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## Travail de fin d'études Consumers' memory for brand storytelling: a quantitative and legal analysis

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# **CONSUMERS' MEMORY FOR BRAND STORYTELLING: A QUANTITATIVE AND LEGAL ANALYSIS**

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## Abstract

This thesis examines brand storytelling advertising through a dual lens, marketing effectiveness and legal defensibility. It asks what consumers remember after watching a brand story once, and whether the most memorable parts are also the easiest to protect under Belgian and EU law. The conceptual framework focuses on four core story components, namely brand integration, characters, plot structure and message clarity, and links these elements to two engagement mechanisms, narrative transportation and character identification, before turning to immediate recall.

A quantitative online study was conducted using a LimeSurvey questionnaire. A final sample of 219 respondents watched the same Mercedes-Benz narrative advertisement once (“Bertha Benz: The Journey That Changed Everything”) and then completed validated scales and immediate recall questions (two items per recall dimension).

Findings indicate that narrative design features predict transportation, and transportation in turn predicts identification. However, evidence is more limited when focusing on element-level memory. Identification does not predict recall, transportation only shows small and selective associations, and the expected moderating roles of emotional engagement and cognitive load are not supported, likely because recall is already very high overall.

The legal analysis shows a practical gap between memorability and protectability. Copyright can protect original expressions, trade mark law mainly secures stable identifiers, and unfair competition may offer a residual route in cases of parasitic copying under Book VI of the Belgian Code of Economic Law. Overall, the thesis suggests that storytelling should be designed so that the brand and key expressive cues are both memorable and legally anchorable.

## Note de synthèse

Ce mémoire analyse la publicité de brand storytelling sous une double perspective, son efficacité marketing et sa « défendabilité » juridique. Il cherche à comprendre ce que les consommateurs retiennent après avoir visionné une publicité narrative une seule fois, et si les éléments les plus marquants sont aussi ceux qui se protègent le plus facilement en droit belge et européen. Le cadre conceptuel retient quatre composantes centrales du récit, à savoir l'intégration de la marque, les personnages, la structure de l'intrigue et la clarté du message, et les relie à deux mécanismes d'engagement, le transport narratif et l'identification au personnage, avant d'examiner le rappel immédiat.

Une étude quantitative en ligne a été menée via un questionnaire LimeSurvey. Un échantillon final de 219 répondants a visionné une fois la même publicité narrative de Mercedes-Benz (« Bertha Benz: The Journey That Changed Everything »), puis a complété des échelles validées ainsi que des questions de rappel immédiat (deux items par dimension de rappel).

Les résultats montrent que les caractéristiques de conception narrative prédisent le transport narratif, et que celui-ci prédit ensuite l'identification. En revanche, les résultats sont plus nuancés lorsqu'on s'intéresse à la mémoire au niveau des éléments précis. L'identification ne prédit pas le rappel, le transport n'est associé qu'à des effets faibles et sélectifs, et les modérations attendues de l'engagement émotionnel et de la charge cognitive ne sont pas confirmées, probablement parce que le niveau de rappel est déjà très élevé dans l'ensemble.

L'analyse juridique met en évidence un écart pratique entre ce qui est mémorable et ce qui est juridiquement protégeable. Le droit d'auteur peut protéger des expressions originales, le droit des marques sécurise surtout des signes stables d'identification, et la concurrence déloyale peut offrir une voie résiduelle en cas de copie parasitaire sur la base du Livre VI du Code de droit économique. Au total, ce mémoire suggère de concevoir les récits de manière à ce que la marque et certains choix expressifs clés soient à la fois mémorables et plus facilement « ancrables » juridiquement.

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# 1. INTRODUCTION

## 1.1. Context

Over the last years, brand communication has increasingly moved from listing product attributes to telling short cinematic stories. This 'narrative turn' makes sense in a media environment where attention is difficult to secure and easier to lose than before. In particular, digital video platforms give viewers more control (skipping, scrolling, switching), which reduces the time available to communicate a message. Research on online video advertising shows that ad avoidance is strongly shaped by the media context (e.g., what people are watching, how the ad is inserted, perceived time cost), meaning that attention cannot be taken for granted and varies across situations (Kim et al., 2023). More broadly, scholars have argued that marketers are facing a structural shift where consumer attention has become more expensive and scarcer, pushing brands to compete not only with other advertisers but with all forms of digital content (Teixeira, 2014). In this context, storytelling is not only a creative trend, but also a managerial response to the practical challenge of earning and holding attention long enough to create meaning.

From a marketing perspective, stories matter because they can organize attention and emotions in ways that plain product information often cannot. For example, research on internet video ads suggests that emotional dynamics can drive engagement, which is critical when viewers can disengage quickly (Teixeira et al., 2012). Theoretically, one of the main explanations for why stories can be persuasive is narrative transportation. When people become mentally 'absorbed' into a story, they process information through the story world rather than through counterarguing (Green & Brock, 2000). In consumer research, this mechanism has been connected to how people build meaning and associations, because narratives provide a structure that can link the brand to emotions, situations and identity-relevant interpretations (Escalas, 2004). A second key mechanism is identification with characters, which is the extent to which viewers take a character's perspective and feel psychologically close to them (Cohen, 2001). Together, these mechanisms suggest that storytelling can be a powerful way to shape what viewers encode and how they connect it to the brand.

However, the literature also shows that narrative effects are not automatic. Meta-analytic evidence indicates that transportation has meaningful average effects, but these effects depend on antecedents and conditions (van Laer et al., 2014). More recent work also emphasizes that the impact of transportation in digital settings is moderated by factors such as context and execution, which helps explain why results vary across audiences and platforms (van Laer et al., 2019). At the level of advertising performance, research on storytelling ads suggests an important nuance. Storytelling does not always increase effectiveness. Its impact depends on how identification is triggered and on the type of character used. In some cases, storytelling executions can even underperform when narrative engagement does not translate into brand-relevant processing (Dessart, 2018). This matters directly for managers, because story-based campaigns are costly, and their value depends on what is actually retained. A viewer may remember the plot or emotions but fail to remember the brand, the message or the intended meaning, especially when branding is subtle or when attention is fragmented.

At the same time, the strategic value of brand storytelling creates a second, often overlooked challenge, which is protection. When a campaign's story, characters, or signature scenes start to function as part of a brand's identity, close imitation by competitors can weaken differentiation. This risk is even stronger in advertising today because campaigns circulate widely online and are easy to observe, share, and replicate. The difficulty is that legal protection is not automatic. In the Belgian system, within the broader EU and Benelux framework that also shapes intellectual property and unfair competition rules, the law typically protects specific expressions rather than broad ideas. As a result, the line between acceptable inspiration and unlawful copying is often hard to draw in practice. For that reason, this

thesis treats brand storytelling not only as a persuasive tool, but also as an intangible asset that may need to be defended.

## 1.2. Problem statement

Despite the popularity of storytelling advertising, a basic question remains surprisingly under-documented: what do consumers actually remember from a brand story? Marketing research offers strong theoretical reasons to expect narratives to influence memory, but empirical evidence is often focused on attitudes, purchase intentions or general ‘ad recall’, rather than on the retention of concrete story elements. In practice, managers also face a very operational problem: if a narrative ad contains multiple components (brand integration, characters, plot/climax, message or moral, and setting), which of these components is most likely to survive in memory after exposure?

A related issue is that what is memorable is not always what is legally protectable. Brands may want to prevent others from copying the ‘heart’ of their story, but different legal regimes apply different thresholds and protect different objects. Copyright may protect an original expression (for example, a specific character depiction or a particular sequence of scenes), trade mark law may protect distinctive signs that identify origin, and unfair competition rules can sometimes address parasitic copying. However, these tools fit poorly with how narrative marketing works in practice, and legal work on protection rarely engages with what research shows about how audiences perceive and retain stories.

Based on these challenges, the thesis is guided by three research questions:

*Which elements of a brand storytelling advertisement are recalled immediately after exposure, and are some elements systematically better remembered than others?*

*How are perceived narrative design qualities (e.g., narrative structure, message clarity, brand integration) and engagement mechanisms (e.g., narrative transportation, character identification, emotional engagement, cognitive load) associated with these recall outcomes?*

*To what extent can the key elements of a brand story be protected under intellectual property and unfair competition frameworks, and what practical implications follow for brand managers?*

## 1.3. Research motivations and expected contributions

The managerial motivation is straightforward. Story-based campaigns are costly to produce and to distribute, and their value depends on what is encoded and retrievable in consumers’ memory. If the brand is not integrated clearly, viewers may remember the plot but not the advertiser. If the message is too implicit, they may remember emotions but not the intended meaning. Understanding which story elements are retained, and under which psychological conditions, can therefore inform more deliberate creative choices and more realistic expectations about what storytelling can achieve.

The academic motivation is to move from broad claims about ‘the power of narratives’ to more precise, element-level evidence. Building on prior work in narrative persuasion and advertising (e.g., transportation and identification), this thesis operationalizes brand storytelling into five analyzable elements and tests how variations in perceived narrative qualities relate to immediate recall of specific elements. The empirical focus is intentionally on memory measured right after exposure, as a first step that captures initial encoding and immediate retention. Longer-term retention remains important, but it is beyond the scope of the present dataset and analyses.

A third motivation is interdisciplinary. If certain narrative components (such as a protagonist, a plot twist, or a recurring theme) are both salient for audiences and central for brand meaning, they are also the components that firms are most likely to want to protect. In practical terms, this can help managers prioritize where to invest creative and legal resources, by linking what tends to 'stick' in viewers' memory with what is also more realistically protectable or defensible under existing legal tools. By combining a quantitative study with a legal analysis, the thesis aims to clarify which narrative elements are most likely to become 'distinctive' in memory, and how far existing legal tools can realistically protect those elements. In doing so, the thesis contributes a more integrated view of brand storytelling as both a communication strategy and a protectable (or at least defensible) brand asset.

## 1.4. Approach

To answer the research questions, the thesis follows a step-by-step structure. Chapter 2 reviews the marketing literature on brand storytelling, narrative engagement and advertising memory, and it clarifies the key concepts and measures used in the empirical study. It also introduces the legal frameworks that can potentially protect storytelling elements, focusing on copyright, trade mark law and unfair competition approaches.

Chapter 3 translates the literature review into a conceptual model and hypotheses. It specifies how narrative design features are expected to shape narrative transportation and character identification, and how these engagement mechanisms are expected to relate to different recall outcomes.

Chapter 4 presents the research design of the quantitative study. It relies on an online questionnaire in which participants watch a narrative advertisement once and then answer validated scale items and recall questions. Chapter 5 reports the statistical results, including data preparation, reliability checks, descriptive patterns and hypothesis tests. Finally, the thesis closes by summarizing the main findings and by discussing their managerial and legal implications, as well as the limits that suggest directions for future research.

## 2. LITERATURE REVIEW

### 2.1. Introduction

Across sectors, campaigns increasingly unfold as compact narratives with characters, tension and resolution rather than lists of claims. The appeal is clear: stories can transport audiences, aligning attention, imagery and affect, thereby mitigating counterarguments (Green & Brock, 2000; Phillips & McQuarrie, 2010). Narratives can also connect brands to the self when the storyline goals resonate with personal goals and, in practice, enrich brand experience (Escalas, 2004). Yet effects are not automatic, meta-analytic evidence shows substantial heterogeneity across sources and settings (van Laer et al., 2019). These observations motivate the present study's focus on what consumers remember from brand stories, under which conditions and to what end.

This review sets the conceptual groundwork for the thesis by clarifying what counts as brand storytelling and its core elements, what is meant by 'memorization' in marketing and how narrative information is encoded, stored and retrieved (Kensinger, 2009; Schacter, 1999). It also sketches the pathways from stories to brand experience and customer-based brand equity, showing how stories can build favorable, strong and unique brand associations, and shape willingness to pay and evaluations (Keller, 1993; Krishnan, 1996; Lundqvist et al., 2013). Finally, it summarizes boundary conditions and moderators from narrative-persuasion research to inform precise operational definitions and measures (van Laer et al., 2014, 2019).

### 2.2. Conceptual Foundations: What Is Brand Storytelling?

#### 2.2.1. Story versus Narrative (and related terminology)

In marketing and consumer research, 'story' is usually used to refer to what happens (events, characters, conflicts) whereas 'narrative' refers to how that content is told (the discourse: sequencing, point of view, tone, symbolism). Narratives arrange information around causal sequences and character goals, which shapes interpretation and memory differently from list-like claims (Adaval & Wyer Jr., 1998). This mirrors the classic narratology distinction between what happens and how it is told, and consumer research applies it to explain how brands organize meaning in consumers' minds (Woodside, 2010). Keeping these terms distinct matters, as two ads can communicate the same underlying story (e.g., a customer overcomes a problem with the brand's help) yet use different narratives (voiceover vs. first person, linear arc vs. flashback) changing processing, identification and engagement (Escalas & Stern, 2003; Padgett & Allen, 1997).

#### 2.2.2. Core elements of a brand story

In practice, brand storytelling often relies on a core story animated by conflict and anchored in recognizable personas. These design choices help campaigns feel coherent and memorable across executions (Fog et al., 2005; Herskovitz & Crystal, 2010). For research purposes, this thesis focuses on five recurring elements aligned with the study's aims: brand integration, characters, plot/structure, message/theme or 'moral gist', and settings/context.

##### 2.2.2.1. Brand integration & brand/product presence

Brand integration describes how explicitly and meaningfully the brand/product is integrated into the story world, ranging from subtle embedding to a central, problem-solving role. Integration determines which associations (attributes, benefits, symbolic meanings) are encoded and how strongly they

connect to the brand in memory (Keller, 1993; Krishnan, 1996). When the brand is structurally tied to goal attainment inside the plot (e.g., the brand removes the obstacle), causal credit is assigned to the brand, strengthening accessibility and coherence of brand associations at retrieval (Adaval & Wyer Jr., 1998; Krishnan, 1996). Empirically, firm-originated stories with a clear brand role enhance reported brand experience (beyond entertainment value) and can influence willingness to pay (Lundqvist et al., 2013). Early autobiographical links formed through story exposure can also color brand meaning over time, as consumers fold the brand into personal memories (Braun-LaTour et al., 2007).

#### 2.2.2.2. Characters

Characters carry goals, emotions and viewpoints. They are the audience's entry point into the story. Identification (the extent to which audiences can know and feel the world as the character does) with a character invites self-referencing (matching story content with one's own experience) and can reduce counterarguing, which supports both comprehension and later recall (Escalas, 2004; Green & Brock, 2000). Using archetypal personas provides quick interpretive shortcuts and stable cues to brand meaning across touchpoints (Fog et al., 2005; Herskovitz & Crystal, 2010). The configuration of roles matters, as positioning the brand as mentor/helper versus protagonist changes perceived agency and can redirect attention toward central (goal-relevant) rather than peripheral details, improving memory for what the brand actually enables (Escalas & Stern, 2003; Kensinger, 2009).

#### 2.2.2.3. Plot & structure

Plot provides the causal chain that organizes events (setup, conflict, development, climax, resolution). Causal structure helps audiences build 'situation models' (who did what, when and why) that support gist memory and, when well cued, recognition of critical details (Lang, 2000; Padgett & Allen, 1997). Classical dramatic devices (reversals, reveals, parallel arcs) can be applied naturally to service or product stories and can convey both functional and symbolic meaning (Fog et al., 2005; Padgett & Allen, 1997). The temporal profile of affect, especially peaks and endings, also shapes global judgments, which is relevant for post-exposure evaluations (Baumgartner et al., 1997). However, structure comes at a cost. If sequencing becomes too complex without guiding cues, cognitive capacity is overloaded and memory suffers (Lang, 2000).

#### 2.2.2.4. Moral gist

Beyond events, stories communicate an organizing idea (the 'so what?') that frames interpretation: values, lessons and the brand's position (e.g., mastery, care, rebellion, fair play). A clear theme compresses experience into an essential trace that is durable and portable across situations, which is useful for word-of-mouth and for stabilizing brand meaning (Schacter, 1999; Woodside, 2010). In practice, the theme often travels via brand characters and slogans; it is what audiences can restate in a sentence after exposure (Fog et al., 2005; Herskovitz & Crystal, 2010). On social media, the theme also structures co-created narratives, guiding how users remix brand content without losing coherence (Singh & Sonnenburg, 2012).

#### 2.2.2.5. Settings / context

Settings (time, place, ambience) do more than decorate the scene, they indicate genre and feasible actions, contribute to realism and enrich mental imagery (a precursor to transportation and a support for memory of central elements) (Phillips & McQuarrie, 2010; van Laer et al., 2014). Concrete and familiar contexts (store, home, street, locker room) make usage and value comprehensible without explicit claims, while sensorial details can increase attention to goal-relevant cues (Phillips & McQuarrie, 2010). Context also filters evaluation, as a story created by a company can reframe how

audiences interpret otherwise modest or ambiguous product signals by embedding them in a plausible world (Lundqvist et al., 2013).

#### 2.2.2.6. How these elements work together

The most durable results come when brand integration, character goals and plot create clear causal links, when point of view and settings make those links vivid, and when the theme compresses them into a portable gist, so that favorable, strong and unique associations are formed where they matter (Keller, 1993; Krishnan, 1996).

#### 2.2.3. Forms of advertising and modes of engagement

A useful formal distinction opposes argumentative ads (claims, reasons and verifiable propositions) to narrative/dramatic ads, where characters enact a plot judged on coherence and verisimilitude. Narrative formats are especially effective for transferring symbolic meanings and value-in-use, while argumentative formats emphasize functional attributes. When the two are aligned (e.g., a story that demonstrates what the copy later states), the effects can be complementary (Padgett & Allen, 1997).

Format influences how people engage. Editorial-style narratives (advertorial tone, slice-of-life) can soften persuasion knowledge and support immersion, thereby improving attitudes toward both the ad and the brand (Chang, 2009). In aesthetics-rich categories, rhetorical design and imagery (e.g., metaphor, contrast, narrative gaps) often facilitate transportation and intensify the brand experience when the meaning is still inferable (Phillips & McQuarrie, 2010).

It is also helpful to distinguish modes of engagement. Viewers can analyze (evaluate the claims), identify (take the character's perspective), feel (co-experience emotions) and be transported or immersed (enter the story world). Storytelling typically triggers identification, feeling and transportation (mechanisms linked to reduced counterarguing and richer brand associations), whereas argumentative formats more often trigger analytic evaluation of propositions (Escalas, 2004; Green & Brock, 2000; Woodside, 2010).

#### 2.2.4. Positioning within broader brand constructs

Brand storytelling intersects first with brand experience (the sensations, feelings, cognitions and behaviors evoked by brand stimuli). Exposure to a firm-originated story can enrich this experience, even when the design elements are modest, sometimes increasing willingness to pay and prompting richer brand descriptions (Lundqvist et al., 2013). In practical terms, stories provide a felt context for use and value. They stage how the brand operates in real situations, which can reinforce meaning without relying on heavy-handed claims (Lundqvist et al., 2013).

Second, storytelling aligns with customer-based brand equity (CBBE), where value depends on the favorability, strength and uniqueness of brand associations (Keller, 1993). Because brand knowledge is stored in associative networks, what matters is not only which signals are present, but also how closely they are linked (Krishnan, 1996). Stories contribute by providing concrete retrieval cues (characters, problems, places) that 'index' the brand in memory, making associations easier to access and combine when people evaluate or talk about the brand (Singh & Sonnenburg, 2012; Woodside, 2010). Interpretation, however, is not mechanical. Consumers recruit their own life themes and personal projects to make sense of what they see, so the same story can be integrated differently into brand knowledge structures (Mick & Buhl, 1992).

## 2.3. Memory in Marketing: Definitions and Measures

### 2.3.1. What 'memorization' means in this context

In advertising research, memorization is typically captured by recognition and recall. Recognition asks whether people can detect prior exposure (e.g., forced-choice logo or scene recognition) and is generally more sensitive to initial encoding, including traces of familiarity (Lang, 2000). Recall requires retrieving content without (free recall) or with minimal cues (cued recall), which says more about storage strength and retrieval efficiency, which is what people can reconstruct when prompts are scarce (Lang, 2000).

A further, useful distinction is gist versus detail. Gist refers to the overall takeaway (e.g., 'the brand enables resourcefulness'), while detail refers to specific features such as a character's action, a line of dialogue, or the setting. Emotional content can shift this balance, as negative affect often privileges item-specific details, whereas positive affect is more likely to support gist retention (Kensinger, 2009). For brand stories, this means that strong or threatening conflicts can make people remember the main plot events more clearly, while warm and positive storylines tend to leave a lasting impression of the overall theme (Kensinger, 2009).

Human memory is also reconstructive. Transience (loss over time), absent-mindedness (weak encoding/attention), blocking (temporary retrieval failure), misattribution (wrong source), suggestibility (external misinformation shaping memory), bias (current beliefs coloring the past) and persistence (intrusive and unwanted recollections), which are the 'seven sins' of memory, imply that post-exposure measures can degrade or distort as time passes and contexts change (Schacter, 1999). For advertising, these sins warn against over-interpreting delayed self-reports or open-ended story summaries. Respondents may confuse brand and context, import details from similar ads, or reshape what they remember to match current brand attitudes, while simple forgetting or retrieval failures diminish the measured effect (Schacter, 1999).

### 2.3.2. How ad memory is usually measured

Advertising studies use a pragmatic toolbox that compares how people have processed an ad to what they can later access. Recognition (e.g., forced choice of scenes, brand/logo recognition) is the most sensitive indicator of initial encoding, while recall (free or cued) indexes what can be reconstructed with minimal information, thus testifying to storage strength and retrieval efficiency (Lang, 2000). To capture emotional dynamics during exposure, researchers often record moment-to-moment affect (e.g., feelings monitor) and link the temporal profile, especially peaks and endings, to global ad evaluations and downstream brand responses (Baumgartner et al., 1997).

Because narratives persuade through absorption, transportation is typically measured with validated scales that index being 'carried into' the story world. Higher scores typically go with more favorable responses (Green & Brock, 2000). Viewers' reactions to characters are assessed through Ad Response Sympathy (how much they understand the character) and Ad Response Empathy (how much they feel what the character feels). Both are linked to how positively people view the ad (Escalas & Stern, 2003). Beyond immediate processing, Self-Brand Connection scales quantify the perceived linkage between self and brand, an outcome that narrative processing can strengthen and that predicts attitudinal and behavioral responses (Escalas, 2004). More recent work adds retrospective reflection (self- or other-relevant memories evoked after transportation) as a mediator of belief and attitude change that is sensitive to personal relevance and cognitive load (Hamby et al., 2017). It is important to note that low recall does not imply low effectiveness, as emotional response can predict outcomes even when explicit recall is modest (Mehta & Purvis, 2006).

To connect memory with meaning, studies complement ad-level measures with brand-level diagnostics. From a customer-based brand equity perspective, equity depends on the favorability, strength and uniqueness of associations (Keller, 1993). Audits of brand knowledge therefore examine awareness and image, along with indicators such as how many associations people report, the valence (whether associations are positive or negative), the distinctiveness relative to competitors and whether associations come from direct experience or advertising (Krishnan, 1996).

### 2.3.3. Temporal and contextual considerations

Memory for stories is not static but changes over time. Emotional arousal tends to improve how well information is stored, yet it also limits attentional focus during encoding. As a result, people may recall central details better than peripheral ones, and this balance can shift over time (Kensinger, 2009; Lang, 2000). In parallel, the temporal profile of an ad (where the affective peak occurs and how it ends) strongly influences how people later evaluate and remember it. Their impressions are usually shaped more by the peaks and endings than by what happens in between (Baumgartner et al., 1997). For how affect unfolds (peaks/endings), see section 2.4.3. Finally, prior familiarity with the category or brand can intensify later judgments and word-of-mouth intentions, depending on whether the experience was positive or negative. This serves as a key boundary condition when linking remembered meaning to behavioral responses (Söderlund, 2002).

## 2.4. Cognitive Mechanisms Linking Stories to Memory

### 2.4.1. Attention and limited capacity

People process media with limited mental resources. We can only encode a small part of what we see and hear at any moment (Lang, 2000). Two forces decide what gets in. First, automatic orienting. Our reflex to turn toward something new or signal-like, such as a sudden cut, onset, or sound cue. Second, controlled allocation. The effort we choose to invest when we have a goal, like following a character's plan. Only the information that these two forces select is encoded and stored (Lang, 2000). Structural features (e.g., edits, scene changes, onsets) can trigger orienting and briefly boost encoding. However, if the overall message demands too many resources at once, these same features compete for capacity and recognition suffers (Lang, 2000). Findings from secondary-task reaction times align with this view. Emotionally intense segments reduce performance on a simultaneous task, revealing that attention has been captured. Yet these same segments tend to enhance recall, reflecting stronger memory encoding when attention is seized (Lang, 2000).

### 2.4.2. Emotion-memory dynamics

Emotion shapes what we notice and what we keep. In broad terms, negative affect is linked to better memory for intrinsic details and greater engagement of sensory processing, while positive affect tends to support more conceptual/semantic processing and thus gist retention (Kensinger, 2009). Arousal can also narrow focus. People remember the central features of an event better, sometimes at the cost of peripheral context. This 'focal enhancement' can be softened when task instructions direct attention outward (Kensinger, 2009). Over longer intervals, emotional material can be more resistant to forgetting, but not uniformly, as central elements often endure better than peripheral ones, and the usual memory distortions still apply (Kensinger, 2009; Schacter, 1999).

### 2.4.3. Affective patterning across the ad

What matters is not only how an ad feels at a given moment, but how feelings evolve over time. Global evaluations track the peak and the final moment of the affect curve more than the middle, and a steeper upward trend tends to produce more favorable judgments (Baumgartner et al., 1997). By contrast, longer duration adds little on its own unless the extra time builds to a higher peak (Baumgartner et al., 1997). After the peak, additional time can even lower evaluations, consistent with adaptation as intensity fades (Baumgartner et al., 1997). These dynamics extend to brand liking and recall, indicating that how a story builds and ends leaves stronger memory traces than length alone (Baumgartner et al., 1997).

### 2.4.4. Narrative transportation and related processes

Narratives can transport audiences into an absorbed state where attention, mental imagery and emotion operate together. This immersion shapes beliefs and attitudes while reducing the tendency to counterargue (Green & Brock, 2000). In aestheticized categories (e.g., fashion), rich narrative imagery offers a direct route to transportation and can intensify the felt brand experience (Phillips & McQuarrie, 2010). Transportation is not the only path, however. Audiences may experience sympathy, by understanding a character's circumstances, and empathy, by sharing their emotions. Though distinct, these reactions are linked. Sympathy typically precedes empathy, and both play a role in shaping attitudes toward the ad (Escalas & Stern, 2003).

These processes connect to longer-term brand meaning. Narrative processing can foster Self-Brand Connection, embedding the brand within a person's identity projects when plot goals map onto personal goals (Escalas, 2004). After exposure, retrospective reflection, where a story evokes personal memories, helps explain how narrative immersion translates into persuasion. The link is stronger when the story resonates personally and weaker when people experience greater cognitive strain, or overload (Hamby et al., 2017).

### 2.4.5. Story features that facilitate transportation

Transportation is more likely when a story offers identifiable characters, an imaginable plot with clear goals and causal links and sufficient verisimilitude to feel plausible in its world. Together, these features invite vivid imagery and sustained attention (van Laer et al., 2014). The Extended Transportation-Imagery Model explains how certain story features lead to emotional and cognitive responses that can change what people believe, feel, or intend to do. It shows how the way a story is built can influence persuasion afterward (van Laer et al., 2014).

A subsequent meta-analysis finds that transportation effects are robust but moderated by the story, the receiver and the context (section 2.6.3). This supports a design view. The same brand message can travel farther when the characters are easy to latch onto, the plot is easy to picture and the story world feels believable (van Laer et al., 2019).

### 2.4.6. How stories index brand meaning in memory

Stories leave behind indices (characters, settings, problems and actions) that create multiple routes to retrieve brand meaning and a scaffold for integrating later brand experiences (Singh & Sonnenburg, 2012; Woodside, 2010). At the brand level, these indices can strengthen awareness and image by helping consumers form associations that are favorable, strong and unique (Keller, 1993). Because brand knowledge is stored in associative networks, stories also enlarge and sharpen the set of brand associations, especially when links grow out of direct experience rather than abstract claims (Krishnan,

1996). Firm-originated stories can further reframe sparse design cues, prompting richer positive descriptions and higher willingness to pay when the narrative clarifies what the brand does in the real world (Lundqvist et al., 2013). Across time, personal memories connected to early or defining experiences in a product category can ground how a brand is understood and guide later choices, offering a window into how consumer-brand relationships evolve (Braun-LaTour et al., 2007).

## 2.5. From Memory Traces to Marketing Outcomes (Conceptual Pathways)

Narrative exposure leaves memory traces that work in two ways, as associative nodes and links (who did what, where and why) and as embodied assessments tied to characters, actions and outcomes. At the message level, transportation and related responses (sympathy, empathy and narrative thought) shape beliefs and attitudes by focusing attention, reducing counterarguing and organizing meaning around a causal plot (Escalas & Stern, 2003; Green & Brock, 2000). At the brand level, stories supply indices (people, places, problems, resolutions) that link the brand to memorable situations and enlarge the network of retrievable links (Singh & Sonnenburg, 2012; Woodside, 2010). When the brand is functionally and symbolically integrated into that plot, the resulting links tend to be favorable, strong and unique, which are the core ingredients of customer-based brand equity (Keller, 1993). Association diagnostics, like set size (how many associations a story creates), valence (whether they are positive or negative), distinctiveness (how unique they are) and experiential origin (whether they come from personal experience), help explain why some story-based meanings are more accessible and influential than others (Krishnan, 1996).

