Giraldi 2023) that suggests that interactive options controlled by users can reduce perceptions of the intrusiveness of ads, which might lead to deeper immersion and more intensive consumption of the advertising content. Finally, the study participants reported deeper engagement and absorption with the advertised content, suggesting greater immersion (Phillips and McQuarrie 2010; Van Laer et al. 2014) when processing carousel ads.

IV Study 2: Eye-Tracking Experiment to Measure Attention

To analyze how much attention consumers devote to carousel ads versus other in-feed ad formats, we gathered eye-tracking data from participants, who were using their own devices in real-life viewing conditions (Read et al. 2024). The relevant data were obtained in a previous study, designed to understand typical smartphone swiping behavior.²

² Note: Data for Study 2 has been collected in a previous experiment from the authors that had included a manipulation on typicality (Article 1, Experiment). However, this manipulation did not significantly affect the means as a comparison of cases with only high typicality versus all cases revealed. Thus, the full sample has been included in our Study 2 analysis.

1 Method

1.1 Participants and Study Design

Thirty-six participants, aged 21 to 58 years, took part in the study (61% female, $M_{age} = 30.5$ years, $SD_{age} = 9.4$), of whom 81% were employed and 19% were university students. Participants, active Instagram users with an average usage of 1.2 hours per day, were predominantly right-handed (92%). The experiment was conducted in the participants' homes at various times of day.

1.2 Procedure and Data Analysis

Using an interview guide, we initially briefed each participant on the experiment's procedure and then equipped them with a mobile eye-tracking device (Tobii Pro Glasses 2; see Figure 11) and asked them to browse their Instagram newsfeed as they typically would for at least 2 minutes, to ensure adequate data collection. Following each session, we asked participants for their unaided brand recall of ads they had seen.

For the analysis, we exported the eye-tracking data into iMotions 9.3 and created individual areas of interest (AOI) for all sponsored posts ($n = 411$). Then we coded these AOI frame-by-frame to capture the dynamic nature of mobile eye-tracking. A sponsored post would be logged as viewable from the moment 50% of it appeared on screen until 50% of it had exited (Trabulsi et al. 2021). The attention measure refers to the total gaze duration in milliseconds and the number of fixations within each AOI. The minimum duration for a fixation was set at 80 milliseconds (Boerman and Müller 2022). All brand names mentioned by participants were cross-referenced with the recorded posts, and only those that matched were considered valid recalls.

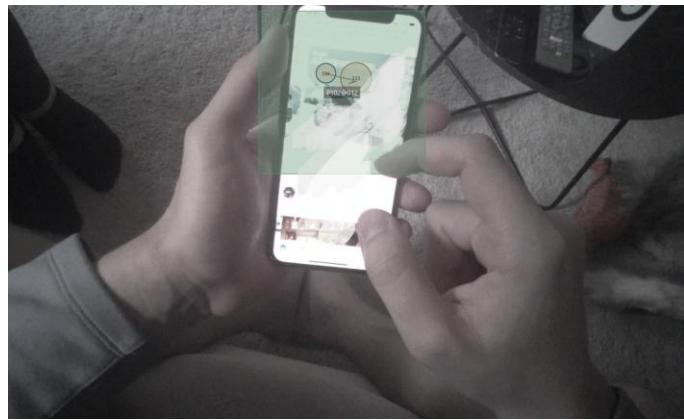


Figure 11: Experimental setup of the mobile eye-tracking device

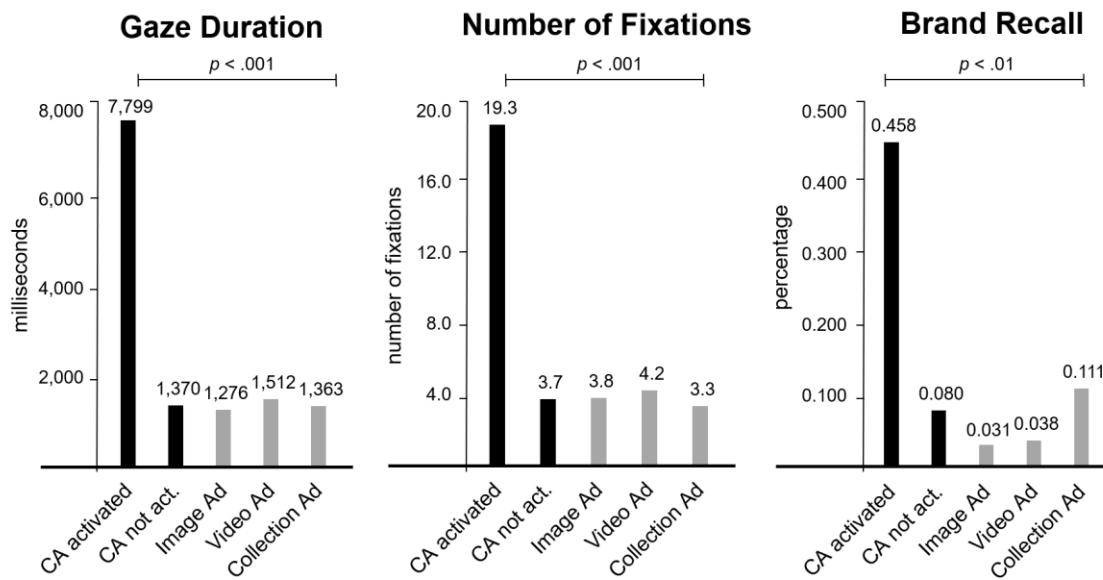
2 Results

2.1 Attention to Carousal Ads and Brand Recall

To analyze H1, pertaining to whether activated carousel ads draw more attention than image, video, or collection ads can, we ran generalized linear mixed effects models. To model gaze duration, we used a Gamma distribution with a log-link (Rosbergen, Pieters, and Wedel 1997). For fixation frequency, which is a count variable, we used a Poisson distribution with a log-link (Pieters, Warlop, and Wedel 2002). The brand recall measure involves a generalized linear mixed effects model with a binomial distribution and a logit link (Simmonds et al. 2020). We also included random intercepts to account for variation in the outcome variable attributable to the participant (Barr 2013; Judd, Westfall, and Kenny 2012; Quené and van den Bergh 2008).

According to planned contrasts with Bonferroni correction, activated carousel ads ($M = 7,799$ milliseconds [ms]) are attended to significantly longer than image ads ($M = 1,276$ ms, $p < .001$), video ads ($M = 1,512$ ms, $p < .001$), collection ads ($M = 1,363$ ms, $p < .001$), and non-activated carousel ads ($M = 1,370$ ms, $p < .001$). They also prompt more frequent fixations ($M = 19.250$ fixations) than image ads ($M = 3.795$, $p < .001$), video ads ($M = 4.215$, $p < .001$), collection ads ($M = 3.333$, $p < .001$), or non-activated carousel ads ($M = 3.732$, $p < .001$). Furthermore, participants recalled the activated carousel ads significantly better ($M = .458$) than

image ads ($M = .031, p < .01$), video ads ($M = .038, p < .01$), collection ads ($M = .111, p < .01$), and non-activated carousel ads ($M = .080, p < .01$). These findings offer support for H1a–H1c.



Notes: CA = carousel ad.

Figure 12: Means by ad format for gaze duration, fixations, and brand recall

The observed carousel effect is quite strong. Calculated across all ad exposures (i.e., activated and non-activated), we find that carousel ads ($M = 2,760$ ms) are attended to significantly longer than image ads ($M = 1,276$ ms, $p < .001$), video ads ($M = 1,512$ ms, $p < .014$), and collection ads ($M = 1,363$ ms, $p < .019$), as well as fixated more often ($M = 7.245$) than image ads ($M = 3.795, p < .001$), video ads ($M = 4.215, p < .001$), and collection ads ($M = 3.333, p < .036$). Overall, carousel ads also were recalled significantly better ($M = .162$) than image ads ($M = .031, p < .01$) and video ads ($M = .038, p < .01$), though not better than collection ads ($M = .111, p = .47$).

2.2 Effects of Longer Carousel Ads on Attention

To analyze whether longer carousel ads increase attention to the ad, we conducted generalized linear regressions, again following a Gamma distribution with a log-link for gaze duration and

a Poisson distribution with log-link for the number of fixations. The results indicate significant effects of the number of cards on gaze duration ($b = .084, p < .001$) and number of fixations ($b = .064, p < .001$). That is, the more cards a carousel ad contains, the longer the gaze duration is, and the greater the number of fixations, which offers support for H2. Notably, participants always swiped the activated carousel ads until they reached the last available card.

3 Discussion

By analyzing consumer attention toward carousel ads and memory of the advertised brands, we find that carousel ads in general attract significantly more attention than image, video, or collections ads. Attention to any ads is limited, as indicated by the observed total average of 1.4 seconds, which also is consistent with other research on social media attention (Borgmann, Kopka, and Langner 2022). But as our findings clarify, the activated carousel ads strongly increase attention, as well as brand recall by a factor of five, in support of H1. Non-activated carousel ads produce results similar to those of other in-feed ad formats in terms of attention and brand recall. Therefore, advertisers can benefit from the carousel format, but only in the event that consumers activate it. As implied by previous research on brand memory (Guitart, Hervet, and Hildebrand 2019; Simmonds et al. 2020), increased visual attention enhances brand recall. In addition, attention to carousel ads can increase even more by adding more cards to the carousel ad, as we predicted in H2.

V Study 3: Videography Study and the Role of the Brand

To understand how brand attitude influences the initiation of sideways swiping behaviors on carousel ads, we combined a videography study with interviews.

1 Method

1.1 Participants and Study Design

Thirty-one participants, aged 20 to 31 years, took part in the study (42% female, $M_{age} = 24.2$ years, $SD_{age} = 2.6$), of whom 39% were employed and 61% were students. All participants were active Instagram users, averaging 1.3 hours of daily usage. The experiment took place in the participants' homes, at different times of the day.

1.2 Procedure and Data Analysis

The videography study was conducted using Tobii Pro Glasses 2. We asked participants to use their own Instagram newsfeeds as they normally would. A trained research assistant closely monitored the content on each participant's smartphone and logged all carousel ads. After each session, participants were shown the carousel ads, logged through iMotions 9.3, and asked about their interaction behavior using open-ended questions such as, "Why did you swipe sideways into this carousel ad?" In addition, participants rated their attitudes toward the brand (A_{Brand}) from "bad" (-3) to "good" (+3) (Bergkvist and Rossiter 2007) for each logged carousel ad, which were either activated or else not activated and skipped.

2 Results

Attitude toward the brand is crucial for carousel activation. According to our study participants, positive past experiences with the brand or brand favorability influence their decision to engage further:

This was a great post, and I love the brand. (P2, female, age 24)

This is a well-known brand, so I trusted it and swiped to explore more. (P22, male, age 30)

A favorable attitude seems to support further interaction. To understand the brand's specific role in carousel ad activation, we also ran a generalized linear model, following a binomial distribution with a logit link for all logged carousel ads, to understand whether attitudes toward brands help encourage the activation of carousel ads. The significant effect of attitude toward the brand on the likelihood of a carousel ad being activated ($b = .623, p < .01$) indicates that the better this attitude is, the more likely the carousal ad will be activated, in support of H3.

3 Discussion

Positive attitudes toward a brand increase the likelihood of activation of a carousel ad, as we predicted in H3. Thus, popular brands can benefit especially from the carousel ad format. Our findings also support previous research related to strong brand impacts on consumer behavior (Rietveld et al. 2020; Gresham and Shimp 1985).

VI Conclusion

Despite strong interest in social media advertising and marketing effectiveness, the effectiveness of carousel ads has not been established sufficiently. We present the first investigation of carousel ads and their impact on ad attention and brand recall in real-world settings, using a mixed methods approach that combines both eye-tracking and qualitative interviews. In the interviews, consumers noted their experience of different stages in carousel ad activation, with curiosity as an initiator of activation and the convenience of swiping as a facilitator that reduces the barrier of interacting with this format. Once the carousel is activated, consumers perceive self-control in terms of pace and direction, which encourages more immersion (Phillips and McQuarrie 2010; Van Laer et al. 2014) in processing carousel ads.

Furthermore, attention paid to activated carousel ads is five times greater than that toward other ad formats, and it increases with carousel ad length (i.e., more cards). This study thereby extends prior research on online advertising effectiveness (e.g., Briggs and Hollis 1997;

Huang et al. 2020; Liu-Thompkins 2019), in that it introduces swiping behavior as an important influence on in-feed ad format interactions and thereby attention and brand recall. Our findings reveal that a more favorable attitude toward the brand increases the likelihood of carousel ads being activated. Consequently, strong brands stand to benefit particularly from using carousel ads, reinforcing previous research on the powerful influence of brand attitudes on consumer behavior (Gresham and Shimp 1985; Rietveld et al. 2020).

1 Implications for Practice

Advertisers need to recognize the appeal of carousel ads as a format that can improve ad attention and brand recall. They are particularly effective at capturing visual attention and improving brand recall, especially for popular brands. These findings suggest two main practical recommendations for advertisers. First, carousel ads should be prioritized; they can generate the highest levels of visual attention in the newsfeed, without much additional cost. That is, the pricing for carousel ads is similar to that of image or video ads (Meta 2024b), and the extra expense of creating multiple images for carousel ads is negligible. If a carousel does not get activated through sideways swiping, its impact remains comparable to that of a single-image ad. However, once the carousel ad has been activated, the format can significantly increase attention and brand recall. Thus, advertisers can only benefit from choosing a carousel format. Second, carousel ads should be optimized, in the form of longer posts with more cards, to benefit from sustained viewer attention toward these longer carousel ads.

2 Limitations and Further Research

Because we measure attention in a real-world experiment, we cannot control the advertising content. A laboratory experiment with standardized newsfeed content could help elaborate on our findings and explore brand recognition as a less complex but equally relevant variable, particularly for recognition-based purchase decisions. In addition, we demonstrate that

brand attitude enhances carousel ad activation, but further research is needed to understand what drives consumers to swipe into a carousel ad, especially advertising for lesser-known or new brands. Continued studies might investigate the impact of the first card's design (e.g., vivid colors, human elements, photographic style) and type of content (e.g., transformative vs. informative) on carousel ad activation. Our findings are likely to apply to other newsfeed-based social media platforms that host carousel ads, but the different dynamics warrant further exploration too. Understanding what motivates consumers to swipe carousel ads across different platform types would be informative, so we call for continued research into carousel ads, to help advertisers take advantage of the strong advertising effectiveness of this format once they understand how to encourage activation of their carousel ads.

Article 3

Before the Hype, Comes the Swipe: How to Design Carousel Ads that Get Activated

Authors:

Stefan Rohrbach (University of Wuppertal, Germany)

Daniel Bruns (University of Wuppertal, Germany)

Tobias Langner (University of Wuppertal, Germany)

D Before the Hype, Comes the Swipe: How to Design Carousel Ads that Get Activated**(Authors: Stefan Rohrbach, Daniel Bruns, and Tobias Langner)**

Abstract: Carousel ads offer an interactive experience by allowing users to swipe through multiple images, encouraging deeper consumer involvement. This research examines the impact of carousel ads on consumer engagement in social media and identifies key design elements that drive carousel activation. Using field data from Interbrand's 100 best global brands on Instagram, Study 1 shows that carousel ads receive significantly more likes than other post formats, with longer carousel posts driving even greater engagement. Study 2 integrates eye-tracking, qualitative interviews, and content analysis to explore the drivers of carousel ad activation. It finds that curiosity cues, such as person orientation or viewing angles, transformational (vs. informational) persuasion, and positive brand attitudes act as motivators. Conversely, design elements that make posts look like advertisements—such as professional photo style or product-only images with cropped backgrounds—act as inhibitors. We recommend that advertisers aiming to benefit from the carousel ad format should make use of identified motivators while avoiding inhibitors of carousel activation.

I Introduction

In today's highly competitive and cluttered social media environment, capturing consumer attention has become increasingly challenging for brands (Beuckels et al. 2021; Nelson-Field, Riebe, and Sharp 2013). With ads on platforms like Instagram being viewed for just 1.8 seconds on average (Borgmann, Kopka, and Langner 2022), advertisers must find new ways to engage consumers in deeper brand interactions. Carousel ads provide an opportunity for advertisers by allowing consumers to interact with their brands through sideways swiping, encouraging deeper engagement with the content (Wei et al. 2021). The carousel ad format has become widely available across different social media platforms such as Facebook, Instagram, TikTok, LinkedIn, or even the Amazon shopping feed. Unlike static image ads, carousel ads offer a unique opportunity for brands to tell stories, showcase products, or guide users through a deeper experience. When consumers actively swipe through a carousel ad, they engage more closely with the content, increasing their exposure to the brand's message.

Initial research suggests that carousel ads enhance consumer engagement. For example, Oltra, Camarero, and San José Cabezudo (2022) demonstrated in a forced exposure setting with a student sample that separating a call-to-action into multiple images using a carousel ad instead of a single image encourage greater intention to participate in electronic word-of-mouth. Wahid and Gunarto (2022) found that Indonesian university Instagram accounts received more likes for carousel posts. However, these studies suffer from limited generalizability and real-world validity, suggesting that further research is needed to investigate the impact of carousel ads on social media engagement.

Advertisers can benefit from carousel ads at little or no additional costs. Prices of carousel ads are comparable to image or video ads (Meta 2024a) and the additional cost of producing multiple images of carousel ads can usually be neglected. When not activated by sideways swiping, carousel ads simply have the same advertising impact as single image ads and

the additional benefit of carousel ads over other ad formats requires carousel activation. This raises the critical question of what entices consumers to swipe carousel ads.

This paper aims to address two key objectives: (1) to understand the impact of carousel ads on social media engagement in real-world brand settings, and (2) to explore the motivations and design elements that prompt consumers to stop for and to activate carousel ads. Drawing on established theories of attention tactics in advertising (Langner and Klinke 2022; Rossiter, Percy, and Bergkvist 2018), we investigate which design choices are most effective in prompting consumers to swipe. Given the explorative nature of our research, we refrain from specifying the hypotheses in a formal manner (cf. Golder et al. 2023; Inman, Winer, and Ferraro 2009).

This research makes two key contributions to the literature. First, it introduces a framework for consumer interaction with carousel ads, detailing the steps from initial exposure to consumer action. We build on the three primary categories of advertising tactics: physically intense, emotional and cognitive elements (Kroeber-Riel and Meyer-Hentschel 1982) to explore stopping power and activation of carousel ads (Pieters, Wedel, and Batra 2010; Posner 1980). Second, our study identified motivators and inhibitors of carousel ad activation, adding to the literature on advertising avoidance (e.g., Youn and Kim 2019; Speck and Elliott 1997) and native advertising (e.g., Wojdynski and Evans 2016). We found that curiosity cues and transformational persuasion increases activation, while design elements that make the post look like an advertisement act as inhibitors. While these execution-related effects can be applied to all brands, we also found that strong brands increase the likelihood of carousel ad activation. These findings offer valuable insights for both researchers and practitioners on how carousel ad design can drive carousel activation and thereby a deeper consumer engagement.

II Theoretical Background

1 The Carousel Ad Format

The carousel format is designed to interrupt the upward scrolling by inviting consumers to engage in sideways swiping (Figure 13). Brands can use the carousel format to create an emotional customer experience, an informative product presentation, or a purchase incentive. Carousel ads are highly engaging and can deliver richer, more immersive consumer experiences than single-image ads. Consumers that interact with carousel ads show higher levels of attentiveness and deeper processing, which should increase their likelihood to engage with the advertisement compared to brief exposures of other social media ad formats. Thus, we expect that the interactive carousel format has a positive impact on consumer engagement.



Figure 13: Example of a carousel ad at Instagram
(own visualization; images generated using ChatGPT, DALL·E)

Carousel ads feature at least two cards with the number of cards indicated by dots beneath the images. Most carousel ads feature between three and five cards, though some platforms restrict the maximum number of cards to 10. Although social media users can swipe upwards to the

next content any time, longer carousel ads provide more content. We expect that a higher number of cards may also increase social media engagement, such that the more cards a social media post contains, the more likes it will receive.

2 Advertising Effects of Carousel Ads

Carousel ads exert their impact on consumers in a series of consecutive steps, starting with carousel exposure and ending with consumer actions (Figure 14). To examine how carousel ads attract attention, we draw on the extensive body of research on attention-capturing tactics in advertising (e.g. Rossiter, Percy, and Bergkvist 2018). Attention processes are differentiated into gaining and holding consumers' attention. While gaining attention refers to the likelihood of an ad to draw initial attention to the ad, holding attention refers to an ad's ability to motivate consumers to engage longer and more deeply with the advertisement (Pieters and Wedel 2004). As early as 1960, Berlyne categorized various stimuli used in advertising, which Kroeber-Riel and Meyer-Hentschel (1982) later distilled into three primary categories: physically intense, emotional, and cognitive stimuli. These stimuli initiate two different attention-related processes. The first involves bottom-up factors (gaining attention), which are intrinsic to the physical intensity of the ad (e.g., size, color). These stimuli enhance the stopping power or likelihood to gain initial attention (Pieters, Wedel, and Batra 2010) but do not convey inherent meaning. The second factor is driven by top-down processes (holding attention) (Posner 1980; Yantis and Egeth 1999) which are consumer-specific and influenced by affective and cognitive factors such as brand attitudes as well as ad and brand experiences (Rayner et al. 2001; Rosbergen, Pieters, and Wedel 1997). In contrast, these elements derive their significance from the content itself and encompass emotional or cognitive stimuli.

We first look into physically intense elements which enhance stopping power and continue with emotional and cognitive elements which increase activation of carousel swiping.

Once activated, swiping carousels leads to increased exposure and in turn deeper levels of processing (MacInnis and Jaworski 1989; Newstead and Romaniuk 2010; Singh and Cole 1993).

Deeper processing in turn causes better learning outcomes as well as changes in attitude and behavior.

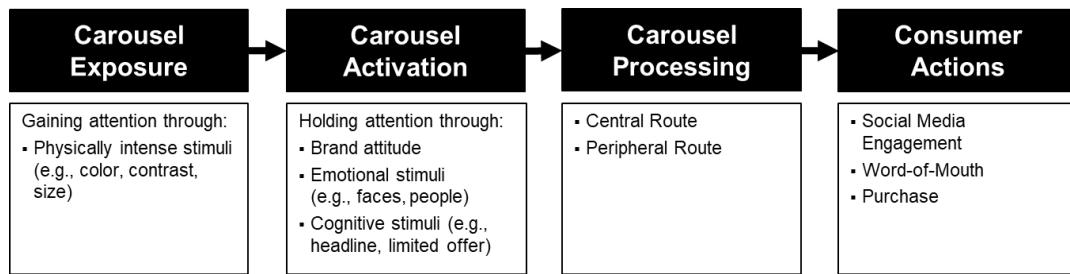


Figure 14: Consumer response steps toward carousel ads

3 Stopping Power of Carousel Ads: Physically Intense Stimuli to Elicit Bottom-Up Processing

Initial attention is often driven by the physical or structural attributes of an object (Pieters and Wedel 2004; Treisman and Gelade 1980). These physically intense elements can be detected almost automatically, without the need for significant cognitive processing. According to the surprising-attention theory (e.g., Asplund et al. 2010; Horstmann 2002), attention is drawn to unexpected stimuli through automatic discrepancy detection. Physically intense elements like vivid colors (Fortin and Dholakia 2005), strong contrasts, or large size (Pieters, Wedel, and Batra 2010) are likely to capture initial attention when featured in carousel posts. To understand the role of physically intense elements in stopping consumers for an ad, we formulate our first research question:

RQ1: What role do physically intense elements play in making consumers stop for carousel ads?

Once consumers have stopped for a carousel, they choose to either swipe sideways to activate the carousel or to swipe downwards to skip it. In the following, we look closely into what makes consumers activate carousels.