These structures map onto outcomes through several routes. First, narrative responses relate to attitudes toward the ad and the brand. Sympathy and empathy contribute directly and indirectly to ad attitudes, while transportation predicts persuasion-relevant beliefs (Escalas & Stern, 2003; Green & Brock, 2000). Second, narrative processing can strengthen Self-Brand Connection, which is consistently linked to attitudinal and behavioral intentions (Escalas, 2004). Third, well-crafted firm-originated stories can reframe sparse design cues and elevate willingness to pay by shifting how consumers describe and value the brand experience (Lundqvist et al., 2013). Fourth, in interpersonal settings, stories act as evidence of expertise and as relational devices that shape the tone and trajectory of buyer-seller exchanges (Gilliam & Flaherty, 2015). Finally, narrative word-of-mouth tends to transmit gist and evaluative tone more reliably than peripheral details, reinforcing story-consistent attitudes (Delgadillo & Escalas, 2004). Taken together, memory is not merely an endpoint but the mechanism through which narrative meaning carries forward to shape brand evaluations and consumer choices.

## 2.6. Contextual Factors and Boundary Conditions

Narrative effects are not uniform, they depend on properties of the story, the receiver and the situation. Meta-analytic evidence shows that transportation is robust on average, but its magnitude shifts with the commercial domain, the origin of the content (professional vs. user-generated) and reception conditions such as how and where people encounter the story (van Laer et al., 2019). Crucially, narrative ads are not automatically more effective than non-story formats. Their impact relies on how skillfully they are executed and how well they match the brand's strategy and context (Dessart, 2018). In parallel, collaborative storytelling in online communities can also sustain engagement by relying on recognizable roles and shared storylines that participants can easily continue or reshape (Dessart & Pitardi, 2019).

### 2.6.1. Story properties

Transportation hinges on specific design choices. The Extended Transportation-Imagery Model highlights identifiable characters, an imaginable plot with clear goals and causal links, and sufficient

verisimilitude to make events feel plausible within a coherent world (van Laer et al., 2014). The way a story is built also matters. Traditional and linear dramas, where events follow one another logically and characters interact over time, usually create more sympathy and empathy than vignette stories, which are made up of short and separate scenes. In such cases, people often feel sympathy first, and empathy develops afterward, influencing how they see the ad (Escalas & Stern, 2003). The argumentative vs. narrative distinction also matters for what meaning travels. As said in section 2.3, narrative executions excel at symbolic meaning through verisimilitude, while argumentative executions foreground functional claims. Aligned combinations work best when each form carries the type of information it conveys most effectively (Padgett & Allen, 1997). In aesthetics-rich categories, imagery-driven narratives provide a route to transportation and a more intense brand experience (Phillips & McQuarrie, 2010). Finally, conflict and structure (setup, development, climax, resolution) remain central levers for guiding attention and organizing meaning across episodes (Fog et al., 2005; Padgett & Allen, 1997).

### 2.6.2. Receiver properties

Narrative impact depends on the audience's resources, emotions and predispositions. Under the Limited Capacity Model, structural cues (e.g., edits, onsets) can trigger orienting and help encoding when overall load is modest, but the same cues compete for resources and impair memory when load is high (Lang, 2000). Emotion further shapes what is stored. Negative affect tends to privilege item-specific detail via sensory engagement, while positive affect more often supports gist through conceptual processing. Guiding the viewer's focus can, however, reduce the trade-off between central and peripheral information (Kensinger, 2009). After exposure, the path from transportation to retrospective reflection strengthens with personal relevance, whereas added cognitive load selectively suppresses this reflective mechanism even when transportation itself remains intact (Hamby et al., 2017). People also differ in transportability and in domain schemas. Prior familiarity with the brand or category can intensify later reactions to positive or negative experiences, providing important context for understanding remembered meanings and subsequent word-of-mouth behavior (Söderlund, 2002; van Laer et al., 2019).

### 2.6.3. Situational and contextual moderators

Narrative persuasion varies with where and how people encounter the message. Meta-analytic evidence finds robust average effects of transportation but shows that magnitude depends on domain (commercial vs. non-commercial), source (professional vs. user-generated) and reception conditions (e.g., individual vs. shared exposure) (van Laer et al., 2019). In branding practice, consistency across episodes matters. A coherent persona/archetype and stable theme help audiences connect executions across touchpoints. Without this, even interesting plots can seem like random scenes put together, which makes the story lose its overall meaning (Fog et al., 2005; Herskovitz & Crystal, 2010).

### 2.6.4. Summary

In sum, narrative impact is a matter of fit. Effects strengthen when the story form matches the intended meaning (what is told and how it is structured), when the emotional pattern matches the audience's attentional capacity (so peaks and endings work with, not against, limited resources) and when receiver predispositions align with the level of processing and reflection the story demands. For practice and for research, this means specifying (up front) what is told (elements, conflict, structure), how it is told (form, imagery, aesthetics), and for whom and under which conditions it will be processed and remembered. Designing and evaluating brand stories should therefore be treated as a matching problem. Narrative design needs to be aligned with the audience and the viewing context so that the intended meaning becomes both memorable and actionable.

Beyond these consumer effects, brand stories also matter as intangible assets. Once a narrative is memorable, it can also be copied, which raises the question of how (and how well) such storytelling can be legally protected.

## 2.7. Legal protection of brand storytelling

As seen before, brand storytelling in advertising combines several elements (characters, plot, moral gist, settings and brand integration) into a narrative that aims to shape how consumers feel about, and remember, the brand. From a legal point of view, these narratives can also represent intangible assets. However, their protection is fragmented. Some elements may fall under copyright, some under trade mark or other distinctive signs, while others are only indirectly protected through market practices and unfair competition law. This section gives an overview of the main legal frameworks under Belgian and EU law and highlights their relevance and limits for narrative advertising.

### 2.7.1. Intellectual property tools

#### 2.7.1.1. Copyright protection

In line with the Berne Convention for the Protection of Literary and Artistic Works, Belgian law provides that copyright protection arises automatically when a literary or artistic work exists and meets the conditions of protection. No registration or other formal step is required, rights are created by the mere act of creation<sup>1, 2</sup>. Copyright covers a wide range of works, and advertising content clearly falls within this broad notion of “literary and artistic works” of the Berne Convention, that includes audiovisual works, slogans and even character names among the examples of protectable works<sup>3</sup>.

Two cumulative requirements must be met for a subject matter to qualify as a protectable ‘work’ under copyright law. First, the work must be expressed in a concrete form. Ideas as such remain free, protection only extends to the ‘expression’ of an idea. This idea-expression dichotomy is reflected at international and EU level, for instance in Article 9(2) of the TRIPS Agreement, which states that copyright protection extends to expressions and not to ideas, procedures or methods<sup>4</sup>. EU and Belgian materials also insist that there must be an identifiable object with sufficient precision and objectivity, as confirmed by the CJEU in *Levola Hengelo*, where the Court refused protection for the taste of a cheese because it could not be identified with enough precision<sup>5</sup>.

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<sup>1</sup> Berne Convention for the Protection of Literary and Artistic Works, art. 5(2), which states that the enjoyment and exercise of copyright “shall not be subject to any formality”. See also the Belgian Code of Economic Law, Book XI (Intellectual Property), which does not subject the existence of copyright to registration or other formalities.

<sup>2</sup> See S. VAN GOMPEL, *Formalities in Copyright Law: An Analysis of Their History, Rationales and Possible Future*, Kluwer Law International, 2011, explaining that, after article 5(2) of the Berne Convention, the enjoyment and exercise of copyright can no longer be made subject to formalities.

<sup>3</sup> Berne Convention for the Protection of Literary and Artistic Works, art. 2(1), defining “literary and artistic works” as including “every production in the literary, scientific and artistic domain, whatever may be the mode or form of its expression” and listing, inter alia, cinematographic works and photographic works and similar creations.

<sup>4</sup> Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), art. 9(2), providing that copyright protection “shall extend to expressions and not to ideas, procedures, methods of operation or mathematical concepts as such.”

<sup>5</sup> Court of Justice of the European Union (C.J.E.U.), *Levola Hengelo BV v Smilde Foods BV*, 13 November 2018, C-310/17, EU:C:2018:899, points 41-44. The Court explains that a protected subject matter must be identifiable with sufficient precision and objectivity (point 41). It then holds that this is not the case for the taste of a food product, which depends on subjective and variable sensations (point 42) and cannot, in the current state of scientific development, be identified precisely and objectively by technical means (point 43). It therefore concludes that the taste of a food product cannot qualify as a “work” under Directive 2001/29 (point 44).

Second, the work must be original. In EU law, originality means that the work is the author's own intellectual creation. This standard was developed and refined by the CJEU in cases such as *Infopaq*, concerning short extracts of newspaper articles, and *Painer*, concerning portrait photographs. In *Infopaq*, the Court held that even short fragments may be protected if the selection and arrangement of elements reflect the author's creative choices<sup>6</sup>. In *Painer*, the Court stressed that a work is original when it reflects the author's personality through free and creative choices, for example in the preparation, shooting and post-production of a photograph<sup>7</sup>.

Applied to narrative advertising, these criteria mean that an advertising film will be protected if its storyline and audiovisual expression result from creative choices. Even if single elements are banal (an ordinary home interior, a family dinner, a city street), the selection, structure and combination of these elements (camera angles, editing, music, dialogue) can constitute an original work when they bear the mark of free and creative choices. The same reasoning can apply to recurring advertising characters or story worlds, provided they are described or visually designed with enough specific features to be distinguished from generic types.

At the same time, the idea-expression dichotomy sets clear limits. Abstract narrative concepts, advertising 'formats', generic themes ("a couple choosing a new home together") or purely functional methods of presenting a product are not protected as such<sup>8,9</sup>. Courts and doctrine underline that what is protected is the concrete way in which the story is told: the specific sequence of scenes, the wording of dialogues, the particular visual compositions or combinations of traits that make a character recognizable<sup>10</sup>. This distinction is illustrated by the *Christo* decisions. In a 1986 judgment, the Paris Court of Appeal treated as an original work "the idea of highlighting the pure lines of a bridge and its lampposts by means of fabric and ropes"<sup>11</sup>, whereas a 1987 judgment of the Paris Tribunal de grande instance held that copyright protects only "determined, individualized and perfectly identifiable" creations, and not a general style or "family of forms" based on an idea such as wrapping objects that do not need such treatment<sup>12</sup>.

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<sup>6</sup> C.J.E.U., *Infopaq International A/S v Danske Dagblades Forening*, 16 July 2009, C-5/08, EU:C:2009:465, confirming that originality in EU law requires the author's own intellectual creation and that even short extracts may be protected if they reflect such creative choices. See also Directive 2001/29/EC, art. 2.

<sup>7</sup> C.J.E.U., *Eva-Maria Painer v Standard VerlagsGmbH and Others*, 1 December 2011, C-145/10, EU:C:2011:798, points 88-92, on originality in portrait photographs and the role of the photographer's free and creative choices.

<sup>8</sup> TRIPS Agreement, art. 9(2), together with C.J.E.U., *Cofemel – Sociedade de Vestuário SA v G-Star Raw CV*, 12 September 2019, C-683/17, EU:C:2019:721, points 29-35, emphasizing that copyright protects the author's original expression and does not extend to abstract styles, concepts or purely functional solutions.

<sup>9</sup> See J. CABAY, "Ce sont les regardeurs qui font les tableaux. La forme d'une œuvre d'art conceptuel en droit d'auteur", in A. PUTTEMANS, B. DEMARSIN (eds.), *Les aspects juridiques de l'art contemporain*, Brussels, Larcier, 2013, pp. 9-82, discussing the form/idea dichotomy and the fact that abstract ideas remain unprotected.

<sup>10</sup> C.J.E.U., *Infopaq*, C-5/08, and C.J.E.U., *Painer*, C-145/10, read together as establishing that what is protected is the concrete expression of a work (selection, sequence, combination of elements), rather than the underlying idea or narrative concept.

<sup>11</sup> Court of Appeal, Paris, 13 March 1986 (*Christo / Pont Neuf*), holding that "the idea of highlighting the purity of the lines of a bridge and its lampposts by means of fabric and ropes ... constitutes an original work capable of protection".

<sup>12</sup> Tribunal de grande instance, Paris, 26 May 1987 (*Christo / Champs-Élysées*), stating that the law protects "only creations of determined, individualized and perfectly identifiable objects, and not a genre or family of forms ... corresponding to a style or process resulting from an idea, such as wrapping objects that do not need such treatment".

Short phrases, titles and slogans occupy an intermediate position. Slogans and character names can in principle qualify as “literary” works<sup>13</sup>, and originality does not depend on length<sup>14</sup>. However, in practice, many ordinary advertising phrases will fail to meet the originality threshold because they do not reflect sufficient creative choices. *Infopaq* confirms that short excerpts may be protected if they embody the author’s intellectual creation, but this will not be the case for simple, descriptive or purely promotional wording. As a result, the emotional ‘tagline’ of a campaign will sometimes be covered by copyright (if it is unusually creative and distinctive), but many common slogans will fall outside, even when they are highly memorable for consumers<sup>15</sup>.

Once a narrative advertisement exists and meets the conditions for copyright protection, the first question is who owns the right. Under Belgian law, the original holder of copyright is the natural person who created the work (art. XI.170 Code of Economic Law)<sup>16</sup>, and rights arise automatically from creation, without any formality, in line with article 5(2) of the Berne Convention<sup>17</sup>. In a campaign context, this usually means several people (scriptwriters, directors, illustrators, composers) each contribute elements that may be protected and are, in principle, co-authors. Belgian law treats such situations as a form of joint ownership (arts. XI.168-169 CDE). Exploitation normally requires the authors’ common agreement, while each of them may act alone to defend the work against infringements<sup>18</sup>.

To make this workable in practice, the Code also provides presumptions. The person whose name appears on the work is presumed to be the author, unless proved otherwise (art. XI.170, al 2 CDE)<sup>19</sup>. In

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<sup>13</sup> B. VANBRABANT, “2.19 CBPI: le mal-aimé, le mal-compris”, *I.R.D.I.*, 2022/3, pp. 256-264, spec. p. 261, noting that, where the conditions are met, an original work may take many forms, including a drawing, a photograph, a slogan, or the name of a fictional character.

<sup>14</sup> Berne Convention, art. 2(1), combined with C.J.E.U., *Infopaq*, C-5/08, indicating that the notion of ‘literary works’ is broad and that protection does not depend on the length of the text, provided originality is present.

<sup>15</sup> C.J.E.U., *Infopaq*, C-5/08, holding that even short extracts may be protected if they embody the author’s own intellectual creation. See also the often-cited advertising slogan “Parce que je le vaux bien” (L’Oréal) as an illustration of a short phrase treated in practice as sufficiently original to qualify as a literary work, in contrast with generic laudatory phrases (“the best quality”, “the best of the best”) which lack any personal intellectual creation.

<sup>16</sup> Belgian Code of Economic Law, art. XI.170: « Le titulaire originaire du droit d’auteur est la personne physique qui a créé l’œuvre. » (English translation: “The original holder of copyright is the natural person who created the work.”)

<sup>17</sup> Berne Convention, art. 5(2): “The enjoyment and the exercise of these rights shall not be subject to any formality.”

<sup>18</sup> Belgian Code of Economic Law, art. XI.168: « Lorsque le droit d’auteur est indivis, l’exercice de ce droit est réglé par les conventions. A défaut de conventions, aucun des auteurs ne peut l’exercer isolément, sauf aux tribunaux à se prononcer en cas de désaccord. Toutefois, chacun des auteurs reste libre de poursuivre, en son nom et sans l’intervention des autres, l’atteinte qui serait portée au droit d’auteur et de réclamer des dommages et intérêts pour sa part. » (English translation: “Where copyright is held in undivided shares, the exercise of this right is governed by agreements. In the absence of agreements, none of the authors may exercise it alone, save for the courts deciding in case of disagreement. However, each author remains free to bring proceedings in his or her own name, without the intervention of the others, in respect of any infringement of copyright and to claim damages for his or her share.”). Belgian Code of Economic Law, art. XI.169: « Néanmoins, ils auront le droit d’exploiter isolément leur contribution, pour autant que cette exploitation ne porte pas préjudice à l’œuvre commune. » (English translation: “However, they shall have the right to exploit their contribution separately, provided that such exploitation does not prejudice the joint work.”)

<sup>19</sup> Belgian Code of Economic Law, art. XI.170: « Est présumé auteur, sauf preuve contraire, quiconque apparaît comme tel sur l’œuvre, sur une reproduction de l’œuvre, ou en relation avec une communication au public de celle-ci, du fait de la mention de son nom ou d’un sigle permettant de l’identifier. » (English translation: “Unless proved otherwise, any person who appears as such on the work, on a reproduction of the work, or in connection with a communication of the work to the public, by the mention of his or her name or of a sign enabling that person to be identified, is presumed to be the author.”)

the advertising and audiovisual industries, this is also shaped by contract law and by specific presumptions for audiovisual works. As a result, economic rights are often concentrated in the hands of the producer<sup>20</sup>. In practice, producers and agencies then use production and commissioning contracts to license or transfer the necessary exploitation rights to the brand that will actually run the campaign. For the outside viewer, the story simply ‘belongs’ to the brand, but legally the chain of rights runs from individual creators, through production contracts, to the final advertiser.

Clarifying ownership also helps to understand the extent of protection. Belgian law distinguishes between economic rights (patrimonial rights) and moral rights. Economic rights allow the right holder to control and monetize the use of the work, while moral rights protect the author’s personal link with the work (name and integrity)<sup>21</sup>. For narrative advertising, the key economic rights are the right of reproduction and the right of communication to the public (art. XI.165 CDE)<sup>22</sup>. Reproduction covers any copying in whole or in part, including adaptations and translations<sup>23</sup>. Courts have accepted that even partial reproductions such as sequences of images, short extracts or re-orchestrated music can infringe if they take elements that contribute to the originality of the work<sup>24</sup>. Communication to the public covers broadcasting, online streaming and making the work available on platforms such as YouTube or social networks<sup>25</sup>.

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<sup>20</sup> Belgian Code of Economic Law, art. XI.182: « Sauf stipulation contraire, les auteurs d'une œuvre audiovisuelle ainsi que les auteurs d'un élément créatif licitement intégré ou utilisé dans une œuvre audiovisuelle, à l'exception des auteurs de compositions musicales, cèdent aux producteurs le droit exclusif de l'exploitation audiovisuelle de l'œuvre, y compris les droits nécessaires à cette exploitation tels que le droit d'ajouter des sous-titres ou de doubler l'œuvre. » (English translation: “Unless otherwise agreed, the authors of an audiovisual work, as well as the authors of a creative element lawfully integrated or used in an audiovisual work, with the exception of the authors of musical compositions, assign to the producers the exclusive right of audiovisual exploitation of the work, including the rights necessary for such exploitation such as the right to add subtitles or to dub the work.”)

<sup>21</sup> A. PUTTEMANS, *Droits intellectuels et concurrence déloyale. Pour une protection des droits intellectuels par l'action en concurrence déloyale*, Brussels, Bruylant, 2000, describing patrimonial rights as exclusive rights of reproduction, communication to the public and distribution, and moral rights as inalienable rights of paternity and integrity of the work.

<sup>22</sup> Belgian Code of Economic Law, art. XI.165, § 1: « L'auteur d'une œuvre littéraire ou artistique a seul le droit de la reproduire ou d'en autoriser la reproduction, de quelque manière et sous quelque forme que ce soit, qu'elle soit directe ou indirecte, provisoire ou permanente, en tout ou en partie. [...] L'auteur d'une œuvre littéraire ou artistique a seul le droit de la communiquer au public par un procédé quelconque, y compris par la mise à disposition du public de manière que chacun puisse y avoir accès de l'endroit et au moment qu'il choisit individuellement. » (English translation: “The author of a literary or artistic work alone has the right to reproduce the work or to authorize its reproduction, in any manner and in any form whatsoever, whether direct or indirect, temporary or permanent, in whole or in part. [...] The author of a literary or artistic work alone has the right to communicate the work to the public by any process, including by making it available to the public in such a way that everyone may have access to it from a place and at a time individually chosen.”)

<sup>23</sup> Belgian Code of Economic Law, art. XI.165, § 1: « ...reproduire ou en autoriser la reproduction [...] en tout ou en partie. Ce droit comporte notamment le droit exclusif d'en autoriser l'adaptation ou la traduction. » (English translation: “...to reproduce the work or authorize its reproduction [...] in whole or in part. This right notably includes the exclusive right to authorize adaptation or translation.”)

<sup>24</sup> See C.J.E.U., *Infopaq*, C-5/08, holding that even very short extracts may constitute a reproduction in part where they reflect the author’s own intellectual creation. See also Court of Appeal, Brussels, 5 May 2011, *Copiepresse SCRL v Google Inc.*, confirming that the reproduction of short fragments of press articles and headlines can infringe copyright where they bear the imprint of the author’s personality. See also Court of Cassation, Belgium, 3 September 2009, *Universal Music Holdings Z.B.V. and K.R. v V.P.E. and V.P.D.*, C.08.0337.N, points 11-12, requiring courts, where there are significant similarities between two works, to examine whether those similarities relate to original elements and, if so, presuming reproduction unless the later author shows that the earlier work could not reasonably have been known.

<sup>25</sup> Belgian Code of Economic Law, art. XI.165, § 1, which grants the author the exclusive right to communicate the work to the public “by any process”, including by making it available so that each person may access it from a place and at a time individually chosen. See also C.J.E.U., *Sociedad General de Autores y Editores de España (SGAE)*

Moral rights can also play a role in campaigns, as the author has inalienable moral rights, including the right to be identified and the right to respect for the work. Radical re-editing of a film or using it in a context that seriously distorts its meaning or harms the author's reputation, may raise moral-rights issues even if the economic rights have been transferred<sup>26</sup>. Finally, protection is long-lasting. As a rule, copyright runs for seventy years after the author's death, or after the death of the last surviving co-author for collaborative works<sup>27</sup>. After that, the work falls into the public domain and may be reused freely, although particular later elements or related rights (for example, performers' rights of actors) may still be protected. For brands, this means that the expressive details of a campaign enjoy strong exclusivity for many years, but that exclusivity is limited to the concrete protected expression and must coexist with exceptions and limitations (such as quotation or reporting)<sup>28</sup> and with the freedom of competitors to reuse general ideas and themes.

In summary, narrative advertising content benefits from copyright protection where it manifests original expression in a concrete form. Scripts (e.g., the "Only Fools and Horses" episode scripts<sup>29</sup>), voice-overs, images, music (e.g., the song "Aabatchouk", used as background music in a radio

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*v Rafael Hoteles SA*, 7 December 2006, C-306/05, EU:C:2006:764 (hotel TV broadcasting as communication to the public). See also C.J.E.U., *Nils Svensson and Others v Retriever Sverige AB*, 13 February 2014, C-466/12, EU:C:2014:76 (providing clickable links to protected works made freely available online as an act of communication to the public). See also C.J.E.U., *YouTube and Cyando (Frank Peterson v Google LLC and Others; Elsevier Inc. v Cyando AG)*, 22 June 2021, joined cases C-682/18 and C-683/18, EU:C:2021:503 (sharing platforms making protected content available to the public online).

<sup>26</sup> Belgian Code of Economic Law, art. XI.165, § 2: « L'auteur d'une œuvre littéraire ou artistique jouit sur celle-ci d'un droit moral inaliénable. [...] L'auteur a le droit de revendiquer ou de refuser la paternité de l'œuvre. Il dispose du droit au respect de son œuvre lui permettant de s'opposer à toute modification de celle-ci. Nonobstant toute renonciation, il conserve le droit de s'opposer à toute déformation, mutilation ou autre modification de cette œuvre ou à toute autre atteinte à la même œuvre, préjudiciables à son honneur ou à sa réputation. » (English translation: "The author of a literary or artistic work enjoys an inalienable moral right in that work. [...] The author has the right to claim or to refuse authorship of the work. He or she has the right to respect for the work, enabling him or her to oppose any modification of it. Notwithstanding any waiver, the author retains the right to oppose any distortion, mutilation or other modification of the work, or any other infringement of the same work, that is prejudicial to his or her honor or reputation."). See also A. PUTTEMANS, *Droits intellectuels et concurrence déloyale. Pour une protection des droits intellectuels par l'action en concurrence déloyale*, Brussels, Bruylant, 2000, describing moral rights as inalienable rights of paternity and respect for the work.

<sup>27</sup> Belgian Code of Economic Law, art. XI.166, § 1: « Le droit d'auteur se prolonge pendant septante ans après le décès de l'auteur [...] Lorsque l'œuvre est le produit d'une collaboration, le droit d'auteur existe au profit de tous les ayants droit jusque septante ans après la mort du dernier co-auteur survivant. » (English translation: "Copyright continues for seventy years after the death of the author [...] Where the work is the result of collaboration, copyright subsists for the benefit of all right holders until seventy years after the death of the last surviving co-author.")

<sup>28</sup> Belgian Code of Economic Law, art. XI.190, § 1, which allow, under certain conditions, the quotation of works for purposes such as criticism, review, teaching or research and the reproduction or communication of works in connection with the reporting of current events "dans la mesure justifiée par le but d'information poursuivi" (English translation: "to the extent justified by the inforamatory purpose pursued"). See also Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonization of certain aspects of copyright and related rights in the information society (InfoSoc Directive), OJ L 167, 22 June 2001, pp. 10-19, art. 5, recognizing optional exceptions for use of works in connection with the reporting of current events and for quotations for purposes such as criticism or review. See also C.J.E.U., *Painer*, C-145/10, confirming that the quotation exception must be interpreted in a way that preserves a fair balance between the interests of right holders and users of protected works.

<sup>29</sup> High Court of Justice (England & Wales), Intellectual Property Enterprise Court (IPEC), *Shazam Productions Ltd v Only Fools The Dining Experience Ltd & Ors*, 8 June 2022, [2022] EWHC 1379 (IPEC), point 65 (noting the defendants' admission that the "OFAH Scripts" were each protected by copyright).

advertisement<sup>30</sup>) and even certain characters (e.g., “Nijntje / Miffy”<sup>31</sup>) and slogans (e.g., “Maten, Makkers, Maes”<sup>32</sup>) may be protected, but general story ideas, narrative formulas and most standard promotional phrases remain in the public domain. This already hints at a tension relevant for this thesis: the narrative elements that are most easily remembered (for example, the central ‘moral’ or format of a campaign) are often those that are least securely protected by copyright.

#### 2.7.1.2. Trade mark protection

Trade marks and other distinctive signs protect the ability of a sign to distinguish the goods or services of one undertaking from those of others. Under EU and Benelux law, a wide range of signs can function as trade marks (words, logos, shapes, colors, sounds) as long as they are capable of distinguishing origin and can be represented clearly in the register<sup>33</sup>. This logic can extend into brand storytelling. The name of a recurring fictional character, the title of a campaign or a distinctive slogan<sup>34</sup> can, in principle, be registered and used as a trade mark if consumers see it as a badge of commercial origin rather than purely as a descriptive message.

For distinctive signs, three key ideas are particularly relevant for narrative advertising. First, trade mark protection focuses on the sign itself, not the broader narrative or atmosphere in which it is embedded. The law protects the name of a character (e.g., “Obelix”<sup>35</sup>), the stylized logo that appears at the end of a video (e.g., Adidas’ three-stripe figurative mark<sup>36</sup>), or a specific combination of words used as a slogan

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<sup>30</sup> Court of First Instance of Nivelles (11th Chamber), 26 October 2010, *Lichôdmapwa v ASBL Festival de Théâtre de Spa*. The defendant selected the song “Aabatchouk” as background music for a radio advertisement promoting the festival. The court treated the Creative Commons license as a copyright license and found a breach of its conditions, awarding damages (thereby confirming that the musical work was protected and exploitable through copyright licensing).

<sup>31</sup> District Court of Amsterdam (interim relief judge), 2 November 2010, *Mercis B.V. v Sanrio Company Ltd. & Sanrio GmbH*, ECLI:NL:RBAMS:2010:BO2607. The court held that the character Nijntje (Miffy) qualifies as a copyright-protected work (“auteursrechtelijk beschermd werk”) with its own original character, and found that the character “Kathy” marketed by Sanrio infringed Mercis’ rights due to the strong similarities.

<sup>32</sup> Court of Appeal (1st Chamber), Antwerp, 29 June 2009, *Auteurs & Média (A&M) 2010/2*, pp. 187-191 (slogan “Maten, Makkers, Maes”). The Court held that the slogan was eligible for copyright protection because it reflected a unique combination of three words and a creative use of alliteration. The integration of the trade mark “Maes” did not exclude copyright protection.

<sup>33</sup> Directive (EU) 2015/2436 of the European Parliament and of the Council of 16 December 2015 to approximate the laws of the Member States relating to trade marks (recast), OJ L 336, 23 December 2015, pp. 1-26, art. 3, and Regulation (EU) 2017/1001 of the European Parliament and of the Council of 14 June 2017 on the European Union trade mark, OJ L 154, 16 June 2017, pp. 1-99, art. 4, listing the types of signs that may constitute trade marks, including words, designs, letters, numerals, colors, the shape of goods or of their packaging and sounds.