4 Activation of Carousal Ads: Emotional and Cognitive Elements to Stimulate Top-Down Processing

Advertising needs to be relevant for consumers, in order to hold their attention (Cho 1999; Yoon, Huang, and Kim 2023). Relevancy is largely obtained by emotional and cognitive aspects of the ad that prompt involvement and interest. This section explores how brand attitude and emotional/cognitive elements influence carousel ad activation.

Brand attitude. Brands that have higher attitude scores get more attention and have a strong role in affecting behavior (Gresham and Shimp 1985; Rietveld et al. 2020). This should increase the likelihood of carousel ad activations for more popular brands.

Transformational vs. informational persuasion. Carousel ads can evoke transformational or informational persuasion from the content presented in the post (Rossiter, Percy, and Bergkvist 2018). On Instagram, social media content typically emphasizes entertainment, incentives, or empowerment (Buzeta, Pelsmacker, and Dens 2020), with a strong visual component. This indicates that users are more accustomed to emotionally driven content rather than informational content. Emotional content drives stronger consumer responses, as Lohtia, Don-thu, and Hershberger (2003) have shown for click-through-rates of banner ads. We anticipate that emotional content will have a stronger carousel activation effect than informational content. In the following, we identify emotional and cognitive stimuli that may stimulate carousel activation.

5 Emotional Stimuli

Affective cues. Affective stimuli engage consumers by eliciting specific feelings, often using affective cues like humans faces, people, animals or erotic to evoke instinctive emotional reactions (Scholl and Tremoulet 2000). Such biological stimuli are essential for survival, helping individuals to recognize potential mates or threats (Klein, Shepherd, and Platt 2009). Humor is another key emotional element in advertising, enhancing engagement by generating positive emotional responses (Eisend 2011; Weinberger and Gulas 1992).

Curiosity cues. As a powerful emotional motivator, curiosity drives individuals to seek new information or experiences (Dukes and Liu 2024; Menon and Soman 2002). It thrives on uncertainty or a gap of knowledge, pushing consumers to explore and resolve the unknown. Design elements can employ curiosity cues in various ways, such as using a person pointing within the image, lateral viewing angles, or cropping the main element, to imply that there's more beyond the visible frame, which can be explored by sideways swiping.

6 Cognitive Stimuli

Cognitive elements prompt consumers to think and engage more deeply in their decision-making processes. One of the main reasons why people engage with brand content on social media is to seek information (Lin and Lu 2011; Muntinga, Moorman, and Smit 2011).

Informative cues. Informative cues like such as limited time offers, discounts, or giveaways stimulate cognitive consideration by invoking perceptions of value and scarcity (Ang 2021). Other informational cues can include headlines offering context, ratings and reviews that provide additional product information or directional cues, such as arrows.

Realization cues. Each social media platform has a distinct audience and content style (Voorveld 2019). Instagram, for instance, is a highly visual platform where users are accus-

tomed to influencer-generated content (Koivisto and Mattila 2020). Informal, less polished images with natural light often resonate more with consumers than professional, highly staged photos. Hence, realization cues such as photo style (professional vs. home-made) and product shot (e.g., pack shot, product in use) can act as cognitive triggers influencing carousel ad activation. To better understand how emotional and cognitive design elements stimulate top-down processing in carousel activation, we formed our second research question:

RQ2: What role do emotional and cognitive elements play in making consumers activate carousels?

Before investigating the stopping power and activation triggers of carousel ads, we first explore whether the carousel format itself enhances consumer engagement.

III Study 1: The Carousel Effect on Engagement

We use data scraping of the Interbrand 100 best global brands to analyze the impact of carousel posts versus other in-feed formats on digital engagement in terms of the number of likes received.

1 Method

We collected data from the most recent Instagram posts of the Interbrand 100 best global brands (Interbrand 2023), resulting in a total number of 955 posts. Since only carousel posts are built of two or more cards, all posts with more than two cards were coded as carousel posts accordingly. Out of the 955 posts, 273 were identified as carousel posts (28.6%), while the remaining 682 were non-carousel posts. As a measure of social media engagement, we assessed the number of likes each post received (e.g., Yoon et al. 2024)

2 Results

2.1 Engagement of Carousel Posts vs. Other In-Feed Formats

To analyze whether carousel posts draw more engagement in terms of number of likes than other formats, we winsorized the number of likes at 3 SDs and conducted a t-test. We found that carousel posts received significantly more likes ($M = 46,042$, $p < .001$) than other post formats ($M = 25,790$, $p < .001$).

2.2 Longer Carousel Posts Drive Increased Engagement

To analyze whether longer carousel posts increase engagement, we conducted generalized linear regressions, following a Poisson distribution with log-link for number of likes. We found significant effects of the number of cards on number of likes ($b = 5,700$, $p < .01$). Hence, the more cards a carousel posts contains, the greater the number of likes received.

3 Discussion

Our results demonstrate that carousel posts for brands strongly increase engagement in terms of number of likes. These results support the findings of Wahid and Gunarto (2022) by extending it to the context of brands in real-life settings.. In addition, our results show, that longer carousel posts, with more cards, receive a greater number of likes.

IV Study 2: What Makes Consumers Swipe Carousels

In Study 2, we utilized eye-tracking, qualitative interviews, and content analysis to explore why consumers stop and activate carousel posts on Instagram in real-life settings. First, participants were equipped with mobile eye-tracking devices to record typical Instagram usage sessions. Following this, we conducted qualitative interviews based on the recorded sessions. Lastly, we performed a content analysis of the carousel posts captured during these sessions.

1 Method

1.1 Design and Participants

To understand why consumers stop and activate carousel posts on social media, we employed a real-life approach (De Pelsmacker 2021) by observing participants' real Instagram viewing behavior in their private homes. Sixty-four participants aged 15 to 54 years (41% women, $M_{age} = 25.7$ years, $SD_{age} = 8.9$), took part in the study. The majority of participants were employed (66%), while the remainder (34%) were university students.

1.2 Procedure

Study 2 involved three components: real-life Instagram usage sessions with mobile eye-tracking, qualitative interviews, and content analysis of captured carousel posts. These usage sessions and interviews were recorded in the participants' homes between November 2023 and January 2024. Participants browsed their own Instagram newsfeed for up to 5 minutes while mobile eye-tracking (Tobii Pro Glasses II) tracked their interactions. A trained research assistant monitored the participant's smartphone activity on a separate laptop via iMotions 9.3, logging all carousel posts with timestamps.

For the qualitative part, participants were shown their logged carousel posts after each session and were asked questions about their interactions (e.g., "Why did you swipe into this specific carousel post?" or "What motivated you to engage with this post?"). The interviews were transcribed using GoSpeech AI transcription software and analyzed through thematic analysis (Naeem et al. 2023) using MAXQDA software for support.

In the quantitative part, participants rated their attitudes toward the brand (A_{Brand}) on a scale from "bad" [-3] to "good" [+3] (Bergkvist and Rossiter 2007) for each logged carousel post. We identified a total of 222 carousel posts, of which 87 were activated. By drawing on attention tactics theory and insights from the qualitative interviews, we developed a category

system of physically intense, emotional, and cognitive elements (Appendix 30). We then performed a content coding all logged carousel posts to examine the impact of formal and content-relevant design elements on carousel activation.

2 Results: Qualitative Part

2.1 Stopping Power of Carousel Ads

Participants identified vivid colors as the most noticeable physically intense design element that made them stop for an ad, though other elements, like background contrast or central element, were not emphasized in our interviews (Table 1).

It's just a bright color where you could say okay, that could be a reason to stop. (Participant 9, female, age 25)

I think aesthetics are important. I also find such intense colors appealing for the most part. (Participant 17, male, age 23)

The study found that consumers primarily use the dots beneath the image to identify carousel posts, as these dots indicated how many cards can be swiped. Most participants did not rely on the card number icon in the upper corner, focusing instead on the dots as the main cue for carousel recognition. After establishing how consumers stop and identify carousel posts, our next focus was to explore why they choose to activate carousels.

2.2 Activation of Carousel Ads

After the Instagram swiping sessions, we further asked participants to explain why they swiped into or skipped each logged carousel ad. We explored how product category involvement, brand attitude, as well as emotional and cognitive design elements influenced their carousel activation (Table 1). Participants noticed the *role of the brand* as a primary reason to activate the carousel as selected statements show

Table 4: Selected interview statements related to carousel activation

<i>Activation</i>	<i>Related Statement</i>	<i>Participants</i>
<u>Relevancy</u>		
Brand	Very eye-catching and because I like the brand. Because I'm simply interested in the brand ...	P 03, female, age 25 P 32, male, age 53
Interest	It wasn't really because it was an ad, but simply because I wasn't interested in the topic. It wasn't convincing enough to make me want to keep reading. The product does not match my interests at all	P 60, female, age 26 P 1, male, age 27
Wear-Out	I didn't swipe because I already knew the post I've seen the ad several times before, and that's why I wasn't interested anymore.	P 25, male, age 27 P 47, male, age 29
<u>Transformational/Informational</u>		
Transformational	There were very appealing pictures. And if you're planning to book a vacation, if that were the case for me, I would probably have spent more time on it.	P 36, female, age 22
Informational	I was caught by the post because I'm currently powder coating rims myself. So, preparing rims. And that hit me in the sense that I'm interested in it at the moment, and I want to do it myself and maybe that's one way I can make it easier or cheaper	P 43, male, age 45
<u>Emotional Elements</u>		
Affective Cues	They actually market it with real posts from people who have been photographed themselves. I think it's mostly people. I still had that from Deutsche Bahn, where they collected such funny announcements and then put a new one on each page. If it's a bit more humorous, then anyway. Yes, I think something funny is really my thing.	P 07, male, age 29 P 11, female, age 22
Curiosity Cues	I believe I simply wanted to see what is still to be found on the next page. I'm just curious.	P 20, female, age 20
<u>Cognitive Elements</u>		
Information Cues	I immediately noticed the price, or rather the €50 off. Because of the printed [text], which immediately caught my eye was the contest. Because coffee appeals to me and I like to drink coffee.	P 54, male, age 22 P 35, female, age 19
Realization Cues	The product needs to be staged in a visually appealing way, either in an environment where it fits in or on a person wearing it. And then it shouldn't just be a model, standing in front of a white wall, but somewhere on some street or in a café. As if it was a real situation.	P 14, male, age 24

When skipping carousel posts, participants mainly cited *relevance* and *wear-out* as key reasons. Irrelevant content that didn't align with their interests was a primary factor in avoiding carousel activation. Additionally, posts that had been seen before often lost their appeal, with familiarity leading participants to skip them. Participants highlighted several emotional and cognitive elements that drove their decision to activate carousel ads. Curiosity emerged as a key motivator for participants to swipe through carousels, with design features like viewing angle or the cropping that hinted at additional content beyond the visible frame. They preferred images showing products or services in real-life context, such as lifestyle images, rather than staged, professional shots or simple product displays. Regarding *emotional* design elements, participants reported they were more likely to activate carousels featuring a human figure or faces rather than product-only images. Humor, in the form of cartoons, memes, anecdotes, or funny stories, was also mentioned as a motivator to activate carousels. *Affective* appeals also played a strong role, as participants sought inspiration from carousel posts, looking for new trends, products, or ideas presented in an appealing way.

Cognitive elements such as "limited offers" and "giveaways" were frequently cited as triggers for carousel activation. Participants responded to cues like price discounts, the word "deal," or percentage reductions. However, arrows were not reported to be particularly useful; instead, participants relied on specific content or the dots below the post to identify carousels, making the inclusion of arrows as a design element less relevant for carousel swiping. Additionally, participants indicated that posts providing valuable *information*, such as tutorials or educational content, made them activate carousels. These carousels posts were seen as an informative source to learn something new.

3 Results: Quantitative Part

3.1 The Role of the Brand

We applied a logistic regression to analyze the impact of brand attitude on carousel ad activation. The results show a significant positive effect of attitude towards the brand on the likelihood of activating a carousel ($b = .662$ $p < .01$). Hence, the better the attitude towards the brand, the more likely it is that a carousel ad will be activated. However, any brand can benefit from the additional engagement offered by activated carousel ads. We now shift our focus to role of content-relevant design elements in influencing carousel activation.

3.2 The Role of Emotional and Cognitive Elements

To analyze the impact of design elements on carousel activation, we used contingency tables for Chi-square tests. We report log-odds-ratios (LOR) with positive values indicating a positive effect and negative values indicating a negative effect. Table 2 summarizes the results for both physically intense and emotional/cognitive elements.

While physically intense elements did not affect carousel activation, emotional and cognitive elements revealed distinct motivators and inhibitors of carousel activation. The primary *motivators* for increasing carousel activation were “curiosity” and “transformative content.” Design elements that fostered “curiosity” show higher activation ratios, with significant effects for viewing angle (LOR .983; $p = .007$) and Person Orientation (LOR .882; $p = 0.022$). Additionally, posts were categorized as transformative ($n = 32$), informational ($n = 29$), or neutral ($n = 161$), with neutral posts mostly consisting of shopping-related carousels that lacked emotional or informational depth. Transformational persuasion had a significantly higher activation ratio (LOR 1.616; $p = .001$) compared to informational content.

Conversely, design elements that appear more promotional, i.e., make the carousel posts look like an advertisement, decreased the likelihood of carousel activation. Significant or marginally significant effects emerged for design elements such as cropped background (LOR = -0.707 , $p < .013$), professional photo style (LOR = -1.930 , $p < .001$) and pack shot (LOR = $-.532$, $p = .067$). Limited offer (LOR = $-.399$, $p = .362$) and logos cues (LOR = $-.440$, $p = .243$) showed below-average activation ratios but were insignificant. Overall, this suggests that design elements that heighten ad recognition actually serve as inhibitors to carousel activation.

Table 5: Motivators (green) and inhibitors (red) of carousel activation

Design Element	Log-Odds-Ratio	p	Phi-coefficient	n	Tactic in use		Tactic not used	
					Carousel activated	Not activated	Carousel activated	Not activated
Physically Intense Elements								
Color	0.087	1.000	0.005	20	8 (40.0%)	12 (60.0%)	79 (39.1%)	123 (60.9%)
Background	-0.707	0.013	-0.171	118	37 (31.4%)	81 (68.6%)	50 (48.1%)	54 (51.9%)
Central Element	0.087	1.000	0.007	183	72 (39.2%)	111 (60.8%)	15 (38.5%)	24 (61.5%)
Emotional and Cognitive Elements								
Transformational/Informational								
Content: Transformational	1.616	0.001	0.275	32	23 (71.9%)	9 (28.1%)	64 (33.7%)	126 (66.3%)
Content: Informational	0.105	0.840	0.017	29	12 (41.4%)	17 (58.6%)	75 (38.9%)	118 (61.1%)
Emotional Elements								
<i>Affective Cues</i>								
Faces	0.317	0.332	0.066	51	23 (45.1%)	28 (54.9%)	64 (37.4%)	107 (62.6%)
People	0.067	0.883	0.015	72	29 (40.3%)	43 (59.7%)	58 (38.7%)	92 (61.3%)
<i>Curiosity Cues</i>								
Person Orientation	0.882	0.022	0.157	33	19 (57.6%)	14 (42.4%)	68 (36.0%)	121 (64.0%)
Viewing Angle	0.983	0.007	0.187	39	23 (59.0%)	16 (41.0%)	64 (35.0%)	119 (65.0%)
Cropping	0.676	0.134	0.109	26	14 (53.8%)	12 (46.2%)	73 (37.2%)	123 (62.8%)
Cognitive Elements								
<i>Information Cues</i>								
Headline	0.086	0.873	0.018	54	22 (40.7%)	32 (59.3%)	65 (38.7%)	103 (61.3%)
Limited offer	-0.399	0.362	-0.071	38	12 (31.6%)	26 (68.4%)	75 (40.8%)	109 (59.2%)
Logo/Brand name	-0.44	0.243	-0.085	48	15 (31.3%)	33 (68.7%)	72 (41.4%)	102 (58.6%)
<i>Realization Cues</i>								
Style: Professional	-1.93	0.001	-0.365	178	54 (30.4%)	124 (69.6%)	33 (75.0%)	11 (25.0%)
Product shot: Pack shot	-0.532	0.067	-0.127	137	47 (34.3%)	90 (65.7%)	40 (47.1%)	45 (52.9%)

Note: Significant and marginally significant effects are printed in bold.

4 Discussion

Focusing on carousel activation, the quantitative analysis of Study 2 revealed major inhibitors and motivators. Notably, design elements that make posts look like advertisements—such as professional photo style and product-only images with cropped backgrounds—reduced the likelihood of carousel activation. This supports prior research showing that consumers on Instagram tend to avoid advertising, whereas posts that better resemble the platform’s user-generated content preferences (Voorveld 2019) and do not appear promotional, are more likely to be activated.

Key motivators of carousel activation included brand attitude, transformational persuasion and curiosity eliciting cues. Consistent with prior research on the impact of brand attitude on downstream advertising effects (Gresham and Shimp 1985; Rietveld et al. 2020), we found a strong effect of brand attitude on carousel activation. Furthermore, transformational (vs. informational) content significantly increased the likelihood of carousel ads to be activated. This finding aligns with research by Tellis et al. (2019), who found a strong effect of emotions on sharing of social media videos. Curiosity cues such as person orientation or viewing angles also increased the likelihood of carousel activation. Building on the human desire to seek new information or experiences (Dukes and Liu 2024) and in line with the visual depiction effect (Elder and Krishna 2012), we suggest that a non-frontal viewing angle piques curiosity by implying there is more to explore, making the post more likely to be swiped.

While participants expressed some interest in informative cues such as “limited offers” and “giveaways” and affective cues like “faces,” “people,” and “humor” in the qualitative interviews, this was not confirmed in the quantitative part. This discrepancy between qualitative and quantitative results should be addressed in further research.

V General Discussion

The present research focused on the effects of carousel ads on social media engagement and the elements that drive their activation. Despite the growing popularity of the carousel ad format, this has been neglected so far. In the analysis of field data from Interbrand's 100 best global brands (Study 1), we found that carousel ads significantly enhance consumer engagement, receiving 1.8 times more likes than other in-feed formats. Longer carousel ads, with more cards, also led to increased interaction, supporting the idea that extended storytelling within carousels encourages deeper engagement (Oltra, Camarero, and San José Cabezudo 2022). Study 2 explored the reasons behind carousel activation using eye-tracking, qualitative interviews, and content analysis, finding that curiosity cues, transformational content, and strong brand attitude motivate activation, while posts that look like advertisements inhibit it.

1 Contributions to Advertising Theory

Our research contributes to the literature in the two ways. First, we introduced a framework for understanding consumer interaction with carousel ads, outlining the steps from initial carousel exposure, over carousel activation, carousel processing, to consumer action (Figure 1). We build on the three primary categories of advertising tactics: physically intense, emotional and cognitive elements (Kroeber-Riel and Meyer-Hentschel 1982) and apply these to stopping power (Pieters, Wedel, and Batra 2010) and activation (Posner 1980; Yantis and Egeth 1999) of carousel ads.

Second, our research identified motivators and inhibitors of carousel activation contributing to the literature on advertising avoidance (e.g., Youn and Kim 2019; Speck and Elliott 1997) and native advertising (e.g., Wojdynski and Evans 2016). Our findings suggest that design elements that employ curiosity cues and transformative content serve as motivators for

carousel ad activation, while design elements that appear promotional and look like an advertisement act as inhibitors.

2 Contributions to Advertising Practice

Advertisers can enhance consumer engagement by understanding inhibitors and motivators of carousel activation. Design elements that make the post look like an advertisement—such as polished, professional-looking images, product-only visuals with cropped backgrounds, or prominent logos—should be avoided to increase carousel activation. However, our study revealed that this is the predominant approach used by practitioners with more than 80 percent of all carousel ads using a professional photo style and 53 percent using cropped backgrounds.

Additionally, by using transformational (vs. informational) persuasion and curiosity evoking design elements, advertisers can improve carousel activation. Curiosity can be triggered by elements that imply that there's more beyond the visible frame such as lateral viewing angles or adjusting the orientation of a person in the picture. Furthermore, advertisers can make use of longer carousel posts, as they foster greater engagement.

3 Limitations and Future Research

While the present research focused on Instagram, the most visual and influencer-driven platform, we believe that our findings are likely transferable to other platforms using the carousel format (e.g., Facebook, LinkedIn, Amazon Shopping Feed). Exploring the specific role of carousel posts on other platforms presents an interesting avenue for future research. Moreover, this research concentrated on image-based carousel ads, which constitute the majority (>95%) in our sample. However, video content offers a different dynamic and should be further explored in the context of carousel ads.

E Final Concluding Discussion

I Summary of the Findings

This thesis introduces smartphone swiping to advertising research, exploring how people's interactions with their smartphones influence advertising effectiveness on social media. Through three interconnected articles, it provides an understanding of how smartphone swiping impacts exposure, processing, and brand communication effects (Figure 1). Real-life social media experiments reveal that Instagram ads are viewed for an average of just 1.7 seconds, consistent with findings by Borgmann, Kopka, and Langner (2022). This brief viewing time underscores the challenge of attention in social media. This thesis provides a framework for understanding the role of smartphone swiping in social media and investigates whether introducing atypical swiping behaviors or using carousel ads can help advertisers to increase advertising effectiveness.

The role of atypical smartphone swiping. Article 1 demonstrates that inducing atypical swiping—deviating from consumers' typical motoric patterns—is not a viable tactic for enhancing advertising effectiveness. While atypical swiping may increase short-term visual attention, it introduces a "motoric vampire effect," diverting cognitive resources from ad content to managing unfamiliar motoric swiping actions. Given humans' limited cognitive capacity (Bryant and Comisky 1978; Lavie et al. 2004), this diversion leaves fewer resources for encoding the ad content (Kormi-Nouri 1995). This reduces brand recall, highlighting the importance of maintaining typical smartphone swiping that aligns with natural user interactions. Atypical swiping poses a threat to building brand memory, making it an ineffective tactic for advertisers. Instead, advertisers should focus on maintaining typical smartphone swiping and leveraging platform-specific features that naturally align with users' motoric swiping habits, such as carousel ads.

Effectiveness of carousel ads. Article 2 establishes carousel ads as a highly effective format. Carousel ads uniquely allow consumers to switch from upwards to sideways swiping (Echauri 2023), promoting deeper engagement with the content (Wei et al. 2021; Oltra, Camarero, and San José Cabezudo 2022). Article 2 highlights that carousel ads are not only the most preferred format by consumers, but also the most effective for driving attention and brand recall. Longer carousel ads with more cards amplify these effects, offering a unique opportunity for brands to create immersive experiences. However, this effectiveness only applies to activated carousel ads; those that are not activated perform similarly to other formats, such as single image, video, or collection ads.

Motivators and inhibitors of carousel activation. Article 3 identifies the design elements that drive or inhibit carousel activation. Emotional (Scholl and Tremoulet 2000; Klein, Shepherd, and Platt 2009; Dukes and Liu 2024; Menon and Soman 2002) and cognitive stimuli (Lin and Lu 2011; Ang 2021; Koivisto and Mattila 2020)—such as curiosity cues and transformational content—act as motivators, while elements that make carousel ads look like advertisements reduce activation likelihood. Positive brand attitudes further enhance activation rates, showing that well-known brands derive greater benefits from carousel ads. Popular brands, in particular, benefit from carousel ads, as positive brand attitudes act as a key motivator for consumer engagement.

These findings address the central research question of this thesis: *How does smartphone swiping impact advertising effectiveness in social media?* The three interconnected articles explore this question, offering both theoretical advancements and practical guidance for advertisers. The following section delves deeper into the key findings from each article.