<sup>34</sup> C.J.E.U., *Audi AG v OHIM (“Vorsprung durch Technik”)*, 21 January 2010, C-398/08 P, EU:C:2010:29, confirming that advertising slogans can be distinctive and registrable when they are perceived as indicating commercial origin rather than merely as promotional formulas.

<sup>35</sup> General Court, *Les Éditions Albert René v OHIM (MOBILIX)*, 27 October 2005, T-336/03, point 79 (stating that “Obelix” “will readily be identified ... with the corpulent character from the comic strip series”, well known in the European Union). See also C.J.E.U., *Les Éditions Albert René v OHIM*, 18 December 2008, C-16/06 P, EU:C:2008:739 (appeal dismissed, thereby upholding the General Court’s judgment).

<sup>36</sup> C.J.E.U., *Marca Mode CV v Adidas AG and Adidas Benelux BV*, 22 June 2000, C-425/98, EU:C:2000:339, point 7. The Court notes that “the figurative mark registered by Adidas ... is composed of three parallel stripes” and that it covers, inter alia, sports clothing, illustrating that a well-known logo/figurative sign can be protected as a trade mark.

(e.g., “Have a break”<sup>37</sup>). It does not protect the plot structure of the advert, the emotional journey or the cinematic ‘look and feel’ as such<sup>38</sup>.

Second, the sign must have distinctive character. Descriptive or generic terms are excluded, and even suggestive or laudatory expressions may be refused if they do not go beyond ordinary promotional language<sup>39</sup>. Purely descriptive designations cannot be monopolized as trade marks, even if they are widely used in marketing. By analogy, an advertising slogan that simply praises quality or taste will normally be seen as non-distinctive and remain free for all. Only when the wording, rhythm or structure of a slogan is sufficiently unusual and memorable will it be able to function as a trade mark. EU case law on advertising slogans follows the same logic, accepting protection for slogans that go beyond a simple laudatory message and require a minimal degree of interpretation or imagination from the consumer<sup>40</sup>.

Third, the *modus operandi* of enforcement is centered on confusion (and, for reputed signs, on dilution and unfair advantage). The scope of protection for trade marks and other commercial signs is largely framed by the ‘risk of confusion’ test or the likelihood of confusion<sup>41</sup>. In the advertising context, this means that a competitor infringes when it uses an identical or similar sign for similar goods or services in a way that may lead the public to believe that the goods come from the same or economically linked undertakings. If a competing campaign imitates the narrative structure, tone and emotional arc of a well-known advert, but adopts different names, logos and slogans, trade mark law will usually not apply because the protected signs have not been taken.

Practically, for brand storytelling, trade mark law is therefore best understood as a way to secure the stable identifiers that emerge from narrative branding: the brand name, logos, distinctive slogans, sometimes a recurring character name or stylized visual element (for example, a particular emblem or product shape). The narrative dimension of the campaign (the story that surrounds these signs) is not protected by trade mark law as such. This also contributes to the fragmented protection picture. Narrative branding can be legally secured at the level of signs, but the story that gives those signs their meaning and emotional weight remains largely outside the trade mark system.

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<sup>37</sup> C.J.E.U., *Société des produits Nestlé SA v Mars UK Ltd*, 7 July 2005, C-353/03, EU:C:2005:432, points 6-7 and 29-32. The case concerned Nestlé’s application to register the words “HAVE A BREAK” (from the slogan “Have a break... Have a Kit Kat”) as a trade mark. The Court held that a sign may acquire distinctive character through use as part of or in conjunction with another registered trade mark, confirming that such a slogan element can, in principle, be protected as a trade mark if the relevant public comes to perceive it as indicating commercial origin.

<sup>38</sup> See arts. 10-11 of Directive (EU) 2015/2436 and art. 9(2) of Regulation (EU) 2017/1001, defining infringement in terms of use of the sign in trade, thereby confirming that protection attaches to the sign itself and not to broader narrative content or ‘look and feel’.

<sup>39</sup> Directive (EU) 2015/2436, art. 4(1)(b)-(c), and Regulation (EU) 2017/1001, art. 7(1)(b)-(c), excluding non-distinctive, descriptive and generic signs from registration so that such indications remain available to all traders.

<sup>40</sup> C.J.E.U., *Audi AG (“Vorsprung durch Technik”)*, C-398/08 P, holding that no stricter criteria apply to marks consisting of advertising slogans and that such a slogan can possess distinctive character where, beyond conveying an objective promotional message, the combination of words displays a certain originality or resonance and requires a measure of interpretation on the part of the public, making it easy to remember.

<sup>41</sup> Directive (EU) 2015/2436, art. 10(2), and Regulation (EU) 2017/1001, art. 9(2), defining trade mark infringement in terms of the use of an identical or similar sign for identical or similar goods or services where there is a likelihood of confusion, including the likelihood of association, and granting additional protection to reputed marks in cases of dilution or unfair advantage. See also Belgian Code of Economic Law, Book VI, arts. VI.97-VI.100, and Directive 2005/29/EC of the European Parliament and of the Council of 11 May 2005 concerning unfair business-to-consumer commercial practices in the internal market (Unfair Commercial Practices Directive), OJ L 149, 11 June 2005, pp. 22-39, which prohibit misleading commercial practices, including marketing communications that create confusion with competitors’ products, trade marks, trade names or other distinguishing signs.

## 2.7.2. Unfair competition and parasitic copying

Before turning to unfair competition, it is important to clarify why intellectual property rights may be insufficient in practice for protecting brand storytelling. Copyright can protect original expression in a campaign, but it does not secure the underlying ideas, generic plot structures, narrative ‘formats’, or the overall message (the campaign’s moral gist) that viewers often remember most. In addition, even when a campaign contains protectable elements, enforcement may remain uncertain because the threshold of originality is assessed case by case and competitors can sometimes imitate the general mechanism of a story while avoiding the reproduction of sufficiently individualized expression. Trade mark law, for its part, offers strong protection for stable identifiers (names, logos, and some slogans), but it is structurally focused on signs that indicate commercial origin and therefore leaves much of the narrative substance (tone, emotional arc, sequencing of scenes, or ‘look and feel’) outside its scope. These limits create a practical protection gap. A competitor may copy the strategic narrative recipe of a successful campaign while staying just outside copyright and trade mark infringement. This gap explains why market practices and unfair competition rules can become relevant as a residual framework.

Recent Belgian authors describe this as a “reflex effect”<sup>42</sup>. The basic point is that unfair competition law should not be used as a shortcut to get IP-type protection when the legal conditions for copyright or trade mark protection are not met. In other words, you cannot use unfair competition to ‘rebuild’ a monopoly over something that copyright or trade mark law leaves free. That said, unfair competition can still apply in some cases. Copying as such may be allowed, but it can become unlawful if there are extra unfair elements around the copying, such as misleading the public, creating confusion, denigrating a competitor, or taking advantage through dishonest methods rather than competing on the merits<sup>43</sup>.

Where neither copyright nor trade mark law offers sufficient protection, the law on market practices and unfair competition can play a residual but important role. At international level, the Paris Convention obliges Member States to provide effective protection against acts of unfair competition, including acts that create confusion, false allegations that discredit a competitor, and indications or allegations liable to mislead the public<sup>44</sup>. In Belgian law, this general idea is implemented and expanded in Book VI of the Code of Economic Law, which governs market practices and consumer protection.

Two provisions are particularly relevant. Article VI.98 prohibits misleading commercial practices that are likely to cause the average consumer to take a transactional decision that they would not have taken otherwise, including marketing activities that create confusion with another product, trade mark,

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<sup>42</sup> For Belgian doctrine, the “reflex effect” refers to the idea that a creation or sign should not obtain, through general rules (civil liability or unfair competition), an IP-equivalent protection when the specific conditions of the relevant IP regime are not met. Authors often distinguish a formal reflex effect (linked to registration logic, notably in trade mark law) and a material reflex effect (grounded in the freedom to copy and the coherence of the IP system). See J. CABAY & B. VANBRABANT, “Propriété intellectuelle et concurrence déloyale : le bon réflexe”, *R.D.C.-T.B.H.*, 2024/3, pp. 257-274. See also, for the formal/material distinction in Benelux trade mark law and the channeling role of art. 2.19 CBPI, B. VANBRABANT, “2.19 CBPI : le mal-aimé, le mal-compris”, *I.R.D.I.*, 2022/3, pp. 256-264.

<sup>43</sup> See footnote 42 (reflex effect: definition, rationale, and the formal/material distinction). See also A. PUTTEMANS, *Droits intellectuels et concurrence déloyale. Pour une protection des droits intellectuels par l’action en concurrence déloyale*, Brussels, Bruylant, 2000 (foundational account of the theory). For a critical viewpoint on the codified reflex effect in art. 2.19 CBPI, see P.-Y. THOUMSIN, “L’article 2.19 CBPI : un dinosaure en voie d’extinction ?”, *I.C.I.P.*, 2020, pp. 688-697.

<sup>44</sup> Paris Convention for the Protection of Industrial Property, art. 10bis(1)-(3), obliging Member States to assure effective protection against unfair competition, including acts that create confusion, false allegations that discredit competitors, and indications liable to mislead the public.

trade name or other sign<sup>45</sup>. Article VI.104 then introduces a broad, open-ended prohibition: any act contrary to honest market practices that harms or may harm the professional interests of one or more other undertakings is unlawful<sup>46</sup>. This clause is the backbone of Belgian actions for unfair competition, including cases labelled as parasitic behavior. Commentators give the example of situations where one trader reuses almost identical advertising photographs or layouts created by another, allowing the imitator to benefit directly from the creative and financial investment made in the original campaign with minimal effort of its own<sup>47</sup>.

As a matter of principle, copying is lawful once specific intellectual property rights have expired or do not apply. Competitors are generally free to imitate successful ideas or marketing concepts<sup>48</sup>. Belgian case law also clarifies that the mere fact of free-riding on another undertaking's investments is not automatically enough. The Belgian Court of Cassation, in its *Noël Marquet* judgment, held that copying (even where it allows a trader to benefit directly from another's significant efforts or investments) is not, in itself, contrary to honest market practices, although the conduct may still be unlawful on another ground beyond IP infringement or confusion-based advertising<sup>49</sup>. Copying becomes problematic only when additional circumstances show that one undertaking is unfairly exploiting the efforts or reputation of another without making its own comparable effort. In such situations, doctrine

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<sup>45</sup> Belgian Code of Economic Law, art. VI.98, prohibiting misleading commercial practices that cause or are likely to cause the average consumer to take a transactional decision that they would not have taken otherwise, including practices that create confusion with another undertaking's products, trade marks or trade names.

<sup>46</sup> Belgian Code of Economic Law, art. VI.104, which prohibits any act contrary to honest market practices that harms or may harm the professional interests of one or more other undertakings, and Book XVII on enforcement of infringements of Book VI.

<sup>47</sup> A. PUTTEMANS, *Droits intellectuels et concurrence déloyale. Pour une protection des droits intellectuels par l'action en concurrence déloyale*, Brussels, Bruylant, 2000, citing in particular Commercial Court, Brussels, 11 June 1990, R.D.C., 1992, p. 436, and further case law on the reuse of another trader's advertising photographs and layouts.

<sup>48</sup> Paris Convention, art. 10bis, which obliges Member States to provide effective protection against acts of unfair competition but does not prohibit imitation as such. This reflects the general structure of intellectual property law, under which the imitation of unprotected ideas and concepts remains lawful in principle, subject only to specific exclusive rights (patents, trade marks, copyright, etc.) and the residual prohibition of unfair competition. See also A. PUTTEMANS, *Droits intellectuels et concurrence déloyale. Pour une protection des droits intellectuels par l'action en concurrence déloyale*, Brussels, Bruylant, 2000, no 143, affirming that our economic and legal system is dominated by the principles of freedom of competition and of commerce and that this implies, in principle, a right to copy or imitate, and no 133, where she recalls that "le simple fait de conquérir la clientèle d'un concurrent ou de copier celui-ci ne sont jamais, en soi, des actes de concurrence déloyale" (English translation: "the mere fact of capturing a competitor's customers or copying that competitor is never, as such, an act of unfair competition").

<sup>49</sup> Court of Cassation, Belgium, 29 May 2009, *Noël Marquet & Cie v Orac (and others)*, C.06.0139.N. The Court states that copying a competitor's offer is in principle allowed unless IP rights are infringed or the offer is made in circumstances contrary to honest market practices. It also holds that directly benefiting from another trader's significant efforts or investments is not automatically contrary to honest market practices, and criticizes the reasoning that would reduce unlawfulness to IP infringement or confusing advertising alone. See also Case note on Cass. (1st Chamber), 29 May 2009, *Noël Marquet & Cie v Orac*, C.06.0139.N, *Auteurs & Média (A&M)*, 2009/5, p. 534 (commenting on the Court's approach to lawful copying and the requirement of additional circumstances to establish conduct contrary to honest market practices). See also A. PUTTEMANS, "Introduction générale, principes et interrogations : Réflexions autour de l'arrêt *Noël Marquet* de la Cour de cassation", in A. PUTTEMANS, J. DE WERRA & Y. GENDREAU (eds), *Propriété intellectuelle et concurrence déloyale : les liaisons dangereuses ?*, Brussels, Larcier, 2017, pp. 9-37 (analyzing the *Noël Marquet* judgment and, more broadly, the methodological limits of using unfair competition as a residual route when IP protection does not apply). See also J. CABAY & B. VANBRABANT, "Propriété intellectuelle et concurrence déloyale : le bon réflexe", *R.D.C.-T.B.H.*, 2024/3, pp. 257-274 (discussing the doctrinal controversy around the scope of *Noël Marquet* and its interaction with the reflex effect).

and case law speak of ‘parasitic’ conduct (a competitor ‘lives off’ the investments made by another instead of competing on its own merits<sup>50</sup>).

Transposed to narrative advertising, these rules can address cases where a brand invests heavily in a distinctive story-based campaign and a competitor then launches a campaign. Even without copying scripts word-for-word or using confusingly similar signs, the competitor may reproduce the central narrative mechanisms, the sequence of key scenes and the overall ‘look and feel’ in a way that clearly free-rides on the original. If copyright protection is denied (because the storyline is seen as too close to an idea, or because the imitation remains just sufficiently different) and no trade mark confusion arises (because names and logos differ), the original advertiser may still rely on article VI.104 and article XVII.1/4 (action for cessation) of the Belgian Code of Economic Law to argue that the competitor’s behavior is contrary to honest market practices<sup>51</sup>.

However, this route is intentionally flexible and case-by-case. Courts will assess the degree of similarity, the economic context, the investments made, and whether the imitator is truly appropriating the competitive advantage generated by the first campaign<sup>52</sup>. There is a fine line between legitimate inspiration, which remains allowed in a competitive market, and imitation that effectively displaces the first mover’s narrative advantage. If unfair competition is interpreted too broadly, there is a risk of over-protecting narrative concepts and unduly restricting creative freedom and competition in advertising. This is why Belgian doctrine insists on keeping a clear boundary between lawful inspiration and unfair appropriation<sup>53</sup>).

### 2.7.3. Interim conclusion

Brand storytelling is only partially covered by existing legal regimes. Copyright protects original expressive choices in scripts, images, music and sometimes characters or slogans, but it does not extend to the underlying ideas, styles or campaign formats that competitors may wish to emulate. Trade mark law can secure the signs that function as identifiers (brand names, logos, distinctive slogans and sometimes character names) yet it is indifferent to the narrative structure and emotional arc in which these signs appear. Unfair competition law, finally, offers a flexible but uncertain tool against

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<sup>50</sup> Paris Convention, art. 10bis(2)-(3) (obligation to provide effective protection against acts of unfair competition, including acts contrary to “honest practices in industrial or commercial matters”). See also C.J.E.U., *L’Oréal SA and Others v Bellure NV and Others*, 18 June 2009, C-487/07, EU:C:2009:378 (characterizing “unfair advantage” as a form of free-riding whereby a trader seeks to benefit from the marketing efforts and reputation of another). See also E. DERCLAYE, “Can and should misappropriation also protect databases?”, in E. DERCLAYE (ed.), *Research Handbook on the Future of EU Copyright*, Cheltenham, Edward Elgar, 2009, pp. 87-89, describing parasitism as a situation in which a trader, without incurring its own expenditure, uses the fruits of another’s efforts, investments or know-how by “following in their wake”. See also A. PUTTEMANS, *Droits intellectuels et concurrence déloyale. Pour une protection des droits intellectuels par l’action en concurrence déloyale*, Brussels, Bruylant, 2000, pp. 234-236, defining “parasitic competition” as the systematic exploitation of a competitor’s investments and commercial value instead of competing on the basis of one’s own effort.

<sup>51</sup> Belgian Code of Economic Law, art. VI.104, combined with art. XVII.1/4, providing for an action for cessation (injunction) in case of unfair market practices or breaches of the rules on market practices.

<sup>52</sup> Belgian Code of Economic Law, art. VI.104. See also A. PUTTEMANS, *Droits intellectuels et concurrence déloyale. Pour une protection des droits intellectuels par l’action en concurrence déloyale*, Brussels, Bruylant, 2000, p. 240, reporting Gh. LONDERS, “Onrechtmatig imiteren, kopiëren en aanhaken”, in J. STUYCK (ed.), *Handelspraktijken anno 1996*, Antwerpen, Kluwer, pp. 204-205, who holds that parasitic competition can only be found in exceptional cases and that the judge must, in concreto, assess whether the copied performance results from substantial efforts or investments, has economic value, gives the imitator a direct advantage and is taken without any creative effort to distinguish his own performance.

<sup>53</sup> See footnote 42 (recent Belgian doctrine on the reflex effect and the methodological limits of unfair competition as a substitute for unmet IP conditions).

parasitic ‘copycat’ campaigns, applied through open-ended standards such as ‘honest market practices’ and ‘misleading practices’.

For this thesis, this fragmented protection is more than a background technicality. It suggests that the narrative elements that consumers remember most clearly (plot, emotional climax, story world, ...) may well be those for which legal exclusivity is the weakest, while more technical elements (names, logos, registered slogans) can be strongly protected even if they are less central in memory. The empirical analysis on recall of narrative elements can therefore be discussed in light of this asymmetry between psychological salience and legal protection.

## 2.8. Synthesis and Research Gaps

### 2.8.1. Consolidated definitions

The literature converges on a pragmatic view of brand storytelling. A brand is embedded within a causal sequence enacted by identifiable characters in a plausible setting, organized around conflict and resolution. Meaning is carried not only by what happens (the story) but also by how it is told (the narrative/discourse) (Fog et al., 2005; Padgett & Allen, 1997; Woodside, 2010).

For operational purposes, five elements are central and observable at exposure: brand integration (how explicitly and functionally the brand/product participates in the causal chain), characters (identifiability, archetypal fit, role/protagonism), plot/structure (setup, development, climax, resolution), message/theme or ‘moral gist’ (values, moral, takeaway), and settings/context (spatiotemporal and ambience cues that create verisimilitude) (Herskovitz & Crystal, 2010; van Laer et al., 2014). These features can be coded and linked to various processing outcomes, such as how attention is allocated (Lang, 2000), how emotions unfold over time (Baumgartner et al., 1997), how deeply audiences are transported or feel empathy (Escalas & Stern, 2003; Green & Brock, 2000), and how they reflect afterward (Hamby et al., 2017). They can also be related to brand meaning, following a customer-based brand equity view that includes the favorability, strength and uniqueness of associations (Keller, 1993; Krishnan, 1996; Lundqvist et al., 2013).

Beyond consumer effects, brand storytelling also matters as an intangible asset. However, the legal protection of narrative elements remains fragmented, as some elements may be protected under copyright, others under trade mark law, and others mainly through unfair competition, depending on their distinctiveness and the way they are expressed. This can create a mismatch between what audiences remember most easily and what can be protected most effectively.

### 2.8.2. Gaps and positioning of the study

This project addresses a core unresolved issue in brand storytelling: which elements of a brand story are actually retained over time, and under what conditions (immediate vs. delayed tests, gist vs. detail). While prior work explains how narratives can shape attention, emotion and beliefs, we still lack element-level evidence on what consumers remember from brand communications (characters, plot/climax, message/theme or ‘moral gist’, settings, the brand’s role) and how these traces evolve (Fog et al., 2005; Keller, 1993; Krishnan, 1996; Padgett & Allen, 1997; Woodside, 2010).

Empirically, the study is positioned to compare immediate retention across the five elements and to link these memory traces to validated self-report measures of narrative transportation and character identification, while also accounting for emotional engagement and cognitive load. By mapping what is retained to recognized cognitive and affective mechanisms, including limited capacity and emotion-memory dynamics (Kensinger, 2009; Lang, 2000), the study aims to deliver concrete, element-level

answers to the practical question that is: what do consumers actually remember from a brand narrative?

Beyond these memory questions, brand storytelling also raises a protection issue. Although the legal literature discusses copyright, trade mark law, and unfair competition as possible tools, it rarely connects these frameworks to empirical evidence on which narrative elements are actually most salient for audiences. This thesis therefore positions the legal analysis as a complementary angle. It examines how the elements that are likely to be remembered (e.g., characters, plot features, themes, brand integration) may (or may not) be protected under different legal regimes.

## 2.9. Conclusion

This review defines brand storytelling as a mode of marketing communication in which a brand is embedded within a causal sequence enacted by identifiable characters in a plausible setting and organized around conflict, development, climax and resolution. It keeps the distinction between story (what happens) and narrative (how it is told: sequencing, point of view, tone, symbolism). On this basis, five elements are operationalized for analysis: brand integration/brand-product presence, characters (identifiability, protagonism, archetypal/persona fit), plot/structure (setup, conflict, development, climax, resolution), message/theme or 'moral gist' (the distilled value stance or moral), and settings/context (spatiotemporal and ambience cues that create verisimilitude).

These definitions provide a shared vocabulary and coding scheme for subsequent work. They specify what constitutes each element at exposure and enable consistent mapping to memory outcomes (recognition/recall, gist/detail) and, ultimately, to brand meaning. In parallel, they also provide a practical basis to discuss which narrative components may qualify for legal protection, depending on how they are expressed and used in branding. With this conceptual foundation in place, the empirical component can test, without presupposition, which story elements are retained over time.

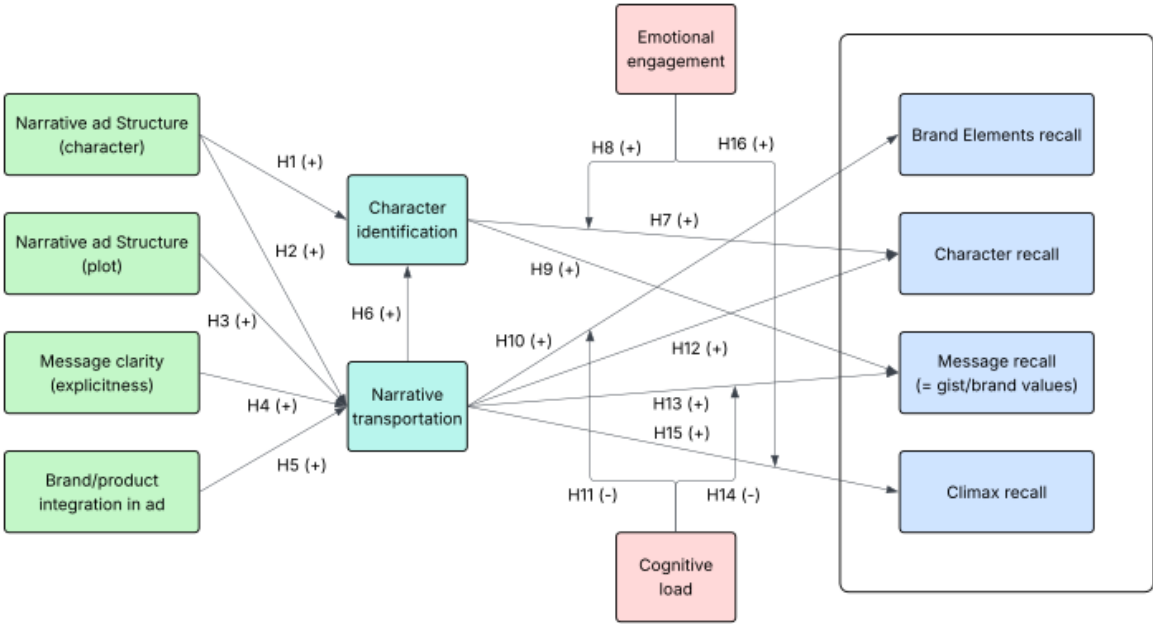
### 3. CONCEPTUAL MODEL AND HYPOTHESES DEVELOPMENT

#### 3.1. From literature review to model and hypotheses

Building on the literature review, this section turns the main theoretical insights into a conceptual model and a set of testable hypotheses. The review clarified what brand storytelling is, how its core elements (brand integration, characters, plot/structure, message or ‘moral gist’, and settings) can shape what is encoded in memory, and which engagement mechanisms are most likely to translate story exposure into recall. It also highlighted several gaps. We still know relatively little about which parts of a brand story are actually remembered, and how narrative design choices shape what people can recall immediately after exposure. The aim here is therefore to articulate a set of hypotheses, grounded in prior work, that specify the expected relationships between narrative design, narrative engagement processes and different types of recall. To support this, the subsection first presents an overview of the conceptual model and then develops each hypothesis in turn.

#### 3.2. Conceptual model

Figure 1



The conceptual model (Figure 1) summarizes the relationships proposed in this thesis. On the left, four variables capture narrative design at the ad level: narrative ad structure (character), narrative ad structure (plot), message clarity (explicitness) and brand/product integration in the ad. Together, these variables describe how the story is built (how clearly characters are defined, how events are organized into a causal plot, how explicit the core message is, and how strongly the brand is woven into the narrative).

In the center of the model, two narrative engagement mechanisms act as key mediators: narrative transportation (absorption into the story world) and character identification (adopting the protagonist’s perspective and emotions) (Cohen, 2001; Green & Brock, 2000; Tal-Or & Cohen, 2010; van Laer et al., 2014). The model assumes that narrative design features facilitate these mechanisms, and that these mechanisms, in turn, shape what is remembered.

Around these central mechanisms, two additional constructs are conceptualized as moderators. Emotional engagement reflects the intensity of feelings elicited by the narrative (Busselle & Bilandzic, 2009) and is expected to strengthen memory for emotionally central elements (e.g., characters and climaxes) (Kensinger, 2009). Cognitive load captures the mental effort required during exposure (Lang, 2000; Paas, 1992) and is expected to weaken the translation of engagement into brand- and message-related recall when resources are constrained.

On the right side of the model, four immediate recall outcomes are distinguished: brand elements recall, character recall, message recall (moral gist / brand values) and climax recall. This element-level approach assumes that a story is not remembered as one single 'block'. Some parts are stored and recalled better than others, depending on how important they were and how they were processed during viewing (Kensinger, 2009; Schacter, 1999).

Overall, the model assumes an indirect pathway from narrative design to recall. Design features influence transportation and identification, then these engagement processes affect how well different elements of the story are remembered, with emotional engagement and cognitive load shaping the strength of these links.

### 3.3. Hypotheses

#### 3.3.1. Narrative design and engagement mechanisms

The first set of hypotheses focuses on how narrative design features are expected to shape viewers' engagement with the story. The literature review suggested that well-structured characters and plots, clear messages, and strong brand integration can all make it easier for viewers to follow the story, understand what is at stake and feel involved in what happens. In this thesis, these design choices are assumed to influence two central mechanisms, which are narrative transportation and character identification. Based on prior work on narrative persuasion and storytelling advertising, the following hypotheses specify how narrative structure (here regarding the character and the plot), message clarity and brand integration are expected to increase transportation and identification, and how transportation in turn should foster identification.

*H1: Narrative ad structure (character) positively impacts character identification.*

When characters are clearly developed and psychologically coherent, viewers can more easily understand their goals and emotions and use them as an entry point into the story, which should foster identification (Escalas, 2004; Fog et al., 2005; Herskovitz & Crystal, 2010). Well-developed protagonists also facilitate empathy and self-definition processes that lie at the core of identification (Cohen, 2001; Tal-Or & Cohen, 2010). In line with this, Gustavo De Souza Netto Gomes' qualitative thesis (2024) suggests that emotionally rich main characters who drive the plot are those viewers feel connected to and keep recalling. Therefore, narrative ad structure (character) is expected to positively impact character identification.

*H2: Narrative ad structure (character) positively impacts narrative transportation.*

When character structure is strong (clear goals, coherent reactions, visible development), viewers should find it easier to mentally simulate the story and stay absorbed in it (Escalas, 2004; Green & Brock, 2000). Clear protagonists also reduce confusion about who matters and why, which helps viewers stay focused throughout the story rather than stopping to figure out what is going on (Busselle & Bilandzic, 2009). Consistent with this, Gomes (2024) links emotionally rich and central characters to stronger engagement and later recall, suggesting that character structure can anchor transportation. Therefore, narrative ad structure (character) is expected to positively impact narrative transportation.

*H3: Narrative ad structure (plot) positively impacts narrative transportation.*

A clear plot structure should strengthen transportation because it helps viewers build a coherent understanding of the story's causal chain (who did what, when, and why), which is central to immersion (Lang, 2000; Padgett & Allen, 1997). A well-delineated progression (especially when it builds toward a visible climax) can also sustain curiosity and emotional momentum, which are core drivers of transportation (Escalas & Stern, 2003; Fog et al., 2005; Green & Brock, 2000). Consistent with this, Gomes (2024) finds that key plot points, and particularly the climax, are among the most frequently recalled elements, suggesting strong engagement at exposure. Therefore, narrative ad structure (plot) is expected to positively impact narrative transportation.