Article 1: The Vampire Effect of Smartphone Swiping: How Atypical Motor Actions Increase Ad Attention but Impair Brand Recall

Article 1 examines how typical and atypical smartphone swiping influences attention and brand recall. Drawing on foundational research in haptics (Lederman and Klatzky 1987; Norman 1988), and extending embodied cognition theory (Rizzolatti et al. 1987) as well as enactment theory (Engelkamp and Zimmer 1994), the research examines whether atypical swiping can enhance advertising effectiveness.

A pre-study observed 30 participants' real-life smartphone usage through in-home videography and think-aloud interviews to classify typical and atypical swiping behaviors. The resulting taxonomy (Figure 5) revealed two dominant swiping patterns: thumb swiping with the dominant hand and index finger swiping while holding the phone in the non-dominant hand.

The main experiment used mobile eye-tracking and recall tests with 36 participants to measure attention (gaze duration and number of fixations) and brand recall during typical and atypical swiping. Findings showed that atypical swiping increased attention but decreased brand recall due to the identified "motoric vampire effect," where cognitive resources were diverted to managing unfamiliar swiping motions.

Key findings:

- Identified the "motoric vampire effect," where atypical motor actions impair brand recall by diverting cognitive resources.
- Established a taxonomy of motoric human–smartphone interactions, highlighting clear motoric preferences.

Article 2: The Carousel Effect: Leveraging Sideways Swiping for Enhanced Ad**Effectiveness in Social Media**

Article 2 explores how carousel ads leverage sideways swiping to enhance ad effectiveness.

Grounded in interaction theory (Liu et al. 2016) and immersion theory (Phillips and McQuarrie 2010; Van Laer et al. 2014), the research investigates how the carousel format promotes higher consumer interaction and enhances advertising effectiveness.

Study 1 used qualitative interviews with 22 participants to explore perceptions of carousel ads compared to other in-feed formats. Participants expressed strong preferences for carousel ads, citing their non-intrusive quality, ease of control, and ability to deliver extensive information. Interaction with carousel ads was described as a journey through distinct stages: initial curiosity sparked by the first card, convenience in swiping, a sense of self-control, and eventual immersion in the ad content (Figure 10).

Study 2 employed ego-perspective eye-tracking with 36 participants to measure attention and recall. Findings revealed that activated carousel ads captured substantially more attention—up to five times the gaze duration and number of fixations—compared to other ad formats. Brand recall was also highest for activated carousel ads, underscoring the impact of carousel ads on memory retention and brand recall.

Study 3 used videography with 31 participants to evaluate the role of brand attitudes in carousel activation. Positive brand attitudes were found to significantly increase the likelihood of carousel engagement, highlighting that well-known brands benefit most from this format. Participants were more inclined to swipe through carousel ads when they recognized or had positive feelings toward the brand, reinforcing the format's effectiveness for established brands.

Key findings:

- The "carousel effect" enhances ad effectiveness by fostering active, controlled interactions that increase attention and brand recall.
- Activated carousel ads outperform other formats in terms of attention and brand recall.
- Longer carousel ads with more cards amplify these benefits.
- Popular brands benefit more from carousel ads, driven by positive brand attitudes.

Article 3: Before the Hype, Comes the Swipe: How to Design Carousel Ads that Get Activated

Article 3 investigates design elements that drive carousel activation. Drawing on attention theories (Langner and Klinke 2022; Rossiter, Percy, and Donavon 1991; Pieters and Wedel 2004), the research identifies motivators and inhibitors of consumer engagement with carousel ads. The research posits that certain visual cues in carousel ads, such as curiosity-evoking images or emotionally engaging content, prompt greater consumer interest and interaction, while elements that make a post look like an advertisement can reduce the likelihood of engagement.

Study 1 used a large-scale analysis of 955 Instagram posts of Interbrand's top 100 brands to examine consumer engagement. The results showed that carousel ads garnered 1.8 times more likes than other formats (Appendix 28), with longer carousel ads receiving the highest engagement.

Study 2 combined mobile ego-perspective eye-tracking and qualitative interviews with 64 participants. The study pinpointed key motivators for carousel activation, including curiosity cues (e.g., lateral viewing angles or cropped images), transformational content (*vs.* informational content), and positive brand attitudes. Conversely, elements that made the posts look like advertisements—such as professional photo styles and product-only images with cropped backgrounds—were shown to reduce the likelihood of carousel activation.

Key findings:

- Carousel ads drive higher consumer engagement, earning more "likes" than other in-feed formats, with longer ads performing best.
- Design elements that elicit curiosity, such as person orientation or viewing angle, transformational (*vs.* informational) persuasion, and positive brand attitudes increase carousel activation.
- Design elements that make posts look like advertisements decrease carousel activation, such as professional photo styles or product-only images. This highlights the importance of designing carousel ads that resemble user-generated content to encourage interaction.

The three articles are interlinked through the research framework (Figure 1). Article 1 lays the foundation by examining how typical and atypical swiping behaviors affect ad attention and recall. Article 2 builds on this by highlighting the carousel ad format's ability to disrupt habitual swiping patterns and enhance attention and brand recall. Finally, Article 3 identifies design elements that drive carousel activation. The findings collectively offer a nuanced understanding of how smartphone swiping impacts advertising effectiveness in social media, advancing both theoretical frameworks and practical strategies for advertisers.

II Implications for Research and Practice

The findings from this thesis provide strong contributions to both advertising theory and practice, particularly in the context of social media advertising effectiveness.

Theoretical implications. This thesis introduces smartphone swiping to advertising research by linking motoric human–smartphone interactions to cognitive processing in digital advertising. This research establishes a foundational understanding of how typical motor interactions influence ad exposure and attention in real-life contexts.

The findings introduce a taxonomy of motoric human–smartphone interactions (Figure 5), offering a foundation for understanding how typical smartphone swiping influences ad processing. This enriches the literature on haptics (Lederman and Klatzky 1987; Norman 1988; Fontani et al. 2007), human-computer interaction (Shin et al. 2016; Miyaki and Rekimoto 2009), and advertising effectiveness (Huang et al. 2020; Liu-Thompkins 2019). This analysis identified two dominant swiping patterns: thumb swiping with the dominant hand and index finger swiping while holding the phone in the non-dominant hand. Over time, consumers exhibit a distinct motoric preference for one of these two patterns, naturally defaulting to their chosen method for navigating their smartphones.

Article 1 introduces the concept of the "motoric vampire effect," showing that atypical swiping diverts cognitive resources from ad content toward managing unfamiliar motor actions. This effect expands embodied cognition theory (Rizzolatti et al. 1987; Abrams et al. 2008) by demonstrating how disruptions in motoric behavior impair the cognitive processing of advertising. Unlike traditional vampire effects, which often arise from celebrity endorsers or humor (Chan and Chau 2023; Erfgen, Zenker, and Sattler 2015; Eisend 2011), the motoric vampire effect focuses on physical interactions, providing new insights into how advertising formats interact with user behavior.

This thesis develops a framework (Figure 14) that maps consumer interaction with carousel ads from exposure to activation and processing, incorporating physical, emotional, and cognitive stimuli. By studying carousel ads under real-life conditions, this research provides evidence of their superior effectiveness compared to other in-feed formats, contributing to the literature on interactivity (Frade, Oliveira, and Giraldi 2023; Muntinga, Moorman, and Smit 2011) and immersion (Phillips and McQuarrie 2010; Van Laer et al. 2014) in advertising. By examining carousel ads under real-life conditions, the thesis provides empirical evidence for

their effectiveness, offering a nuanced understanding of their performance compared to other in-feed formats.

Article 3 identifies motivators and inhibitors of carousel activation, extending the understanding of ad avoidance (Youn and Kim 2019; Speck and Elliott 1997) and native advertising (Wojdynski and Evans 2016). In addition, by examining the role of emotional, cognitive, and physically intense stimuli (Kroeber-Riel and Meyer-Hentschel 1982), this research offers new insights into how design elements can encourage or inhibit carousel activation. Curiosity cues and transformational content emerge as key motivators, while elements that make posts look like advertisements act as inhibitors. These findings align with top-down processing theories (Posner 1980; Yantis and Egeth 1999), showing how emotional and cognitive elements can drive deeper engagement. The research also highlights that positive brand attitudes significantly enhance activation likelihood, providing insights into how brand equity interacts with interactive ad formats. These observations align with previous research emphasizing the influence of strong brand affinity on shaping consumer behavior (Rietveld et al. 2020; Gresham and Shimp 1985).

Practical implications. The motoric vampire effect underscores the risks of introducing atypical swiping interactions. While atypical swiping may increase short-term attention, it detracts from brand recall. Advertisers should design campaigns that align with consumers' typical smartphone swiping to optimize cognitive processing and avoid impairing ad effectiveness. Additionally, platform changes or technological breakthroughs—such as Instagram stories or foldable smartphone screens—warrant careful evaluation for their potential to disrupt established user interactions and impact ad performance.

Carousel ads stand out as the most effective in-feed advertising format, offering immersive and interactive experiences that enhance attention, engagement, and recall. Longer carousel ads with more cards amplify these benefits without significant additional costs. Advertisers

should prioritize this format for campaigns that aim to maximize advertising effectiveness. Moreover, popular brands can leverage their strong brand attitudes to benefit from elevated carousel activation, underscoring the format's potential for established brands.

To increase carousel activation, advertisers must move away from elements that make posts look like an ad, which dominate the industry despite their negative impact on engagement. Data from our Study 3 revealed that 80% of carousel ads currently utilize professional photo styles, and 53% feature product visuals with cropped backgrounds—approaches that have been shown to reduce activation likelihood. Instead, advertisers should focus on transformational content and curiosity-evoking design elements, such as lateral viewing angles or partially revealed objects that hint at unseen content. These elements encourage consumers to swipe through the carousel, fostering deeper interaction and enhancing ad effectiveness.

By integrating these theoretical advancements and practical insights, this thesis provides a framework for understanding smartphone swiping in advertising research. Table 6 gives an overview of the three articles of this thesis and their key findings.

Table 6: Overview of the three articles with key findings and contributions

	Article 1	Article 2	Article 3
Title	The Vampire Effect of Smartphone Swiping: How Atypical Motor Actions Increase Ad Attention but Impair Brand Recall	The Carousel Effect: Leveraging Sideways Swiping for Enhanced Ad Effectiveness in Social Media	Before the Hype, Comes the Swipe: How to Design Carousel Ads that Get Activated
Focus	Understand the role of atypical smartphone swiping	Evaluate carousel ads' effectiveness	Identify motivators and inhibitors for activating carousel ads
Key Findings	<ul style="list-style-type: none"> Atypical swiping increases attention but reduces brand recall 	<ul style="list-style-type: none"> Activated carousel ads achieve higher attention and brand recall Longer carousel ads amplify this effect 	<ul style="list-style-type: none"> Curiosity cues and emotional elements enhance activation Elements that make carousel posts look like an ad decrease activation
Theoretical Contribution	<ul style="list-style-type: none"> Established a taxonomy of motoric human-smartphone interactions in social media Introduced the "motoric vampire effect" 	<ul style="list-style-type: none"> Established the "carousel effect", showing that activated carousel ads enhance advertising effectiveness 	<ul style="list-style-type: none"> Identified motivators/inhibitors of carousel ad activation
Practical Contribution	<ul style="list-style-type: none"> Avoid new ad formats or features that might trigger atypical swiping 	<ul style="list-style-type: none"> Prioritize carousel ads and favor longer formats 	<ul style="list-style-type: none"> Avoid elements that make posts look like ads Leverage Curiosity cues and Emotion

III Limitations and Future Research

This thesis addresses neglections in advertising research by introducing smartphone swiping to impact advertising effectiveness in social media. Advertising research often relies on controlled laboratory settings that fail to capture the complexities of real-life consumer behavior (De Pelsmacker 2021). By employing ego-perspective eye-tracking in participants' homes with their personal devices and newsfeeds, this research measured ad attention and recall in natural conditions, yielding highly realistic and externally valid insights.

While the methodology offers high external validity, it also introduces certain constraints. The inability to control the advertised content or brands meant that the findings were based on naturally encountered ads. Future studies could incorporate fully controlled laboratory experiments with standardized newsfeeds and ads to corroborate these results. However, such experiments may lack the personalization inherent to real-life newsfeeds, which are dynamically tailored to individual preferences, such as following specific influencers or brands.

Additionally, incorporating alternative attention measures, such as viewport time (Bruns et al. 2024), could enable larger-scale studies. Testing less demanding metrics, like brand recognition—relevant for recognition-based purchase decisions in categories such as consumer packaged goods (Rossiter, Percy, and Donavon 1991)—may also provide complementary insights into advertising effectiveness.

This thesis centers on smartphones as the dominant communication device globally. However, swiping behaviors are not confined to smartphones; they are prevalent across other screen-based devices, including tablets, gaming consoles, and VR/AR headsets. Interface designs on these devices may introduce new motoric patterns, differently shaping advertising attention and effectiveness. Future research should explore swiping behaviors and ad interactions across diverse devices to extend the applicability of these findings and uncover device-specific advertising strategies.

Articles 2 and 3 focus on the effectiveness of carousel ads on Instagram, one of the most widely used and preferred social media platform (Appendix 4 and 5). While these findings may apply to platforms like Facebook, LinkedIn, or the Amazon Shopping Feed, each platform's unique user demographics and content dynamics warrant further research to refine and contextualize these results (Voorveld 2019). Moreover, this thesis primarily analyzes image-based carousel ads, which dominate newsfeed content (comprising more than 90% of the sampled data in our studies). However, the rise of video-based carousel ads introduces new dynamics,

including motion-driven engagement and heightened emotional appeal. Investigating video carousel ads could provide deeper insights into their potential for driving consumer interaction and recall.

The findings from Article 3 indicate that human elements, such as faces or people, slightly increase carousel activation likelihood. However, their effectiveness depends on individual viewer preferences and their relationship to the person depicted. Prior research (Kopka, Borgmann, and Langner 2024 2024) has shown that influencers are particularly effective at capturing and sustaining consumer attention. Further exploration into the role of influencers in driving carousel activation could offer actionable insights for advertisers seeking to optimize engagement with this format.

This thesis underscores the essential role of smartphone swiping as an important determinant of social media advertising effectiveness, thereby providing a foundation for future research. Future studies could focus on optimizing activation strategies by identifying innovative design elements or emotional triggers that enhance carousel ad engagement. Additionally, the interplay between emerging trends, such as video-based carousel ads and influencer-driven campaigns, warrants exploration to understand their potential for driving carousel ad activation. Investigating cross-platform dynamics is essential to uncover how carousel ad performance varies across platforms with unique user behaviors and content ecosystems. Future research can build on the framework developed in this thesis to help advertisers better navigate the competitive social media landscape and maximize the potential of carousel ads. Smartphone swiping is a key part of our daily social media interactions, so it's essential for researchers and advertisers to understand and further explore its influence on advertising effectiveness.

References

Abrams, Richard A., Christopher C. Davoli, Feng Du, William H. Knapp, and Daniel Paull. 2008. "Altered vision near the hands." *Cognition* 107 (3): 1035–47. doi:10.1016/j.cognition.2007.09.006.

Amazon. 2022. "Press release: Sponsored products launches mobile carousel ads." Accessed February 21, 2024. <https://advertising.amazon.com/resources/whats-new/sponsored-display-mobile-carousel-ads>.

Ang, Lawrence. 2021. *Principles of Integrated Marketing Communications*: Cambridge University Press.

Asplund, Christopher L., J. J. Todd, A. P. Snyder, Christopher M. Gilbert, and René Marois. 2010. "Surprise-induced blindness: A stimulus-driven attentional limit to conscious perception." *Journal of Experimental Psychology. Human Perception and Performance* 36 (6): 1372–81. doi:10.1037/a0020551.

Barr, Dale J. 2013. "Random effects structure for testing interactions in linear mixed-effects models." *Frontiers in Psychology* 4: 328. doi:10.3389/fpsyg.2013.00328.

Bellman, Steven, Magda Nenycz-Thiel, Rachel Kennedy, Nicole Hartnett, and Duane Varan. 2019. "Best measures of attention to creative tactics in TV advertising." *Journal of Advertising Research* 59 (3): 295–311. doi:10.2501/JAR-2019-002.

Bergkvist, Lars, and Tobias Langner. 2023. "A comprehensive approach to the study of advertising execution and its effects." *International Journal of Advertising* 42 (1): 227–46. doi:10.1080/02650487.2022.2140524.

Bergkvist, Lars, and John R. Rossiter. 2007. "The predictive validity of multiple-item versus single-item measures of the same constructs." *Journal of Marketing Research* 44 (2): 175–84.

Berlyne, Daniel E. 1960. *Conflict, Arousal and Curiosity*. New York: McGraw-Hill.

Beuckels, Emma, Steffi de Jans, Veroline Cauberghe, and Liselot Hudders. 2021. "Keeping up with media multitasking: An eye-tracking study among children and adults to investigate the impact of media multitasking behavior on switching frequency, advertising attention, and advertising effectiveness." *Journal of Advertising* 50 (2): 197–206. doi:10.1080/00913367.2020.1867263.

Bevan, Chris, and Danaë S. Fraser. 2016. "Different strokes for different folks? Revealing the physical characteristics of smartphone users from their swipe gestures." *International Journal of Human-Computer Studies* 88: 51–61. doi:10.1016/j.ijhcs.2016.01.001.

Boerman, Sophie C., and Céline M. Müller. 2022. "Understanding which cues people use to identify influencer marketing on Instagram: An eye tracking study and experiment." *International Journal of Advertising* 41 (1): 6–29. doi:10.1080/02650487.2021.1986256.

Boerman, Sophie C., Eva A. van Reijmersdal, and Peter C. Neijens. 2015. "Using eye tracking to understand the effects of brand placement disclosure types in television programs." *Journal of Advertising* 44 (3): 196–207. doi:10.1080/00913367.2014.967423.

Boerman, Sophie C., Lotte M. Willemsen, and Eva P. van der Aa. 2017. "This post is sponsored." *Journal of Interactive Marketing* 38 (1): 82–92. doi:10.1016/j.intmar.2016.12.002.

Borgmann, Lennart, Julian F. Kopka, and Tobias Langner. 2022. "Ad reception in the living room: A mobile eye-tracking study of attention to the ad and ad recall in real-life media encounters." *Proceedings of the 20th ICORIA, Prague, Czech Republic*.

Briggs, Rex, and Nigel Hollis. 1997. "Advertising on the web: Is there response before click-through?" *Journal of Advertising Research* 37 (2): 33–45.

Bruns, Daniel, Julian F. Kopka, Lennart Borgmann, and Tobias Langner. 2024. "Validating viewport logging through mobile eye-tracking as a measure of gaining and holding attention toward social media ads." *Proceedings of the 53rd EMAC Conference, Bucharest, Romania*.

Bryant, Jennings, and Paul W. Comisky. 1978. "The effect of positioning a message within differentially cognitively involving portions of a television segment on recall of the message." *Human Communications Research* 5 (1): 63–75.

Buzeta, Cristian, Patrick de Pelsmacker, and Nathalie Dens. 2020. "Motivations to use different social media types and their impact on consumers' online brand-related activities (CO-BRAs)." *Journal of Interactive Marketing* 52: 79–98. doi:10.1016/j.intmar.2020.04.004.

Chan, Terri H., and Bolton K. H. Chau. 2023. "Mitigating the vampire effect of using celebrity in advertising: an eye-tracking approach." *Journal of Current Issues & Research in Advertising* 44 (4): 1–20. doi:10.1080/10641734.2023.2209848.

Chen, Taizhou, Kening Zhu, and Ming C. Yang. 2023. "Deep-learning-based unobtrusive handedness prediction for one-handed smartphone interaction." *Multimedia Tools and Applications* 82 (4): 4941–64. doi:10.1007/s11042-021-11844-6.

Cho, Chang-Hoan. 1999. "How advertising works on the WWW: Modified elaboration likelihood model." *Journal of Current Issues & Research in Advertising* 21 (1): 34–50. doi:10.1080/10641734.1999.10505087.

Ciman, Matteo, and Katarzyna Wac. 2018. "Individuals' stress assessment using human-smartphone interaction analysis." *IEEE Transactions on Affective Computing* 9 (1): 51–65. doi:10.1109/TAFFC.2016.2592504.

Cummins, R. G., Zijian H. Gong, and Tom Reichert. 2021. "The impact of visual sexual appeals on attention allocation within advertisements: An eye-tracking study." *International Journal of Advertising* 40 (5): 708–32. doi:10.1080/02650487.2020.1772656.

DataReportal. 2023. "Digital 2023: Global overview report." Accessed September 16, 2023.
<https://datareportal.com/>.

DataReportal. 2024. "Digital 2024. Global overview report." Accessed November 17, 2024.
<https://datareportal.com/>.

De Keyzer, Freya, Nathalie Dens, and Patrick De Pelsmacker. 2023. "The processing of native advertising compared to banner advertising: an eye-tracking experiment." *Electronic Consumer Research* 23 (3): 1921–40. doi:10.1007/s10660-021-09523-7.

De Pelsmacker, Patrick. 2021. "What is wrong with advertising research and how can we fix it?" *International Journal of Advertising* 40 (5): 835–48.
doi:10.1080/02650487.2020.1827895.

De Pelsmacker, Patrick, Maggie Geuens, and Pascal Anckaert. 2002. "Media context and advertising effectiveness: The role of context appreciation and context/ad similarity." *Journal of Advertising* 31 (2): 49–61. doi:10.1080/00913367.2002.10673666.

Duff, Brittany R., and Claire M. Segijn. 2019. "Advertising in a media multitasking era: Considerations and future directions." *Journal of Advertising* 48 (1): 27–37.
doi:10.1080/00913367.2019.1585306.

Dukes, Anthony, and Qihong Liu. 2024. "The consumption of advertising in the digital age: Attention and ad content." *Management Science* 70 (4): 2086–2106.
doi:10.1287/mnsc.2023.4793.

Echauri, Guillermo. 2023. "Infinite media: The contemporary infinite paradigm in media." *Convergence: The International Journal of Research into New Media Technologies*. doi:10.1177/13548565231208135.

Eisend, Martin. 2011. "How humor in advertising works: A meta-analytic test of alternative models." *Marketing Letters* 22 (2): 115–32. doi:10.1007/s11002-010-9116-z.

Elder, Ryan S., and Aradhna Krishna. 2012. "The "visual depiction effect" in advertising: Facilitating embodied mental simulation through product orientation." *Journal of Consumer Research* 38 (6): 988–1003. doi:10.1086/661531.

Engelkamp, Johannes, and Hubert D. Zimmer. 1994. *The Human Memory: A Multimodal Approach*. Seattle: Hogrefe.

Erfgen, Carsten, Sebastian Zenker, and Henrik Sattler. 2015. "The vampire effect: When do celebrity endorsers harm brand recall?" *International Journal of Research in Marketing* 32 (2): 155–63.

Ericsson. 2021. "Ericsson Mobility Report." Accessed January 07, 2022. <https://www.ericsson.com/4ad7e9/assets/local/reports-papers/mobility-report/documents/2021/ericsson-mobility-report-november-2021.pdf>.

Evans, Robin B. 1988. *Production and Creativity in Advertising*. London: Pitman.

Facebook. 2018. "News feed ranking in three minutes flat." Accessed March 08, 2024. <https://about.fb.com/news/2018/05/inside-feed-news-feed-ranking/>.

Feix, Thomas, Ian M. Bullock, and Aaron M. Dollar. 2014. "Analysis of human grasping behavior: Object characteristics and grasp type." *IEEE Transactions on Haptics* 7 (3): 311–23. doi:10.1109/TOH.2014.2326871.

Fernandes, Myra A., Jeffrey D. Wammes, and Melissa E. Meade. 2018. "The surprisingly powerful influence of drawing on memory." *Current Directions in Psychological Science* 27 (5): 302–8. doi:10.1177/0963721418755385.