*H4: Message clarity (explicitness) positively impacts narrative transportation.*

When the ad's main idea is clear, viewers should spend less effort resolving ambiguity and can devote more attention to imagery and emotional involvement, which supports transportation (Lang, 2000). Empirical work on slogans also shows that higher clarity improves comprehension and helps align perceived brand meaning with the intended message (Dass et al., 2023). However, narrative research suggests that excessive obviousness can reduce immersion if persuasive intent becomes too salient (Kim et al., 2022). Gomes (2024) similarly reports that explicit messages are retained more strongly than implicit ones, which he links to their central narrative role and their strong associative ties with other key elements. Overall, when clarity is high but remains integrated in the story, it should facilitate transportation. Therefore, message clarity (explicitness) is expected to positively impact narrative transportation.

*H5: Brand/product integration in ad positively impacts narrative transportation.*

When the brand or product is meaningfully embedded in the story's causal chain, it should feel less like an external interruption and more like part of a coherent narrative experience, which supports immersion and transportation (Russell, 2002). Brand storytelling research suggests that brands positioned as central helpers or quasi-characters can generate stronger engagement than purely informational brand cues (Herskovitz & Crystal, 2010; Lundqvist et al., 2013). Consistent with this, Gomes (2024) reports relatively strong recall for brand history when it functions as a central narrative theme, which he explains by its structural role and links with other story elements. Therefore, brand/product integration in the ad is expected to positively impact narrative transportation.

*H6: Narrative transportation positively impacts character identification.*

Although distinct, transportation and identification are expected to reinforce each other. When viewers are transported, attention and imagination are focused on the unfolding story, which makes them more likely to closely follow the protagonist's thoughts, goals, and emotions (Busselle & Bilandzic, 2009; Green & Brock, 2000; van Laer et al., 2014). This sustained focus and emotional involvement supports identification processes such as empathy and perceived similarity (Cohen, 2001; Dessart, 2018). Gomes (2024) also suggests that stronger emotional bonds with main characters help explain why they remain more memorable than secondary figures. Therefore, narrative transportation is expected to positively impact character identification.

### 3.3.2. Engagement mechanisms and recall outcomes

The second set of hypotheses focuses on how viewers' engagement with the story is expected to translate into what they can remember after exposure. The literature review suggested that being transported into a narrative and identifying with its main character can shape how information is processed and encoded, making some story elements more accessible in memory than others. In this thesis, these engagement mechanisms are assumed to influence recall across different targets of the ad (such as brand-related information, characters, the message and the climax). Based on prior work on narrative persuasion, storytelling advertising, and memory, the following hypotheses specify how

narrative transportation and character identification are expected to predict these recall outcomes, and how emotional engagement and cognitive load may condition some of these relationships.

*H7: Character identification positively impacts character recall.*

When viewers identify with the protagonist, they process the narrative from that character's perspective and link the character's experiences to their own feelings, which encourages self-referential encoding and should strengthen later recall of the character and their actions (Escalas, 2004; Tal-Or & Cohen, 2010). Gomes (2024) similarly observes that main characters associated with stronger emotional bonds remain relatively well remembered, whereas side characters fade more quickly. This pattern also aligns with memory research showing that emotionally meaningful, central agents tend to be stored more robustly and retrieved more easily (Kensinger, 2009; Schacter, 1999). Therefore, character identification is expected to positively impact character recall.

*H8: Emotional engagement moderates the effect between character identification and character recall.*

Emotional engagement should strengthen the link between identification and character recall. Narrative engagement research suggests that emotional engagement is a distinct facet of the viewing experience and can be a key driver of how strongly people respond to a story (Busselle & Bilandzic, 2009). From an emotion-memory perspective, affect can prioritize certain information for encoding and protect it from decay (Kensinger, 2009). Consistent with this, Gomes (2024) finds that emotionally resonant characters (especially main characters and emotionally supportive side characters) are described in richer detail and retained better than more neutral figures. Therefore, when emotional engagement is higher, identification should translate more strongly into character recall.

*H9: Character identification positively impacts message recall.*

In narrative ads, the message is often conveyed through what the protagonist says, learns, or embodies. When viewers identify with the protagonist, they are more likely to treat this meaning as personally relevant and integrate it into their own thinking, which should support message recall (Escalas, 2004; Green & Brock, 2000). Research on narrative persuasion and self-referencing similarly suggests that this type of personalized processing strengthens understanding and retention (Hamby et al., 2017). Gomes (2024) also reports that explicit messages tend to show less decay than implicit ones, partly because they are strongly linked to central narrative elements such as the main character. Therefore, character identification is expected to positively impact message recall.

*H10: Narrative transportation positively impacts brand elements recall.*

Brand equity research argues that brand associations become stronger and more accessible when information is processed deeply and integrated into existing knowledge structures (Keller, 1993; Krishnan, 1996). When viewers are transported into a narrative that meaningfully includes the brand, brand-related information is more likely to be processed as part of the experience rather than as a peripheral cue, which should support later recall (Delgadoillo & Escalas, 2004; Russell, 2002). Gomes (2024) similarly finds that brand history is recalled relatively well when it plays a central narrative role and is tightly linked to other story elements. Therefore, narrative transportation is expected to positively impact brand elements recall.

*H11: Cognitive load moderates the effect between narrative transportation and brand elements recall.*

Because cognitive resources are limited, higher cognitive load should reduce the extent to which transportation translates into brand elements recall (Lang, 2000; Paas, 1992). When processing demands are high, fewer resources remain available to encode brand-related information alongside the story. Experimental work supports this logic, showing that cognitive load during exposure can reduce transportation and weaken its downstream influence on reflective processing (Hamby et al., 2017). Gomes (2024) similarly suggests that dense or complex narratives increase the risk that less central brand details are dropped from memory. Therefore, cognitive load is expected to weaken the positive link between transportation and brand elements recall.

*H12: Narrative transportation positively impacts character recall.*

When transportation is high, viewers devote sustained attention to the unfolding events and the protagonists driving them, which should strengthen encoding of character information (Green & Brock, 2000). In narrative advertising, main characters typically carry conflict and resolution, so transported viewers should follow their journey more closely, improving recall (Escalas, 2004; Fog et al., 2005). Gomes (2024) similarly finds that main characters are among the most robustly remembered elements over time, which he links to their central narrative role and the bonds they create with viewers. Therefore, narrative transportation is expected to positively impact character recall.

*H13: Narrative transportation positively impacts message recall.*

Transportation should support message recall because absorption in a narrative reduces counterarguing and encourages viewers to integrate the story's implications into their beliefs (Green & Brock, 2000; van Laer et al., 2014). Stories also tend to translate complex events into a more 'gist-like' takeaway, especially when attention and emotional involvement are high (Schacter, 1999; Woodside, 2010). Gomes (2024) similarly finds that explicit messages closely tied to the narrative show relatively little decay over time, which he links to their strong connections with other central elements (e.g., characters, climaxes, brand history). Therefore, narrative transportation is expected to positively impact message recall.

*H14: Cognitive load moderates the effect between narrative transportation and message recall.*

Higher cognitive load should weaken the link between transportation and message recall, because fewer resources remain available to encode and integrate the story's core meaning, even when the narrative feels engaging (Hamby et al., 2017; Lang, 2000). Experimental evidence suggests that load can disrupt the deeper processing through which transportation translates into more stable message-related outcomes (Hamby et al., 2017). Gomes (2024) also reports stronger decay for implicit messages, which he attributes to the higher cognitive effort required to infer meaning, and notes that complex narrative structures can overwhelm resources so that only the most salient elements are retained. Therefore, the positive transportation-message recall association is expected to be stronger under low cognitive load and weaker under high load.

*H15: Narrative transportation positively impacts climax recall.*

Transportation should enhance climax recall because climaxes are structurally central moments that combine peak tension, strong emotion, and causal resolution, which naturally attract attention and mental simulation (Fog et al., 2005; Padgett & Allen, 1997). Memory research also suggests that emotional peak moments tend to be encoded as part of an event's summary representation, making them especially accessible later (Baumgartner et al., 1997; Kensinger, 2009). Consistent with this, Gomes (2024) finds that climaxes are among the most resilient plot points across recall waves. Therefore, narrative transportation is expected to positively impact climax recall.

*H16: Emotional engagement moderates the effect between narrative transportation and climax recall.*

Emotional engagement should strengthen the effect of transportation on climax recall. Emotion-memory research suggests that higher arousal enhances memory for central and goal-relevant moments such as climaxes (Kensinger, 2009). Gomes (2024) similarly reports that emotionally intense climaxes (often linked to conflict resolution or brand history) are repeatedly mentioned in later interviews. Therefore, among equally transported viewers, those who feel more emotionally engaged are expected to recall the climax more strongly than those whose emotional response is weaker.

## 4. RESEARCH DESIGN

### 4.1. Methodology

#### 4.1.1. Research strategy and design choice

To answer the research question, this thesis relies on a quantitative online study. All participants were exposed to the same narrative advertisement and then completed a structured questionnaire measuring how they perceived and experienced the story, as well as what they remembered right after viewing.

The goal is to test whether differences in perceived storytelling qualities (e.g., narrative structure, message clarity, brand integration) and psychological mechanisms (e.g., transportation, identification, emotional engagement, cognitive load) are associated with differences in immediate recall outcomes. In the context of this thesis, this is appropriate because the research objective is to understand which factors go together with stronger recall of specific story elements.

A key feature of the design is that all measures were collected immediately after exposure (no delayed memory test is included in the thesis analyses). Participants could optionally provide an email address for a possible follow-up study, but this follow-up is outside the scope of the present thesis.

#### 4.1.2. Data collection instrument and procedure

Data were collected through an online questionnaire built in LimeSurvey. For transparency, the original PDF exports of the English and French versions of the questionnaire (as displayed online) are provided in Appendix A – LimeSurvey questionnaire (EN)(EN) and Appendix B – LimeSurvey questionnaire (FR)(FR).

When respondents accessed the survey, they first saw a short welcome message explaining the academic purpose of the research and the anonymous nature of their responses. Immediately after this welcome message, respondents were asked to enter their Prolific ID (when applicable), in order to enable participation via the Prolific platform. Participants were then instructed to watch the advertisement one time only and to return to the questionnaire immediately after viewing. All respondents watched the same video advertisement: “Bertha Benz: The Journey That Changed Everything” (Mercedes-Benz), hosted on YouTube. The video lasts 4 minutes and 02 seconds and is in English, with subtitles available in English and French. This stimulus was selected because it is a clear example of brand storytelling. It follows a central protagonist, uses a journey-like structure with obstacles and resolution, and connects the narrative events to brand meaning. After viewing, respondents completed the measures of storytelling perceptions and engagement mechanisms, then the recall questions, and finally the control variables and demographics. The questionnaire took approximately 10 minutes to complete. At the end of the survey, Prolific participants were instructed to click the completion link provided in order to validate their submission on Prolific. These Prolific-specific elements (ID entry and completion link) were added after the initial version of the questionnaire to allow distribution to Prolific users, as mentioned in the sampling method (section 4.1.4).

At the end of the survey, participants could optionally leave an email address if they agreed to be contacted for a later follow-up study. This email was not required to complete the questionnaire.

### 4.1.3. Strengths and limits of the chosen methodology

This methodology has several advantages. First, it is well suited to advertising research because it allows data collection from a relatively large group of participants in a short time, with a standardized exposure and standardized measures. Second, the immediate post-exposure setting fits the thesis' focus on initial encoding and immediate retention of story elements.

At the same time, there are clear limitations that must be acknowledged. Since most variables are measured through self-report at the same time, the study may be exposed to common method concerns (for instance, participants who report high involvement might also report higher clarity). In addition, because the stimulus was viewed on YouTube via a link, it was not possible to technically enforce the "watch only once" instruction, which means the design relies on the compliance of the respondents.

Despite these limitations, the design remains coherent with the thesis objective, which is to map the psychological and narrative conditions under which story elements are better remembered immediately after exposure.

### 4.1.4. Sampling method and respondents

The questionnaire was distributed through personal social networks (convenience sampling with snowball sharing through friends, family, and extended networks). In addition, the supervisor also recruited respondents through Prolific, which helped diversify the sample beyond personal contacts.

There were no strict inclusion criteria, except that the survey was available only in English and French, which naturally limits participation to respondents comfortable in one of these languages. The final sample includes 220 complete responses.

Because this is not a probability sample, the thesis does not claim that results are representative of the general population. Instead, the sample is used to test theoretically grounded relationships within the proposed model.

## 4.2. Measures

The following section describes how each construct in the conceptual model was operationalized.

An Excel table summarizing the full questionnaire (items, exact wording, response formats and scale sources) is provided in Appendix C – Excel summary of the questionnaire (EN) (EN) and Appendix D – Excel summary of the questionnaire (FR) (FR). The following measures were included:

### 4.2.1. Narrative transportation

Transportation was measured with the Transportation Scale (Escalas, 2007; Green & Brock, 2000), with three items that captured mental involvement and imagery (e.g., being mentally involved and being able to picture events). Responses were recorded on a 5-point scale, from "Not at all" to "Very much".

### 4.2.2. Character identification

Identification with the protagonist was measured with four items from the Identification Scale (Currás-Pérez et al., 2009). The items captured perceived similarity and self-character overlap (e.g., "The image

I have of that character overlaps with my self-image"). Responses were recorded on a 5-point agreement scale, from "Strongly disagree" to "Strongly agree".

#### 4.2.3. Narrative ad structure

Perceived narrative structure was measured using Escalas' Narrative Structure Coding Scale (Escalas, 2004), split into two dimensions:

Narrative ad structure (characters) (3 items): perception of actors as intentional agents, insight into what they think/feel and personal evolution of a character.

Narrative ad structure (plot) (3 items): causal explanation of events, a clear beginning-middle-end structure and focus on specific events rather than abstractions.

Responses were recorded on a 5-point scale, from "Not at all" to "Very much so".

#### 4.2.4. Message clarity (explicitness)

Message clarity was measured with two items capturing how clearly the ad's message is expressed. The first item was adapted from slogan/message clarity work (Dass et al., 2023) and the second item was adapted from work on message explicitness/obviousness (Kim et al., 2022). Responses were recorded on a 5-point agreement scale, from "Strongly disagree" to "Strongly agree".

#### 4.2.5. Brand integration in the ad

Brand integration was measured with the three "Plot Connection" items (Russell, 2002). These items captured whether the brand is perceived as integral to the narrative (e.g., the brand played an important role in the story; without references to the brand, the story would be different; the brand is connected to the plot). Responses were recorded on a 5-point agreement scale, from "Strongly disagree" to "Strongly agree".

#### 4.2.6. Emotional engagement

Emotional engagement was measured with three items adapted from Ahmed et al. (2024). The items captured the intensity and richness of emotions evoked by the story (e.g., profound emotions, happiness, sensory engagement). Responses were recorded on a 5-point agreement scale, from "Strongly disagree" to "Strongly agree".

#### 4.2.7. Cognitive load

Cognitive load was measured using two complementary components. First, three "Mental Cognition" items (Ahmed et al., 2024) were used to capture perceived understanding and processing ease and engagement with the story (e.g., clear understanding, effortless understanding, active engagement). Responses were recorded on a 5-point agreement scale, from "Strongly disagree" to "Strongly agree". Second, mental effort was measured using the "Mental-effort Rating Scale" of Paas (1992), on a 5-point scale ranging from "Very low mental effort" to "Very high mental effort".

This combined approach was chosen to reflect two facets of cognitive processing during exposure, which are the perceived mental effort (Paas, 1992) and the viewer's subjective experience of processing the story (Ahmed et al., 2024).

#### 4.2.8. Recall outcomes

Recall was measured using multiple-choice questions (MCQs) adapted from the approach used by Kostyk et al. (2024). No confidence rating was included to keep the survey shorter (and simpler) and to avoid making the task too heavy for participants.

Four recall dimensions were measured, each with two MCQs (three answer options each): Brand elements recall, Character recall, Message recall and Climax recall.

#### 4.2.9. Control variables

In addition to the main constructs, four control variables were included to account for plausible alternative explanations. Brand Familiarity was measured with one item on a 5-point scale (from “Not at all” to “Very much so”), assessing how familiar respondents were with the brand shown in the advertisement. Second, Purchase Intention was measured with three items on a 5-point likelihood scale (from “Very unlikely” to “Very likely”). Finally, Age and Gender were collected as demographic controls.

These controls were included because prior familiarity with a brand can shape how much attention people allocate to brand-related cues and how easily brand information is encoded and remembered (Alba & Hutchinson, 1987; Pieters et al., 2002). Purchase intention was included because people who are already more interested in the brand may pay more attention and remember more from the ad.

#### 4.2.10. Ethical considerations and data handling

Participants were informed that responses are anonymous and used for academic purposes only. The optional email address was collected separately and was not required to complete the survey. This approach limits personal data collection to what is strictly necessary for the thesis.

## 5. RESULTS

This chapter reports the empirical results of the study. It begins with data preparation and a brief overview of the final sample, followed by a descriptive look at immediate recall performance. Next, it documents the main preliminary checks (normality and descriptive statistics) and evaluates measurement quality through reliability indicators. Correlation patterns are then presented as a first overview of how the constructs relate to one another. Finally, the chapter tests the hypotheses, first without controls and then with control variables to assess the robustness of the conclusions.

### 5.1. Data preparation

Before running the analyses, the dataset was cleaned and prepared to ensure that the variables were consistent and interpretable. Because the survey settings only retained fully completed questionnaires, there were no missing values to handle at this stage.

Two specific data-quality corrections were made. First, one respondent entered “2002” in response to the question “How old are you? (in years)”. Since the question clearly asked for an age and not a birth year, this value was recoded to “23”, which is the expected age corresponding to a 2002 birth year at the time of data collection. Second, one otherwise complete response was removed. The participant entered “TEST” for the Prolific ID and selected the highest agreement on every single scale item, suggesting non-attentive responding. After this exclusion, the final dataset used for the results includes 219 complete responses.

All scale items were coded using 1 to 5, following their respective response formats. To make interpretation consistent across constructs, items were coded so that higher values reflect higher levels of the underlying construct (e.g., higher transportation, higher identification, higher clarity).

For Cognitive Load, the three “mental cognition” items (CL1, CL2 and CL3) were reverse-coded, so that higher scores indicate higher cognitive load (i.e., more effortful processing rather than cognitive ease). This led to the creation of CL1\_Reversed, CL2\_Reversed, and CL3\_Reversed, which are the versions used in the analyses. This choice is straightforward for CL1 and CL2 (which clearly reflect ease of understanding), and it is applied to CL3 as well to keep the direction of the scale coherent. However, CL3 is conceptually slightly more delicate because it captures the idea of “engaging and interacting” with the story. Here, it is treated as reflecting lower load (more cognitive ease) when respondents report higher engagement and interaction. CL4 was not reverse-coded, because it is already phrased and scaled in the intended direction. The item asks “How much mental effort did this video require?” and uses a 5-point mental effort scale where 1 = “Very low mental effort” and 5 = “Very high mental effort”. Higher scores therefore directly indicate higher cognitive load, so reversing this item would have gone against its meaning.

Finally, each construct was computed as a composite score, calculated as the mean of its items (e.g., NT = mean of NT1-NT3, CI = mean of CI1-CI4, NAS(ch) = mean of NAS1-NAS3, NAS(p) = mean of NAS4-NAS6).

For the recall measures, each question was coded 1 = correct and 0 = incorrect, and then summed within each recall dimension. Two items were asked for each recall dimension, resulting in four sub-scores (BER, ChR, MR, and ClR) each ranging from 0 to 2. In addition, an overall recall score (Total\_R) was computed by summing all eight recall items (range 0 to 8). This total score was created only to provide an overall descriptive picture of recall performance (success rates) across the sample. It was not used to test the study’s hypotheses or as a main variable in the analyses.

For the binomial analyses (section 5.8), additional ‘proportion’ variables were created for each recall dimension (e.g., BER\_prop = BER/2), together with a constant Trials variable set to 2, so that recall could be modelled as the number of correct answers out of two items.

## 5.2. Sample overview

After the steps described above, the final sample includes 219 respondents. The gender distribution (Table 1) is close to balanced, with 112 women (51.1%), 106 men (48.4%), and 1 non-binary participant (0.5%). In other words, no single gender group dominates the sample.

Table 1

*Binomial Test*

Variable	Level	Counts	Total	Proportion	p
Gender	1	106	219	0.484	.685
	2	112	219	0.511	.787
	4	1	219	0.005	< .001

Note. Proportions tested against value: 0.5.

Source: JASP output

In terms of age, respondents are on average 41.36 years old (Table 2), with ages ranging from 18 to 83. When broken down by gender, men report a mean age of 39.02 (18-83), women 43.64 (18-76), and the non-binary participant is 34 years old (Table 3). These figures suggest a relatively broad and heterogeneous adult sample.

Table 2

*Descriptive Statistics*

	Age
Valid	219
Missing	0
Mean	41.36
Std. Deviation	14.87
Minimum	18.00
Maximum	83.00

Source: JASP output

Table 3

*Descriptive Statistics*

	Age		
	1	2	4
Valid	106	112	1
Missing	0	0	0
Mean	39.02	43.64	34.00
Std. Deviation	15.50	14.00	
Minimum	18.00	18.00	34.00
Maximum	83.00	76.00	34.00

Source: JASP output

### 5.3. Recall outcomes

This section reports respondents' recall performance immediately after viewing the advertisement. This overview is included mainly to give a clear picture of how well key elements of the ad were remembered in this sample. The results are presented first at the dimension level, then at the item level, and finally as an overview of overall success rates.

At the dimension level (Table 4), recall performance was consistently high. For BER, 95.9% of participants achieved the maximum score (2/2 correct, 210 out of 219), while the remaining 4.1% (9 out of 219) obtained 1/2 correct. For ChR, 79.5% (174/219) obtained 2/2 correct and 20.5% (45/219) obtained 1/2 correct. For MR, 88.1% (193/219) reached 2/2 correct, 10.5% (23/219) reached 1/2, and only 1.4% (3/219) scored 0/2. Finally, for CIR, 77.6% (170/219) achieved 2/2 correct, 20.1% (44/219) achieved 1/2, and 2.3% (5/219) scored 0/2.

Table 4

<i>Binomial Test</i>					
Variable	Level	Counts	Total	Proportion	p
BER	1	9	219	0.041	< .001
	2	210	219	0.959	< .001
ChR	1	45	219	0.205	< .001
	2	174	219	0.795	< .001
MR	0	3	219	0.014	< .001
	1	23	219	0.105	< .001
	2	193	219	0.881	< .001
CIR	0	5	219	0.023	< .001
	1	44	219	0.201	< .001
	2	170	219	0.776	< .001

Note. Proportions tested against value: 0.5.

Source: JASP output

At the item level (Table 5), the pattern is similar. Most questions were answered correctly by a large majority of respondents. BER1 was answered correctly by 99.1% of participants (217/219), and BER2 by 96.8% (212/219). For character-related recall, ChR2 reached 95.4% correct (209/219), while ChR1 was relatively more difficult with 84% correct (184/219). For the MR items, MR1 reached 96.3% correct (211/219) and MR2 90.4% (198/219). Finally, for climax recall, CIR1 reached 86.3% correct (189/219) and CIR2 89% (195/219). The only items below 90% correct were therefore ChR1, CIR1 and CIR2, suggesting that some character and climax details were more likely to be missed than other elements.

When aggregating across all eight items (Total\_R), performance is strongly concentrated at the top of the scale, as shown in Table 5. 58.9% of participants achieved a perfect score (8/8, 129/219), and 27.9% achieved 7/8 (61/219). Overall, 86.8% of the sample reached at least 7 correct answers out of 8, indicating very strong immediate recall. Substantively, this suggests that the advertisement's key elements were retained by most respondents right after exposure.

Table 5

*Binomial Test*

Variable	Level	Counts	Total	Proportion	p
BER1	0	2	219	0.009	< .001
	1	217	219	0.991	< .001
BER2	0	7	219	0.032	< .001
	1	212	219	0.968	< .001
ChR1	0	35	219	0.160	< .001
	1	184	219	0.840	< .001
ChR2	0	10	219	0.046	< .001
	1	209	219	0.954	< .001
MR1	0	8	219	0.037	< .001
	1	211	219	0.963	< .001
MR2	0	21	219	0.096	< .001
	1	198	219	0.904	< .001
CIR1	0	30	219	0.137	< .001
	1	189	219	0.863	< .001
CIR2	0	24	219	0.110	< .001
	1	195	219	0.890	< .001
Total_R	3	1	219	0.005	< .001
	4	4	219	0.018	< .001
	5	7	219	0.032	< .001
	6	17	219	0.078	< .001
	7	61	219	0.279	< .001
	8	129	219	0.589	.010

Note. Proportions tested against value: 0.5.

Source: JASP output

### 5.4. Normality check

To proceed with the main analyses, variables were expected to be approximately normally distributed. This assumption was assessed using three complementary checks: Shapiro–Wilk tests (p-value > 0.05 indicating that normality is not rejected (Mishra et al., 2019; Shapiro & Wilk, 1965)), skewness and kurtosis (treated as unproblematic when absolute values remain below 3), and visual inspection of distribution plots (a roughly bell-shaped pattern indicating acceptable normality). All distribution plots are provided in Appendix E – Distribution plots, and the detailed statistics are reported in Tables 6–12.

Table 6

*Descriptive Statistics*

	NT[NT1]	NT[NT2]	NT[NT3]	CI[CI1]	CI[CI2]	CI[CI3]	CI[CI4]
Valid	219	219	219	219	219	219	219
Missing	0	0	0	0	0	0	0
Mean	4.228	3.849	3.187	3.397	3.361	3.388	3.100
Std. Deviation	0.900	1.193	1.316	0.978	0.997	0.977	1.108
Skewness	-1.267	-1.048	-0.326	-0.481	-0.578	-0.606	-0.343
Std. Error of Skewness	0.164	0.164	0.164	0.164	0.164	0.164	0.164
Kurtosis	1.546	0.299	-1.012	-0.243	-0.295	-0.321	-0.735
Std. Error of Kurtosis	0.327	0.327	0.327	0.327	0.327	0.327	0.327
Shapiro–Wilk	0.776	0.815	0.891	0.884	0.868	0.855	0.896
P-value of Shapiro–Wilk	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Minimum	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Maximum	5.000	5.000	5.000	5.000	5.000	5.000	5.000

Source: JASP output

Table 7

Descriptive Statistics

	NAS[NAS1]	NAS[NAS2]	NAS[NAS3]	NAS[NAS4]	NAS[NAS5]	NAS[NAS6]
Valid	219	219	219	219	219	219
Missing	0	0	0	0	0	0
Mean	4.301	3.941	3.603	3.315	4.411	4.169
Std. Deviation	0.761	0.894	1.097	1.164	0.804	0.885
Skewness	-0.947	-0.738	-0.527	-0.426	-1.415	-1.019
Std. Error of Skewness	0.164	0.164	0.164	0.164	0.164	0.164
Kurtosis	0.565	0.326	-0.439	-0.673	1.853	0.638
Std. Error of Kurtosis	0.327	0.327	0.327	0.327	0.327	0.327
Shapiro-Wilk	0.777	0.847	0.887	0.896	0.722	0.799
P-value of Shapiro-Wilk	< .001	< .001	< .001	< .001	< .001	< .001
Minimum	2.000	1.000	1.000	1.000	1.000	1.000
Maximum	5.000	5.000	5.000	5.000	5.000	5.000

Source: JASP output

Table 8

Descriptive Statistics

	MC[MC1]	MC[MC2]	BI[BI1]	BI[BI2]	BI[BI3]
Valid	219	219	219	219	219
Missing	0	0	0	0	0
Mean	4.078	3.799	3.516	3.096	3.525
Std. Deviation	0.938	1.060	1.254	1.269	1.201
Skewness	-1.268	-0.801	-0.600	-0.073	-0.540
Std. Error of Skewness	0.164	0.164	0.164	0.164	0.164
Kurtosis	1.668	0.017	-0.696	-1.103	-0.735
Std. Error of Kurtosis	0.327	0.327	0.327	0.327	0.327
Shapiro-Wilk	0.785	0.853	0.870	0.905	0.874
P-value of Shapiro-Wilk	< .001	< .001	< .001	< .001	< .001
Minimum	1.000	1.000	1.000	1.000	1.000
Maximum	5.000	5.000	5.000	5.000	5.000

Source: JASP output

Table 9

Descriptive Statistics

	EE[EE1]	EE[EE2]	EE[EE3]	CL1_Reversed	CL2_Reversed	CL3_Reversed	CL4[CL4]
Valid	219	219	219	219	219	219	219
Missing	0	0	0	0	0	0	0
Mean	3.324	3.210	3.516	2.068	2.205	2.370	3.210
Std. Deviation	1.079	1.023	1.046	0.851	0.990	0.993	1.067
Skewness	-0.543	-0.406	-0.673	1.264	0.865	0.592	-0.017
Std. Error of Skewness	0.164	0.164	0.164	0.164	0.164	0.164	0.164
Kurtosis	-0.396	-0.239	-0.100	2.134	0.290	-0.197	-0.587
Std. Error of Kurtosis	0.327	0.327	0.327	0.327	0.327	0.327	0.327
Shapiro-Wilk	0.883	0.896	0.870	0.758	0.835	0.871	0.911
P-value of Shapiro-Wilk	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Minimum	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Maximum	5.000	5.000	5.000	5.000	5.000	5.000	5.000

Source: JASP output

Table 10

## Descriptive Statistics

	BF[BF1]	PI[PI1]	PI[PI2]	PI[PI3]
Valid	219	219	219	219
Missing	0	0	0	0
Mean	3.370	2.763	2.648	2.671
Std. Deviation	1.319	1.188	1.153	1.150
Skewness	-0.393	-0.044	0.067	-0.006
Std. Error of Skewness	0.164	0.164	0.164	0.164
Kurtosis	-0.949	-0.949	-0.904	-0.939
Std. Error of Kurtosis	0.327	0.327	0.327	0.327
Shapiro-Wilk	0.887	0.901	0.902	0.899
P-value of Shapiro-Wilk	< .001	< .001	< .001	< .001
Minimum	1.000	1.000	1.000	1.000
Maximum	5.000	5.000	5.000	5.000

Source: JASP output

Table 11

## Descriptive Statistics

	NT	CI	NAS(ch)	NAS(p)	MC	BI	EE	CL
Valid	219	219	219	219	219	219	219	219
Missing	0	0	0	0	0	0	0	0
Mean	3.755	3.312	3.948	3.965	3.938	3.379	3.350	2.463
Std. Deviation	0.908	0.929	0.718	0.739	0.925	1.024	0.923	0.653
Skewness	-0.614	-0.507	-0.752	-0.724	-0.972	-0.438	-0.553	0.835
Std. Error of Skewness	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164
Kurtosis	-0.034	-0.436	0.525	0.317	0.823	-0.492	0.005	0.779
Std. Error of Kurtosis	0.327	0.327	0.327	0.327	0.327	0.327	0.327	0.327
Shapiro-Wilk	0.945	0.943	0.938	0.938	0.881	0.959	0.958	0.938
P-value of Shapiro-Wilk	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Minimum	1.000	1.000	1.667	1.333	1.000	1.000	1.000	1.000
Maximum	5.000	5.000	5.000	5.000	5.000	5.000	5.000	4.500

Source: JASP output

Table 12

## Descriptive Statistics

	BF	PI	Age
Valid	219	219	219
Missing	0	0	0
Mean	3.370	2.694	41.36
Std. Deviation	1.319	1.133	14.87
Skewness	-0.393	-0.022	0.073
Std. Error of Skewness	0.164	0.164	0.164
Kurtosis	-0.949	-0.940	-0.920
Std. Error of Kurtosis	0.327	0.327	0.327
Shapiro-Wilk	0.887	0.933	0.946
P-value of Shapiro-Wilk	< .001	< .001	< .001
Minimum	1.000	1.000	18.00
Maximum	5.000	5.000	83.00

Source: JASP output

Across all items and composite variables (NT, CI, NAS(ch), NAS(p), MC, BI, EE, CL, BF, PI, and Age), the Shapiro-Wilk test systematically rejected strict normality ( $p$ -value < 0.001). Importantly, skewness and kurtosis values consistently remained within the  $\pm 3$  tolerance threshold, and the plots showed plausible response patterns, most often slightly skewed toward agreement. Taken together, these

results suggest no extreme departures from normality that would compromise the planned analyses. Normality was therefore considered acceptable for the study variables, and analyses were conducted as planned.

## 5.5. Descriptive analysis

This section provides an overview of the main constructs used in the study. Since all scales use a 1-5 response format, means can be interpreted relative to the midpoint, which is 3. Values clearly above 3 suggest general agreement, while values closer to 3 indicate more mixed or neutral evaluations.

Overall, respondents reported fairly high transportation experiences. Narrative Transportation (NT) shows a mean of 3.755 (Table 11), suggesting that participants generally felt ‘drawn into’ the ad. At the item level (Table 6), NT1 is particularly high (mean = 4.228), while NT3 is lower (mean = 3.187), indicating that people were more mentally involved than able to picture themselves in the scene.

In contrast, Character Identification (CI) is more moderate (Table 11, mean = 3.312). This pattern suggests that, on average, respondents did not reject identification, but they also did not strongly endorse it across the board. Since the main character in the advertisement is a woman, CI was also inspected descriptively by gender (Table 13). Women reported slightly higher identification (mean = 3.382) than men (mean = 3.243), although the difference remains small and should not be over-interpreted. Beyond gender, another plausible explanation for this moderate level of identification is that the protagonist is portrayed as a pioneer, which may create a certain distance for ‘everyday’ viewers (more admiration or respect, but not necessarily a strong feeling of “this could be me”).

Table 13

	CI		
	1	2	4
Valid	106	112	1
Missing	0	0	0
Mean	3.243	3.382	2.750
Std. Deviation	0.893	0.964	
Minimum	1.000	1.000	2.750
Maximum	5.000	5.000	2.750

Source: JASP output

The Narrative Ad Structure dimensions were rated highly. As shown in Table 11, both NAS(ch) and NAS(p) are close to 4 on average. This suggests that the ad was generally perceived as well-structured, both in terms of characters and plot. One striking point is NAS5 (Table 7, mean = 4.411), which asks to what extent the ad presents a clear sequence of events (a beginning, a middle and an ending). This very high mean suggests that respondents strongly perceived the advertisement as having a coherent narrative flow, with a structure that was easy to follow from introduction to conclusion.

Message Clarity (MC) is similarly high (Table 11, mean = 3.938), meaning that respondents tended to agree that the message of the ad was clear and obvious enough.

As reported in Table 11, Brand Integration (BI) is moderate (mean = 3.379). Interestingly, BI2 is the lowest of the three items (mean = 3.096), while BI1 and BI3 are slightly higher (around 3.52) (Table 8). This pattern suggests that respondents tended to agree that the brand played an important role in the

story (BI1) and that it was connected to the plot (BI3), while they were more hesitant to say that the story would be different without the brand references (BI2).

Emotional Engagement (EE) sits around the midpoint but slightly above (Table 11, mean = 3.350), indicating a moderate emotional response overall. The three items are fairly close (Table 9, EE1: mean = 3.324, EE2: mean = 3.210, EE3: mean = 3.516), which suggests a relatively consistent emotional engagement profile, without one item dominating the construct.

In Table 11, Cognitive Load (CL) shows a mean of 2.463. This is below the midpoint, suggesting that, on average, the ad was not experienced as mentally demanding. At the item level (Table 9), the reversed items range from 2.068 to 2.370, which aligns with the same interpretation (most respondents reported relatively low load rather than high effortful processing). CL4, which directly asked how much mental effort the video required, is a bit higher (mean = 3.210).

Brand Familiarity (BF) is relatively moderate (Table 12, mean = 3.370), showing meaningful variability between respondents (standard deviation = 1.319) (some were clearly familiar with the brand, while others were not).

Finally, respondents' Purchase Intention (PI) is relatively low-to-moderate (Table 12, mean = 2.694).

## 5.6. Factorial analysis and reliability of the measurement instruments

Before testing the hypotheses, it is important to check whether the multi-item constructs are measured in a coherent way. In principle, this can be done through factorial analyses. Because the items used in this study come from validated scales, the most appropriate approach is a confirmatory factor analysis, which checks whether items effectively represent the construct they are supposed to measure. In practice, and in line with the focus of this thesis, measurement quality was mainly assessed through Cronbach's alpha, which reflects the internal consistency of the items within each construct. As a general guideline, values around 0.70 or above are usually considered acceptable for research (Nunnally & Bernstein, 1994). However, alpha is sensitive to scale length, and shorter multi-item constructs may naturally produce lower values (Tavakol & Dennick, 2011). Details on Cronbach's alpha coefficients are provided in Appendix F – Cronbach's alpha coefficients.

Overall, reliability results are reassuring for most composite variables. Character Identification (CI) shows excellent internal consistency ( $\alpha = 0.935$ ), meaning that the four items behave very consistently as one scale. Purchase Intention (PI) is also extremely consistent ( $\alpha = 0.972$ ), and Emotional Engagement (EE) is strong as well ( $\alpha = 0.853$ ). Message Clarity (MC) shows good reliability ( $\alpha = 0.828$ ), and Brand Integration (BI) is acceptable ( $\alpha = 0.764$ ).

Two constructs show more borderline reliability, which is not unusual with short scales and should be interpreted cautiously rather than automatically treated as a measurement failure (Malhotra et al., 2017; Tavakol & Dennick, 2011). First, Narrative Transportation (NT) reaches  $\alpha = 0.699$ , which is just under the common 0.70 guideline. This suggests that NT can still be used as a composite score, but its results should be read with slightly more caution than constructs showing very high alpha values.

A similar pattern appears for Narrative Ad Structure when using the two sub-dimensions separately. NAS(ch) shows  $\alpha = 0.666$  and NAS(p)  $\alpha = 0.651$ , which are modest but understandable values given that each subscale includes only three items. However, when all six items are combined into a single overall index (NAS), reliability becomes clearly acceptable ( $\alpha = 0.795$ ). Overall, this indicates that the full NAS measure is consistent, while the split into two short sub-dimensions naturally comes with lower internal consistency.

The most important measurement issue concerns Cognitive Load (CL). When CL is computed with all four items, reliability is low ( $\alpha = 0.585$ ), and JASP indicates that CL4 correlates negatively with the scale, meaning it does not behave in the same direction as the other items in the composite. This is also reflected in the “Coefficient  $\alpha$  (if item dropped)” diagnostics. Removing CL4 increases reliability substantially, with the three-item version (CL1-CL3, reverse-coded) reaching  $\alpha = 0.809$ . Conceptually, this makes sense: CL1-CL3 capture a ‘cognitive ease / fluency’ aspect (reverse-coded to reflect load), whereas CL4 asks directly about mental effort, which may reflect a slightly different evaluation. CL4 was therefore excluded from the cognitive load scale, and CL now refers only to the composite score based on the three reverse-coded items (CL1\_Reversed, CL2\_Reversed and CL3\_Reversed).

Finally, Brand Familiarity (BF) is measured with a single item, so Cronbach’s alpha cannot be computed for this construct.

## 5.7. Correlation analysis

As a preliminary step before hypothesis testing, correlations were examined to explore whether the variables tend to move together. Importantly, correlations only indicate associations. Even when a p-value is below 0.05 (which means that the correlation is statistically significant, i.e., the variables are considered to be correlated (Schober et al., 2018)), this does not demonstrate causality or prove an influence or impact hypothesis by itself. See the correlation table in Appendix G – Correlation table.

Before interpreting the correlations, it is important to clarify the choice of coefficients. Pearson correlations were used as the main indicator for the composite scale constructs (NT, CI, NAS(ch), NAS(p), MC, BI, EE, CL, BF, PI and Age), because these variables are treated as continuous scales in the analyses and Pearson’s  $r$  is typically used to assess linear associations between continuous variables (Schober et al., 2018). By contrast, the recall outcomes (BER, ChR, MR, and CIR) are discrete scores ranging from 0 to 2 and are therefore closer to ordinal measures. For these recall variables, Spearman correlations were considered more appropriate, as rank-based correlations are recommended for ordinal data (Schober et al., 2018). In addition, Pearson and Spearman lead to the same overall conclusions for the recall variables in this dataset, so the interpretation does not depend on a single correlation choice.

For the main composite variables (NT, CI, NAS(ch), NAS(p), MC, BI, EE, CL, BF, PI), a clear pattern emerges, as narrative and engagement variables tend to cluster together. For instance, Narrative Transportation (NT) is strongly associated with Emotional Engagement (EE) ( $r = 0.607$ ,  $p$ -value  $< 0.001$ ), and moderately associated with Character Identification (CI) ( $r = 0.442$ ,  $p$ -value  $< 0.001$ ) and both Narrative Ad Structure dimensions (NT-NAS(ch):  $r = 0.466$ , NT-NAS(p):  $r = 0.470$ , both  $p$ -value  $< 0.001$ ). Substantively, this suggests that when participants felt more ‘transported’ by the ad, they also tended to report higher emotional involvement, stronger identification, and a clearer sense of narrative structure.

Another consistent result is the role of Cognitive Load. CL shows negative associations with several key perceptions, meaning that higher perceived load tends to go together with lower evaluations of the ad experience. The strongest example is MC-CL ( $r = -0.613$ ,  $p$ -value  $< 0.001$ ), indicating that when the message was perceived as clearer, the experience was also perceived as less cognitively demanding (or easier to process). Similar negative links appear between CL and NT ( $r = -0.490$ ), NAS(ch) ( $r = -0.431$ ), NAS(p) ( $r = -0.484$ ) and EE ( $r = -0.459$ ), all with  $p$ -value  $< 0.001$ . Overall, the correlational structure is coherent: a smoother, clearer and more engaging experience is associated with lower cognitive strain.

One other strong association is between Brand Familiarity (BF) and Purchase Intention (PI) ( $r = 0.512$ ,  $p$ -value  $< 0.001$ ). This suggests that participants who already know the brand better also tend to report

higher buying intention. In addition, Brand Integration (BI) is positively associated with PI ( $r = 0.328$ ,  $p\text{-value} < 0.001$ ), which aligns with the idea that when the brand feels more connected to the story, purchase intention tends to be higher.

Regarding Age, most correlations with the main constructs are small. The clearest pattern is a negative association with Purchase Intention (PI-Age:  $r = -0.205$ ,  $p\text{-value} = 0.002$ ), suggesting that older respondents tended to report slightly lower PI in this sample. Age also shows a small positive association with CI ( $r = 0.174$ ,  $p\text{-value} = 0.010$ ), meaning that older respondents reported slightly higher identification, although the effect remains limited.

For the recall dimensions (BER, ChR, MR, and CIR), the correlational pattern is overall weaker and less consistent than for the other composites. Only a few links with the main constructs stand out, and they remain small. NT is positively associated with Character Recall (ChR) (Spearman  $\rho = 0.157$ ,  $p\text{-value} = 0.020$ ), while most other associations with recall are close to zero or have  $p\text{-values}$  close to 0.05. BF also relates to recall, again with ChR ( $\rho = 0.160$ ,  $p\text{-value} = 0.018$ ). Age shows the clearest links, with small positive correlations with Message Recall (MR) ( $\rho = 0.177$ ,  $p\text{-value} = 0.009$ ) and Climax Recall (CIR) ( $\rho = 0.196$ ,  $p\text{-value} = 0.004$ ). Importantly, recall measures correlate more strongly with each other than with the perception scales. The two strongest and most significant associations are between Brand Elements Recall (BER) and MR ( $\rho = 0.353$ ,  $p\text{-value} < 0.001$ ), and between MR and CIR ( $\rho = 0.285$ ,  $p\text{-value} < 0.001$ ).

## 5.8. Hypotheses testing

With data quality and measurement checks completed, the next step is to test the hypothesized relationships of the conceptual model.

For outcomes measured on 1-5 scales (e.g., NT, CI), hypotheses were examined using linear regression, focusing on the  $p\text{-value}$  of the predictor and the model  $R^2$ . Throughout this section, effects are considered statistically significant when  $p\text{-value} < 0.05$  (Yen et al., 2020). When  $p\text{-value} \geq 0.05$ , the hypothesis is treated as not supported. For recall outcomes (BER, ChR, MR and CIR), several modelling options were explored. However, the main analyses rely on binomial-type models because each recall score is simply the number of correct answers out of two questions. In other words, recall is not a 'smooth' 1-5 scale, it is a small count (0, 1 or 2) with a clear maximum. This corresponds to the binomial logic of modelling the number of successes out of a fixed number of trials (Agresti, 2007). Binomial models are designed for this structure, so they fit the recall measures better than treating them as fully continuous outcomes. For the binomial models used with recall outcomes, the same decision rule is applied, based on the  $p\text{-value}$  of the coefficient ( $p\text{-value} < 0.05$ ). Importantly, alternative models were also tested (for example, treating recall more like a continuous score in a linear regression). Overall, these checks led to the same conclusions in almost all cases, so the results do not depend on a single modelling choice.

In line with the analysis strategy, hypotheses are first tested without controls. In a second step, Age, Brand Familiarity (BF), Purchase Intention (PI) and Gender were added to check whether they alter the core conclusions. When Gender was included as a control, the single "non-binary" response was treated as missing, because this category included only one respondent and could not be meaningfully modelled. Therefore, these models may rely on a slightly reduced sample. Only the most meaningful or noteworthy changes are discussed.

### 5.8.1. Narrative design and engagement mechanisms (H1-H6)

As explained above, these hypotheses were tested using linear regression models. The corresponding outputs are reported in Appendix H – JASP outputs for hypotheses testing.

H1 (NAS(ch) → CI). The regression model provides a statistically significant estimation of Character Identification (p-value < 0.001). However, Narrative Ad Structure (characters) is responsible for a relatively small share of the change in CI ( $R^2 = 0.082$ ). In other words, stronger character structuring significantly predicts higher identification, but the effect remains modest. H1 is supported.

H2 (NAS(ch) → NT). The model gives a statistically significant estimation of Narrative Transportation (p-value < 0.001), and NAS(ch) is responsible for 21.7% of the change in NT ( $R^2 = 0.217$ ). H2 is supported.

H3 (NAS(p) → NT). The model provides a statistically significant estimation of Narrative Transportation (p-value < 0.001), with Narrative Ad Structure (plot) responsible for 22.1% of the change in NT ( $R^2 = 0.221$ ). H3 is supported.

H4 (MC → NT). Message Clarity significantly predicts Narrative Transportation (p-value < 0.001). The model explains 13.5% of the change in NT ( $R^2 = 0.135$ ). H4 is supported.

H5 (BI → NT). Brand Integration significantly predicts Narrative Transportation (p-value < 0.001), accounting for 11.3% of the change in NT ( $R^2 = 0.113$ ). H5 is supported.

Because H2, H3, H4 and H5 all predict NT, they were also tested together in a multiple regression. Taken jointly, the model including NAS(ch), NAS(p), MC and BI significantly predicts NT (p-value < 0.001) and is responsible for 30.8% of the change in NT ( $R^2 = 0.308$ ). In that model, NAS(p), BI and NAS(ch) remain statistically significant predictors (all p-value  $\leq 0.002$ ), while MC is not retained. This suggests that MC overlaps with the information captured by the structure and brand integration variables, rather than adding a clearly distinct contribution on its own.

H6 (NT → CI). Narrative Transportation significantly predicts Character Identification (p-value < 0.001), and the model explains 19.5% of the change in CI ( $R^2 = 0.195$ ). H6 is supported.

The overall support for H1-H6 remains the same when controls are introduced. Gender was added selectively in models where identification-related outcomes are central (H1 and H6), because the protagonist is a woman and earlier descriptive patterns suggested slightly higher identification among women than men. In practice, adding Gender did not meaningfully change the accept/reject conclusions. Among the controls, Brand Familiarity is the one that most visibly enters the NT models, indicating that BF is retained in the final prediction equation for NT, meaning it contributes to predicting NT alongside the main predictors, without changing the overall conclusions.

#### 5.8.1.1. Supplementary analysis

This analysis was not part of the hypothesized model. However, because Emotional Engagement (EE) and Narrative Transportation (NT) were strongly correlated in the correlation analysis (section 5.7), an additional linear regression was conducted with NT as the dependent variable and EE as predictor. The model was statistically significant (p-value < 0.001) and explained a substantial share of variance in NT ( $R^2 = 0.368$ ). The same relationship was then re-estimated with the usual control variables (Age, Brand Familiarity, and Purchase Intention). In this controlled model, the association remained statistically significant (p-value < 0.001) and overall explanatory power increased ( $R^2 = 0.434$ ). In practical terms, this indicates that higher emotional engagement is strongly associated with higher narrative

transportation in this dataset, and that this link remains strong even when accounting for individual differences captured by the control variables.

### 5.8.2. Engagement mechanisms and recall outcomes (H7, H9, H10, H12, H13, H15)

As explained in section 5.8, these recall hypotheses were tested using binomial-type regression models, with significance assessed via the p-value of the coefficient. All corresponding JASP outputs are reported in Appendix H – JASP outputs for hypotheses testing, including both the binomial models and the supplementary linear regression checks. Given the very high recall levels reported earlier (section 5.3), these outcomes leave limited room for differences to appear, which can make effects harder to detect.

H7 (CI → ChR). Character Identification does not significantly predict Character Recall (p-value = 0.328). H7 is not supported.

H9 (CI → MR). Character Identification does not significantly predict Message Recall (p-value = 0.636). H9 is not supported.

H10 (NT → BER). Narrative Transportation does not significantly predict Brand Elements Recall (p-value = 0.302). H10 is not supported.

H12 (NT → ChR). Narrative Transportation significantly predicts Character Recall positively (p-value = 0.019). H12 is supported.

H13 (NT → MR). Narrative Transportation significantly predicts Message Recall positively (p-value = 0.013). H13 is supported.

H15 (NT → CIR). Narrative Transportation does not significantly predict Climax Recall (p-value = 0.657). H15 is not supported.

With controls added, conclusions stay broadly similar for the non-supported hypotheses. The main change is that the two significant links become less clear. NT no longer significantly predicts ChR (H12: p-value = 0.159) and MR (H13: p-value = 0.103) once BF, PI, Age and Gender are entered together. This suggests that these effects are relatively small and sensitive to specification in a context where recall is already close to the maximum for many respondents. One additional point is that, for CIR, Age emerges as a significant predictor in the controlled model of H15 (p-value = 0.011), even though NT remains non-significant. In the controlled specification for H9, CI still does not predict MR (p-value = 0.796). However, two controls stand out. Brand Familiarity is retained with a positive effect on MR (p-value < 0.001), while Purchase Intention is retained with a negative effect on MR (p-value = 0.020). By contrast, Age does not add a clear contribution to the model (p-value = 0.109). These effects should be interpreted cautiously, but they suggest that who the respondent is (in terms of brand familiarity and purchase intention) may matter more for MR than identification does in this dataset.

### 5.8.3. Moderation hypotheses (H8, H11, H14, H16)

Moderation hypotheses were tested by including interaction terms (predictor x moderator). To check that conclusions did not depend on one specific modelling choice, the moderation models were estimated in three ways: binomial models using the original (non-centered) predictors, binomial models using mean-centered versions of the predictors and moderator (and their interaction), and linear regression models treating the recall score more continuously. All three sets of models are reported in Appendix H – JASP outputs for hypotheses testing. Across these alternative

specifications, the interaction terms led to the same conclusions, so the p-values and conclusions reported below come from the binomial models. The non-centered and mean-centered binomial specifications give identical p-values in this dataset, so the reported results apply to both.

H8 (EE moderates CI  $\rightarrow$  ChR). The interaction term does not show evidence of moderation (p-value = 0.589). H8 is not supported.

H11 (CL moderates NT  $\rightarrow$  BER). The interaction term does not show evidence of moderation (p-value = 0.789). H11 is not supported.

H14 (CL moderates NT  $\rightarrow$  MR). The interaction term does not show evidence of moderation (p-value = 0.883). H14 is not supported.

H16 (EE moderates NT  $\rightarrow$  CIR). The interaction term does not show evidence of moderation (p-value = 0.866). H16 is not supported.

As an additional robustness check, the moderation models were also estimated with controls (Age, BF, PI, and Gender where relevant). Adding these variables did not change the conclusions. None of the interaction terms became statistically significant, and the overall pattern of non-supported moderation effects remained the same. That said, a few covariates were significant in some controlled models. In H14 (CL x NT  $\rightarrow$  MR), Brand Familiarity had a statistically significant positive effect on Message Recall, whereas Purchase Intention showed a statistically significant negative effect. In H16 (EE x NT  $\rightarrow$  CIR), Age emerged as a significant covariate for Climax Recall.

Overall, the moderation hypotheses are not supported. Emotional Engagement and Cognitive Load do not appear to change the strength of the tested relationships in this sample. A plausible interpretation is simply that, with recall outcomes already very high and tightly clustered, there is limited room for interaction effects to emerge clearly.

## 6. DISCUSSION

This thesis aimed to clarify what viewers actually remember from a brand storytelling advertisement, and how this memory relates to narrative design choices and engagement mechanisms. Overall, the results show a clear contrast between what drives engagement and what predicts immediate recall in a context where recall is already very high.

First, the ‘front end’ of the model is strongly supported. Narrative design features are clearly associated with narrative transportation, and transportation is clearly associated with character identification. In other words, when participants perceived the ad as better structured (character and plot), clearer and better integrated in terms of brand-plot connection, they also reported being more mentally absorbed in the story. This aligns well with narrative transportation theory. Coherence and comprehensibility facilitate immersion rather than forcing viewers to ‘solve’ the story while watching it. Transportation then appears as a strong predictor of identification, likely because absorbed viewers track the protagonist’s goals and emotions more closely. Practically, this suggests that transportation and identification are not only ‘audience effects’, but they can be fostered by concrete design choices.

Second, the ‘back end’ of the model is less supported. Engagement mechanisms did not consistently predict immediate recall outcomes, and moderation effects did not emerge. This should not be interpreted as evidence that storytelling is ineffective. A more cautious interpretation is that, in this specific setting (one ad, immediate testing, two-item recall scores), recall is near-ceiling, which reduces variance and limits the ability to detect more subtle mechanisms.

### 6.1. Immediate recall patterns

Immediate recall is high across all four dimensions. Brand elements recall is near-ceiling, message recall is also very high, and character and climax recall are slightly lower but still strong. This pattern is noteworthy because it does not fully match the common managerial fear that viewers remember the story but forget the brand. In this particular case, brand information seems to be encoded effectively. A plausible explanation is structural, as the brand is not presented as an external label but as an integral part of the narrative logic. When brand cues are causally meaningful, they may be stored as story information rather than as peripheral branding.

### 6.2. Narrative design as a driver of transportation

The strong support for H1-H6 confirms the conceptual core of the thesis, which is that narrative design is tightly linked to engagement. Character structuring predicts identification, and both character and plot structure predict transportation. Brand integration also predicts transportation, which supports the idea that branding does not necessarily break immersion if it plays a narrative role.

One nuance is that message clarity loses significance when all antecedents are tested together, while structure and brand integration remain significant. This suggests shared variance. In practice, a causally coherent story often feels clearer, and viewers may not experience clarity as separate from overall coherence. For future research, this implies that message clarity may sometimes be better modelled as part of perceived coherence or processing fluency, particularly in short narrative formats.

### 6.3. Engagement mechanisms and immediate memory

The weak support for recall hypotheses requires a careful interpretation, and several explanations can coexist.

A first explanation is limited variance in the recall outcomes. With only two items per dimension, each outcome can take only three values (0, 1, 2). When many participants score at the top, differences are compressed and effect detection becomes difficult, especially for moderation.

A second explanation is a partial mismatch between mechanisms and the recall format. Transportation and identification are often theorized to operate through meaning-making, emotional simulation and reduced counterarguing. These processes may shape attitudes, interpretations and 'gist' understanding more than they shape immediate multiple-choice recognition of details. In that sense, engagement may influence what the story means to viewers rather than whether they can select a correct option right after exposure.

A third explanation is that immediate recall may be cue-driven. Right after viewing, salient cues (brand name, explicit message, plot resolution) may be retrievable even without deep absorption. Engagement may become more visible when memory decays and retrieval depends more on strong associative networks. This would be consistent with the broader memory logic of the thesis. Immediate testing captures initial encoding but may under-represent processes that matter for longer-term retention.

#### 6.4. Moderation effects

The moderation hypotheses were theoretically motivated, but none were supported. The most likely reason is practical. Interaction effects are difficult to detect when outcomes have limited variance. There is also a conceptual nuance. Emotional engagement and transportation are strongly correlated here. This raises the possibility that, in this context, emotional engagement behaves less like an independent moderator and more like a component of the transported experience. This does not contradict the literature, but it suggests that separating these constructs empirically may depend on the stimulus and measurement choices.

#### 6.5. Individual differences in memory outcomes

The controlled models suggest that individual factors can still matter for certain recall outcomes. Brand familiarity shows a positive association with message recall, while purchase intention shows a negative association. These effects should be interpreted cautiously, but they are plausible. Familiarity may provide a schema that helps integrate and retrieve brand meaning. The negative link with purchase intention could reflect selective attention or pre-existing expectations that shape how viewers interpret the message question. Overall, the implication is managerial as well as theoretical. The same story can 'land' differently across audiences, including in terms of what is retained.

#### 6.6. From memorability to protectability

Even though the empirical study does not test legal variables, it informs the legal angle by showing which components are most likely to stick in viewers' minds. Here, brand cues and the message are especially well recalled, while some character and climax details are slightly less consistently retrieved.

However, the legal framework does not protect all memorable elements equally. Concrete and distinctive expressions (e.g., a specific character depiction, a slogan or recurring brand signs) are generally easier to anchor legally. By contrast, broader moral gist, themes or atmosphere can be impactful but are often harder to protect because they remain closer to ideas than to a specific expression. This highlights an interdisciplinary tension. The elements that are most meaningful for consumers are not always the elements the law protects best. From a management perspective, this

suggests that when a brand invests in storytelling, it may be strategic to make key expressive components more distinctive and consistent, so that memorability and protectability align more closely.

Overall, the thesis provides strong evidence that narrative design shapes transportation and identification, but more limited evidence that these mechanisms translate into higher immediate element-level recall in a near-ceiling context. Rather than challenging narrative persuasion theory, the results point to a boundary condition, which is that when a stimulus already produces very strong immediate encoding, engagement may matter more for experience and interpretation than for short-term recognition scores.