Fernandez, Karen V., and Dennis L. Rosen. 2000. "The effectiveness of information and color in yellow pages advertising." *Journal of Advertising* 29 (2): 61–73. doi:10.1080/00913367.2000.10673609.

Festman, Yariv, Jos J. Adam, Jay Pratt, and Martin H. Fischer. 2013. "Both hand position and movement direction modulate visual attention." *Frontiers in Psychology* 4: 657. doi:10.3389/fpsyg.2013.00657.

Fontani, Giuliano, Silvia Migliorini, Roberto Benocci, Angelo Facchini, Marco Casini, and Fausto Corradeschi. 2007. "Effect of mental imagery on the development of skilled motor actions." *Perceptual and Motor Skills* 105 (3): 803–26. doi:10.2466/pms.105.3.803-826.

Fortin, David R., and Ruby R. Dholakia. 2005. "Interactivity and vividness effects on social presence and involvement with a web-based advertisement." *Journal of Business Research* 58 (3): 387–96. doi:10.1016/S0148-2963(03)00106-1.

Fournier, Susan. 1998. "Consumers and their brands: Developing relationship theory in consumer research." *Journal of Consumer Research* 24 (4): 343–73.

Frade, João L. H., Jorge H. C. de Oliveira, and Janaina d. M. E. Giraldi. 2023. "Skippable or non-skippable? Pre-roll or mid-roll? Visual attention and effectiveness of in-stream ads." *International Journal of Advertising* 42 (8): 1242–66. doi:10.1080/02650487.2022.2153529.

Gavilanes, José M., Tessa C. Flatten, and Malte Brettel. 2018. "Content strategies for digital consumer engagement in social networks: Why advertising is an antecedent of engagement." *Journal of Advertising* 47 (1): 4–23. doi:10.1080/00913367.2017.1405751.

Goh, Khim-Yong, and Jerry W. Ping. 2014. "Engaging consumers with advergames: An experimental evaluation of interactivity, fit and expectancy." *Journal of the Association for Information Systems* 15 (7): 388–421.

Golder, Peter N., Marnik G. Dekimpe, Jake T. An, Harald J. van Heerde, Darren S. Kim, and Joseph W. Alba. 2023. "Learning from data: An empirics-first approach to relevant knowledge generation." *Journal of Marketing* 87 (3): 319–36. doi:10.1177/00222429221129200.

Goldinger, Stephen D., Megan H. Papesh, Anthony S. Barnhart, Whitney A. Hansen, and Michael C. Hout. 2016. "The poverty of embodied cognition." *Psychonomic Bulletin & Review* 23 (4): 959–78. doi:10.3758/s13423-015-0860-1.

Gresham, Larry G., and Terence A. Shimp. 1985. "Attitude toward the advertisement and brand attitudes: A classical conditioning perspective." *Journal of Advertising* 14 (1): 10–49. doi:10.1080/00913367.1985.10672924.

Guitart, Ivan A., Guillaume Hervet, and Diogo Hildebrand. 2019. "Using eye-tracking to understand the impact of multitasking on memory for banner ads: The role of attention to the ad." *International Journal of Advertising* 38 (1): 154–70. doi:10.1080/02650487.2018.1473023.

Heitmayer, Maxi, and Saadi Lahlou. 2021. "Why are smartphones disruptive? An empirical study of smartphone use in real-life contexts." *Computers in Human Behavior* 116: 106637. doi:10.1016/j.chb.2020.106637.

Hollebeek, Linda D., Mark S. Glynn, and Roderick J. Brodie. 2014. "Consumer brand engagement in social media: Conceptualization, scale development and validation." *Journal of Interactive Marketing* 28 (2): 149–65. doi:10.1016/j.intmar.2013.12.002.

Horstmann, Gernot. 2002. "Evidence for attentional capture by a surprising color singleton in visual search." *Psychological Science* 13 (499-505).

Huang, Shan, Sinan Aral, Yu J. Hu, and Erik Brynjolfsson. 2020. "Social advertising effectiveness across products: A large-scale field experiment." *Marketing Science* 39 (6): 1142-65. doi:10.1287/mksc.2020.1240.

Inman, Jeffrey J., Russel S. Winer, and Rosellina Ferraro. 2009. "The interplay among category characteristics, customer characteristics, and customer activities on in-store decision making." *Journal of Marketing* 73 (5): 19-29.

Interbrand. 2023. "Best Global Brands 2023. How iconic brands lead across arenas." Accessed September 28, 2024. <https://learn.interbrand.com/hubfs/Best-Global-Brands-2023-Report.pdf>.

Judd, Charles M., Jacob Westfall, and David A. Kenny. 2012. "Treating stimuli as a random factor in social psychology: A new and comprehensive solution to a pervasive but largely ignored problem." *Journal of Personality and Social Psychology* 103 (1): 54-69. doi:10.1037/a0028347.

Jung, Nayoung, and Subin Im. 2021. "The mechanism of social media marketing: influencer characteristics, consumer empathy, immersion, and sponsorship disclosure." *International Journal of Advertising* 40 (8): 1265-93. doi:10.1080/02650487.2021.1991107.

Kim, Inki, and Jang H. Jo. 2015. "Performance comparisons between thumb-based and finger-based input on a small touch-screen under realistic variability." *International Journal of Human-Computer Interaction* 31 (11): 746-60. doi:10.1080/10447318.2015.1045241.

Kim, Kee-Eung, Wook Chang, Sung-Jung Cho, Junghyun Shim, Hyunjeong Lee, Joonah Park, Youngbeom Lee, and Sangryoung Kim. 2006. "Hand grip pattern recognition for mobile user interfaces." *Proceedings of the National Conference on Artificial Intelligence* 21 (2): 1789.

Klatzky, Roberta L., Susan J. Lederman, and Victoria A. Metzger. 1985. "Identifying objects by touch: An "expert system"." *Perception & Psychophysics* 37 (4): 299–302. doi:10.3758/bf03211351.

Klein, Jeffrey T., Stephen V. Shepherd, and Michael L. Platt. 2009. "Social attention and the brain." *Current Biology* 19 (20): 958–62.

Knoll, Johannes. 2016. "Advertising in social media: A review of empirical evidence." *International Journal of Advertising* 35 (2): 266–300. doi:10.1080/02650487.2015.1021898.

Koivisto, Elina, and Pekka Mattila. 2020. "Extending the luxury experience to social media – User-Generated Content co-creation in a branded event." *Journal of Business Research* 117: 570–78. doi:10.1016/j.jbusres.2018.10.030.

Kopka, Julian F., Lennart Borgmann, and Tobias Langner. 2024. "How to gain and hold attention: Combining the perspectives of research, practice, and consumers to generate a comprehensive list of attention tactics." *Proceedings of the 53rd EMAC Conference, Bucharest, Romania*.

Kormi-Nouri, Reza. 1995. "The nature of memory for action events: An episodic integration view." *European Journal of Cognitive Psychology* 7 (4): 337–63. doi:10.1080/09541449508403103.

Krishna, Aradhna, Andrea W. Luangrath, and Joann Peck. 2024. "A review of touch research in consumer psychology." *Journal of Consumer Psychology*. doi:10.1002/jcpy.1413.

Kroeber-Riel, Werner, and Gundolf Meyer-Hentschel. 1982. *Werbung. Steuerung des Konsumentenverhaltens*. Wien: Physica-Verlag.

Lahlou, Saadi. 2007. "Human activity modeling for systems design: A trans-disciplinary and empirical approach." In *Engineering Psychology and Cognitive Ergonomics*, edited by D. Harris. 4562nd ed. Berlin, Heidelberg. Springer.

Land, William M., Dima Volchenkov, Bettina E. Bläsing, and Thomas Schack. 2013. "From action representation to action execution: Exploring the links between cognitive and biomechanical levels of motor control." *Frontiers in Computational Neuroscience* 7: 127. doi:10.3389/fncom.2013.00127.

Langner, Tobias, and Tobias Klinke. 2022. "Managing brands in ever-changing media environment." In *Media and Change Management*, edited by Mathias Karmasin, Sandra Diehl, and Isabell Koinig, 143–68: Springer.

Lavie, Nilli, Aleksandra Hirst, Jan W. de Fockert, and Essi Viding. 2004. "Load theory of selective attention and cognitive control." *Journal of Experimental Psychology. General* 133 (3): 339–54. doi:10.1037/0096-3445.133.3.339.

Lederman, Susan J., and Roberta L. Klatzky. 1987. "Hand movements: A window into haptic object recognition." *Cognitive Psychology* 19 (3): 342–68. doi:10.1016/0010-0285(87)90008-9.

Lee, Songil, Gyouhyung Kyung, Jungyong Lee, Seung K. Moon, and Kyoung J. Park. 2016. "Grasp and index finger reach zone during one-handed smartphone rear interaction: Effects of task type, phone width and hand length." *Ergonomics* 59 (11): 1462–72. doi:10.1080/00140139.2016.1146346.

Li, Guangzheng, Mei Li, Jin Wang, Zhanyu Yu, Hangjie Ma, and Bing Li. 2022. “The effects of cognitive load and encoding modality on prospective memory.” *Cognitive Processing* 23 (3): 441–48. doi:10.1007/s10339-022-01085-2.

Lin, Kuan-Yu, and Hsi-Peng Lu. 2011. “Why people use social networking sites: An empirical study integrating network externalities and motivation theory.” *Computers in Human Behavior* 27 (3): 1152–61. doi:10.1016/j.chb.2010.12.009.

Liu, Hefu, Haili Chu, Qian Huang, and Xiayu Chen. 2016. “Enhancing the flow experience of consumers in China through interpersonal interaction in social commerce.” *Computers in Human Behavior* 58: 306–14. doi:10.1016/j.chb.2016.01.012.

Liu-Thompkins, Yuping. 2019. “A decade of online advertising research: What we learned and what we need to know.” *Journal of Advertising* 48 (1): 1–13. doi:10.1080/00913367.2018.1556138.

Lohse, Gerald L. 1997. “Consumer eye movement patterns on yellow pages advertising.” *Journal of Advertising* 26 (1): 61–73. doi:10.1080/00913367.1997.10673518.

Lohtia, Ritu, Naveen Donthu, and Edmund K. Hershberger. 2003. “The impact of content and design elements on banner advertising click-through rates.” *Journal of Advertising Research* 43 (4): 410–18.

Luangrath, Andrea W., Joann Peck, William Hedgcock, and Yixiang Xu. 2022. “Observing product touch: The vicarious haptic effect in digital marketing and virtual reality.” *Journal of Marketing Research* 59 (2): 306–26. doi:10.1177/00222437211059540.

Macedonia, Manuela, and Thomas R. Knösche. 2011. “Body in mind: How gestures empower foreign language learning.” *Mind Brain and Education* 5 (4): 196–211. doi:10.1111/j.1751-228X.2011.01129.x.

Macedonia, Manuela, Claudia Repetto, Anja Ischebeck, and Karsten Mueller. 2019. “Depth of encoding through observed gestures in foreign language word learning.” *Frontiers in Psychology* 10: 33. doi:10.3389/fpsyg.2019.00033.

MacInnis, Deborah J., and Bernard J. Jaworski. 1989. “Information processing from advertisements: Toward an integrative framework.” *Journal of Marketing* 53 (4): 1–23.

MacLeod, Colin M., and Glen E. Bodner. 2017. “The production effect in memory.” *Current Directions in Psychological Science* 26 (4): 390–95. doi:10.1177/0963721417691356.

Menon, Satya, and Dilip Soman. 2002. “Managing the power of curiosity for effective web advertising strategies.” *Journal of Advertising* 31 (3): 1–14. doi:10.1080/00913367.2002.10673672.

Meta. 2024a. “About reach metrics in Meta Business Suite.” Accessed September 28, 2024. <https://www.facebook.com/business/help/1109973216315602>.

Meta. 2024b. “Buying ads. Buy Facebook ads on any budget.” Accessed November 05, 2024. <https://www.facebook.com/business/ads/pricing/>.

Meyvis, Tom, and Stijn van Osselaer. 2017. “Increasing the power of your study by increasing the effect size.” *Journal of Consumer Research* 44 (5): 1157–73. doi:10.3886/E101134V1.

Miyaki, Takashi, and Jun Rekimoto. 2009. “GraspZoom: Zooming and scrolling control model for single-handed mobile interaction.” *Proceedings of the 11th International Conference on Human-Computer Interaction with Mobile Devices and Services*, 1–4.

Muntinga, Daniël G., Marjolein Moorman, and Edith G. Smit. 2011. “Introducing COBRAs: Exploring motivations for brand-related social media use.” *International Journal of Advertising* 30 (1): 13–46. doi:10.2501/IJA-30-1-013-046.

Naeem, Muhammad, Wilson Ozuem, Kerry Howell, and Silvia Ranfagni. 2023. "A step-by-step process of thematic analysis to develop a conceptual model in qualitative research." *International Journal of Qualitative Methods* 22. doi:10.1177/16094069231205789.

Napier, John R. 1956. "The prehensile movement of the human hand." *Journal of Bone and Joint Surgery* 38 (4): 902–13.

Nelson-Field, Karen, Erica Riebe, and Byron Sharp. 2013. "More mutter about clutter: Extending empirical generalizations to Facebook." *Journal of Advertising Research* 53 (2): 186–91. doi:10.2501/JAR-53-2-186-191.

Newstead, Kate, and Jenni Romaniuk. 2010. "Cost per second: The relative effectiveness of 15- and 30-second television advertisements." *Journal of Advertising Research* 50 (1): 68–76.

Norman, Donald A. 1988. *The Psychology of Everyday Things*: Basic Book.

Oltra, Itziar, Carmen Camarero, and Rebeca San José Cabezudo. 2022. "Inspire me, please! The effect of calls to action and visual executions on customer inspiration in Instagram communications." *International Journal of Advertising* 41 (7): 1209–34. doi:10.1080/02650487.2021.2014702.

Perry, Keith B., and Juan P. Hourcade. 2008. "Evaluating one handed thumb tapping on mobile touchscreen devices." *Proceedings of Graphics Interface*, 57–64.

Phillips, Barbara J., and Edward F. McQuarrie. 2010. "Narrative and persuasion in fashion advertising." *Journal of Consumer Research* 37 (3): 368–92. doi:10.1086/653087.

Pieters, Rik, Luk Warlop, and Michel Wedel. 2002. "Breaking through the clutter: Benefits of advertisement originality and familiarity for brand attention and memory." *Management Science* 48 (6): 765–81. doi:10.1287/mnsc.48.6.765.192.

Pieters, Rik, and Michel Wedel. 2004. "Attention capture and transfer in advertising: Brand, pictorial, and text-size effects." *Journal of Marketing* 68 (2): 36–50. doi:10.1509/jmkg.68.2.36.27794.

Pieters, Rik, Michel Wedel, and Rajeev Batra. 2010. "The stopping power of advertising: Measures and effects of visual complexity." *Journal of Marketing* 74 (5): 48–60.

Posner, Michael I. 1980. "Orienting of attention." *The Quarterly Journal of Experimental Psychology* 32 (1): 3–25. doi:10.1080/00335558008248231.

Quené, Hugo, and Huub van den Bergh. 2008. "Examples of mixed-effects modeling with crossed random effects and with binomial data." *Journal of Memory and Language* 59 (4): 413–25. doi:10.1016/j.jml.2008.02.002.

Rahman, Renée, Tobias Langner, and Dirk Temme. 2021. "Brand love: Conceptual and empirical investigation of a holistic causal model." *Journal of Brand Management* 28 (6): 609–42. doi:10.1057/s41262-021-00237-7.

Rayner, Keith, Caren M. Rotello, Andrew J. Stewart, Jessica Keir, and Susan A. Duffy. 2001. "Integrating text and pictorial information: Eye movements when looking at print advertisements." *Journal of Experimental Psychology: Applied* 7 (3): 219.

Read, Glenna L., Steven Holiday, Jameson L. Hayes, and Brian C. Britt. 2024. "Biometric tools in a computational advertising context: An overview of use and application." *Journal of Advertising*, 1–17. doi:10.1080/00913367.2024.2399657.

Rietveld, Robert, Willemijn van Dolen, Masoud Mazloom, and Marcel Worring. 2020. "What you feel, is what you like. Influence of message appeals on customer engagement on Instagram." *Journal of Interactive Marketing* 49 (1): 20–53. doi:10.1016/j.intmar.2019.06.003.

Rixen, Jan O., Luca-Maxim Meinhardt, Michael Glöckler, Marius-Lukas Ziegenbein, Anna Schlothauer, Mark Colley, Enrico Rukzio, and Jan Gugenheimer. 2023. "The loop and reasons to break it: Investigating infinite scrolling behaviour in social media applications and reasons to stop." *Proceedings of the ACM on Human-Computer Interaction* 7 (MHCI): 1–22. doi:10.1145/3604275.

Rizzolatti, Giacomo, Lucia Riggio, Isabella Dascola, and Carlo Umiltá. 1987. "Reorienting attention across the horizontal and vertical meridians: Evidence in favor of a premotor theory of attention." *Neuropsychologia* 25 (1): 31–40. doi:10.1016/0028-3932(87)90041-8.

Rohrbach, Stefan, Daniel Bruns, and Tobias Langner. 2024. "The vampire effect of smartphone swiping: how atypical motor actions increase ad attention but impair brand recall." *International Journal of Advertising*, 1–19. doi:10.1080/02650487.2024.2354081.

Rosbergen, Edward, Rik Pieters, and Michel Wedel. 1997. "Visual attention to advertising: A segment-level analysis." *Journal of Consumer Research* 24 (3): 305–14.

Roskos-Ewoldsen, David R., and Russell H. Fazio. 1992. "On the orienting value of attitudes: attitude accessibility as a determinant of an object's attraction of visual attention." *Journal of Personality and Social Psychology* 63 (2): 198–211. doi:10.1037//0022-3514.63.2.198.

Rossiter, John R., and Larry Percy. 2017. "Methodological guidelines for advertising research." *Journal of Advertising* 46 (1): 71–82. doi:10.1080/00913367.2016.1182088.

Rossiter, John R., Larry Percy, and Lars Bergkvist. 2018. *Marketing Communications: Objectives, Strategy, Tactics*. London: SAGE Publications, Inc.

Rossiter, John R., Larry Percy, and Robert J. Donavon. 1991. "A better advertising planning grid." *Journal of Advertising Research* 31 (5): 11–21.

Scholl, Brian J., and Patrice D. Tremoulet. 2000. "Perceptual causality and animacy." *Trends in Cognitive Sciences* 4 (8): 299–309.

Shin, Donghee, Myunggoon Choi, Jang Hyun Kim, and Jae-gil Lee. 2016. “Interaction, engagement, and perceived interactivity in single-handed interaction.” *Internet Research* 26 (5): 1134–57. doi:10.1108/IntR-12-2014-0312.

Simmonds, Lucy, Steven Bellman, Rachel Kennedy, Magda Nenycz-Thiel, and Svetlana Bogomolova. 2020. “Moderating effects of prior brand usage on visual attention to video advertising and recall: An eye-tracking investigation.” *Journal of Business Research* 111: 241–48. doi:10.1016/j.jbusres.2019.02.062.

Singh, Surendra N., and Catherine A. Cole. 1993. “The effects of length, content, and repetition on television commercial effectiveness.” *Journal of Marketing Research* 30 (1): 91–104.

Smit, Edith G., Sophie C. Boerman, and Lex van Meurs. 2015. “The power of direct context as revealed by eye tracking.” *Journal of Advertising Research* 55 (2): 216–27. doi:10.2501/JAR-55-2-216-227.

Speck, Paul S., and Michael T. Elliott. 1997. “Predictors of advertising avoidance in print and broadcast media.” *Journal of Advertising* 26 (3): 61–76. doi:10.1080/00913367.1997.10673529.

Tellis, Gerard J., Deborah J. MacInnis, Seshadri Tirunillai, and Yanwei Zhang. 2019. “What drives virality (sharing) of online digital content? The critical role of information, emotion, and brand prominence.” *Journal of Marketing* 83 (4): 1–20. doi:10.1177/0022242919841034.

Trabulsi, Julia, Kian Norouzi, Seidi Suurmets, Mike Storm, and Thomas Z. Ramsøy. 2021. “Optimizing fixation filters for eye-tracking on small screens.” *Frontiers in Neuroscience* 15: 1257. doi:10.3389/fnins.2021.578439.

Treisman, Anne M., and Garry Gelade. 1980. "A feature-integration theory of attention." *Cognitive Psychology* 12 (1): 97–136.

Tsai, Tsai-Hsuan, Kevin C. Tseng, and Yung-Sheng Chang. 2017. "Testing the usability of smartphone surface gestures on different sizes of smartphones by different age groups of users." *Computers in Human Behavior* 75: 103–16.

Van Laer, Tom, Ko de Ruyter, Luca M. Visconti, and Martin Wetzels. 2014. "The extended transportation-imagery model: A meta-analysis of the antecedents and consequences of consumers' narrative transportation." *Journal of Consumer Research* 40 (5): 797–817. doi:10.1086/673383.

Van Raaij, W. F. 1989. "How consumers react to advertising." *International Journal of Advertising* 8 (3): 261–73. doi:10.1080/02650487.1989.11107110.

Voorveld, Hilde A. 2019. "Brand communication in social media: A research agenda." *Journal of Advertising* 48 (1): 14–26. doi:10.1080/00913367.2019.1588808.

Wahid, Risqo M., and Muji Gunarto. 2022. "Factors driving social media engagement on Instagram: evidence from an emerging market." *Journal of Global Marketing* 35 (2): 169–91. doi:10.1080/08911762.2021.1956665.

Waltenrath, Adrian, Christoph Brenner, and Oliver Hinz. 2022. "Some interactions are more equal than others: The effect of influencer endorsements in social media brand posts on engagement and online store performance." *Journal of Interactive Marketing* 57 (4): 541–60.

Wang, Liangyan, Ali Gohary, and Eugene Y. Chan. 2024. "Are concave ads more persuasive? The role of immersion." *Journal of Advertising* 53 (2): 230–41. doi:10.1080/00913367.2023.2216262.

Wang, Zhengjie, Yushan Hou, Kangkang Jiang, Wenwen Dou, Chengming Zhang, Zehua Huang, and Yinjing Guo. 2019. "Hand gesture recognition based on active ultrasonic sensing of smartphone: A survey." *IEEE Access* 7: 111897–922. doi:10.1109/ACCESS.2019.2933987.

WARC. 2022. "Over 80% of ads fail to reach 'attention threshold'." Accessed October 19, 2024. <https://www.warc.com/content/feed/over-80-of-ads-fail-to-reach-attention-threshold/en-GB/6899>.

WARC. 2024. "Global Ad Spend Outlook 2024/25." Accessed November 17, 2024. <https://page.warc.com/global-ad-spend-outlook-2024-25>.

Wei, Lewen, Guolan Yang, Heather Shoenberger, and Fuyuan Shen. 2021. "Interacting with social media ads: effects of carousel advertising and message type on health outcomes." *Journal of Interactive Advertising* 21 (3): 269–82. doi:10.1080/15252019.2021.1977736.

Weinberger, Marc G., and Charles S. Gulas. 1992. "The impact of humor in advertising: A review." *Journal of Advertising* 21 (4): 35–59. doi:10.1080/00913367.1992.10673384.

Wilson, Rick T., Daniel W. Baack, and Brian D. Till. 2015. "Creativity, attention and the memory for brands: An outdoor advertising field study." *International Journal of Advertising* 34 (2): 232–61. doi:10.1080/02650487.2014.996117.

Wilson, Rick T., and Brian D. Till. 2012. "Managing non-traditional advertising: A message processing framework." In *Advertising theory*, edited by Shelly Rodgers and Esther Thorson, 337–54. Routledge communication series. New York: Routledge.

Wojdynski, Bartosz W., and Nathaniel J. Evans. 2016. "Going native: Effects of disclosure position and language on the recognition and evaluation of online native advertising." *Journal of Advertising* 45 (2): 157–68. doi:10.1080/00913367.2015.1115380.

Wolf, Lukas. 2023. "Device-mediated customer behaviour on the internet: A systematic literature review." *International Journal of Consumer Studies* 47 (6): 2270–2304. doi:10.1111/ijcs.12925.

Yadav, Manjit S., and Paul A. Pavlou. 2014. "Marketing in computer-mediated environments: Research synthesis and new directions." *Journal of Marketing* 78 (1): 20–40.

Yantis, Steven, and Howard E. Egeth. 1999. "On the distinction between visual salience and stimulus-driven attentional capture." *Journal of Experimental Psychology. Human Perception and Performance* 25 (3): 661–76. doi:10.1037//0096-1523.25.3.661.

Yoon, Gunwoo, Cong Li, Jiangmeng Liu, Michael North, Yi Ji, and Cheng Hong. 2024. "Facebook likes and corporate revenue: testing the consistency between attitude and behavior." *International Journal of Advertising*, 1–24. doi:10.1080/02650487.2024.2322855.

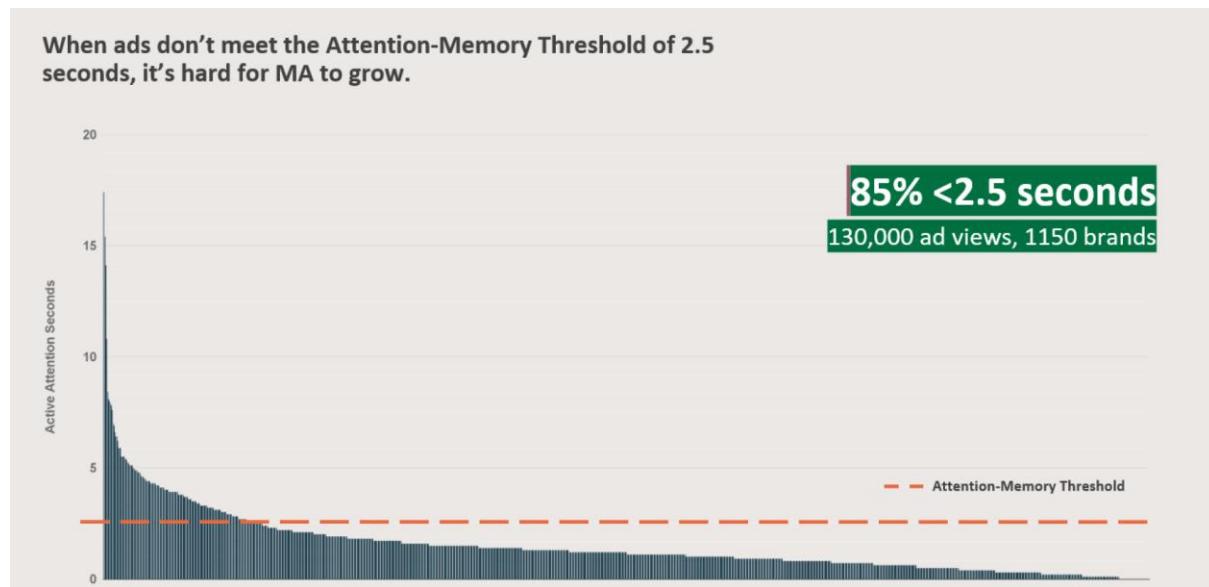
Yoon, Hye J., Yan Huang, and Taeyeon Kim. 2023. "The role of relevancy in native advertising on social media." *International Journal of Advertising* 42 (6): 972–99. doi:10.1080/02650487.2022.2135345.

Youn, Seounmi, and Seunghyun Kim. 2019. "Newsfeed native advertising on Facebook: Young millennials' knowledge, pet peeves, reactance and ad avoidance." *International Journal of Advertising* 38 (5): 651–83. doi:10.1080/02650487.2019.1575109.

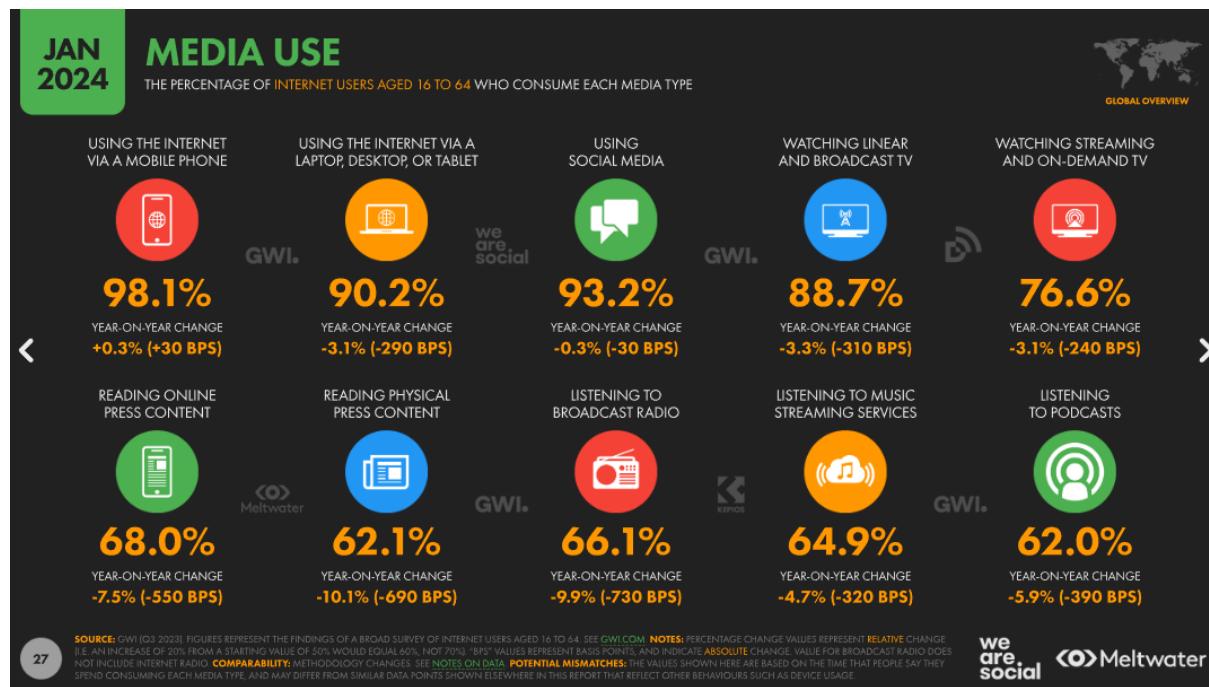
Appendix

Facebook	2-10	Images, Videos	Product showcasing, e-commerce, storytelling
Instagram	2-10	Images, Videos	Product discovery, brand storytelling, influencer content
LinkedIn	2-10	Images	B2B lead generation, product features, events promotion
X	2-6	Images, Videos	Promoting multiple services, apps, or events
Pinterest	2-5	Images, Videos	Product discovery, step-by-step tutorials, collections
TikTok	2-5	Videos	Short-form storytelling, brand campaigns, product demos
Snapchat	2-20	Images, Videos	Quick product demos, influencer content, brand storytelling
YouTube	2-5	Images, Videos	Product showcase, event promotion, film trailers
Amazon	2-10	Product images	E-commerce, product display, cross-selling

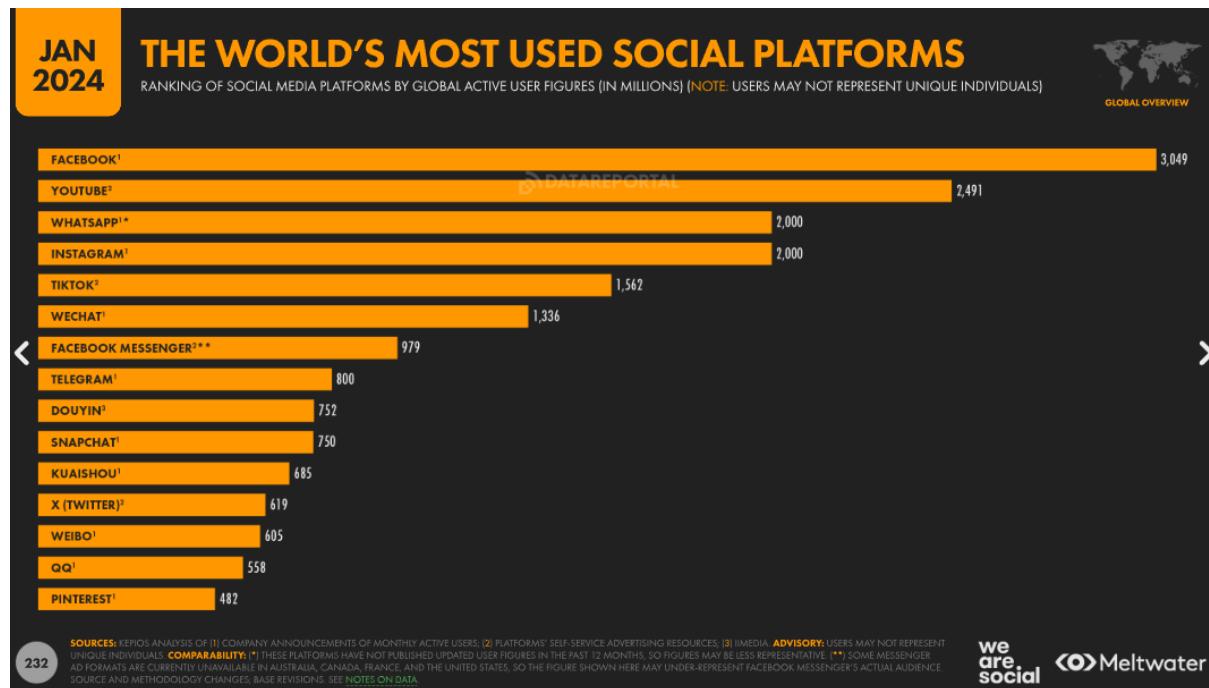
Appendix 1: Carousel ad formats across different social media platforms



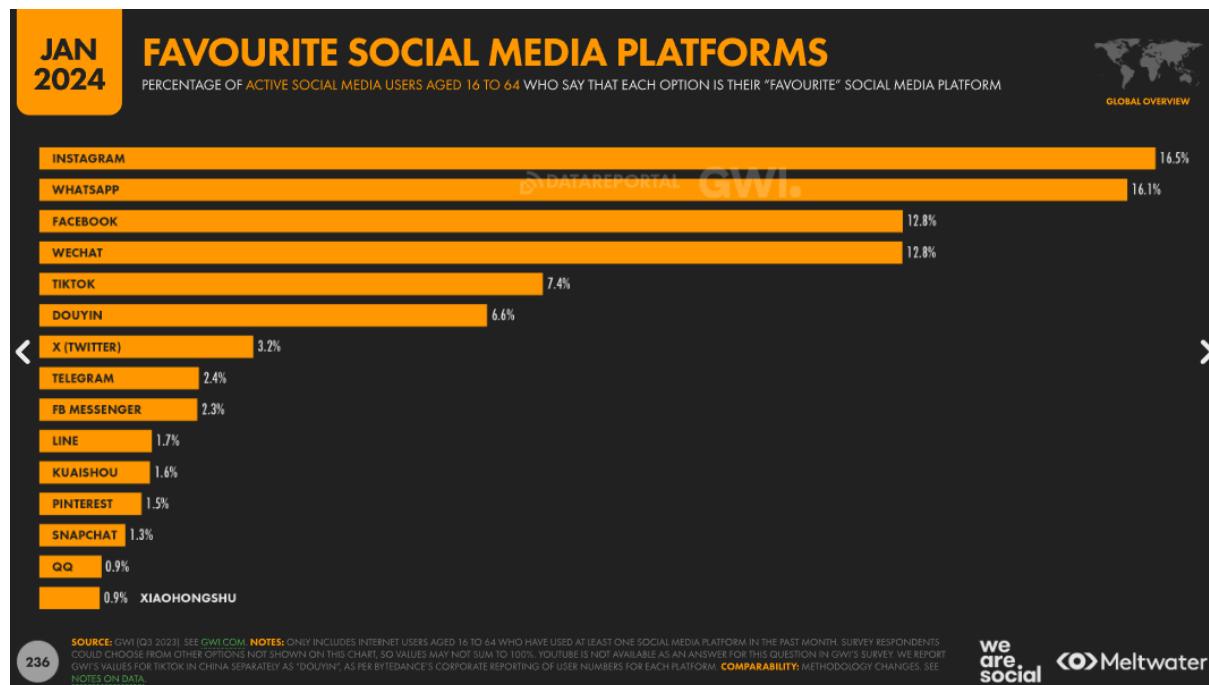
Appendix 2: The 2.5-seconds attention memory threshold (WARC 2022)



Appendix 3: Media consumption of users aged 16 to 64 years (DataReportal 2024)



Appendix 4: The world's most used social media platforms (DataReportal 2024)



Appendix 5: Favorite social media platforms (DataReportal 2024)

WARC	USD millions, Nominal			Year-on-year % change			Share of total		
	2022	2023(f)	2024(f)	2022	2023(f)	2024(f)	2022	2023(f)	2024(f)
Social Media	180,630.0	201,389.7	227,220.2	2.0%	11.5%	12.8%	19.6%	20.9%	21.8%
Search	197,966.1	210,006.9	229,233.6	8.3%	6.1%	9.2%	21.5%	21.8%	22.0%
Retail Media	116,370.3	128,271.3	141,705.7	12.0%	10.2%	10.5%	12.6%	13.3%	13.6%
Online Display	76,385.0	78,048.3	85,086.7	2.9%	2.2%	9.0%	8.3%	8.1%	8.2%
Online Classified	21,862.7	21,980.8	22,800.2	-6.0%	0.5%	3.7%	2.4%	2.3%	2.2%
Pure Play Internet	593,214.1	639,697.1	706,046.4	5.7%	7.8%	10.4%	64.3%	66.4%	67.7%
Linear TV	166,378.0	157,415.2	162,995.4	-5.4%	-5.4%	3.5%	18.0%	16.3%	15.6%
CTV	26,463.8	29,477.0	33,041.3	39.2%	11.4%	12.1%	2.9%	3.1%	3.2%
Premium Video	192,841.8	186,892.1	196,036.6	-1.0%	-3.1%	4.9%	20.9%	19.4%	18.8%
Newsbrands	36,490.2	34,581.3	34,013.3	-6.6%	-5.2%	-1.6%	4.0%	3.6%	3.3%
Magazines	15,694.2	14,926.5	14,559.5	-10.8%	-4.9%	-2.5%	1.7%	1.5%	1.4%
Publishing	52,184.4	49,507.8	48,572.8	-7.9%	-5.1%	-1.9%	5.7%	5.1%	4.7%
Radio	29,461.8	28,740.9	29,366.8	7.7%	-2.4%	2.2%	3.2%	3.0%	2.8%
Online Audio	6,245.4	6,670.2	7,227.3	18.5%	6.8%	8.4%	0.7%	0.7%	0.7%
Audio	35,707.3	35,411.1	36,594.1	9.5%	-0.8%	3.3%	3.9%	3.7%	3.5%
Cinema	2,460.3	2,739.2	2,881.6	-2.7%	11.3%	5.2%	0.3%	0.3%	0.3%
Out of Home	46,097.5	49,223.2	52,800.3	1.7%	6.8%	7.3%	5.0%	5.1%	5.1%
Total	922,505.4	963,470.6	1,042,931.8	3.3%	4.4%	8.2%	100.0%	100.0%	100.0%

WARC Media, *Ad Spend Outlook 2023/24: Withstanding Turbulence, August 2023*

Appendix 6: Ad spend outlook 2023/24 (WARC 2024)

Authors	Journal	Method	Focus	Findings
Kim et al. (2006)	Proceedings of the Nat. Conference on Artificial Intell.	Laboratory experiment based on smartphone sensors	Grip	Natural grip patterns for mobile devices are identified using smartphone sensors. Eight typical grip patterns were found (e.g. texting single-handed and two-handed, video watching, calling, and gaming on a mobile device).
Kim and Jo (2015)	Journal of Human-Computer Interaction	Laboratory experiment manipulating thumb vs. index-based inputs	Input finger performance	Mobile phone users often prefer thumb-based input methods in their daily context of use. While both input methods were comparable in speed, thumb-based inputs showed reduced accuracy.
Bevan and Fraser (2016)	International Journal of Human-Computer Studies	Laboratory experiment based on smartphone sensors	Gestures	People with longer thumbs complete swiping gestures with shorter completion and higher speed than people with shorter thumbs.
Lee et al. (2016)	Ergonomics	Laboratory experiment based on smartphone sensors	Grasp	Smartphone interaction on rear surface is investigated based on task, phone width and hand length. Interaction can be grouped into operating condition (e.g., sitting, standing), hand used (e.g., one-hand, both hands) and screen orientation (portrait, landscape).
Tsai, Tseng and Chang (2017)	Computers in Human Behavior	Laboratory experiment based on smartphone sensors	Gestures	Children and adults outperformed elderly in gesture operations and larger smartphone screens size showed faster response times.
Ciman and Wac (2018)	IEEE Transactions on Affective Computing	Laboratory experiment	Gestures	Approach for stress assessment by leveraging data extracted from smartphone sensors. Participants under stress seem to swipe faster with shorter gestures and higher pressure.
Wang et al. (2019)	IEEE Access	Laboratory experiment based on smartphone sensors	Grip, Gestures	Hand movements are identified by using the smartphone as an active sonar sensing system. Twelve types of hand gestures and six types of grip gestures (1 hand, 2 hands, portrait vs. landscape) have been identified.

Appendix 7: Related studies on hand movements in human-smartphone interaction

I Article 1

No.	Gender	Age	Occupation	Handedness	Social Media Platforms
1	Female	20	Student	Right-Hander	Snapchat, Instagram, Facebook, LinkedIn
2	Female	19	Student	Left-Hander	Instagram, Snapchat, WhatsApp
3	Male	36	Employed	Left-Hander	Instagram, YouTube, Facebook
4	Female	38	Employed	Left-Hander	Pinterest, WhatsApp
5	Female	43	Employed	Right-Hander	Facebook, Instagram, LinkedIn
6	Male	26	Student	Right-Hander	Facebook, Instagram, LinkedIn
7	Male	68	Retired	Right-Hander	Pinterest, WhatsApp
8	Male	38	Employed	Right-Hander	Instagram, Facebook, YouTube
9	Male	41	Employed	Right-Hander	WhatsApp, YouTube, Xing
10	Female	23	Student	Left-Hander	Instagram, Facebook, YouTube, Twitter
11	Female	39	Employed	Right-Hander	Twitter, FB, Pinterest, YouTube, Instagram
12	Male	26	Student	Right-Hander	Instagram, Facebook, YouTube, LinkedIn
13	Male	24	Student	Right-Hander	YouTube, Instagram, Twitter
14	Male	38	Self Employed	Right-Hander	Instagram, LinkedIn, YouTube, Facebook
15	Female	38	Employed	Right-Hander	Facebook, YouTube
16	Female	19	Student	Right-Hander	Instagram, TikTok, YouTube
17	Male	21	Student	Right-Hander	LinkedIn, Instagram, YouTube
18	Male	26	Student	Right-Hander	Instagram, Twitter, YouTube, Reddit
19	Male	43	Self Employed	Right-Hander	Facebook, Xing
20	Male	58	Employed	Right-Hander	LinkedIn, Instagram, YouTube
21	Male	35	Employed	Right-Hander	LinkedIn, YouTube
22	Female	29	Self Employed	Right-Hander	Facebook, Instagram, LinkedIn, Xing
23	Male	21	Student	Right-Hander	Instagram, YouTube
24	Male	41	Employed	Right-Hander	YouTube, WhatsApp, LinkedIn
25	Male	22	Student	Right-Hander	Instagram, YouTube
26	Female	69	Retired	No Preference	Pinterest, WhatsApp
27	Male	40	Employed	Right-Hander	Facebook, YouTube, LinkedIn
28	Female	38	Employed	Right-Hander	Facebook, Xing
29	Female	61	Employed	Right-Hander	YouTube, Instagram, Facebook
30	Female	22	Student	Right-Hander	Instagram, Facebook, LinkedIn, TikTok

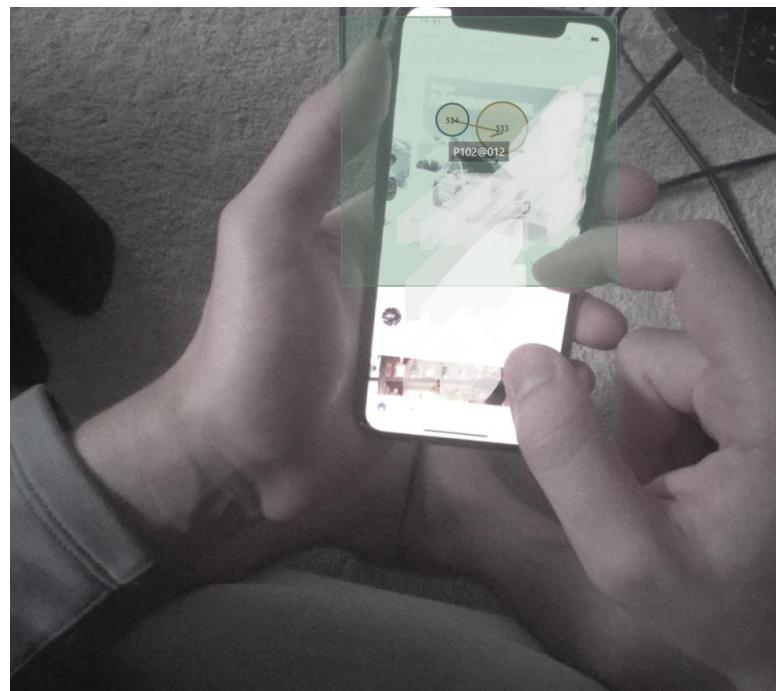
Appendix 8: Participants in the pre-study of Article 1

No.	Gender	Age	Occupation	Handedness	Smartphone	Phone ownership (months)	Social media usage (hours per day)
1	Female	25	Student	Right-Hander	iPhone XS	40	1.0
2	Male	25	Employee	Right-Hander	iPhone X	48	1.0
3	Female	26	Employee	Right-Hander	iPhone 13 pro	11	1.5
4	Female	25	Employee	Right-Hander	iPhone 13 pro max	6	2.0
5	Female	57	Employee	Right-Hander	Samsung Galaxy 8	72	1.5
6	Female	22	Student	Right-Hander	iPhone XS	30	2.0
7	Female	28	Student	Right-Hander	iPhone 11	18	1.0
8	Female	45	Employee	Right-Hander	iPhone 12	6	2.0
9	Male	28	Employee	Right-Hander	iPhone 11	27	1.5
10	Female	25	Employee	Right-Hander	Huawei P30 Pro	24	2.0
11	Female	27	Employee	Right-Hander	iPhone 11 pro max	30	1.0
12	Male	39	Employee	Right-Hander	iPhone 12 pro	24	1.0
13	Male	26	Employee	Right-Hander	iPhone 11 Pro	40	1.0
14	Female	21	Student	Right-Hander	iPhone 11	24	1.0
15	Female	24	Employee	Right-Hander	iPhone 8	56	0.4
16	Female	25	Employee	Left-Hander	Huawei P30 Light	24	1.5
17	Male	28	Employee	Right-Hander	Samsung Galaxy Flip	15	2.5
18	Female	29	Employee	Right-Hander	Huawei P20 Pro	48	0.5
19	Female	24	Employee	Right-Hander	Samsung Galaxy A5	24	0.8
20	Female	25	Employee	Right-Hander	iPhone 12 Pro	24	1.0
21	Male	27	Employee	Right-Hander	iOne Plus 6t	60	0.3
22	Female	58	Employee	Right-Hander	iPhone 13	13	0.5
23	Male	57	Employee	Right-Hander	iPhone 12	24	0.2
24	Male	26	Employee	Right-Hander	Samsung 22 Ultra	10	2.5
25	Male	32	Employee	Right-Hander	Huawei P30 pro	30	1.5
26	Male	24	Employee	Right-Hander	iPhone 14 pro	2	0.8
27	Male	27	Employee	Right-Hander	One plus 9 pro	3	2.0
28	Female	30	Student	Right-Hander	Samsung Galaxy a50	12	1.0
29	Female	30	Employee	Right-Hander	Xiaomi Note 9	14	1.0
30	Female	31	Employee	Right-Hander	Samsung Galaxy S8+	36	1.1
31	Male	33	Employee	Right-Hander	Xiaomi 11+ pro	6	6.0
32	Female	28	Employee	Right-Hander	Huawei P30 lite	48	0.9
33	Male	33	Employee	Right-Hander	Huawei P30 pro	23	1.1
34	Female	25	Student	Left-Hander	Xiaomi redmi 10	12	3.0
35	Female	30	Student	Right-Hander	iPhone X	48	2.5
36	Male	32	Employee	Left-Hander	iPhone X	3	0.1