## 7. CONCLUSIONS

### 7.1. Short Summary

This thesis examined brand storytelling advertising through a dual lens, marketing effectiveness and legal defensibility. On the marketing side, the question was concrete: after watching a brand story once, what do consumers remember, and which narrative features and engagement mechanisms are associated with that memory? On the legal side, the thesis asked how these memorable components relate to what can realistically be protected within Belgian/EU intellectual property and unfair competition frameworks.

To address this, the thesis developed a conceptual model linking narrative design features (character structure, plot structure, message clarity, and brand integration) to two engagement mechanisms (narrative transportation and character identification), and then to four immediate recall outcomes (brand elements, characters, message, and climax). Emotional engagement and cognitive load were included as potential moderators. The model was tested through an online survey in which 219 respondents watched the same Mercedes-Benz narrative advertisement once and then completed validated scales and immediate recall questions.

The results support a clear conclusion for the first part of the model: narrative design features predict transportation, and transportation predicts character identification. This strengthens the idea that engagement is not only audience-dependent, it is also shaped by how the story is constructed. For the second part of the model, support is limited. Identification did not predict recall, transportation showed only small links with some recall outcomes in basic models (less robust with controls), and moderation hypotheses were not supported. A key contextual observation is that recall was very high overall, which likely reduced the ability to detect finer differences. In other words, the ad seems to have been highly memorable immediately, which compresses variance and limits the observable contribution of engagement mechanisms in this measurement format.

### 7.2. Managerial implications of the study

Building on these findings, the following implications highlight what managers can realistically take from the study.

For brand managers, the main implication is not simply to use storytelling, but to design storytelling deliberately and avoid assuming that engagement automatically guarantees what audiences will remember.

First, prioritize narrative coherence. Plot structure and character structuring are strong levers of transportation. Concretely, this means making the protagonist's goal and obstacles clear and ensuring events feel causally connected. When viewers do not need to reconstruct the story, immersion increases.

Second, integrate the brand into the causal chain. Brand integration predicts transportation, suggesting that branding does not have to break immersion if it plays a narrative role (e.g., enabling the resolution, shaping the conflict). This also helps address a classic storytelling risk. In this study, brand elements were remembered very well when the brand was structurally central.

Third, treat message clarity as a 'hygiene factor'. Clarity is positively related to transportation, but it does not add a distinct contribution once structure and brand integration are considered together. A

practical reading is that clarity often comes from good narrative coherence. Still, managers should avoid making the moral so implicit that viewers must infer too much, especially for broad audiences.

Fourth, remember that audiences are not interchangeable. Even in a single-ad design, controls suggest that brand familiarity and other individual factors can relate to what is retrieved immediately. This supports a practical approach. Pre-test campaigns with the audience segments that matter (e.g., customers vs. prospects) and test recall for the specific element the campaign prioritizes (brand cue, message, key scene).

Finally, from an interdisciplinary perspective, there is a direct bridge between memory and protection. Brands should identify which components are most likely to stick (brand cues, message themes, iconic scenes) and consider whether these can be made more distinctive and more defensible through consistent use, documentation of creation and, where relevant, trademark strategy for recurring signs. The broader managerial idea is to align creative investment with both cognitive impact and strategic defensibility.

### 7.3. Theoretical implications of the study

This thesis contributes in three main ways.

First, it supports a design-driven view of narrative engagement. The strong links from narrative structure and brand integration to transportation, and from transportation to identification, align with narrative persuasion theories while providing applied evidence in a brand advertising context. It reinforces the idea that transportation is not only a predisposition, it is also shaped by execution quality.

Second, it offers element-level evidence for advertising memory. By separating recall into brand, character, message and climax outcomes, the study illustrates that memory is not a single result, different story elements can be retained differently, even within the same ad.

Third, the results suggest boundary conditions for engagement-to-memory links in immediate settings. When immediate recall is already near-ceiling and measured through brief recognition scores, engagement may not translate into measurable recall differences. This supports a nuanced reading. Engagement may be more strongly related to interpretation, meaning and longer-term retention than to immediate recognition performance. In addition, the strong correlation between emotional engagement and transportation suggests that their empirical separation may vary by context, which future research could clarify.

### 7.4. Limitations and suggestions for future research

Several limitations should be acknowledged, each suggesting clear directions for further research.

First, the study used one specific narrative advertisement (Mercedes-Benz). High recall may partly reflect the particular quality and clarity of this stimulus. Future research should test multiple ads and categories, varying narrative complexity, brand integration and message explicitness.

Second, recall relied on two multiple-choice items per dimension. This restricts variance and reduces sensitivity, especially for interaction effects. Future studies should use richer memory measures, with more items per dimension and a mix of recognition and open-ended recall.

Third, the design focused on memory measured immediately after exposure. Strategic effects often depend on retention over time. Future research should include delayed recall waves to test whether transportation and identification become more predictive as memory fades.

Fourth, the ad was viewed in a survey setting rather than a typical digital environment where attention is fragmented. Future research should test similar models in more naturalistic contexts (e.g., mobile viewing, multitasking) to assess whether cognitive load and emotional engagement play stronger roles.

Finally, the thesis connects memory to protection strategically but does not test legal outcomes empirically. Future interdisciplinary research could examine whether the elements most retained by consumers are also perceived as uniquely tied to a brand, and how this perception relates to legal concepts such as distinctiveness, originality and likelihood of confusion.

Taken together, these limitations mainly indicate that the strongest contribution of the present research lies in clarifying the robust link between narrative design and engagement mechanisms, and in identifying conditions under which engagement mechanisms do (or do not) translate into measurable immediate recall. Future work can build on this with multiple stimuli, richer memory measures, longer time horizons and designs that connect consumer perception more directly to legal defensibility.

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## 9. APPENDICES

### Appendix A – LimeSurvey questionnaire (EN)

14/12/2025 16:53

LimeSurvey - Data collection

## Data collection

This survey is part of my Master's thesis and explores how people react to brand communication. It takes only a few minutes to complete. Your answers are anonymous and will be used for academic purposes only. Thank you very much for your help!

Welcome, and thank you for taking part in this survey!

You will be shown a short video and then asked a few questions about your impressions. There are no right or wrong answers, I'm only interested in your personal opinion. Please answer as honestly and spontaneously as you can.

There are 24 questions in this survey.

## Prolific ID

Please enter here your Prolific ID. \*

Please write your answer here:

## Video

Before answering any questions, please watch the video below carefully and **only once**.

Make sure you are in a quiet environment and can watch the video without interruption.

Subtitles are available if you wish to use them.

Once you've finished watching it, click "Next" to continue to the questions.

Click [here](#) to watch the video.

## Narrative transportation

To what extent do the following statements describe your experience while watching the ad? \*

Please choose the appropriate response for each item:

	Not at all	A little	Moderately	Quite a bit	Very much
I was mentally involved in the ad.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
While thinking about the ad, I could easily picture the events in it taking place.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I could picture myself in the scene shown in the ad.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Character identification

To what extent do you agree or disagree with the following statements about Bertha, the main character in the ad? \*

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
The way I am fits in with what I perceive of that character.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am similar to what I think that character represents.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am similar to how I perceive that character.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The image I have of that character overlaps with my self-image.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Narrative ad structure

To what extent does this ad... \*

Please choose the appropriate response for each item:

	Not at all	A little	Moderately	Quite a lot	Very much so
... consist of actors engaged in actions to achieve goals?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... let you know what the actors are thinking and feeling?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... provide you with insight about the personal evolution or change in the life of a character?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... explain why things happen, that is, what caused things to happen?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... have a well-delineated beginning (initial event), middle (crisis or turning point), and ending (conclusion)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... focus on specific, particular events rather than on generalizations or abstractions?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Message clarity

To what extent do you agree or disagree with the following statements about the message in this ad? \*

Please choose the appropriate response for each item:

	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>Agree</b>	<b>Strongly agree</b>
<b>The message in this ad is very clear.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>The advertising message in this ad is very obvious.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Brand integration in ad

To what extent do you agree or disagree with the following statements about the brand in this ad? \*

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
The brand played an important role in the story.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Without the references to the brand, the story would be different.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The brand was connected to the plot.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Emotional engagement

To what extent do you agree or disagree with the following statements about the story in this ad? \*

Please choose the appropriate response for each item:

	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>Agree</b>	<b>Strongly agree</b>
<b>Its elements evoke profound emotions in me.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>It fills me with happiness.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>It deeply engages my senses.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Cognitive load

To what extent do you agree or disagree with the following statements about how you processed the story in this ad? \*

Please choose the appropriate response for each item:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I have a clear understanding of the marketing story.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understanding the marketing story is effortless for me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I actively engage and interact with the marketing story.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Answer this question. \*

Please choose the appropriate response for each item:

	Very low mental effort	Low mental effort	Neither high nor low mental effort	High mental effort	Very high mental effort
In the viewing of the ad, I invested:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Recall

### Which brand created this commercial? \*

Choose one of the following answers

Please choose **only one** of the following:

- BMW
- Mercedes-Benz
- Audi

### What historical link does the commercial make between the story shown and the brand? \*

Choose one of the following answers

Please choose **only one** of the following:

- It shows where the brand opened its first dealership
- It shows the construction of the brand's first tire factory
- It presents one of the founding moments in the brand's automotive history

### Which of the following descriptions best matches Bertha's appearance in the commercial? \*

Choose one of the following answers

Please choose **only one** of the following:

- A woman in a blue dress, without a hat
- A woman in a dark green dress, wearing a black hat and gloves
- A woman in a modern suit, with glasses and a handbag

### Who accompanies Bertha during her journey? \*

Choose one of the following answers

Please choose **only one** of the following:

- Her two sons
- Her husband and the pharmacist
- Her parents

### Which of the following statements best describes the main message of the commercial? \*

Choose one of the following answers

Please choose **only one** of the following:

- Technical mastery is the most important condition for a successful invention
- Believing in yourself and in your project can turn an idea into reality, despite obstacles
- Major innovations are mainly the result of luck and chance

### Among the following values, which one is the most central in the story told by the commercial? \*

Choose one of the following answers

Please choose **only one** of the following:

- The courage to lead the way and play a pioneering role
- The ability to gradually improve technology over time
- The importance of sharing family moments on the road

Who provides Bertha help to repair her carriage? \*

Choose one of the following answers

Please choose **only one** of the following:

- The mayor
- The bartender
- The pharmacist

Which of the following sequences best describes what happens just before Bertha leaves again? \*

Choose one of the following answers

Please choose **only one** of the following:

- She uses her hat as a bowl for the horses
- She uses her hat pin to clean the engine pipes
- She uses a rope to fasten the engine to the chassis

## Brand familiarity

Answer this question. \*

Please choose the appropriate response for each item:

	Not at all	A little	Moderately	Quite a lot	Very much so
To which extent are you familiar with the brand depicted in the ad?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Purchase intention

How likely are you to do the following in the future? \*

Please choose the appropriate response for each item:

	Very unlikely	Unlikely	Neither likely nor unlikely	Likely	Very likely
If you need a car in the future, how likely are you to try Mercedes-Benz?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If you ever purchase a car again, how likely are you to buy it from Mercedes-Benz?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How likely are you to revisit Mercedes-Benz for your shopping needs?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Age and Gender

How old are you? (in years) \*

Only an integer value may be entered in this field.

Please write your answer here:

### What is your gender? \*

Choose one of the following answers

Please choose **only one** of the following:

Male

Female

Non-binary

Transgender

Prefer not to say

Other

### Email

We would like to contact you again in the future to see what you remember of the ad.

If you agree, please provide your email here.

Your data will be stored securely, used solely for the purpose of this study and never shared with any third party.

Please write your answer here:

### Validate on Prolific

Please click the following link to validate your answers on Prolific

<https://app.prolific.com/submissions/complete?cc=CV2BDKF7>

Thank you for completing the survey!

Your participation is very valuable for my Master's thesis and helps me better understand how people react to brands and their messages. Have a great day!

12/10/2025 – 11:36

Submit your survey.

Thank you for completing this survey.

## Appendix B – LimeSurvey questionnaire (FR)

14/12/2025 16:54

LimeSurvey - Data collection

### Data collection

Ce questionnaire s'inscrit dans le cadre de mon TFE de Master et porte sur la manière dont les personnes réagissent à la communication des marques. Il ne vous prendra que quelques minutes. Vos réponses sont anonymes et seront utilisées uniquement à des fins académiques.

Merci beaucoup pour votre aide !

Bienvenue, et merci de participer à ce questionnaire !

Vous allez visionner une vidéo, puis quelques questions sur vos impressions vous seront posées. Il n'y a pas de bonnes ou de mauvaises réponses, je m'intéresse uniquement à votre opinion personnelle. Merci de répondre de la façon la plus honnête et spontanée possible.

Il y a 24 questions dans ce questionnaire.

### Prolific ID

Veillez encoder votre Prolific ID ici. \*

Veillez écrire votre réponse ici :

### Vidéo

Avant de répondre aux questions, veuillez regarder attentivement la vidéo ci-dessous, et ce **une seule fois**.

Assurez-vous d'être dans un environnement calme et de pouvoir la regarder sans interruption.

Des sous-titres automatiquement traduits en français sont disponibles si vous le souhaitez.

Une fois la vidéo terminée, cliquez sur « Suivant » pour passer aux questions.

Cliquez [ici](#) pour regarder la vidéo.

## Transportation narrative

Dans quelle mesure les affirmations suivantes décrivent-elles votre expérience lors du visionnage de la publicité ? \*

Choisissez la réponse appropriée pour chaque élément :

	Pas du tout	Un peu	Modérément	Plutôt	Tout à fait
J'étais mentalement impliqué(e) dans cette publicité.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
En pensant à cette publicité, je pouvais facilement imaginer les événements qui s'y déroulent.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Je pouvais m'imaginer dans la scène montrée dans la publicité.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Identification au personnage

Dans quelle mesure êtes-vous d'accord ou pas d'accord avec les affirmations suivantes à propos de Bertha, le personnage principal de la publicité ? \*

Choisissez la réponse appropriée pour chaque élément :

	Pas du tout d'accord	Pas d'accord	Ni d'accord, ni pas d'accord	D'accord	Tout à fait d'accord
<b>Ma façon d'être correspond à ce que je perçois de ce personnage.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Je suis similaire à ce que je pense que ce personnage représente.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Je suis similaire à la manière dont je perçois ce personnage.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>L'image que j'ai de ce personnage se superpose à l'image que j'ai de moi-même.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Structure narrative

## Dans quelle mesure cette publicité... \*

Choisissez la réponse appropriée pour chaque élément :

	Pas du tout	Un peu	Modérément	Assez	Tout à fait
... met-elle en scène des personnages engagés dans des actions pour atteindre des objectifs ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... vous permet-elle de savoir ce que les personnages pensent et ressentent ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... vous donne-t-elle un aperçu de l'évolution personnelle ou des changements dans la vie d'un personnage ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... explique-t-elle pourquoi les choses se produisent, c'est-à-dire ce qui les provoque ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... présente-t-elle un début (événement initial), un milieu (crise ou tournant) et une fin (conclusion) bien définis ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... se concentre-t-elle sur des événements précis et concrets plutôt que sur des généralités ou des idées abstraites ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Clarté du message

Dans quelle mesure êtes-vous d'accord ou pas d'accord avec les affirmation suivantes concernant le message de cette publicité ? \*

Choisissez la réponse appropriée pour chaque élément :

	Pas du tout d'accord	Pas d'accord	Ni d'accord, ni pas d'accord	D'accord	Tout à fait d'accord
<b>Le message de cette publicité est très clair.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Le message publicitaire de cette publicité est très évident.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Intégration de la marque dans la publicité

Dans quelle mesure êtes-vous d'accord ou pas d'accord avec les affirmations suivantes concernant la marque dans cette publicité ? \*

Choisissez la réponse appropriée pour chaque élément :

	Pas du tout d'accord	Pas d'accord	Ni d'accord, ni pas d'accord	D'accord	Tout à fait d'accord
La marque joue un rôle important dans l'histoire.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sans les références à la marque, l'histoire serait différente.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
La marque est liée à l'intrigue de la publicité.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Engagement émotionnel

Dans quelle mesure êtes-vous d'accord ou pas d'accord avec les affirmations suivantes concernant l'histoire racontée dans cette publicité ? \*

Choisissez la réponse appropriée pour chaque élément :

	Pas du tout d'accord	Pas d'accord	Ni d'accord, ni pas d'accord	D'accord	Tout à fait d'accord
Ses éléments évoquent en moi de fortes émotions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Elle me remplit de joie.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Elle sollicite profondément mes sens.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Charge cognitive

Dans quelle mesure êtes-vous d'accord ou pas d'accord avec les affirmations suivantes concernant votre manière de traiter l'histoire racontée dans cette publicité ? \*

Choisissez la réponse appropriée pour chaque élément :

	Pas du tout d'accord	Pas d'accord	Ni d'accord, ni pas d'accord	D'accord	Tout à fait d'accord
J'ai une compréhension claire de l'histoire marketing présentée.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Comprendre cette histoire marketing ne me demande aucun effort.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Je m'implique activement et j'interagis mentalement avec cette histoire marketing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Répondez à cette question. \*

Choisissez la réponse appropriée pour chaque élément :

	Très faible	Faible	Ni élevé, ni faible	Élevé	Très élevé
En regardant la publicité, j'ai investi un effort mental :	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Rappel

#### Quelle marque est à l'origine de cette publicité ? \*

Veuillez sélectionner une réponse ci-dessous.

Veuillez sélectionner une seule des propositions suivantes :

- BMW
- Mercedes-Benz
- Audi

#### Quel lien historique la publicité établit-elle entre l'histoire racontée et la marque ? \*

Veuillez sélectionner une réponse ci-dessous.

Veuillez sélectionner une seule des propositions suivantes :

- Elle montre où la marque a ouvert sa première concession
- Elle montre la construction de la première usine de pneus de la marque
- Elle présente l'un des moments fondateurs de l'histoire de la marque

### Laquelle de ces descriptions correspond le mieux à l'apparence de Bertha dans la publicité ? \*

Veillez sélectionner une réponse ci-dessous.

Veillez sélectionner une seule des propositions suivantes :

- Une femme en robe bleue, sans chapeau
- Une femme en robe verte foncée, chapeau noir et gants
- Une femme en tailleur moderne, avec des lunettes et un sac à main

### Qui accompagnent Bertha pendant son voyage ? \*

Veillez sélectionner une réponse ci-dessous.

Veillez sélectionner une seule des propositions suivantes :

- Ses deux fils
- Son mari et le pharmacien
- Ses parents

### Parmi ces formulations, laquelle décrit le mieux le message principal de la publicité ? \*

Veillez sélectionner une réponse ci-dessous.

Veillez sélectionner une seule des propositions suivantes :

- La maîtrise technique est la condition la plus importante pour réussir une invention
- Croire en soi et en son projet peut transformer une idée en réalité, malgré les obstacles
- Les grandes innovations naissent avant tout du hasard et de la chance

Parmi les valeurs suivantes, laquelle est la plus centrale dans l'histoire racontée par la publicité ? \*

Veillez sélectionner une réponse ci-dessous.

Veillez sélectionner une seule des propositions suivantes :

- Le courage d'ouvrir la voie et de jouer un rôle de pionnier/pionnière
- La capacité à améliorer progressivement la technologie au fil du temps
- L'importance de partager des moments en famille sur la route

Qui aide Bertha à réparer son moyen de transport ? \*

Veillez sélectionner une réponse ci-dessous.

Veillez sélectionner une seule des propositions suivantes :

- Le maire
- Le barman
- Le pharmacien

Laquelle de ces séquences décrit le mieux ce qu'il se passe juste avant que Bertha ne reparte ? \*

Veillez sélectionner une réponse ci-dessous.

Veillez sélectionner une seule des propositions suivantes :

- Elle utilise son chapeau comme bol pour les chevaux
- Elle utilise son épingle à chapeau pour nettoyer les conduits du moteur
- Elle utilise une corde pour attacher le moteur au châssis

## Familiarité avec la marque

Répondez à cette question. \*

Choisissez la réponse appropriée pour chaque élément :

	<b>Pas du tout</b>	<b>Un peu</b>	<b>Modérément</b>	<b>Assez</b>	<b>Tout à fait</b>
<b>Dans quelle mesure êtes-vous familier/familière avec la marque présentée dans cette publicité ?</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Intention d'achat

Quelle est la probabilité que vous fassiez les choses suivantes à l'avenir ? \*

Choisissez la réponse appropriée pour chaque élément :

	Très peu probable	Peu probable	Ni probable, ni peu probable	Probable	Très probable
Si vous avez besoin d'une voiture à l'avenir, quelle est la probabilité que vous essayiez Mercedes-Benz ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Si vous achetez à nouveau une voiture, quelle est la probabilité que vous l'achetiez chez/de Mercedes-Benz ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quelle est la probabilité que vous retourniez chez Mercedes-Benz pour vos futurs achats ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Âge et Genre

Quel âge avez-vous ? (en années) \*

Seul un nombre entier peut être inscrit dans ce champ.

Veuillez écrire votre réponse ici :

### Quel est votre genre ? \*

Veillez sélectionner une réponse ci-dessous.

Veillez sélectionner une seule des propositions suivantes :

- Homme
- Femme
- Non-binaire
- Transgenre
- Je préfère ne pas le dire
- Autre

### Email

Nous souhaiterions vous recontacter plus tard pour voir ce dont vous vous souvenez de la publicité.

Si vous êtes d'accord, merci d'indiquer votre adresse e-mail ci-dessous.

Vos données seront stockées de manière sécurisée, utilisées uniquement dans le cadre de cette étude et ne seront jamais partagées avec des tiers.

Veillez écrire votre réponse ici :

Validez sur Prolific

Cliquez sur ce lien pour valider vos réponses sur Prolific  
[https://app.prolific.com/submissions/complete?  
cc=CV2BDKF7](https://app.prolific.com/submissions/complete?cc=CV2BDKF7)

Merci d'avoir complété le questionnaire !

Votre participation est très précieuse pour mon TFE et m'aide à mieux comprendre comment les personnes réagissent aux marques et à leurs messages. Belle journée à vous !

10/12/2025 – 11:36

Envoyer votre questionnaire.

Merci d'avoir complété ce questionnaire.

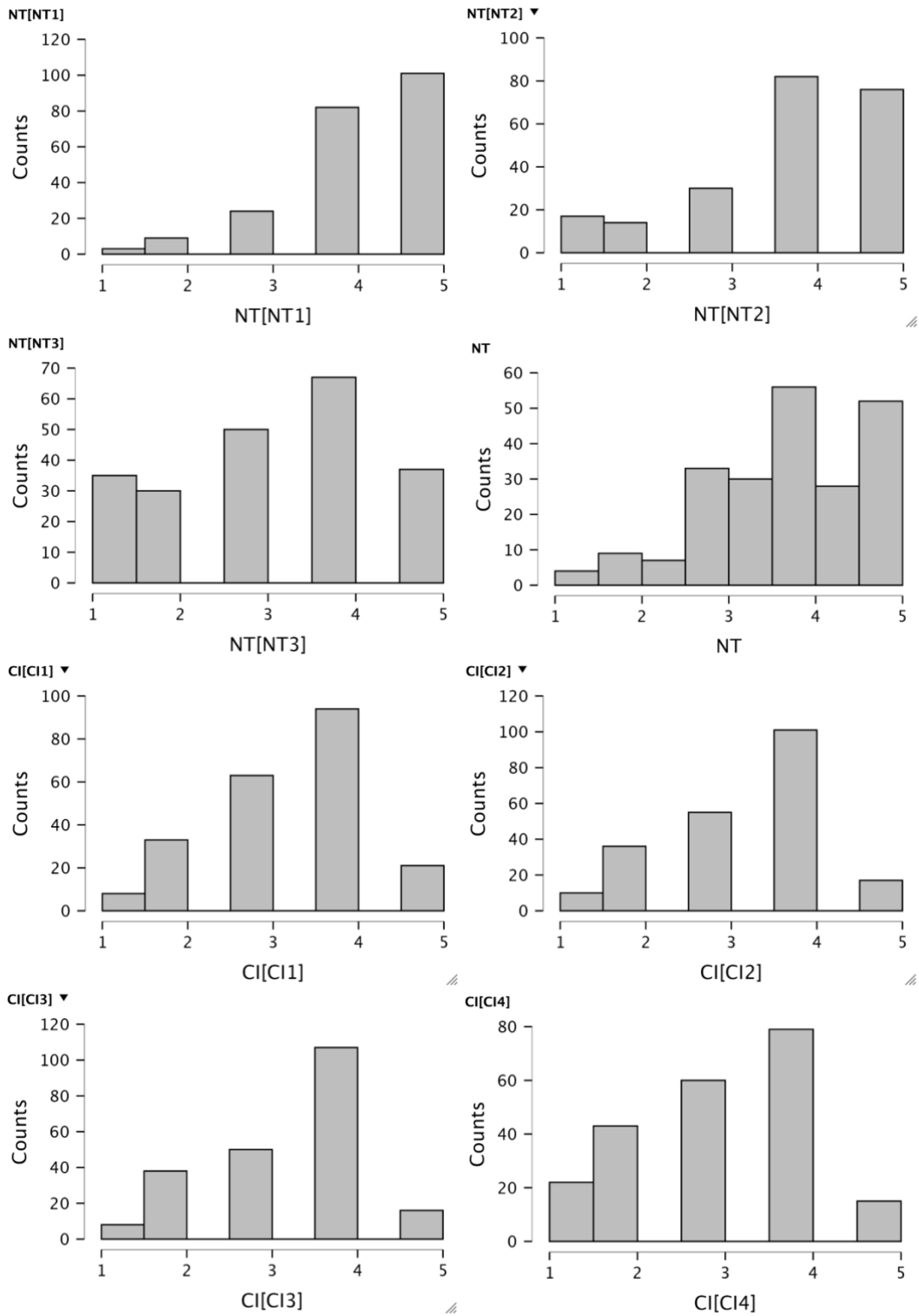
## Appendix C – Excel summary of the questionnaire (EN)