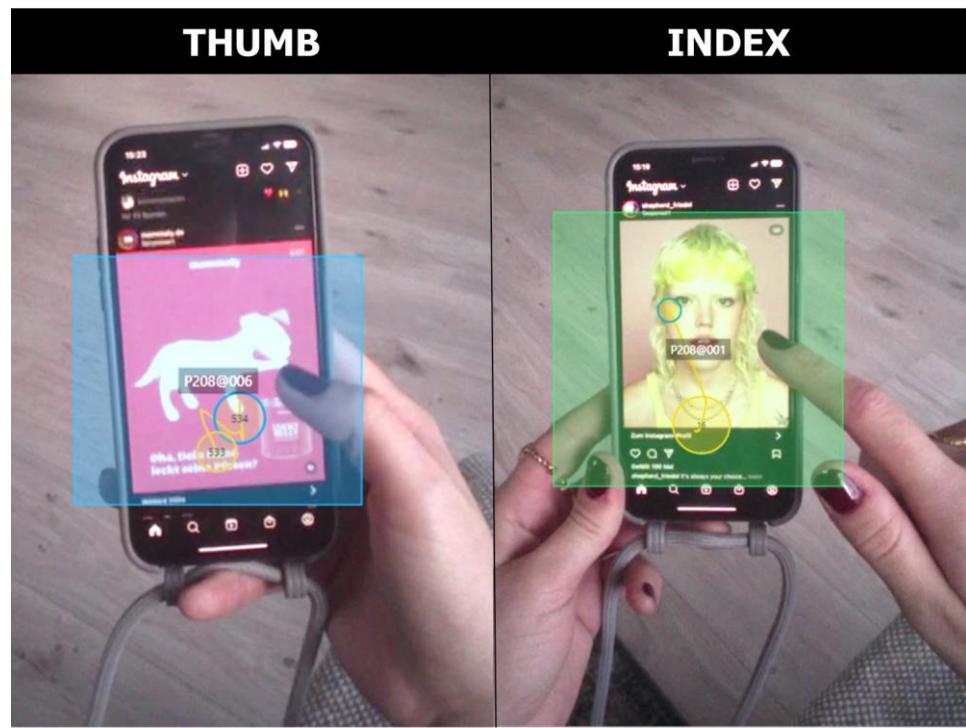
Appendix 9: Participants in the main experiment of Article 1



Appendix 10: Tobii Pro Glasses 2



Appendix 11: Ego-perspective eye-tracking with Tobii Pro Glasses 2



Appendix 12: Ego-perspective view of thumb and index swiping

<i>Participant (gender, age)</i>	<i>Statement</i>	<i>Category</i>
P 15, female, 38	Yes, I do everything [on the phone] with one hand only.	One-hand grip
P 09, male, 41	When I'm tired, I sometimes also use my left hand for support, but I still hold my phone in the right hand and swipe with my right thumb.	two-hand grip
P 29, female, 61	So, truth be told, it looks like my children told me I had to learn to text with both thumbs. Because I like my keyboard very fast, so they're like, no, you'll have to use two thumbs.	Using both thumbs for texting
P 19 male, 43	I do everything like this [using the right hand]. My right hand is my writing and working hand.	Handedness
P 19, male, 43	I do have an extra case for my phone. My wallet-case might be special. I swing it open and use it like this [holding in the left hand and using the index finger for inputs]. I also call with the phone like this, and it holds all my credit cards. I just need to grab my phone [and case] and can go shopping and everything. I find this very convenient.	Grip & accessories
P 27, male, 40	I always hold my smartphone in my right hand just like this. I hold it relatively straight up and I am a thumb-swiper.	Thumb swiping
P 20, male, 58	This is a very typical grip. My left hand is holding the phone. That's very typical for me and I use the index finger of my right hand to do something on the phone.	Index swiping
P 22, female, 29	Yes, always like this. My hand movements [for smartphone swiping] are always the same.	Typical swiping
P 28, female, 38	This is a very typical Grip for me.	Typical swiping
P 21, male, 35	I always hold it like this. Yes, this is very typical for me.	Typical swiping
P 03, male, 36	This is a new phone. Holding it and swiping still feels a bit unfamiliar.	Atypical swiping

All interviews were conducted in German and excerpts translated into English.

Appendix 13: Statements from the Article 1 pre-study on smartphone swiping

Nr. _____ Datum: _____ Uhrzeit: _____ Interviewer: _____

Interview-ID*: _____

* zur späteren Verlinkung mit dem Online-Fragebogen. Die Interview-ID sollte aus den Initialen des Interviewers und einer fortlaufenden dreistelligen Zahl bestehen. z.B. „SR043“

Leitfaden

Liebe/r Frau/Herr xxx,

schön, dass Sie sich heute Zeit für dieses Interview nehmen.

In diesem Interview geht es darum, wie Sie mit Ihrem Smartphone verschiedene Social Media Plattformen nutzen. Damit keine wichtigen Informationen verloren gehen, möchte ich dieses Interview gerne **per Video aufzeichnen**.

Alle Daten werden **anonym und vertraulich** behandelt und dienen ausschließlich der wissenschaftlichen Forschung. Diese erfolgt durch die Bergische Universität Wuppertal gemäß DSGVO Verfahrensverzeichnis, das Sie mit der Einladungs-Email zu diesem Interview erhalten haben.

Wenn Sie mit der Video-Aufzeichnung des Interviews und einer wissenschaftlichen Auswertung gemäß Verfahrensverzeichnis einverstanden sind, bestätigen Sie mir dies bitte mit einem „Ja“.

Verfahrensverzeichnis zur Erhebung personenbezogener Daten gemäß DSGVO

Sehr geehrte Interviewteilnehmerin,
sehr geehrter Interviewteilnehmer,

vielen Dank, dass Sie an der Studie zum Thema „Nutzung von Social Media“ teilnehmen. Mit Ihrer Teilnahme am Interview willigen Sie ein, dass Ihre Daten und Antworten zu rein wissenschaftlichen Zwecken ausgewertet werden können. Alle Ihre Antworten werden selbstverständlich vertraulich behandelt und anonymisiert gespeichert:

1. Name und Kontakt des Verantwortlichen:

Das Interview wird im Zusammenhang mit einer Forschungsarbeit am Lehrstuhl für Marketing an der Schumpeter School of Business and Economics der Bergischen Universität Wuppertal durchgeführt. Verantwortlicher Ansprechpartner seitens des Lehrstuhls ist Stefan Rohrbach.

2. Zweck der Verarbeitung:

Ihre Antworten und Daten werden zu rein wissenschaftlichen Zwecken ausgewertet. Erkenntnisinteresse ist es das Nutzungsverhalten von Konsumenten auf verschiedenen Social Media Plattformen zu ergründen.

3. Wem werden diese Daten zur Verfügung gestellt?

Es erfolgt keine Weitergabe Ihrer Daten an Dritte Personen. Im Rahmen der wissenschaftlichen Forschung und des wissenschaftlichen Publizierens wird berechtigten wissenschaftlichem Personal und Studierenden der Zugang zu den anonymisierten Daten unter Auflagen ermöglicht.

4. Allg. Beschreibung der technischen Sicherheit der Daten:

Ihre Daten werden nach der Aufzeichnung anonymisiert auf einem gesicherten Server zu Dokumentationszwecken gespeichert.

Rückfragen zur Studie oder Ihren personenbezogenen Daten erhalten Sie jederzeit über den Studien-Verantwortlichen: Stefan Rohrbach (Rohrbach@wiwi.uni-wuppertal.de)

1) Aufzeichnung der Nutzung

Ich möchte Sie nun bitten mit Ihrem **eigenen Smartphone durch die von Ihnen häufig genutzten Social Media Plattformen zu surfen** – so wie Sie das üblicherweise auch machen. Mit Social Media Plattformen sind alle Webseiten oder Apps gemeint, die Sie nutzen, um sich mit anderen auszutauschen und wo Sie Beiträge „liken“, kommentieren oder teilen können. Dies sind z.B. Facebook, Instagram, LinkedIn, Twitter, Snapchat – aber auch YouTube oder Pinterest.

Wenn Sie dann durch Ihre Social Media Plattformen surfen, tun Sie das bitte genauso wie sonst auch. **Halten Sie hierzu bitte Ihr Smartphone so in die Kamera**, dass ich Ihren Smartphone-Bildschirm sehen kann – und auch sehen kann, wie Sie wischen, scrollen und swipen. Wenn Sie ein Tablet (z.B. iPad) nutzen, drehen Sie dieses ggf. um 180°, damit ich Ihre Smartphone-Nutzung besser sehen kann.

Wie vorher besprochen, **sollten Sie Ihre Social Media Plattformen in der letzten Stunde vor diesem Interview nicht besucht haben**, damit Sie sich neue Post (Beiträge) anschauen können.

Wenn Sie gleich eine Social Media Plattform öffnen, **scrollen Sie bitte zuerst „von oben nach unten“** – so dass sich ein kleines Rädchen dreht und **neue Beiträge geladen werden**. Bei LinkedIn und Twitter klicken Sie bitte auf den „Neue Beiträge“ Button.

Wenn Sie interessante Beiträge sehen, können Sie diese gerne „liken“, kommentieren oder auch teilen. **Wechseln Sie gerne auch zwischen verschiedenen Social Media Plattformen**, wenn Sie diese üblicherweise nutzen.

Von Ihrer Social Media Nutzung wird nun ein **kurzes Video** aufgezeichnet, das wir uns anschließend **gemeinsam anschauen und besprechen werden**.

Videoaufzeichnung des Swiping Verhaltens per Snagit. (Start - - - Stop)

2) Wiedergabe – Protokoll lauten Denkens

Nach Abschluss wird das Video per „**Screensharing**“ abgespielt.

Beschreiben Sie bitte Ihr Vorgehen bei der Nutzung der Social Media Plattform. Es ist wichtig, dass Sie einfach **alles aussprechen**, was Ihnen gerade in den Sinn kommt und durch den Kopf geht. Es gibt **keine richtigen oder falschen Antworten**. Ich bitte Sie, mir alles zu erzählen, was Sie tatsächlich denken oder fühlen.



Ex-Post Protokoll lauten Denkens

- - - Hinweis: Das Protokoll lauten Denkens wird später transkribiert - - -

„Screensharing“ wird **gestoppt**.

3) Fragen zur Nutzung

Auf welchen Social Media Plattformen wurde gerade gesurft?

Plattform #1: _____

Plattform #2: _____

Plattform #3: _____

Plattform #4: _____

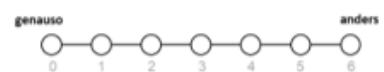
Plattform #5: _____

- Haben Sie eine Reihenfolge, in der Sie die Social Media Plattformen nutzen?
- Nutzen Sie Social Media Plattformen mit Ihrem Namen (Klarnamen)?
- Nutzen Sie die Social Media Plattformen mit Ton?
- Surfen Sie durch die Social Media Plattformen mit unterschiedlicher Geschwindigkeit?
Wie unterscheidet sich dies?
- Haben Sie Ihr Smartphone schon lange? Gab es beim Wechsel Unterschiede in der Nutzung?

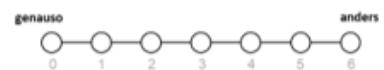
Lassen Sie uns über Ihre Social Media Nutzung von gerade eben sprechen. (Fragen für jede genutzte Plattform wiederholten)

Wie schätzen Sie Ihre [Plattform XY] Nutzung von gerade eben im Vergleich zu sonst ein?

1. Die **Beiträge** (Posts, Videos) auf [Plattform XY]
waren gerade eben genauso wie sonst auch - oder anders?



2. Mein „**liken**“, **kommentieren** oder **teilen** von Posts
auf [Plattform XY] war gerade eben genauso wie ich das
immer mache - oder anders?



3. Ist Ihnen **gerade eben** Werbung auf [Plattform XY] aufgefallen? Ja Nein

- Wenn ja, wofür? - und wie viele Werbeanzeigen haben Sie gesehen? (Schätzung)
- Für welche Marken ist Ihnen Werbung aufgefallen?
- Und, warum ist Ihnen diese Werbung aufgefallen? Was war an der Werbung besonders?
- Kommt es vor, dass Sie sich Zeit für Werbung auf [Plattform XY] nehmen und Sie z.B. auf Werbung klicken?
- Was sagen Sie sonst so zu Werbung auf [Plattform XY]?

4) Fragen zu weiteren Plattformen

Gibt es weitere Social Media Plattformen, die Sie **regelmäßig nutzen**?
(z.B. Facebook, LinkedIn, Twitter, Instagram, YouTube, Snapchat, Pinterest, ...)

Plattform #1: _____

Plattform #2: _____

Plattform #3: _____

Plattform #4: _____

Plattform #5: _____

Weitere Fragen zur Nutzung von [Plattform XY]. (Fragen für jede regelmäßig genutzte Plattform wiederholten, falls noch nicht bereits beantwortet)

1. Beschreiben Sie doch einmal, wie Sie Ihr Smartphone halten und wischen, scrollen und swipen – wenn Sie die [Plattform XY] nutzen.
2. Wenn Sie [Plattform XY] in unterschiedlichen Situationen nutzen (z.B. beim Frühstück, unterwegs in Bus & Bahn, abends vorm TV, ...) halten und scrollen Sie dann anders?
3. Haben Sie bereits bewusst Werbung auf [Plattform XY] wahrgenommen? Welche Marken wurden dort beworben?
4. Kommt es vor, dass Sie sich auf [Plattform XY] Zeit für Werbung nehmen und Markenbeiträge anklicken, kommentieren oder weiterleiten?
5. Gibt es weitere Punkte, die Ihnen bei der Nutzung von [Plattform XY] einfallen, die wir noch nicht besprochen haben?

5) Abschließende Fragen

1. Alter _____ Jahre
2. Geschlecht w m d
3. Beruf _____
4. Sind Sie Rechts- oder Linkshänder? Linkshänder Rechtshänder keine Präferenz
5. Welches Smartphone Modell wurde gerade genutzt?
(z.B. iPhone 6S) _____

Kontakterlaubnis In Einzelfällen kann es sinnvoll sein, Probanden **nachträglich zu kontaktieren**, um die Richtigkeit von Aussagen zu prüfen. *Kann ich Sie in diesem Fall per Email kontaktieren?*

Vielen Dank für Ihre Teilnahme!

Interviewerin: _____ Interview-Nr. _____ Datum: _____ Uhrzeit: _____

Interview-Leitfaden

Liebe Teilnehmerin, lieber Teilnehmer,

vielen Dank, dass Sie sich die Zeit für diese Studie nehmen. Sie helfen damit einer Studierenden bei ihrer Seminararbeit und unterstützen die wissenschaftliche Forschung an der Universität Wuppertal.

In der folgenden Studie geht es um Ihre **persönliche Instagram-Nutzung**. Es gibt hierbei kein Richtig oder Falsch! Wir sind an ihrem natürlichen Nutzungsverhalten interessiert.

Die Studie dauert ca. **10 Minuten** und besteht aus einer **Eye-Tracking Aufzeichnung** ihrer Social Media Nutzung am Smartphone und einem **kurzen Interview** zum Nutzungsverhalten.

Alle Daten werden **streng anonym und vertraulich** behandelt und dienen ausschließlich der wissenschaftlichen Forschung.

Wir sichern Ihnen ein umfassendes Recht auf Löschung von Inhalten des aufgezeichneten Videomaterials zu, sollten Sie Bedenken bezüglich der Auswertung haben. Da **Datenschutz** für die Universität sehr wichtig ist, wird die Datenverarbeitung aller Interviewdaten gemäß der Datenschutz-Grundverordnung dokumentiert. Hierfür möchte ich Sie bitten die folgenden zwei Erklärungen sorgfältig durchzulesen und zu unterzeichnen:

1. Verfahrensverzeichnis zur Erhebung personenbezogener Daten

Hier erklären wir Ihnen, wie wir mit den Daten umgehen, die im Rahmen dieser Studie erhoben werden.

2. Überlassungserklärung

Hiermit bestätigen Sie, dass wir Ihre Daten für die wissenschaftliche Forschung und Lehre nutzen dürfen.

Haben Sie noch weitere Fragen zu dieser Studie?

Wenn alles klar ist, können wir anfangen.

[Eye-Tracking Brille eingeschalten und die Aufnahme starten]

Verfahrensverzeichnis zur Erhebung personenbezogener Daten

Sehr geehrte Teilnehmerin,

sehr geehrter Teilnehmer,

vielen Dank, dass Sie an der folgenden Studie zum Thema „Social Media Konsum am Smartphone“ teilnehmen. Bitte versichern Sie uns mit Ihrer Einverständniserklärung, dass wir Ihre Daten und Antworten zu **rein wissenschaftlichen Zwecken** auswerten dürfen. Alle Ihre Antworten werden selbstverständlich vertraulich behandelt und in späteren Publikationen vollständig anonymisiert.

1. Name und Kontakt des Verantwortlichen:

Die Videoaufzeichnung und das Interview wird im Zusammenhang mit einer Forschungsarbeit am Lehrstuhl für Marketing an der Schumpeter School of Business and Economics der Bergischen Universität Wuppertal durchgeführt. Verantwortlicher Ansprechpartner seitens des Lehrstuhls ist Stefan Rohrbach (rohrbach@wiwi.uni-wuppertal.de).

2. Zweck der Verarbeitung:

Ihre Antworten und Daten werden zu rein wissenschaftlichen Zwecken ausgewertet. Erkenntnisinteresse ist es das geräte- und medienspezifische Nutzungsverhalten von Konsumenten zu ergründen.

3. Wem werden diese Daten zur Verfügung gestellt?

Es erfolgt keine Weitergabe Ihrer Daten an Dritte Personen. Im Rahmen der wissenschaftlichen Forschung und des wissenschaftlichen Publizierens wird berechtigten wissenschaftlichem Personal und Studierenden der Zugang zu den anonymisierten Daten unter Auflagen ermöglicht.

4. Vorgesehene Löschfristen der Daten:

Die Daten werden anonymisiert und zu Dokumentations- und Belegzwecken gespeichert.

5. Allg. Beschreibung der technischen Sicherheit der Daten:

Ihre Daten werden nach der Aufzeichnung auf einem gesicherten Server gespeichert.

6. Rechte der Probanden:

Nach der Erhebung erhalten Sie auf Wunsch die Möglichkeit, die erhobenen Daten über Sie als erstes zu sichten und Löschungen oder Schwärzungen vornehmen zu lassen.

Hiermit willige ich ein, dass meine Daten und Antworten zu den oben genannten Zwecken aufgezeichnet und gespeichert werden:

Datum: _____

Unterschrift: _____



BERGISCHE
UNIVERSITÄT
WUPPERTAL

Bergische Universität Wuppertal, Prof. Dr. Tobias Langner, Gaußstraße 20,
42119 Wuppertal

Prof. Dr. Tobias Langner
Lehrstuhl für Marketing

Schumpeter School of Business
and Economics

Gaußstraße 20, 42119 Wuppertal

RAUM	M.13.35
TELEFON	+49 (0)202-439-2823
FAX	+49 (0)202-439-2471
MAIL	Langner@wiwi.uni-wuppertal.de
WWW	Langner.wiwi.uni-wuppertal.de
AKTENZEICHEN	LA

DATUM 27. Oktober 2022

Überlassungserklärung

Hiermit erkläre ich, Frau/Herr _____, wohnhaft in (Str., Nr., PLZ, Ort)
_____, dass ich die als Proband der Studie zum Geräte- und Mediennutzungsverhalten über mich erhobenen Daten den Lehrpersonen des Lehrstuhls für Marketing überlasse. Damit erlaube ich die umfassende und unbeschränkte Nutzung der Daten für Forschung und Lehre, das Recht auf Vervielfältigung sowie die Verbreitung und Übersetzung und das Recht zur Bearbeitung und Änderung inklusive Nutzung und Vervielfältigung der dabei entstehenden Ergebnisse. Die Verwendung dieser Daten begründet keine Mitautorenschaft in künftigen Publikationen. Gleichzeitig erkläre ich hiermit, dass ich die Daten nicht selber an Dritte weitergeben oder anderweitig veröffentlichen oder zu Veröffentlichungszwecken nutzen werde. Die mir zugesicherten Rechte auf Datenschutz und Löschung bleiben von dieser Erklärung unberührt.

(Ort und Datum)

(Unterschrift)

Teil 1: Eye-Tracking

(nur für den Interviewer, Fragen bitte laut vorlesen)

A) Newsfeed Sequenz I

Ich möchte Sie nun bitten Instagram (alternativ Facebook) zu öffnen und durch Ihren Newsfeed (also die neusten Posts) zu gehen – so wie Sie das sonst auch tun. Bitte bleiben Sie **auf Ihrem Instagram-Newsfeed** und wechseln Sie nicht zwischen Apps. Bitte swipen Sie mit Ihrem:



[Version A oder B jeweils 50% der Probanden vorgeben]
[Zeit stoppen: nach 2 Minuten die Sequenz beenden]

B) Fragen zur Nutzung

1. Sind Sie Rechts- oder Linkshänder? Linkshänder Rechtshänder keine Präferenz
2. Welches Smartphone Modell nutzen Sie?
(z.B. iPhone 11) _____
3. Wie lange nutzen Sie dieses Smartphone schon? _____ Monate
- 4a Wie oft nutzen Sie Instagram
 Nie Jährlich Monatlich Wöchentlich Einmal am Tag Mehrere Male am Tag
- 4b Wie viel Zeit schätzen Sie verbringen Sie ca. am Tag auf Instagram _____ Stunden.
- 4a Wie oft nutzen Sie Facebook
 Nie Jährlich Monatlich Wöchentlich Einmal am Tag Mehrere Male am Tag
- 5b Wie viel Zeit schätzen Sie verbringen Sie ca. am Tag auf Facebook _____ Stunden.