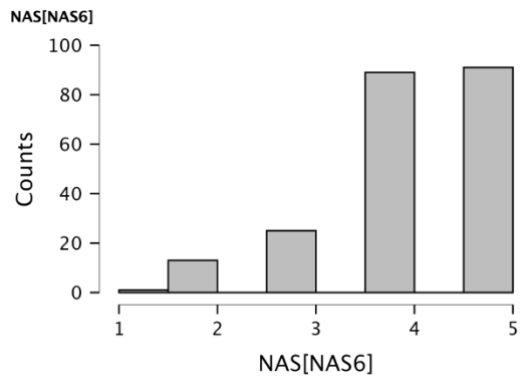
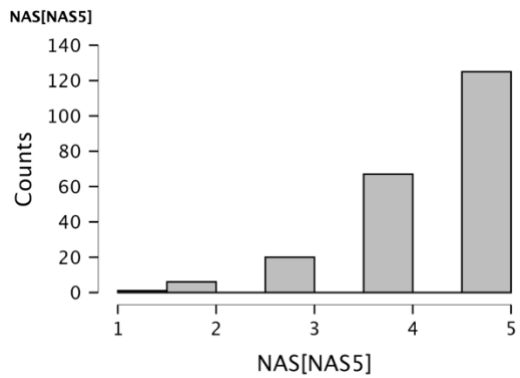
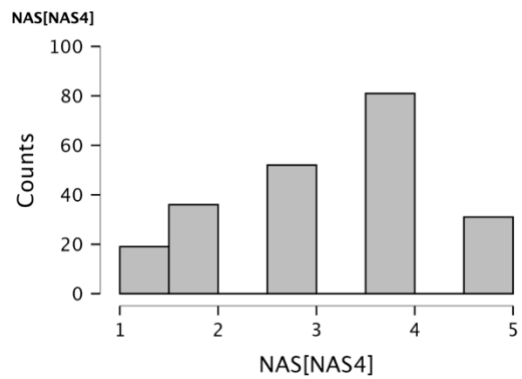
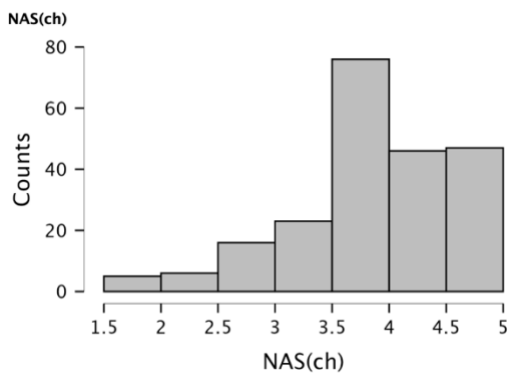
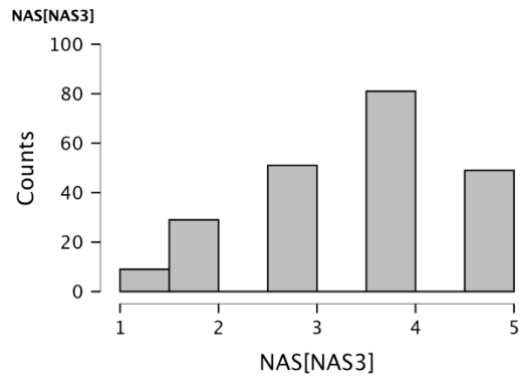
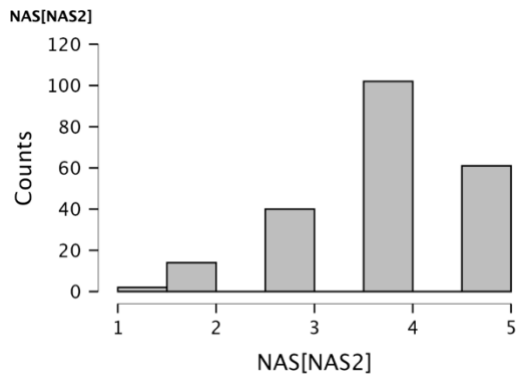
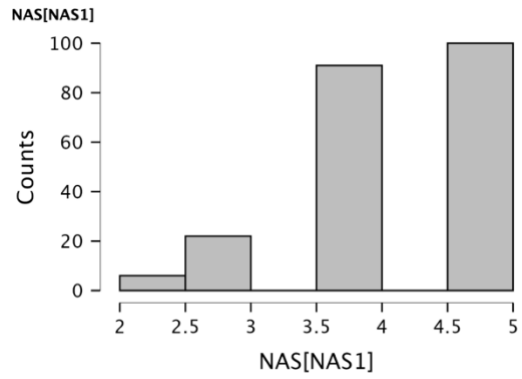
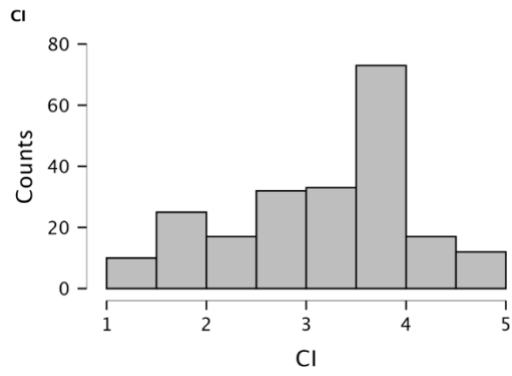
Category	Code	Question	Scale / response format	Response options (if any) * = correct answer (if any)	Scale source
Narrative transportation	NT1	I was mentally involved in the ad.	5-point scale, 1=Not at all → 5=Very much		Green & Brock (2000); Escalas (2007)
	NT2	While thinking about the ad, I could easily picture the events in it taking place.			
	NT3	I could picture myself in the scene shown in the ad.			
Character identification	CI1	The way I am fits in with what I perceive of that character.	5-point scale, 1=Strongly disagree → 5=Strongly agree		Currás-Pérez et al. (2009)
	CI2	I am similar to what I think that character represents.			
	CI3	I am similar to how I perceive that character.			
	CI4	The image I have of that character overlaps with my self-image.			
Narrative ad structure (characters)	NAS1	To what extent does this ad consist of actors engaged in actions to achieve goals?	5-point scale, 1=Not at all → 5=Very much so		Escalas (2004)
	NAS2	To what extent does this ad let you know what the actors are thinking and feeling?			
	NAS3	To what extent does this ad provide you with information about the personal evolution or change in the life of a character?			
Narrative ad structure (plot)	NAS4	To what extent does this ad explain why things happen, that is, what caused things to happen?			
	NAS5	To what extent does this ad have a well-structured sequence of events; beginning (introduction), middle (crisis or turning point), and ending (conclusion)?			
	NAS6	To what extent does this ad focus on specific particular events rather than on generalizations or abstractions?			
Message clarity (explicitness)	MC1	The message in this ad is very clear.	5-point scale, 1=Strongly disagree → 5=Strongly agree		Dass et al. (2023)
	MC2	The advertising message in this ad is very obvious.	5-point scale, 1=Strongly disagree → 5=Strongly agree		Kim et al. (2022)
Brand integration in ad	B11	The brand played an important role in the story.	5-point scale, 1=Strongly disagree → 5=Strongly agree		Russell (2002)
	B12	Without the references to the brand, the story would be different.			
	B13	The brand was connected to the plot.			
Emotional engagement	EE1	The marketing story's elements evoke profound emotions in me.	5-point scale, 1=Strongly disagree → 5=Strongly agree		Ahmed et al. (2024)
	EE2	The marketing story fills me with happiness.			
	EE3	The marketing story deeply engages my senses.			
Cognitive load	CL1	I have a clear understanding of the marketing story.	5-point scale, 1=Strongly disagree → 5=Strongly agree		Ahmed et al. (2024)
	CL2	Understanding the marketing story is effortless for me.			
	CL3	I actively engage and interact with the marketing story.			
	CL4	How much mental effort did this video require?		5-point mental effort scale, 1=Very low mental effort → 5=Very high mental effort	
Brand elements recall	BER1	Which brand created this commercial?	MCQ (3 options)	BMW Mercedes-Benz* Audi	Kostyk et al. (2024)
	BER2	What historical link does the commercial make between the story shown and the brand?		It shows where the brand opened its first dealership It shows the construction of the brand's first tire factory It presents one of the founding moments in the brand's automotive history*	
Character recall	Chr1	Which of the following descriptions best matches Bertha's appearance in the commercial?	MCQ (3 options)	A woman in a blue dress, without a hat A woman in a dark green dress, wearing a black hat and gloves* A woman in a modern suit, with glasses and a handbag	Kostyk et al. (2024)
	Chr2	Who accompanies Bertha during her journey?		Her two sons* Her husband and the pharmacist Her parents	
Message recall	MR1	Which of the following statements best describes the main message of the commercial?	MCQ (3 options)	Technical mastery is the most important condition for a successful invention Believing in yourself and in your project can turn an idea into reality, despite obstacles* Major innovations are mainly the result of luck and chance	Kostyk et al. (2024)
	MR2	Among the following values, which one is the most central in the story told by the commercial?		The courage to lead the way and play a pioneering role* The ability to gradually improve technology over time The importance of sharing family moments on the road	
Climax recall	ClR1	Who provides Bertha help to repair her carriage?	MCQ (3 options)	The mayor The bartender The pharmacist*	Kostyk et al. (2024)
	ClR2	Which of the following sequences best describes what happens just before Bertha leaves again?		She uses her hat as a bowl for the horses She uses her hat pin to clean the engine pipes* She uses a rope to fasten the engine to the chassis	
Brand Familiarity	BF1	To which extent are you familiar with the brand depicted in the ad?	5-point scale, 1=Not at all → 5=Very much so		
Purchase Intention	PI1	If you need a car in the future, how likely are you to try Mercedes-Benz?	5-point scale, 1=Very unlikely → 5=Very likely		
	PI2	If you ever purchase a car again, how likely are you to buy it from Mercedes-Benz?			
	PI3	How likely are you to revisit Mercedes-Benz for your shopping needs?			
Age	A1	How old are you?	Open numeric response		
Gender	G1	What is your gender?	Single-choice question	Male Female Non-binary Transgender Prefer not to say Other: ...	
E-mail	E1	We would like to contact you again in the future to see what you remember of the ad. If you agree, please provide your email here. Your data will be stored securely, used solely for the purpose of this study and never shared with any third party.	Open text response (optional)		

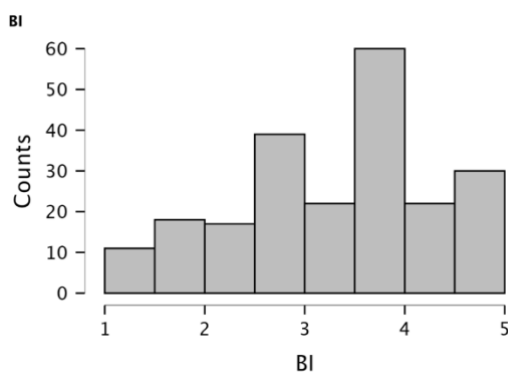
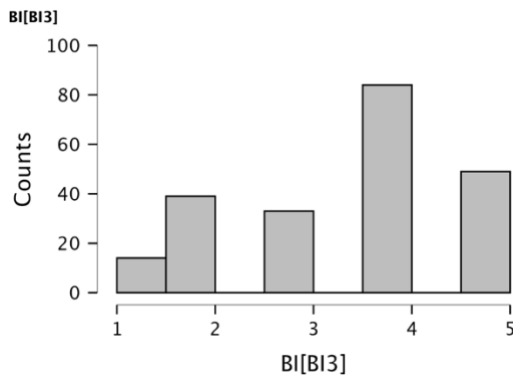
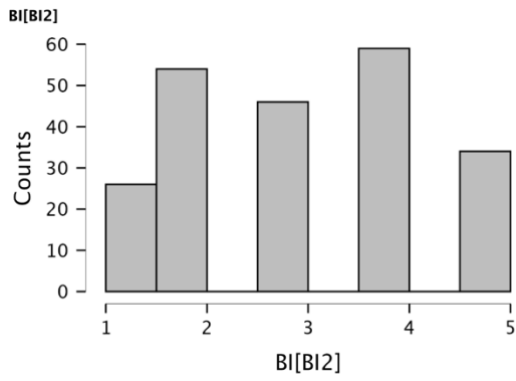
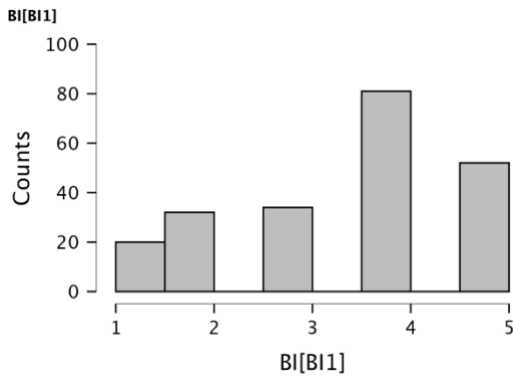
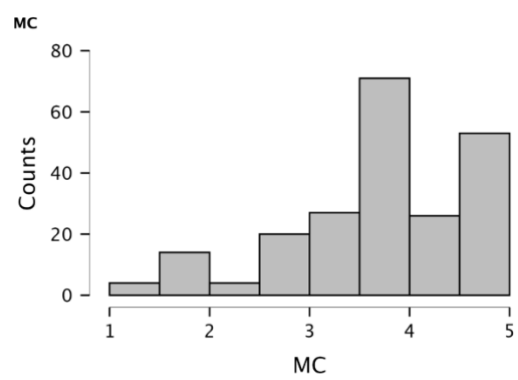
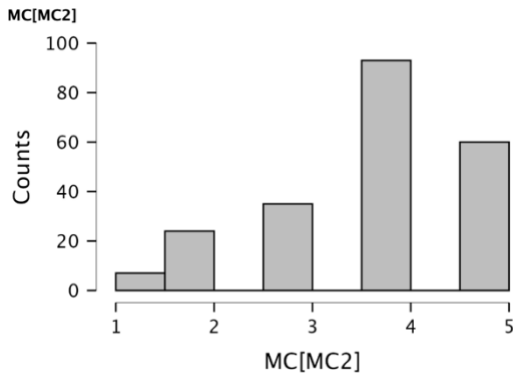
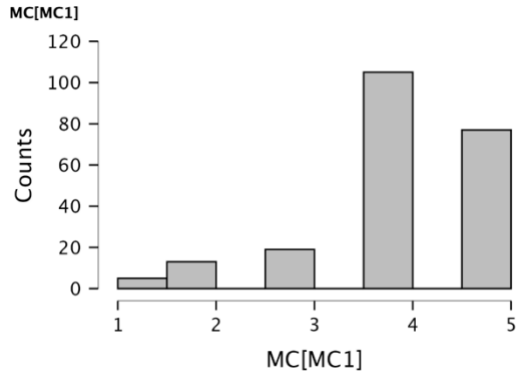
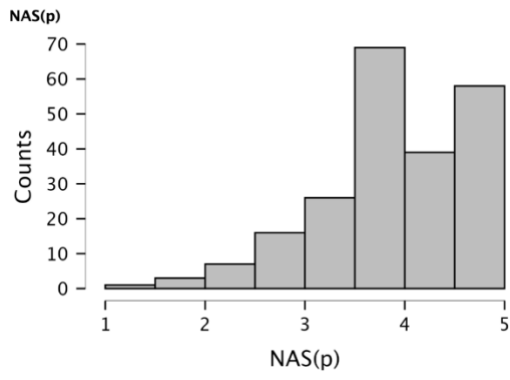
## Appendix D – Excel summary of the questionnaire (FR)

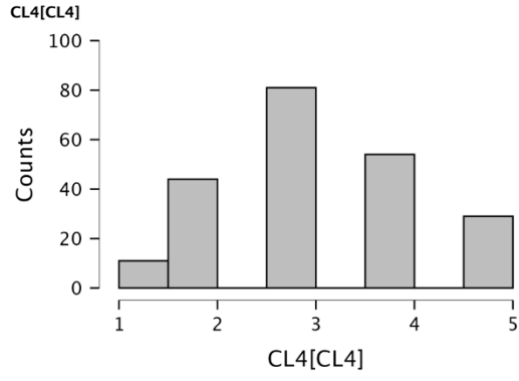
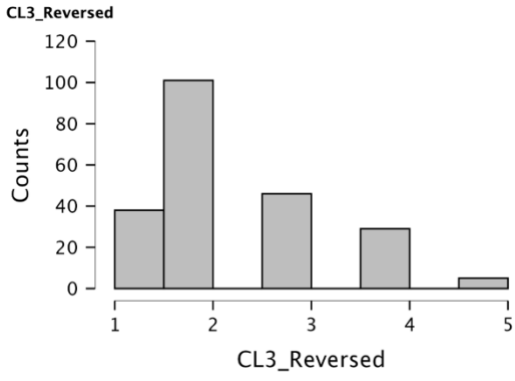
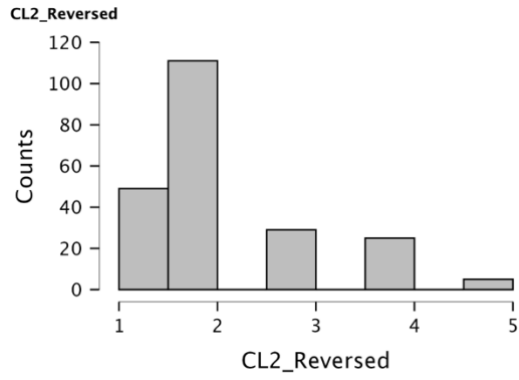
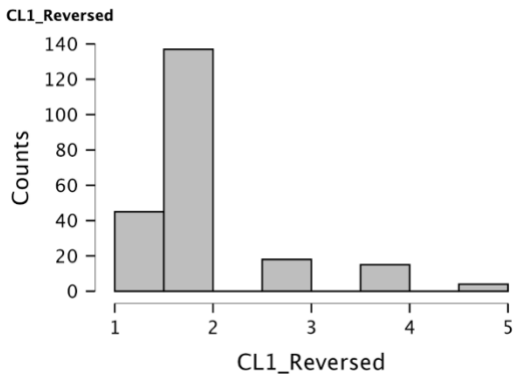
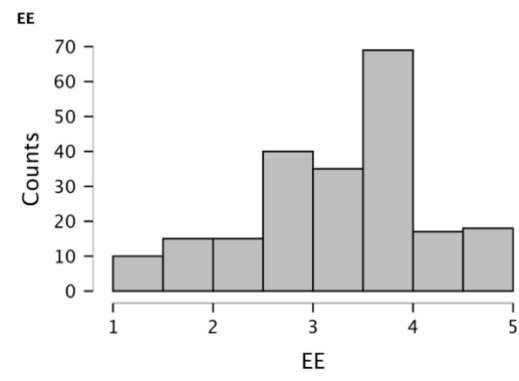
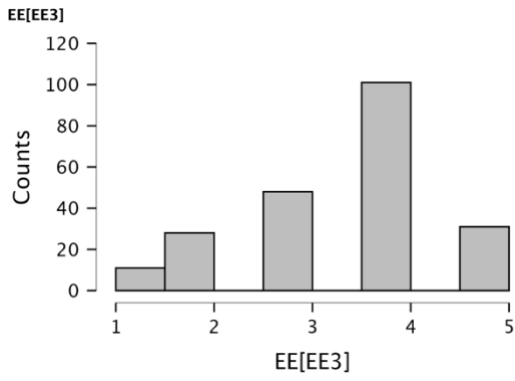
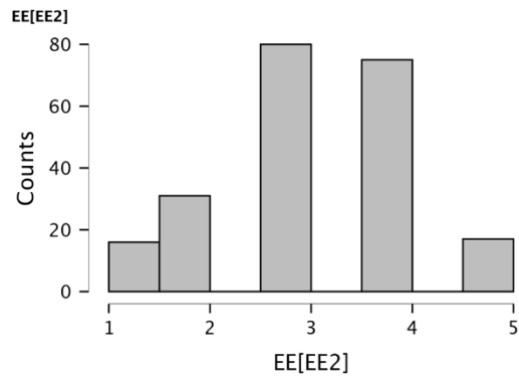
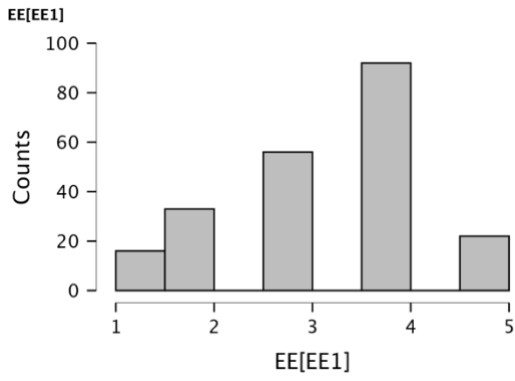
Catégorie	Code	Question	Échelle / format de réponse	Options de réponse (si présentes) * = bonne réponse (si existante)	Source de l'échelle
Transportation narrative	NT1	J'étais mentalement impliqué(e) dans cette publicité.	Échelle sur 5, 1=Pas du tout → 5=Tout à fait		Green & Brock (2000); Escalas (2007)
	NT2	En pensant à cette publicité, je pouvais facilement imaginer les événements qui s'y déroulent.			
	NT3	Je pouvais m'imaginer dans la scène montrée dans la publicité.			
Identification au personnage	C11	Ma façon d'être correspond à ce que je perçois de ce personnage.	Échelle sur 5, 1=Pas du tout d'accord → 5=Tout à fait d'accord		Currás-Pérez et al. (2009)
	C12	Je suis similaire à ce que je pense que ce personnage représente.			
	C13	Je suis similaire à la manière dont je perçois ce personnage.			
	C14	L'image que j'ai de ce personnage se superpose à l'image que j'ai de moi-même.			
Structure narrative (personnages)	NAS1	Dans quelle mesure cette publicité met-elle en scène des personnages engagés dans des actions pour atteindre des objectifs ?	Échelle sur 5, 1=Pas du tout → 5=Tout à fait		Escalas (2004)
	NAS2	Dans quelle mesure cette publicité vous permet-elle de savoir ce que les personnages pensent et ressentent ?			
	NAS3	Dans quelle mesure cette publicité vous donne-t-elle un aperçu de l'évolution personnelle ou des changements dans la vie d'un personnage ?			
Structure narrative (intrigue)	NAS4	Dans quelle mesure cette publicité explique-t-elle pourquoi les choses se produisent, c'est-à-dire ce qui les provoque ?	Échelle sur 5, 1=Pas du tout → 5=Tout à fait		Escalas (2004)
	NAS5	Dans quelle mesure cette publicité présente-t-elle un début (événement initial), un milieu (crise ou tournant) et une fin (conclusion) bien définis ?			
	NAS6	Dans quelle mesure cette publicité se concentre-t-elle sur des événements précis et concrets plutôt que sur des généralités ou des idées abstraites ?			
Clarté du message	MC1	Le message de cette publicité est très clair.	Échelle sur 5, 1=Pas du tout d'accord → 5=Tout à fait d'accord		Dass et al. (2023)
	MC2	Le message publicitaire de cette publicité est très évident.	Échelle sur 5, 1=Pas du tout d'accord → 5=Tout à fait d'accord		Kim et al. (2022)
Intégration de la marque dans la publicité	B11	La marque joue un rôle important dans l'histoire.	Échelle sur 5, 1=Pas du tout d'accord → 5=Tout à fait d'accord		Russell (2002)
	B12	Sans les références à la marque, l'histoire serait différente.			
	B13	La marque est liée à l'intrigue de la publicité.			
Engagement émotionnel	EE1	Les éléments de l'histoire racontée dans cette publicité évoquent en moi de fortes émotions.	Échelle sur 5, 1=Pas du tout d'accord → 5=Tout à fait d'accord		Ahmed et al. (2024)
	EE2	L'histoire racontée dans cette publicité me remplit de joie.			
	EE3	L'histoire racontée dans cette publicité sollicite profondément mes sens.			
Charge cognitive	CL1	J'ai une compréhension claire de l'histoire marketing présentée.	Échelle sur 5, 1=Pas du tout d'accord → 5=Tout à fait d'accord		Ahmed et al. (2024)
	CL2	Comprendre cette histoire marketing ne me demande aucun effort.			
	CL3	Je m'implique activement et j'interagis mentalement avec cette histoire marketing.			
	CL4	En regardant la publicité, j'ai investi un effort mental :			
Rappel d'éléments de la marque	BER1	Quelle marque est à l'origine de cette publicité ?	QCM (3 options)	BMW Mercedes-Benz* Audi Elle montre où la marque a ouvert sa première concession Elle montre la construction de la première usine de pneus de la marque Elle présente l'un des moments fondateurs de l'histoire de la marque*	Kostyk et al. (2024)
	BER2	Quel lien historique la publicité établit-elle entre l'histoire racontée et la marque ?			
Rappel du personnage	ChR1	Laquelle de ces descriptions correspond le mieux à l'apparence de Bertha dans la publicité ?	QCM (3 options)	Une femme en robe bleue, sans chapeau Une femme en robe verte foncée, chapeau noir et gants* Une femme en tailleur moderne, avec des lunettes et un sac à main Ses deux fils* Son mari et le pharmacien Ses parents	Kostyk et al. (2024)
	ChR2	Qui accompagnent Bertha pendant son voyage ?			
Rappel du message	MR1	Parmi ces formulations, laquelle décrit le mieux le message principal de la publicité ?	QCM (3 options)	La maîtrise technique est la condition la plus importante pour réussir une invention Croire en soi et en son projet peut transformer une idée en réalité, malgré les obstacles* Les grandes innovations naissent avant tout du hasard et de la chance Le courage d'ouvrir la voie et de jouer un rôle de pionnier/pionnière* La capacité à améliorer progressivement la technologie au fil du temps L'importance de partager des moments en famille sur la route	Kostyk et al. (2024)
	MR2	Parmi les valeurs suivantes, laquelle est la plus centrale dans l'histoire racontée par la publicité ?			
Rappel du climat	CIR1	Qui aide Bertha à réparer son moyen de transport ?	QCM (3 options)	Le maire Le barman Le pharmacien* Elle utilise son chapeau comme bol pour les chevaux Elle utilise son épinglé à chapeau pour nettoyer les conduits du moteur* Elle utilise une corde pour attacher le moteur au châssis	Kostyk et al. (2024)
	CIR2	Laquelle de ces séquences décrit le mieux ce qu'il se passe juste avant que Bertha ne reparte ?			
Familiarté avec la marque	BF1	Dans quelle mesure êtes-vous familier/familière avec la marque présentée dans cette publicité ?	Échelle sur 5, 1=Pas du tout → 5=Tout à fait		
Intention d'achat	PI1	Si vous avez besoin d'une voiture à l'avenir, quelle est la probabilité que vous essayiez Mercedes-Benz ?	Échelle sur 5, 1=Très peu probable → 5=Très probable		
	PI2	Si vous achetez à nouveau une voiture, quelle est la probabilité que vous l'achetiez chez/de Mercedes-Benz ?			
	PI3	Quelle est la probabilité que vous retourniez chez Mercedes-Benz pour vos futurs achats ?			
Âge	A1	Quel âge avez-vous ?	Réponse numérique ouverte		
Genre	G1	Quel est votre genre ?	Question à choix unique	Homme Femme Non-binaire Transgenre Je préfère ne pas le dire Autre : ...	
E-mail	E1	Nous souhaiterions vous recontacter plus tard pour voir ce dont vous vous souvenez de la publicité. Si vous êtes d'accord, merci d'indiquer votre adresse e-mail ci-dessous. Vos données seront stockées de manière sécurisée, utilisées uniquement dans le cadre de cette étude et ne seront jamais partagées avec des tiers.	Réponse de type texte (optionnelle)		

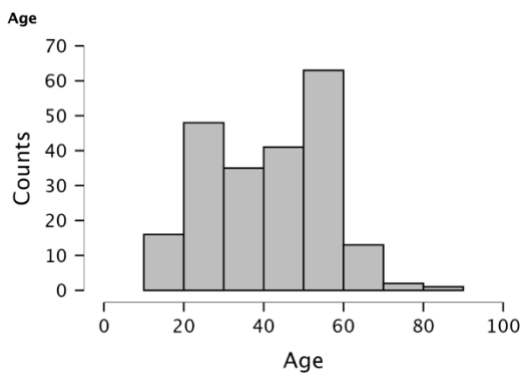
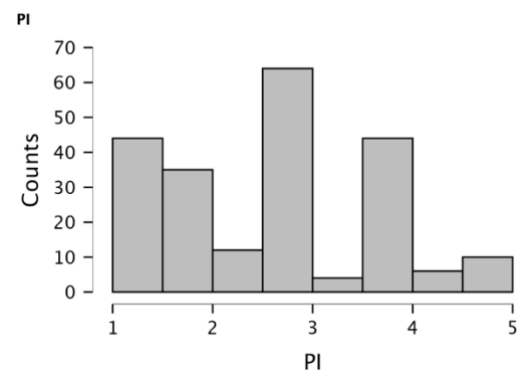
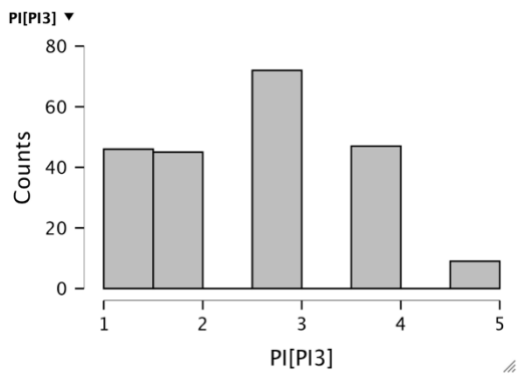
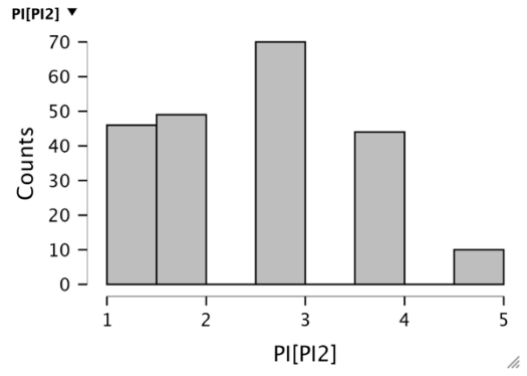
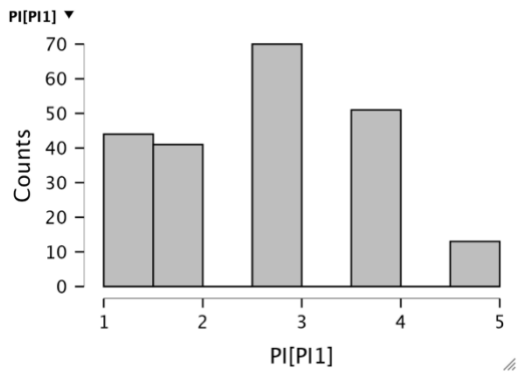
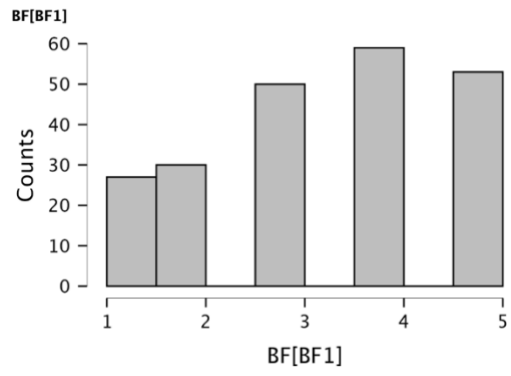
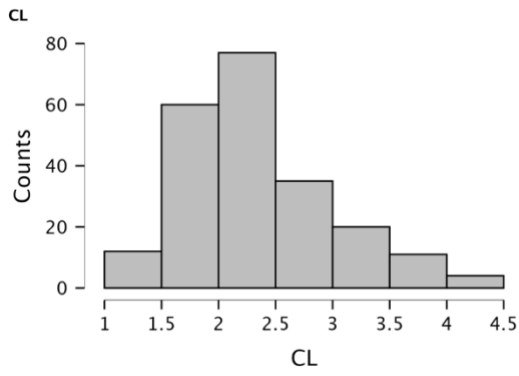
## Appendix E – Distribution plots











## Appendix F – Cronbach’s alpha coefficients

### Narrative Transportation:

#### Frequentist Scale Reliability Statistics ▼

Coefficient	Estimate	Std. Error	95% CI	
			Lower	Upper
Coefficient $\alpha$	0.699	0.038	0.626	0.773

#### Frequentist Individual Item Reliability Statistics

Item	Coefficient $\alpha$ (if item dropped)		
	Estimate	Lower 95% CI	Upper 95% CI
NT[NT1]	0.665	0.571	0.759
NT[NT2]	0.548	0.424	0.673
NT[NT3]	0.589	0.461	0.717

### Character Identification:

#### Frequentist Scale Reliability Statistics

Coefficient	Estimate	Std. Error	95% CI	
			Lower	Upper
Coefficient $\alpha$	0.935	0.009	0.918	0.952

#### Frequentist Individual Item Reliability Statistics

Item	Coefficient $\alpha$ (if item dropped)		
	Estimate	Lower 95% CI	Upper 95% CI
CI[CI1]	0.932	0.911	0.953
CI[CI2]	0.900	0.874	0.926
CI[CI3]	0.904	0.878	0.930
CI[CI4]	0.923	0.902	0.944

### Narrative Ad Structure (characters):

#### Frequentist Scale Reliability Statistics

Coefficient	Estimate	Std. Error	95% CI	
			Lower	Upper
Coefficient $\alpha$	0.666	0.046	0.576	0.757

#### Frequentist Individual Item Reliability Statistics

Item	Coefficient $\alpha$ (if item dropped)		
	Estimate	Lower 95% CI	Upper 95% CI
NAS[NAS1]	0.623	0.511	0.736
NAS[NAS2]	0.520	0.338	0.701
NAS[NAS3]	0.557	0.360	0.753

### Narrative Ad Structure (plot):

#### Frequentist Scale Reliability Statistics

Coefficient	Estimate	Std. Error	95% CI	
			Lower	Upper
Coefficient $\alpha$	0.651	0.045	0.562	0.740

#### Frequentist Individual Item Reliability Statistics

Item	Coefficient $\alpha$ (if item dropped)		
	Estimate	Lower 95% CI	Upper 95% CI
NAS[NAS4]	0.619	0.493	0.744
NAS[NAS5]	0.594	0.481	0.706
NAS[NAS6]	0.457	0.318	0.596

### Narrative Ad Structure (overall):

#### Frequentist Scale Reliability Statistics

Coefficient	Estimate	Std. Error	95% CI	
			Lower	Upper
Coefficient $\alpha$	0.795	0.021	0.755	0.836

#### Frequentist Individual Item Reliability Statistics

Item	Coefficient $\alpha$ (if item dropped)		
	Estimate	Lower 95% CI	Upper 95% CI
NAS[NAS1]	0.779	0.725	0.833
NAS[NAS2]	0.752	0.703	0.801
NAS[NAS3]	0.756	0.705	0.807
NAS[NAS4]	0.749	0.693	0.804
NAS[NAS5]	0.772	0.728	0.816
NAS[NAS6]	0.772	0.724	0.821

### Message Clarity:

#### Frequentist Scale Reliability Statistics

Coefficient	Estimate	Std. Error	95% CI	
			Lower	Upper
Coefficient $\alpha$	0.828	0.032	0.765	0.892

#### Frequentist Individual Item Reliability Statistics

Item	Coefficient $\alpha$ (if item dropped)		
	Estimate	Lower 95% CI	Upper 95% CI
MC[MC1]			
MC[MC2]			

Note. Please enter at least 3 variables for the if item dropped statistics.