C) Newsfeed Sequenz II

Ich möchte Sie noch einmal bitten durch Ihren Instagram-Newsfeed zu gehen (alternative Facebook; unbedingt gleiche Social Media App, wie in Session I wählen). Diesmal bitte swipen mit:

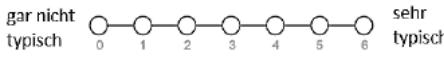


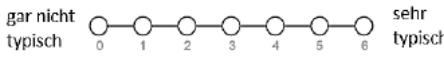
[Zeit stoppen: nach 2 Minuten die Sequenz beenden]

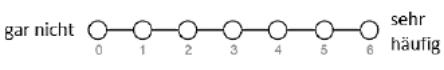
Teil 2: Interview

(nur für den Interviewer, Fragen bitte laut vorlesen)

A) Fragen zum Swiping-Verhalten

1. Wie typisch war das Swiping (Wischen) für Sie in der ersten Newsfeed-Sequenz?  sehr typisch
gar nicht typisch 0 1 2 3 4 5 6

2. Wie typisch war das Swiping (Wischen) für Sie in der zweiten Newsfeed-Sequenz?  sehr typisch
gar nicht typisch 0 1 2 3 4 5 6

3. Wechseln Sie zwischen den beiden Navigationstypen (Daumen/Zeigefinger), wenn Sie Instagram/Facebook nutzen?  sehr häufig
gar nicht 0 1 2 3 4 5 6

4. Falls Sie zwischen den Navigationstypen (Daumen/Zeigefinger) wechseln:

- Wann wechseln Sie?
- Warum wechseln Sie?

B) Fragen zur Werberezeption

1. Ist Ihnen gerade eben Werbung aufgefallen?

Ja - mir ist Werbung aufgefallen, und zwar für _____ (welche Marken)

Ja - mir ist Werbung aufgefallen, ich weiß aber nicht mehr für welche Marke geworben wurde.

Nein - mir ist keine Werbung aufgefallen

2. Falls Werbung aufgefallen ist:

- Warum ist Ihnen diese Werbung aufgefallen?
- Was war an der Werbung besonders?

3. Falls keine Werbung aufgefallen ist:

Waran könnte es Ihrer Meinung nach liegen, dass Sie keine Werbung wahrgenommen haben?

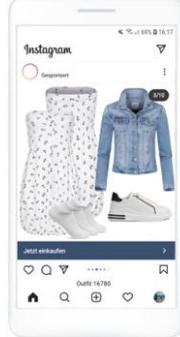
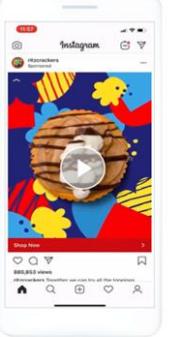
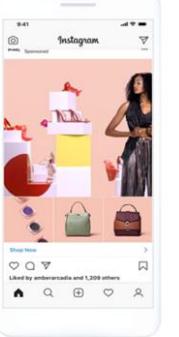
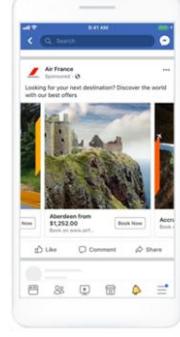
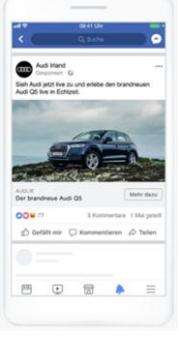
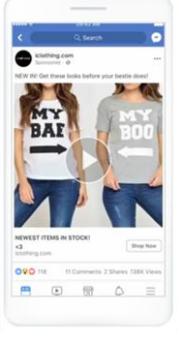
C) Fragen zu Ihrer Person

1. Alter _____ Jahre 2. Geschlecht w m d 3. Beruf _____

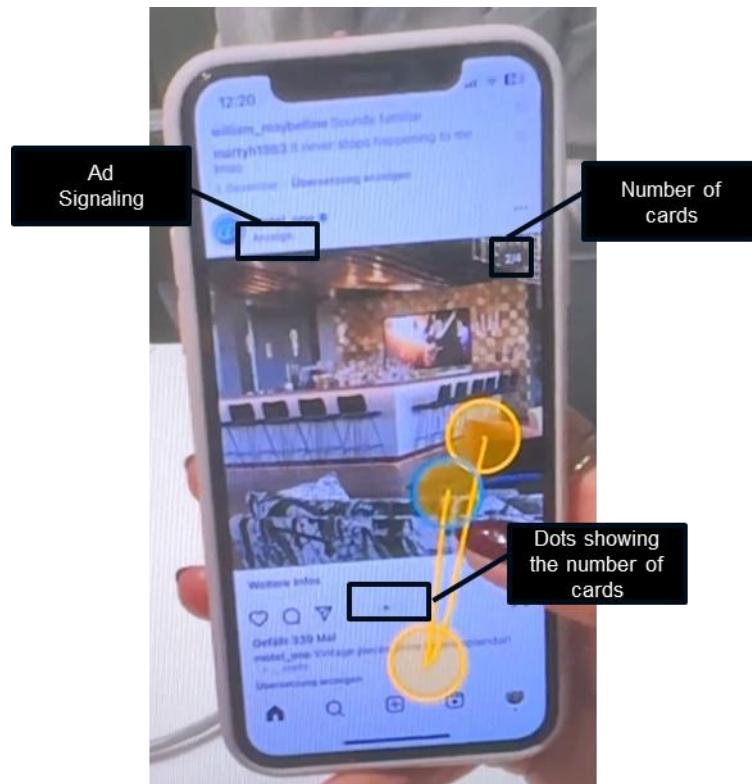
Vielen Dank für Ihre Teilnahme!

[Aufnahme beenden und Eye-Tracking Brille ausschalten]

II Article 2

	Carousel Ad	Image Ad	Video Ad	Collection Ad
<i>Format description</i>	Two or more swipeable images or videos. Carousel ads do not run automatically but needs user interaction to activate.	One single image. The image can vary in different dimensions but is static.	Plays video content within the feed with motion and sound. Videos start automatically.	Combination of one main image or video and three additional smaller images below. Users see a collection of images that can be clicked on.
<i>Instagram example</i>				
<i>Facebook example</i>				

Appendix 16: In-feed ad formats with samples for Instagram and Facebook



Appendix 17: Carousel ad indicators: Format and card count

No.	Gender	Age	Student/Non-Student
1	Male	24	Non-Student
2	Female	26	Non-Student
3	Female	56	Non-Student
4	Female	17	Student
5	Female	26	Non-Student
6	Male	31	Non-Student
7	Male	25	Student
8	Male	27	Non-Student
9	Male	24	Student
10	Male	25	Non-Student
11	Male	72	Non-Student
12	Male	41	Non-Student
13	Female	20	Student
14	Female	22	Student
15	Female	25	Non-Student
16	Male	26	Non-Student
17	Female	27	Non-Student
18	Female	24	Student
19	Female	24	Student
20	Female	27	Non-Student
21	Female	23	Student
22	Female	26	Non-Student
Avg.		29.0	

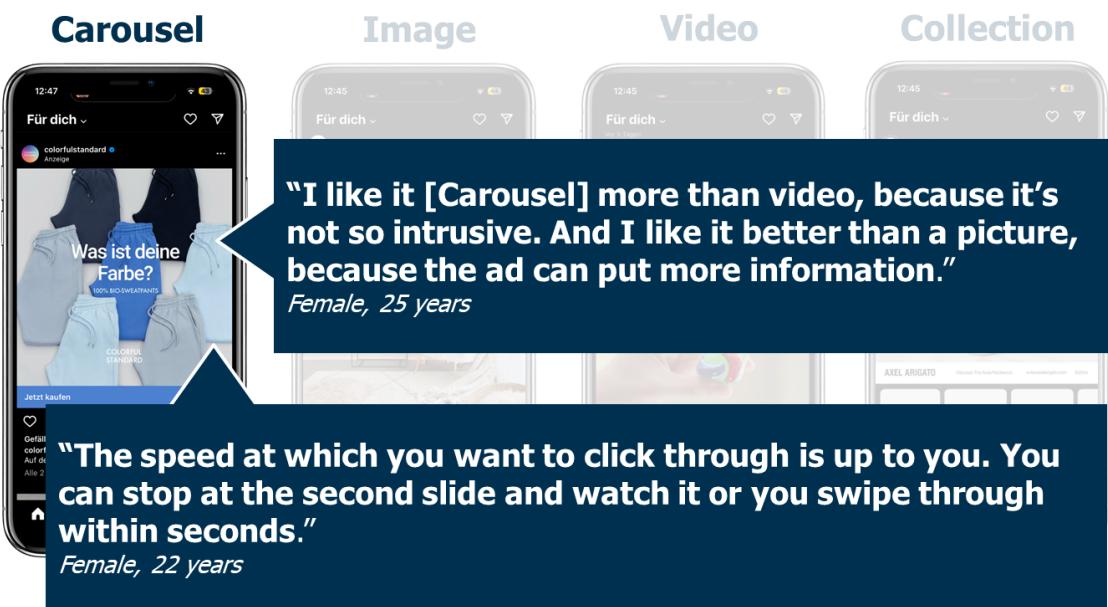
Appendix 18: Participants of Article 2 - Study 1

No.	Gender	Age	Occupation	Smartphone	Daily social media usage (hours)
1	Female	25	Student	iPhone XS	1.0
2	Male	25	Employee	iPhone X	1.0
3	Female	26	Employee	iPhone 13 pro	1.5
4	Female	25	Employee	iPhone 13 pro max	2.0
5	Female	57	Employee	Samsung Galaxy 8 Note	1.5
6	Female	22	Student	iPhone XS	2.0
7	Female	28	Student	iPhone 11	1.0
8	Female	45	Employee	iPhone 12	2.0
9	Male	28	Employee	iPhone 11	1.5
10	Female	25	Employee	Huawei P30 Pro	2.0
11	Female	27	Employee	iPhone 11 pro max	1.0
12	Male	39	Employee	iPhone 12 pro	1.0
13	Male	26	Employee	iPhone 11 Pro	1.0
14	Female	21	Student	iPhone 11	1.0
15	Female	24	Employee	iPhone 8	0.4
16	Female	25	Employee	Huawei P30 Light	1.5
17	Male	28	Employee	Samsung Galaxy Flip 3	2.5
18	Female	29	Employee	Huawei P20 Pro	0.5
19	Female	24	Employee	Samsung Galaxy A5	0.8
20	Female	25	Employee	iPhone 12 Pro	1.0
21	Male	27	Employee	iOne Plus 6t	0.3
22	Female	58	Employee	iPhone 13	0.5
23	Male	57	Employee	iPhone 12	0.2
24	Male	26	Employee	Samsung 22 Ultra	2.5
25	Male	32	Employee	Huawai P30 pro	1.5
26	Male	24	Employee	iPhone 14 pro	0.8
27	Male	27	Employee	One plus 9 pro	2.0
28	Female	30	Student	Samsung Galaxy a50	1.0
29	Female	30	Employee	Xiaomi Note 9	1.0
30	Female	31	Employee	Samsung Galaxy S8+	1.1
31	Male	33	Employee	Xiaomi 11+ pro	6.0
32	Female	28	Employee	Huawai P30 lite	0.9
33	Male	33	Employee	Huawai P30 pro	1.1
34	Female	25	Student	Xiaomi redmi 10	3.0
35	Female	30	Student	iPhone X	2.5
36	Male	32	Employee	iPhone X	0.1
Avg.		30.5			1.4

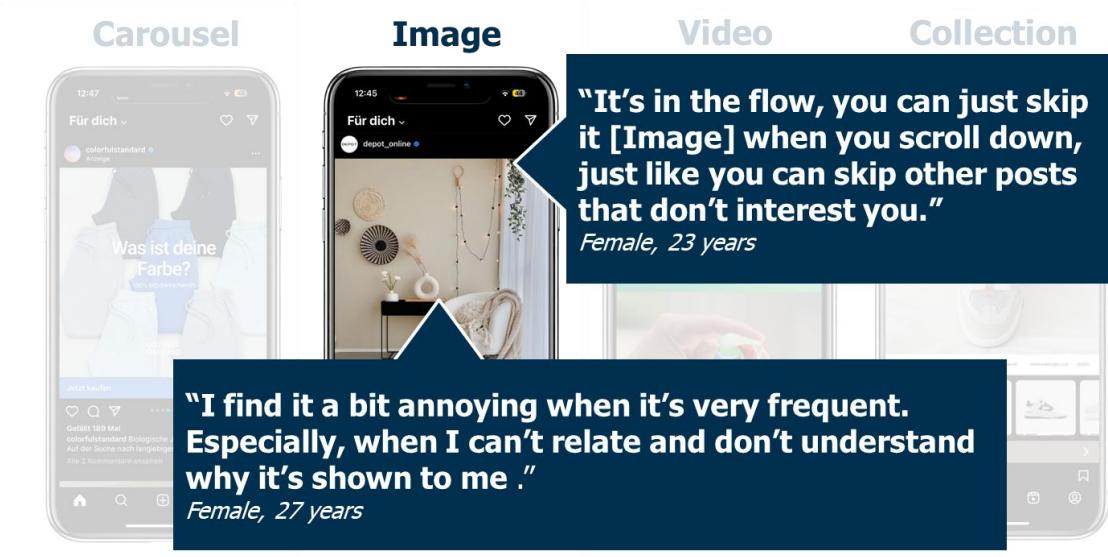
Appendix 19: Participants of Article 2 - Study 2

No.	Gender	Age	Student/Non-Student	Daily Instagram usage (Min.)
1	Male	31	Non-Student	60
2	Female	25	Non-Student	30
3	Female	24	Student	180
4	Female	20	Student	60
5	Male	24	Student	90
6	Female	23	Student	120
7	Male	27	Non-Student	30
8	Female	22	Student	90
9	Male	24	Non-Student	180
10	Male	25	Non-Student	90
11	Female	25	Student	90
12	Female	24	Student	30
13	Female	25	Student	45
14	Female	24	Non-Student	240
15	Female	22	Student	45
16	Male	22	Non-Student	60
17	Male	23	Student	30
18	Male	29	Student	180
19	Male	23	Non-Student	120
20	Male	23	Student	90
21	Male	21	Student	120
22	Female	21	Student	30
23	Male	27	Student	50
24	Female	22	Student	45
25	Male	25	Non-Student	60
26	Male	28	Non-Student	180
27	Male	28	Non-Student	106
28	Male	26	Student	35
29	Male	23	Non-Student	60
30	Female	21	Student	60
31	Male	23	Student	90
Avg.		24.2		87.0

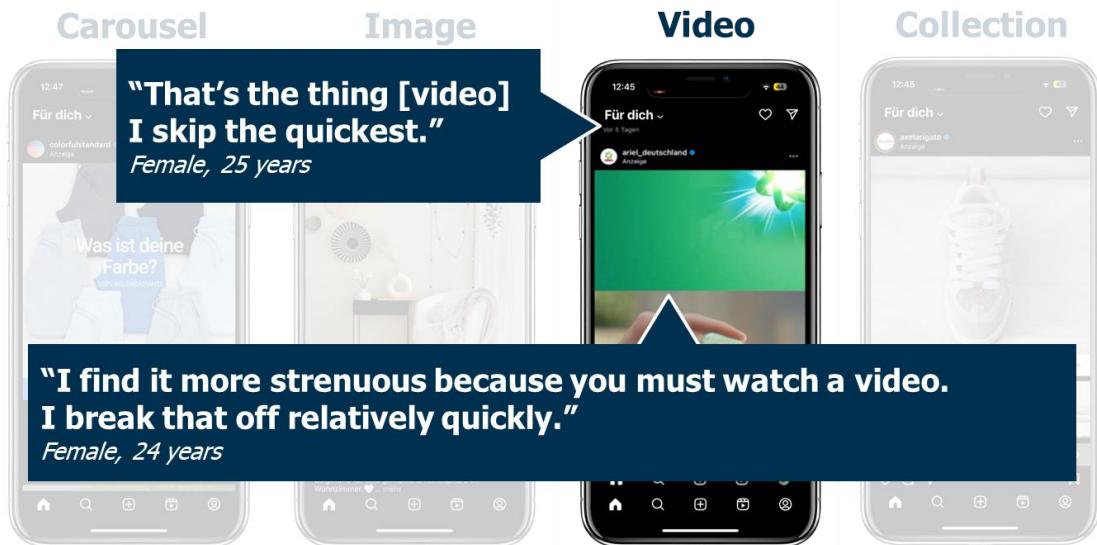
Appendix 20: Participants of Article 2 - Study 3



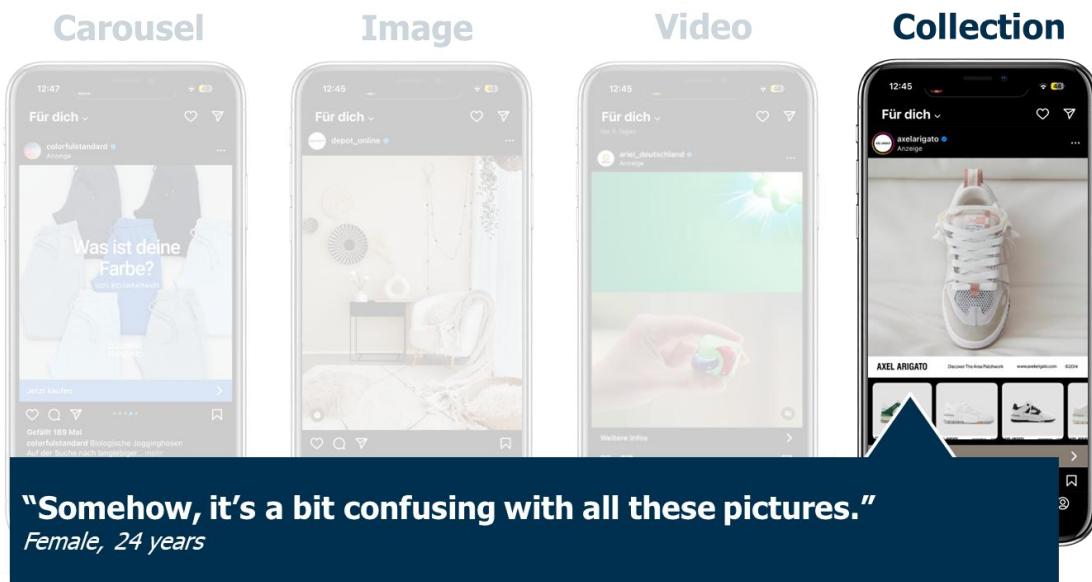
Appendix 21: Selected statements about carousel ads



Appendix 22: Selected statements about image ads



Appendix 23: Selected statements about video ads



Appendix 24: Selected statements about collection ads

Interviewerin: _____ Interview-Nr. _____ Datum: _____ Uhrzeit: _____

Interview-Leitfaden

Liebe Teilnehmerin, lieber Teilnehmer,

vielen Dank, dass Sie sich die Zeit für dieses Interview nehmen. Sie helfen damit einer Studierenden bei ihrer Bachelorarbeit und unterstützen die wissenschaftliche Forschung an der Universität Wuppertal.

Das Interview dauert ca. 15 Minuten. Alle Daten werden **streng anonym und vertraulich** behandelt und dienen ausschließlich der wissenschaftlichen Forschung. Da **Datenschutz** für die Universität sehr wichtig ist, wird die Datenverarbeitung aller Interviewdaten gemäß der Datenschutz-Grundverordnung dokumentiert. Hierfür möchte ich Sie bitten die folgenden zwei Erklärungen sorgfältig durchzulesen und zu unterzeichnen.

1. Verfahrensverzeichnis zur Erhebung personenbezogener Daten

Hier geht es um den Umgang Ihrer Daten, die im Rahmen dieser Studie erhoben werden.

2. Überlassungserklärung

Bestätigung, dass wir Ihre Daten für wissenschaftliche Forschung und Lehre nutzen dürfen.

Haben Sie noch weitere Fragen zu dieser Studie?

[wenn alles klar ist, können sie mit dem Interview beginnen]

Verfahrensverzeichnis zur Erhebung personenbezogener Daten

Sehr geehrte Teilnehmerin,

sehr geehrter Teilnehmer,

vielen Dank, dass Sie an der folgenden Studie zum Thema „Social Media“ teilnehmen. Bitte versichern Sie uns mit Ihrer Einverständniserklärung, dass wir Ihre Daten und Antworten zu **rein wissenschaftlichen Zwecken** auswerten dürfen. Alle Ihre Antworten werden selbstverständlich vertraulich behandelt und in späteren Publikationen vollständig anonymisiert.

1. Name und Kontakt des Verantwortlichen:

Das Interview wird im Zusammenhang mit einer Forschungsarbeit am Lehrstuhl für Marketing an der Schumpeter School of Business and Economics der Bergischen Universität Wuppertal durchgeführt. Verantwortlicher Ansprechpartner seitens des Lehrstuhls ist Stefan Rohrbach (rohrbach@wiwi.uni-wuppertal.de).

2. Zweck der Verarbeitung:

Ihre Antworten und Daten werden zu rein wissenschaftlichen Zwecken ausgewertet. Erkenntnisinteresse ist es das geräte- und medienspezifische Nutzungsverhalten von Konsumenten zu ergründen.

3. Wem werden diese Daten zur Verfügung gestellt?

Es erfolgt keine Weitergabe Ihrer Daten an Dritte Personen. Im Rahmen der wissenschaftlichen Forschung und des wissenschaftlichen Publizierens wird berechtigten wissenschaftlichem Personal und Studierenden der Zugang zu den anonymisierten Daten unter Auflagen ermöglicht.

4. Vorgesehene Löschfristen der Daten:

Die Daten werden anonymisiert und zu Dokumentations- und Belegzwecken gespeichert.

5. Allg. Beschreibung der technischen Sicherheit der Daten:

Ihre Daten werden nach der Aufzeichnung auf einem gesicherten Server gespeichert.

6. Rechte der Probanden:

Nach der Erhebung erhalten Sie auf Wunsch die Möglichkeit, die erhobenen Daten über Sie als erstes zu sichten und Löschungen oder Schwärzungen vornehmen zu lassen.

Hiermit willige ich ein, dass meine Daten und Antworten zu den oben genannten Zwecken aufgezeichnet und gespeichert werden:

Datum: _____

Unterschrift: _____



BERGISCHE
UNIVERSITÄT
WUPPERTAL

Prof. Dr. Tobias Langner
Lehrstuhl für Marketing

Bergische Universität Wuppertal, Prof. Dr. Tobias Langner, Gaußstraße 20,
42119 Wuppertal

Schumpeter School of Business
and Economics

Gaußstraße 20, 42119 Wuppertal

RAUM	M.13.35
TELEFON	+49 (0)202-439-2823
FAX	+49 (0)202-439-2471
MAIL	Langner@wiwi.uni-wuppertal.de
WWW	Langner.wiwi.uni-wuppertal.de
AKTENZEICHEN	LA

DATUM 27. April 2024

Überlassungserklärung

Hiermit erkläre ich, Frau/Herr _____, wohnhaft in (Str., Nr., PLZ, Ort) _____, dass ich die als Proband der Studie zum Geräte- und Mediennutzungsverhalten über mich erhobenen Daten den Lehrpersonen des Lehrstuhls für Marketing überlasse. Damit erlaube ich die umfassende und unbeschränkte Nutzung der Daten für Forschung und Lehre, das Recht auf Vervielfältigung sowie die Verbreitung und Übersetzung und das Recht zur Bearbeitung und Änderung inklusive Nutzung und Vervielfältigung der dabei entstehenden Ergebnisse. Die Verwendung dieser Daten begründet keine Mitauteorschft in künftigen Publikationen. Gleichzeitig erkläre ich hiermit, dass ich die Daten nicht selber an Dritte weitergeben oder anderweitig veröffentlichen oder zu Veröffentlichungszwecken nutzen werde. Die mir zugesicherten Rechte auf Datenschutz und Löschung bleiben von dieser Erklärung unberührt.

(Ort und Datum)

(Unterschrift)

Teil 1: Werbeformate in Social Media

(nur für den Interviewer, Fragen bitte laut vorlesen)

Achtung: Audioaufnahme für das Interview starten; iPhone: „Sprachmemo“



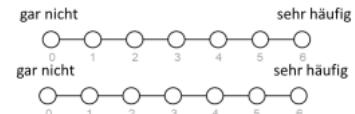
Im Folgenden werde ich Ihnen verschiedene Werbeformate für Social Media (z.B. Facebook, Instagram) zeigen und Ihnen hier zu jeweils ein paar Fragen stellen. Alle Werbeformate beziehen sich auf Anzeigen im Newsfeed. Bitte beurteilen Sie bei den folgenden Beispielen nur, ob Sie diese Art der Anzeige schon einmal auf Ihrem Smartphone gesehen haben. Es geht nicht um die gezeigte Anzeige selbst, sondern um den Anzeigentyp. **Bitte bewerten Sie nur den Anzeigentyp.**

Format 1: Bild Anzeige



Beispiele im Interview teilen, damit klar ist über welchen Anzeigentyp gerade gesprochen wird.

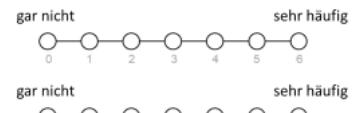
1. Haben Sie diese Art von Werbung schon einmal gesehen?
2. Haben Sie auf so eine Werbung schon einmal geklickt/interagiert?
3. Was halten Sie von diesem Werbeformat?
4. Was stört Sie an diesem Werbeformat?
5. Was finden Sie gut an diesem Werbeformat?



Format 2: Video Anzeige



1. Haben Sie diese Art von Werbung schon einmal gesehen?
2. Haben Sie auf so eine Werbung schon einmal geklickt/interagiert?
3. Was halten Sie von diesem Werbeformat?
4. Was stört Sie an diesem Werbeformat?
5. Was finden Sie gut an diesem Werbeformat?

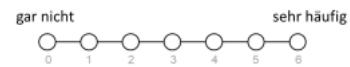
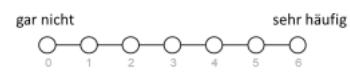


Format 3: Carousel Anzeige

Typ 3: Carousel Anzeige

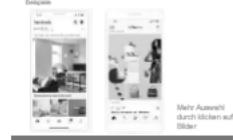


1. Haben Sie diese Art von Werbung schon einmal gesehen?
2. Haben Sie auf so eine Werbung schon einmal geklickt/interagiert?
3. Was halten Sie von diesem Werbeformat?
4. Was stört Sie an diesem Werbeformat?
5. Was finden Sie gut an diesem Werbeformat?

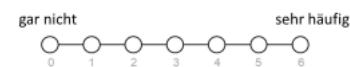


Format 4: Collection Anzeige

Typ 4: Collection Anzeige



1. Haben Sie diese Art von Werbung schon einmal gesehen?
2. Haben Sie auf so eine Werbung schon einmal geklickt/interagiert?
3. Was halten Sie von diesem Werbeformat?
4. Was stört Sie an diesem Werbeformat?
5. Was finden Sie gut an diesem Werbeformat?



Teil 2: Soziale Netzwerke & Werbeformate

Die folgenden Fragen beziehen sich auf die sozialen Netzwerke „Instagram, Facebook, und Linkedin“. Bitte beantworten Sie die Fragen für alle sozialen Netzwerke, die Sie aktiv nutzen. Es geht wieder um die 4 Werbeformate „Bild, Video, Carousel und Collection Anzeigen“.

1a. Welche der 4 Werbeformate haben Sie bei Instagram gesehen? [Aufzählen lassen]

1b. Was ist Ihnen hierbei besonders aufgefallen?

2a. Welche dieser 4 Werbeformate haben Sie bei Facebook gesehen?

2b. Was ist Ihnen hierbei besonders aufgefallen?

3a. Welche dieser 4 Werbeformate haben Sie bei Linkedin gesehen?

3b. Was ist Ihnen hierbei besonders aufgefallen?

Teil 3: Fragen zur Person & Nutzung

1. Alter _____ Jahre 2. Geschlecht w m d 3. Beruf _____

4. Welches Smartphone Modell nutzen Sie?

(z.B. iPhone 11, iPhone 11 Max; konkret nach Modell nachfragen, Hinweis: Bildschirmgröße ist relevant)

5. Wie viel Zeit schätzen Sie verbringen Sie ca. am Tag in Social Media?

_____ Minuten

Vielen Dank für Ihre Teilnahme!

Interviewerin: _____ Interview-Nr. _____ Datum: _____ Uhrzeit: _____

Interview-Leitfaden

Liebe Teilnehmerin, lieber Teilnehmer,

vielen Dank, dass Sie sich die Zeit für diese Studie nehmen. Sie helfen damit einer Studierenden bei ihrer Seminararbeit und unterstützen die wissenschaftliche Forschung an der Universität Wuppertal.

Die Studie dauert ca. 10 Minuten und besteht aus einer Eye-Tracking Aufzeichnung ihrer Instagram-Nutzung am Smartphone und einem kurzen Interview. Alle Daten werden streng anonym und vertraulich behandelt und dienen ausschließlich der wissenschaftlichen Forschung.

Wir sichern Ihnen ein umfassendes Recht auf Löschung von Inhalten des aufgezeichneten Videomaterials zu, sollten Sie Bedenken bezüglich der Auswertung haben. Da Datenschutz für die Universität sehr wichtig ist, wird die Datenverarbeitung aller Interviewdaten gemäß der Datenschutz-Grundverordnung dokumentiert. Hierfür möchte ich Sie bitten die folgenden zwei Erklärungen sorgfältig durchzulesen und zu unterzeichnen:

1. Verfahrensverzeichnis zur Erhebung personenbezogener Daten

Hier geht es um den Umgang Ihrer Daten, die im Rahmen dieser Studie erhoben werden.

2. Überlassungserklärung

Bestätigung, dass wir Ihre Daten für wissenschaftliche Forschung und Lehre nutzen dürfen.

Haben Sie noch weitere Fragen zu dieser Studie?

Wenn alles klar ist, können wir anfangen.

[Eye-Tracking Brille eingeschalten und die Aufnahme starten]

Verfahrensverzeichnis zur Erhebung personenbezogener Daten

Sehr geehrte Teilnehmerin,

sehr geehrter Teilnehmer,

vielen Dank, dass Sie an der folgenden Studie zum Thema „Social Media“ teilnehmen. Bitte versichern Sie uns mit Ihrer Einverständniserklärung, dass wir Ihre Daten und Antworten zu **rein wissenschaftlichen Zwecken** auswerten dürfen. Alle Ihre Antworten werden selbstverständlich vertraulich behandelt und in späteren Publikationen vollständig anonymisiert.

1. Name und Kontakt des Verantwortlichen:

Die Videoaufzeichnung und das Interview wird im Zusammenhang mit einer Forschungsarbeit am Lehrstuhl für Marketing an der Schumpeter School of Business and Economics der Bergischen Universität Wuppertal durchgeführt. Verantwortlicher Ansprechpartner seitens des Lehrstuhls ist Stefan Rohrbach (rohrbach@wiwi.uni-wuppertal.de).

2. Zweck der Verarbeitung:

Ihre Antworten und Daten werden zu rein wissenschaftlichen Zwecken ausgewertet. Erkenntnisinteresse ist es das geräte- und medienspezifische Nutzungsverhalten von Konsumenten zu ergründen.

3. Wem werden diese Daten zur Verfügung gestellt?

Es erfolgt keine Weitergabe Ihrer Daten an Dritte Personen. Im Rahmen der wissenschaftlichen Forschung und des wissenschaftlichen Publizierens wird berechtigten wissenschaftlichem Personal und Studierenden der Zugang zu den anonymisierten Daten unter Auflagen ermöglicht.

4. Vorgesehene Löschfristen der Daten:

Die Daten werden anonymisiert und zu Dokumentations- und Belegzwecken gespeichert.

5. Allg. Beschreibung der technischen Sicherheit der Daten:

Ihre Daten werden nach der Aufzeichnung auf einem gesicherten Server gespeichert.

6. Rechte der Probanden:

Nach der Erhebung erhalten Sie auf Wunsch die Möglichkeit, die erhobenen Daten über Sie als erstes zu sichten und Löschungen oder Schwärzungen vornehmen zu lassen.

Hiermit willige ich ein, dass meine Daten und Antworten zu den oben genannten Zwecken aufgezeichnet und gespeichert werden:

Datum: _____

Unterschrift: _____



BERGISCHE
UNIVERSITÄT
WUPPERTAL

Bergische Universität Wuppertal, Prof. Dr. Tobias Langner, Gaußstraße 20,
42119 Wuppertal

Prof. Dr. Tobias Langner
Lehrstuhl für Marketing

Schumpeter School of Business
and Economics

Gaußstraße 20, 42119 Wuppertal

RAUM	M.13.35
TELEFON	+49 (0)202-439-2823
FAX	+49 (0)202-439-2471
MAIL	Langner@wiwi.uni-wuppertal.de
WWW	Langner.wiwi.uni-wuppertal.de
AKTENZEICHEN	LA

DATUM 5. Dezember 2023

Überlassungserklärung

Hiermit erkläre ich, Frau/Herr _____, wohnhaft in (Str., Nr., PLZ, Ort) _____, dass ich die als Proband der Studie zum Geräte- und Mediennutzungsverhalten über mich erhobenen Daten den Lehrpersonen des Lehrstuhls für Marketing überlasse. Damit erlaube ich die umfassende und unbeschränkte Nutzung der Daten für Forschung und Lehre, das Recht auf Vervielfältigung sowie die Verbreitung und Übersetzung und das Recht zur Bearbeitung und Änderung inklusive Nutzung und Vervielfältigung der dabei entstehenden Ergebnisse. Die Verwendung dieser Daten begründet keine Mitautorenschaft in künftigen Publikationen. Gleichzeitig erkläre ich hiermit, dass ich die Daten nicht selber an Dritte weitergeben oder anderweitig veröffentlichen oder zu Veröffentlichungszwecken nutzen werde. Die mir zugesicherten Rechte auf Datenschutz und Löschung bleiben von dieser Erklärung unberührt.

(Ort und Datum)

(Unterschrift)

Teil 1: Eye-Tracking

(nur für den Interviewer, Fragen bitte laut vorlesen)

A. Newsfeed Swiping

Ich möchte Sie bitten Instagram zu öffnen und durch Ihren Newsfeed (also die neusten Posts) zu gehen – so wie Sie das sonst auch tun. Bitte bleiben Sie auf dem Newsfeed und wechseln Sie nicht zu Stories oder zu anderen Apps. Wenn Sie interessante Beiträge sehen, können Sie diese gerne „liken“, kommentieren oder auch teilen.

Aktivierte Carousel Anzeigen (Marke, Zeit in Session)	Nicht-aktivierte Carousel Anzeigen (Marke, Zeit in Session)

[in dieser Tabelle jeweils aktivierte und nicht-aktivierte Carousel Anzeigen festhalten.
Nach 5 Minuten die Session und Eye-Tracking Aufnahme beenden.]

Achtung: Audioaufnahme für das Interview starten; iPhone: „Sprachmemo“



Teil 2: Interview

(nur für den Interviewer, Fragen bitte laut vorlesen)

Ich möchte Sie im Folgenden zu „Carousel Anzeigen“ befragen. Carousel Anzeigen sind Werbeanzeigen, bei denen zur Seite geswiped wird. Es ist wichtig, dass Sie einfach **alles aussprechen**, was Ihnen gerade in den Sinn kommt und durch den Kopf geht. Es gibt **keine richtigen oder falschen Antworten**. Ich bitte Sie, mir alles zu erzählen, was Sie tatsächlich denken oder fühlen.

[zur Szene mit aktiverter Carousel Anzeigen gehen und das Video abspielen]



A) Aktivierte Carousel Anzeigen:

A1. Post/Anzeige: _____

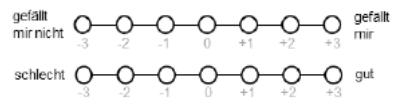
a. Der Post...

b. Die Marke ist...

c. Warum haben Sie bei diesem Post zur Seite geswiped?

d. Was hat sie dazu veranlasst sich ausführlicher mit dem Post zu beschäftigen?

(nachfassen, damit ausführliche Antwort)



A2. Post/Anzeige: _____

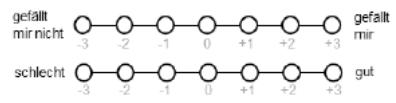
a. Der Post...

b. Die Marke ist...

c. Warum haben Sie bei diesem Post zur Seite geswiped?

d. Was hat sie dazu veranlasst sich ausführlicher mit dem Post zu beschäftigen?

(nachfassen, damit ausführliche Antwort)



A3. Post/Anzeige: _____

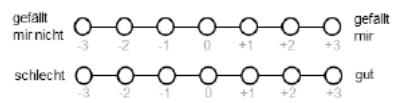
a. Der Post...

b. Die Marke ist...

c. Warum haben Sie bei diesem Post zur Seite geswiped?

d. Was hat sie dazu veranlasst sich ausführlicher mit dem Post zu beschäftigen?

(nachfassen, damit ausführliche Antwort)

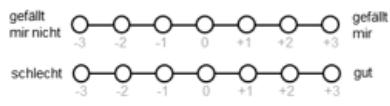


B) Nicht aktivierte Carousel Anzeigen:

B1. Post/Anzeige: _____

a. Der Post...

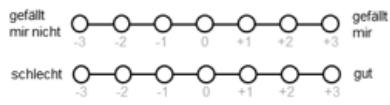
b. Die Marke ist...

c. Warum haben Sie bei diesem Post nicht zur Seite geswiped?d. Was hat sie dazu veranlasst sich nicht ausführlicher mit dem Post zu beschäftigen?
(nachfassen, damit ausführliche Antwort)

B2. Post/Anzeige: _____

a. Der Post...

b. Die Marke ist...

c. Warum haben Sie bei diesem Post nicht zur Seite geswiped?d. Was hat sie dazu veranlasst sich nicht ausführlicher mit dem Post zu beschäftigen?
(nachfassen, damit ausführliche Antwort)C) Fragen zur Person & Nutzung1. Alter _____ Jahre 2. Geschlecht w m d 3. Beruf _____

4. Welches Smartphone Modell nutzen Sie?

(z.B. iPhone 11, iPhone 11 Max; konkret nach Modell nachfragen, Hinweis: Bildschirmgröße ist relevant)

5. Wie viel Zeit schätzen Sie verbringen Sie ca. am Tag auf Instagram _____ Minuten.

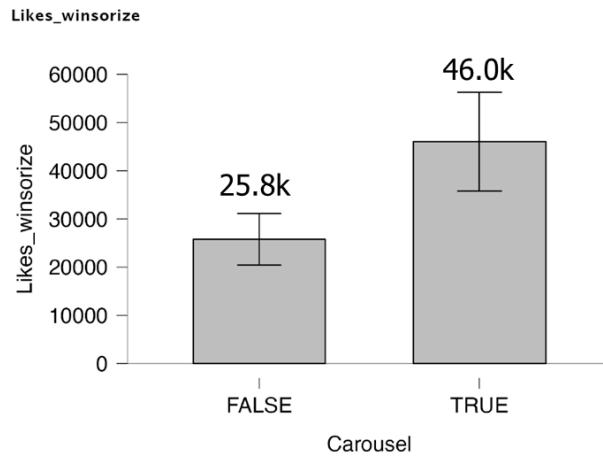
Vielen Dank für Ihre Teilnahme!

III Article 3

No.	Gender	Age	Occupation	Smartphone	Daily Instagram usage (Min.)
1	Male	27	Risk Manager	iPhone X	30
2	Female	24	Project Manager	Google pixel 4 5g	240
3	Female	25	Student	iPhone 15	45
4	Male	23	Electrician	iPhone 13	60
5	Female	24	Student	iPhone 11	180
6	Male	23	Student	Samsung Galaxy S9	30
7	Male	29	Student	iPhone X Max	180
8	Male	31	Controller	iPhone XS	60
9	Female	25	Student	iPhone 11	90
10	Female	23	Student	iPhone 12	120
11	Female	22	Student	Samsung S21 FE	90
12	Male	25	Engineer	iPhone 11 Pro	60
13	Female	25	Assistant	Google Pixel 7	30
14	Male	25	Project Manager	iPhone 11 Pro	90
15	Male	28	Art Director	iPhone XR	180
16	Male	24	Craftsman	iPhone 11	180
17	Male	23	Student	iPhone 11	90
18	Female	22	Student	Samsung Galaxy S21	45
19	Male	22	Care Giver	iPhone 15	60
20	Female	20	Student	Samsung Galaxy S8	60
21	Male	24	Student	iPhone 11	90
22	Male	23	Sales Manager	iPhone XR	120
23	Male	23	Student	iPhone 8+	90
24	Female	24	Student	iPhone 12	30
25	Male	27	Student	Samsung Galaxy S23	50
26	Male	28	Craftsman	iPhone 12 mini	106
27	Male	26	Student	iPhone 15	35
28	Female	22	Student	iPhone XS	45
29	Female	21	Student	iPhone 8+	30
30	Male	21	Student	iPhone 12	120
31	Female	21	Student	Samsung Galaxy	60
32	Male	53	Insurance Salesman	iPhone 11	30
33	Male	15	Student	iPhone 11	90
34	Female	48	Nurse	iPhone SE	30

35	Female	19	Nurse	iPhone 11	90
36	Female	22	Student	iPhone 12	60
37	Male	25	Research Assistant	iPhone 14	30
38	Male	22	Working Student	iPhone 14	120
39	Female	28	Psychologist	iPhone 11	60
40	Female	33	Doctor	iPhone 12	60
41	Male	15	Student	Samsung Galaxy	120
42	Male	46	Insurance Salesman	iPhone 12	30
43	Male	45	Civil Servant	Samsung s20 FE	45
44	Male	17	Vocational Training	iPhone 12	90
45	Female	31	Counsellor	iPhone SE 2020	30
46	Male	30	Marketing Expert	iPhone 14	120
47	Male	29	Police Officer	iPhone 13 Pro	100
48	Male	40	Technical Buyer	iPhone 6	30
49	Male	19	Student	S22	45
50	Male	22	Carpenter	iPhone 12	90
51	Male	22	Creator	iPhone 12	120
52	Male	17	Student	iPhone	90
53	Male	19	Student	iPhone 12	90
54	Female	19	Civil Servant	iPhone XS	120
55	Female	54	Supervisor	iPhone 12	30
56	Male	18	Student	iPhone XR	60
57	Female	17	Student	iPhone 13	60
58	Male	16	Student	S20	180
59	Male	19	Student	iPhone 14	60
60	Female	19	Police Officer	iPhone 11	50
61	Male	28	Consultant	iPhone 13	60
62	Female	19	Police Officer	iPhone12	90
63	Female	48	Nurse	S20	30
64	Female	19	Civil Servant	iPhone XS	120
				25.7	80.1

Appendix 27: List of participants of Article 3 - Study 2



Appendix 28: T-Test for number of likes of carousel versus non-carousel posts

Category	Total Posts	Activated Posts	Non-Activated Posts	Activation Percentage	General Category Involvement*
Fashion	98	33	65	34%	Medium (4.2)
Electronics	18	4	14	22%	High (4.6)
Consumer Goods	18	6	12	33%	Low (3.0)
Services	17	4	13	24%	Low (3.2)
Automotive	16	13	3	81%	High (4.6)
Jewelry	12	2	10	17%	Low (2.5)
Travel	11	8	3	73%	High (4.4)
Food	8	3	5	38%	Medium (3.8)
Furniture	7	3	4	43%	Low (2.2)
Sports	7	7		100%	High (4.2)
Beauty	6	3	3	50%	Medium (3.6)
Entertainment	3	1	2	33%	High (4.3)
Health	1	0	1	0%	Medium (3.4)
Totals	222	87	135	39%	3.7

* note: we asked five marketing experts to rate general product involvement by categories on a scale from "not at all" [0] to "very high involvement" [+6] to cluster category involvement into high, medium and low. The numbers in brackets are the average ratings among these experts.

Appendix 29: Carousel activation by category as analyzed for Study 2

Physical Intense Elements

Main Category		Category	Coding	Description
Physical Intense	Color	Color	0 = No use of bright color 1 = Bright colors are used	Bright colors (e.g., red, green, blue, yellow) cover at least 50% of the image area to attract attention and make the ad stand out.
	Contrast	Background	0 = Existing background 1 = Background has been cropped	The background is either kept as it is or cut out. Cropping creates a strong visual contrast between the subject and background, often placing a light product on a dark background or vice versa.
	Size	Central Element	0 = No single large element 1 = One or two large elements	The image has one or two dominant central elements, like a product or figure, that are much larger than the other elements in the image. This emphasizes the main subject and avoids visual clutter.

Emotional and Cognitive Elements

Main Category		Category	Coding	Description
Transformational/ Informational		Affective or Informative	0 = neutral 1 = affective 2 = informative	The post's content is primarily emotional (affective), provides information (informative), or is neutral, containing neither emotional appeal nor clear information.
Emotion	Affective Cues	Faces	0 = no use of faces 1 = faces are shown	The post includes one or more clearly recognizable human faces.
		People	0 = no use of people 1 = people are shown	The post features one or more people, including full bodies or partial depictions like hands, necks, or gestures.
		Animals	0 = no use of animals 1 = animals are shown	The post features one or more animals.
		Erotic	0 = no use of erotic 1 = erotic images are shown	The post contains content intended to be sexually suggestive or explicit.
	Curiosity Cues	Humor	0 = no use of humor 1 = humor is used in post	The post includes elements intended to be humorous or amusing, such as jokes, puns, or visual humor.
		Viewing Angle	0 = Frontal shot 1 = Left Angle 2 = Right Angle	In photography, the viewing angle describes the angular extent of a given scene that is imaged by a camera. A frontal shot has the object facing straight, while left or right angle views the object from the side.
Cognitive	Informative Cues	Person Orientation	0 = Frontal 1 = Left Side 2 = Right Side	In case the image shows a person, this describes the direction the person is orienting towards. This can be frontal with no direction or sideways to the right or left, e.g. by pointing towards something.
		Cropping	0 = No cropping 1 = Main element is cropped	At least 20% of the main element is intentionally cropped out of the frame, suggesting continuity beyond the visible area.
		Arrows	0 = no arrow 1 = arrows pointing to the right 2 = arrows pointing to the left 3 = arrows in both directions	The post includes arrows that guide the viewer's attention or indicate movement within the carousel. The post can have either no arrows, arrows point towards right or left, or multiple unclear directions.
		Headline	0 = no headline 1 = existing headline 2 = HL with appellative character	The post includes a headline or title. This can be a regular headline or a headline that contains a call to action or directive (e.g., "Swipe to see more").
		Limited Offer	0 = no limited offer indication 1 = limited offer sign/icon	The post signals a limited-time offer, using text or visuals that indicate urgency (e.g., discounts, deals, or "limited time only").
	Realization Cues	Giveaways	0 = no use of giveaways 1 = post indicates a giveaway	The post encourages participation in giveaways or contests, signaling a chance for the viewer to win or engage.
		Brand Logo/ Brand Name	0 = no brand logo or name 1 = Brand logo/name is shown	The brand's logo or name is clearly visible in the image of the post.
		Ratings & Reviews	0 = no use of ratings and reviews 1 = ratings and reviews are shown	The post displays ratings, reviews, or testimonials, often through star ratings or customer feedback.
		Photo Style	0 = Professional shot 1 = Homemade shot	The style of photography used in the ad. A "professional shot" is taken in a studio with high-quality lighting and setup. A "home-made shot" looks amateur, typically lacking professional lighting and composition.
		Product Shots	0 = Product not included 1 = Pack Shot 2 = Product placed on-top 3 = Product in Use by consumer	This category classifies how the product is visually represented in the ad. Either as not included or simply displayed (pack shot), placed on top of an image, shown in use by the consumer.

Appendix 30: Category system for physical, emotional and cognitive elements