### Brand Integration:

*Frequentist Scale Reliability Statistics*

Coefficient	Estimate	Std. Error	95% CI	
			Lower	Upper
Coefficient $\alpha$	0.764	0.033	0.699	0.829

*Frequentist Individual Item Reliability Statistics*

Item	Coefficient $\alpha$ (if item dropped)		
	Estimate	Lower 95% CI	Upper 95% CI
BI[B11]	0.655	0.547	0.763
BI[B12]	0.768	0.691	0.844
BI[B13]	0.624	0.502	0.746

### Emotional Engagement:

*Frequentist Scale Reliability Statistics*

Coefficient	Estimate	Std. Error	95% CI	
			Lower	Upper
Coefficient $\alpha$	0.853	0.021	0.811	0.895

*Frequentist Individual Item Reliability Statistics*

Item	Coefficient $\alpha$ (if item dropped)		
	Estimate	Lower 95% CI	Upper 95% CI
EE[EE1]	0.789	0.722	0.857
EE[EE2]	0.797	0.733	0.862
EE[EE3]	0.798	0.729	0.866

### Cognitive Load:

*Frequentist Scale Reliability Statistics*

Coefficient	Estimate	Std. Error	95% CI	
			Lower	Upper
Coefficient $\alpha$	0.585	0.049	0.488	0.681

Note. The following item correlated negatively with the scale: CL4[CL4].

*Frequentist Individual Item Reliability Statistics*

Item	Coefficient $\alpha$ (if item dropped)		
	Estimate	Lower 95% CI	Upper 95% CI
CL1_Reversed	0.292	0.125	0.459
CL2_Reversed	0.220	0.035	0.405
CL3_Reversed	0.538	0.429	0.647
CL4[CL4]	0.809	0.754	0.865

### Purchase Intention:

*Frequentist Scale Reliability Statistics*

Coefficient	Estimate	Std. Error	95% CI	
			Lower	Upper
Coefficient $\alpha$	0.972	0.005	0.963	0.981

*Frequentist Individual Item Reliability Statistics*

Item	Coefficient $\alpha$ (if item dropped)		
	Estimate	Lower 95% CI	Upper 95% CI
PI[PI1]	0.961	0.947	0.976
PI[PI2]	0.954	0.936	0.972
PI[PI3]	0.960	0.944	0.975

BF: only one item so it doesn't compute the alpha (need at least 2 variables).

## Appendix G – Correlation table

Correlation Table

			Pearson		Spearman	
			r	p	rho	p
NT	-	CI	0.442	< .001	0.418	< .001
NT	-	NAS(ch)	0.466	< .001	0.423	< .001
NT	-	NAS(p)	0.470	< .001	0.434	< .001
NT	-	MC	0.367	< .001	0.287	< .001
NT	-	BI	0.336	< .001	0.311	< .001
NT	-	EE	0.607	< .001	0.602	< .001
NT	-	CL	-0.490	< .001	-0.460	< .001
NT	-	BF	0.431	< .001	0.400	< .001
NT	-	PI	0.313	< .001	0.305	< .001
NT	-	BER	0.071	.296	0.047	.485
NT	-	ChR	0.170	.012	0.157	.020
NT	-	MR	0.159	.019	0.125	.065
NT	-	CIR	0.029	.670	0.026	.698
NT	-	Age	0.077	.259	0.111	.101
CI	-	NAS(ch)	0.286	< .001	0.240	< .001
CI	-	NAS(p)	0.243	< .001	0.196	.004
CI	-	MC	0.303	< .001	0.246	< .001
CI	-	BI	0.161	.017	0.151	.025
CI	-	EE	0.349	< .001	0.384	< .001
CI	-	CL	-0.272	< .001	-0.233	< .001
CI	-	BF	0.187	.005	0.158	.019
CI	-	PI	0.214	.001	0.196	.004
CI	-	BER	0.008	.911	0.000	1.000
CI	-	ChR	0.070	.300	0.070	.305
CI	-	MR	0.030	.660	-0.005	.937
CI	-	CIR	-0.073	.279	-0.043	.528
CI	-	Age	0.174	.010	0.200	.003
NAS(ch)	-	NAS(p)	0.664	< .001	0.611	< .001
NAS(ch)	-	MC	0.489	< .001	0.428	< .001
NAS(ch)	-	BI	0.246	< .001	0.232	< .001
NAS(ch)	-	EE	0.433	< .001	0.426	< .001
NAS(ch)	-	CL	-0.431	< .001	-0.432	< .001
NAS(ch)	-	BF	0.169	.012	0.156	.021
NAS(ch)	-	PI	0.155	.022	0.159	.018
NAS(ch)	-	BER	0.071	.298	0.041	.542
NAS(ch)	-	ChR	-0.005	.939	-0.043	.530
NAS(ch)	-	MR	0.115	.088	0.121	.075
NAS(ch)	-	CIR	0.060	.376	0.035	.605
NAS(ch)	-	Age	0.119	.079	0.138	.041
NAS(p)	-	MC	0.506	< .001	0.490	< .001

Correlation Table

			Pearson		Spearman	
			r	p	rho	p
NAS(p)	-	BI	0.218	.001	0.210	.002
NAS(p)	-	EE	0.377	< .001	0.356	< .001
NAS(p)	-	CL	-0.484	< .001	-0.457	< .001
NAS(p)	-	BF	0.220	.001	0.190	.005
NAS(p)	-	PI	0.132	.051	0.107	.114
NAS(p)	-	BER	0.115	.090	0.115	.090
NAS(p)	-	ChR	0.098	.147	0.126	.062
NAS(p)	-	MR	0.115	.091	0.154	.022
NAS(p)	-	CIR	0.079	.247	0.068	.317
NAS(p)	-	Age	0.148	.028	0.161	.017
MC	-	BI	0.259	< .001	0.241	< .001
MC	-	EE	0.360	< .001	0.343	< .001
MC	-	CL	-0.613	< .001	-0.536	< .001
MC	-	BF	0.260	< .001	0.233	< .001
MC	-	PI	0.213	.001	0.198	.003
MC	-	BER	0.086	.205	0.057	.398
MC	-	ChR	0.125	.064	0.104	.126
MC	-	MR	0.016	.815	-0.019	.780
MC	-	CIR	0.012	.859	-0.026	.706
MC	-	Age	0.074	.276	0.074	.273
BI	-	EE	0.366	< .001	0.360	< .001
BI	-	CL	-0.386	< .001	-0.382	< .001
BI	-	BF	0.342	< .001	0.333	< .001
BI	-	PI	0.328	< .001	0.340	< .001
BI	-	BER	-0.058	.390	-0.054	.422
BI	-	ChR	0.067	.324	0.065	.335
BI	-	MR	0.031	.643	0.025	.708
BI	-	CIR	-0.027	.695	-0.003	.971
BI	-	Age	0.082	.229	0.064	.347
EE	-	CL	-0.459	< .001	-0.509	< .001
EE	-	BF	0.309	< .001	0.296	< .001
EE	-	PI	0.312	< .001	0.304	< .001
EE	-	BER	-0.063	.355	-0.073	.280
EE	-	ChR	-0.011	.869	-0.010	.881
EE	-	MR	-0.002	.972	-0.027	.688
EE	-	CIR	-0.025	.713	-0.014	.833
EE	-	Age	0.133	.049	0.164	.015
CL	-	BF	-0.405	< .001	-0.376	< .001
CL	-	PI	-0.324	< .001	-0.318	< .001
CL	-	BER	-0.050	.465	-0.034	.614
CL	-	ChR	-0.173	.010	-0.114	.091
CL	-	MR	-0.127	.060	-0.083	.222
CL	-	CIR	-0.060	.377	-0.074	.275

Correlation Table

			Pearson		Spearman	
			r	p	rho	p
CL	-	Age	-0.032	.638	-0.047	.490
BF	-	PI	0.512	< .001	0.499	< .001
BF	-	BER	0.058	.391	0.050	.460
BF	-	ChR	0.160	.018	0.160	.018
BF	-	MR	0.163	.016	0.124	.067
BF	-	CIR	-0.022	.748	-1.700×10 <sup>-5</sup>	1.000
BF	-	Age	6.507×10 <sup>-4</sup>	.992	0.023	.739
PI	-	BER	-0.070	.305	-0.065	.339
PI	-	ChR	0.059	.385	0.057	.401
PI	-	MR	-0.066	.327	-0.113	.094
PI	-	CIR	-0.139	.040	-0.136	.045
PI	-	Age	-0.205	.002	-0.201	.003
BER	-	ChR	0.122	.071	0.122	.071
BER	-	MR	0.354	< .001	0.353	< .001
BER	-	CIR	0.276	< .001	0.195	.004
BER	-	Age	0.025	.711	0.023	.732
ChR	-	MR	0.151	.025	0.162	.016
ChR	-	CIR	0.115	.089	0.130	.055
ChR	-	Age	0.010	.882	0.012	.860
MR	-	CIR	0.273	< .001	0.285	< .001
MR	-	Age	0.136	.045	0.177	.009
CIR	-	Age	0.205	.002	0.196	.004

## Appendix H – JASP outputs for hypotheses testing

### H1: Linear regression between NAS(ch) and CI:

#### Model Summary - CI

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.929
M <sub>1</sub>	0.286	0.082	0.078	0.893

Note. M<sub>1</sub> includes NAS(ch)

#### ANOVA

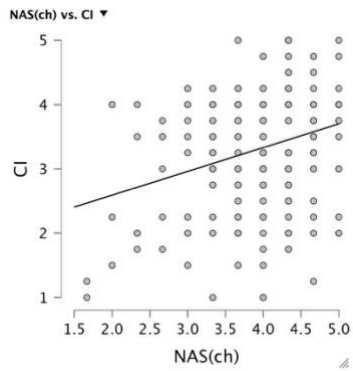
Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	15.39	1	15.391	19.32	< .001
	Residual	172.90	217	0.797		
	Total	188.29	218			

Note. M<sub>1</sub> includes NAS(ch)

Note. The intercept model is omitted, as no meaningful information can be shown.

#### Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	3.312	0.063		52.732	< .001
M <sub>1</sub>	(Intercept)	1.851	0.338		5.483	< .001
	NAS(ch)	0.370	0.084	0.286	4.395	< .001



+BF, PI, Age and Gender:

Model Summary - CI

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.931
M <sub>1</sub>	0.285	0.081	0.077	0.894
M <sub>2</sub>	0.332	0.110	0.102	0.882
M <sub>3</sub>	0.380	0.145	0.133	0.867

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	15.28	1	15.284	19.12	< .001
	Residual	172.69	216	0.799		
	Total	187.98	217			
M <sub>2</sub>	Regression	20.77	2	10.385	13.35	< .001
	Residual	167.21	215	0.778		
	Total	187.98	217			
M <sub>3</sub>	Regression	27.18	3	9.060	12.06	< .001
	Residual	160.79	214	0.751		
	Total	187.98	217			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized <sup>a</sup>	t	p
M <sub>0</sub>	(Intercept)	3.314	0.063		52.576	< .001
M <sub>1</sub>	(Intercept)	1.858	0.338		5.489	< .001
	NAS(ch)	0.369	0.084	0.285	4.372	< .001
M <sub>2</sub>	(Intercept)	1.612	0.347		4.651	< .001
	NAS(ch)	0.334	0.084	0.258	3.970	< .001
	PI	0.142	0.053	0.173	2.656	.009
M <sub>3</sub>	(Intercept)	1.170	0.373		3.139	.002
	NAS(ch)	0.296	0.084	0.229	3.537	< .001
	PI	0.178	0.054	0.217	3.300	.001

Coefficients

Model	Unstandardized	Standard Error	Standardized <sup>a</sup>	t	p
Age	0.012	0.004	0.191	2.921	.004

Note. The following covariate was considered but not included: BF.

<sup>a</sup> Standardized coefficients can only be computed for continuous predictors.

H2: Linear regression between NAS(ch) and NT:

Model Summary - NT

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.908
M <sub>1</sub>	0.466	0.217	0.213	0.806

Note. M<sub>1</sub> includes NAS(ch)

ANOVA

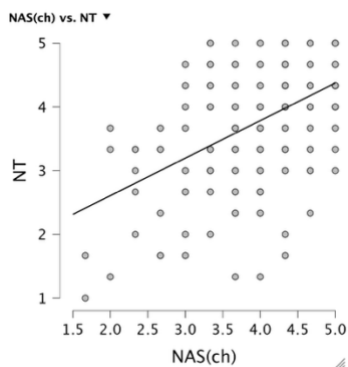
Model	Sum of Squares	df	Mean Square	F	p
M <sub>1</sub> Regression	38.97	1	38.973	60.03	< .001
Residual	140.88	217	0.649		
Total	179.85	218			

Note. M<sub>1</sub> includes NAS(ch)

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model	Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub> (Intercept)	3.755	0.061		61.179	< .001
M <sub>1</sub> (Intercept)	1.431	0.305		4.696	< .001
NAS(ch)	0.589	0.076	0.466	7.748	< .001



+BF, PI, Age:

*Model Summary - NT*

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.908
M <sub>1</sub>	0.466	0.217	0.213	0.806
M <sub>2</sub>	0.587	0.345	0.338	0.739

*ANOVA*

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	38.97	1	38.973	60.03	< .001
	Residual	140.88	217	0.649		
	Total	179.85	218			
M <sub>2</sub>	Regression	61.96	2	30.979	56.76	< .001
	Residual	117.89	216	0.546		
	Total	179.85	218			

*Note.* The intercept model is omitted, as no meaningful information can be shown.

*Coefficients*

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	3.755	0.061		61.179	< .001
M <sub>1</sub>	(Intercept)	1.431	0.305		4.696	< .001
	NAS(ch)	0.589	0.076	0.466	7.748	< .001
M <sub>2</sub>	(Intercept)	0.895	0.291		3.071	.002
	NAS(ch)	0.511	0.071	0.404	7.234	< .001
	BF	0.250	0.038	0.363	6.490	< .001

*Note.* The following covariates were considered but not included: PI, Age.

**H3: Linear regression between NAS(p) and NT:**

*Model Summary - NT*

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.908
M <sub>1</sub>	0.470	0.221	0.217	0.804

*Note.* M<sub>1</sub> includes NAS(p)

*ANOVA*

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	39.70	1	39.704	61.48	< .001
	Residual	140.14	217	0.646		
	Total	179.85	218			

*Note.* M<sub>1</sub> includes NAS(p)

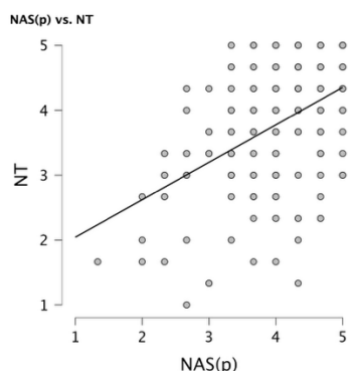
ANOVA

Model	Sum of Squares	df	Mean Square	F	p
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Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	3.755	0.061		61.179	< .001
M <sub>1</sub>	(Intercept)	1.466	0.297		4.939	< .001
	NAS(p)	0.577	0.074	0.470	7.841	< .001



+BF, PI, Age:

Model Summary - NT

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.908
M <sub>1</sub>	0.470	0.221	0.217	0.804
M <sub>2</sub>	0.577	0.333	0.327	0.745

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	39.70	1	39.704	61.48	< .001
	Residual	140.14	217	0.646		
	Total	179.85	218			
M <sub>2</sub>	Regression	59.97	2	29.983	54.02	< .001
	Residual	119.88	216	0.555		
	Total	179.85	218			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	3.755	0.061		61.179	< .001
M <sub>1</sub>	(Intercept)	1.466	0.297		4.939	< .001

*Coefficients*

Model		Unstandardized	Standard Error	Standardized	t	p
	NAS(p)	0.577	0.074	0.470	7.841	< .001
M <sub>2</sub>	(Intercept)	1.037	0.284		3.648	< .001
	NAS(p)	0.484	0.070	0.394	6.919	< .001
	BF	0.237	0.039	0.344	6.042	< .001

Note. The following covariates were considered but not included: PI, Age.

**H4: Linear regression between MC and NT:**

*Model Summary - NT*

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.908
M <sub>1</sub>	0.367	0.135	0.131	0.847

Note. M<sub>1</sub> includes MC

*ANOVA*

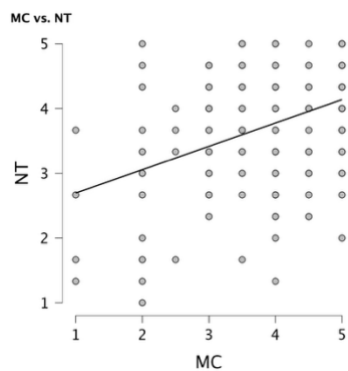
Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	24.22	1	24.218	33.77	< .001
	Residual	155.63	217	0.717		
	Total	179.85	218			

Note. M<sub>1</sub> includes MC

Note. The intercept model is omitted, as no meaningful information can be shown.

*Coefficients*

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	3.755	0.061		61.179	< .001
M <sub>1</sub>	(Intercept)	2.335	0.251		9.308	< .001
	MC	0.360	0.062	0.367	5.811	< .001



+BF, PI, Age:

*Model Summary - NT*

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.908
M <sub>1</sub>	0.431	0.186	0.182	0.822
M <sub>2</sub>	0.505	0.255	0.249	0.787

*ANOVA*

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	33.40	1	33.400	49.49	< .001
	Residual	146.45	217	0.675		
	Total	179.85	218			
M <sub>2</sub>	Regression	45.95	2	22.975	37.06	< .001
	Residual	133.90	216	0.620		
	Total	179.85	218			

*Note.* The intercept model is omitted, as no meaningful information can be shown.

*Coefficients*

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	3.755	0.061		61.179	< .001
M <sub>1</sub>	(Intercept)	2.755	0.153		18.046	< .001
	BF	0.297	0.042	0.431	7.035	< .001
M <sub>2</sub>	(Intercept)	1.861	0.247		7.547	< .001
	BF	0.248	0.042	0.360	5.921	< .001
	MC	0.269	0.060	0.274	4.499	< .001

*Note.* The following covariates were considered but not included: PI, Age.

**H5: Linear regression between BI and NT:**

*Model Summary - NT*

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.908
M <sub>1</sub>	0.336	0.113	0.109	0.857

*Note.* M<sub>1</sub> includes BI

*ANOVA*

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	20.31	1	20.312	27.63	< .001
	Residual	159.54	217	0.735		
	Total	179.85	218			

*Note.* M<sub>1</sub> includes BI

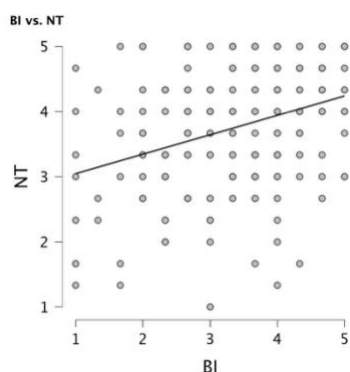
ANOVA

Model	Sum of Squares	df	Mean Square	F	p
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Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	3.755	0.061		61.179	< .001
M <sub>1</sub>	(Intercept)	2.747	0.200		13.719	< .001
	BI	0.298	0.057	0.336	5.256	< .001



+BF, PI, Age:

Model Summary - NT

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.908
M <sub>1</sub>	0.431	0.186	0.182	0.822
M <sub>2</sub>	0.475	0.226	0.219	0.803

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	33.40	1	33.400	49.49	< .001
	Residual	146.45	217	0.675		
	Total	179.85	218			
M <sub>2</sub>	Regression	40.65	2	20.325	31.54	< .001
	Residual	139.20	216	0.644		
	Total	179.85	218			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	3.755	0.061		61.179	< .001
M <sub>1</sub>	(Intercept)	2.755	0.153		18.046	< .001

*Coefficients*

Model		Unstandardized	Standard Error	Standardized	t	p
	BF	0.297	0.042	0.431	7.035	< .001
M <sub>2</sub>	(Intercept)	2.284	0.205		11.147	< .001
	BF	0.247	0.044	0.358	5.618	< .001
	BI	0.190	0.057	0.214	3.354	< .001

Note. The following covariates were considered but not included: PI, Age.

**H2→H5: Multiple regression between NAS(ch), NAS(p), MC, BI and NT:**

*Model Summary - NT*

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.908
M <sub>1</sub>	0.470	0.221	0.217	0.804
M <sub>2</sub>	0.527	0.278	0.271	0.775
M <sub>3</sub>	0.555	0.308	0.299	0.761

*ANOVA*

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	39.70	1	39.704	61.48	< .001
	Residual	140.14	217	0.646		
	Total	179.85	218			
M <sub>2</sub>	Regression	50.03	2	25.013	41.62	< .001
	Residual	129.82	216	0.601		
	Total	179.85	218			
M <sub>3</sub>	Regression	55.45	3	18.482	31.94	< .001
	Residual	124.40	215	0.579		
	Total	179.85	218			

Note. The intercept model is omitted, as no meaningful information can be shown.

*Coefficients*

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	3.755	0.061		61.179	< .001
M <sub>1</sub>	(Intercept)	1.466	0.297		4.939	< .001
	NAS(p)	0.577	0.074	0.470	7.841	< .001
M <sub>2</sub>	(Intercept)	0.991	0.309		3.211	.002
	NAS(p)	0.512	0.073	0.416	7.031	< .001
	BI	0.218	0.053	0.245	4.144	< .001
M <sub>3</sub>	(Intercept)	0.627	0.325		1.929	.055
	NAS(p)	0.327	0.093	0.266	3.495	< .001
	BI	0.196	0.052	0.221	3.758	< .001

*Coefficients*

Model	Unstandardized	Standard Error	Standardized	t	p
NAS(ch)	0.297	0.097	0.235	3.061	.002

Note. The following covariate was considered but not included: MC.

**+BF, PI, Age:**

*Model Summary - NT*

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.908
M <sub>1</sub>	0.470	0.221	0.217	0.804
M <sub>2</sub>	0.577	0.333	0.327	0.745
M <sub>3</sub>	0.609	0.371	0.363	0.725
M <sub>4</sub>	0.621	0.385	0.374	0.719

*ANOVA*

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	39.70	1	39.704	61.48	< .001
	Residual	140.14	217	0.646		
	Total	179.85	218			
M <sub>2</sub>	Regression	59.97	2	29.983	54.02	< .001
	Residual	119.88	216	0.555		
	Total	179.85	218			
M <sub>3</sub>	Regression	66.80	3	22.268	42.35	< .001
	Residual	113.05	215	0.526		
	Total	179.85	218			
M <sub>4</sub>	Regression	69.28	4	17.321	33.52	< .001
	Residual	110.56	214	0.517		
	Total	179.85	218			

Note. The intercept model is omitted, as no meaningful information can be shown.

*Coefficients*

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	3.755	0.061		61.179	< .001
M <sub>1</sub>	(Intercept)	1.466	0.297		4.939	< .001
	NAS(p)	0.577	0.074	0.470	7.841	< .001
M <sub>2</sub>	(Intercept)	1.037	0.284		3.648	< .001
	NAS(p)	0.484	0.070	0.394	6.919	< .001
	BF	0.237	0.039	0.344	6.042	< .001
M <sub>3</sub>	(Intercept)	0.586	0.304		1.932	.055
	NAS(p)	0.273	0.090	0.222	3.035	.003
	BF	0.233	0.038	0.338	6.094	< .001
	NAS(ch)	0.330	0.092	0.261	3.606	< .001

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>4</sub>	(Intercept)	0.425	0.310		1.373	.171
	NAS(p)	0.267	0.089	0.217	2.993	.003
	BF	0.206	0.040	0.299	5.175	< .001
	NAS(ch)	0.303	0.092	0.239	3.306	.001
	BI	0.113	0.052	0.128	2.191	.029

Note. The following covariates were considered but not included: MC, PI, Age.

H6: Linear regression between NT and CI:

Model Summary - CI

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.929
M <sub>1</sub>	0.442	0.195	0.192	0.836

Note. M<sub>1</sub> includes NT

ANOVA

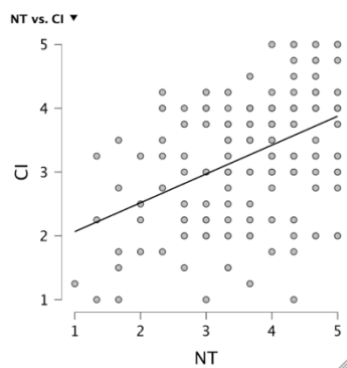
Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	36.76	1	36.759	52.64	< .001
	Residual	151.53	217	0.698		
	Total	188.29	218			

Note. M<sub>1</sub> includes NT

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	3.312	0.063		52.732	< .001
M <sub>1</sub>	(Intercept)	1.614	0.241		6.706	< .001
	NT	0.452	0.062	0.442	7.255	< .001



+BF, PI, Age and Gender:

Model Summary - CI

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.931
M <sub>1</sub>	0.440	0.194	0.190	0.838
M <sub>2</sub>	0.462	0.214	0.207	0.829

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	36.45	1	36.449	51.96	< .001
	Residual	151.53	216	0.702		
	Total	187.98	217			
M <sub>2</sub>	Regression	40.20	2	20.102	29.25	< .001
	Residual	147.77	215	0.687		
	Total	187.98	217			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized <sup>a</sup>	t	p
M <sub>0</sub>	(Intercept)	3.314	0.063		52.576	< .001
M <sub>1</sub>	(Intercept)	1.611	0.243		6.631	< .001
	NT	0.453	0.063	0.440	7.208	< .001
M <sub>2</sub>	(Intercept)	1.285	0.278		4.620	< .001
	NT	0.442	0.062	0.430	7.091	< .001
	Age	0.009	0.004	0.142	2.337	.020

Note. The following covariates were considered but not included: BF, PI.

<sup>a</sup> Standardized coefficients can only be computed for continuous predictors.

Supplementary analysis: Linear regression between EE and NT:

Model Summary - NT

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.908
M <sub>1</sub>	0.607	0.368	0.365	0.724

Note. M<sub>1</sub> includes EE

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	66.18	1	66.182	126.3	< .001
	Residual	113.67	217	0.524		
	Total	179.85	218			

## ANOVA

Model	Sum of Squares	df	Mean Square	F	p
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Note. M<sub>1</sub> includes EE

Note. The intercept model is omitted, as no meaningful information can be shown.

## Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	3.755	0.061		61.179	< .001
M <sub>1</sub>	(Intercept)	1.756	0.184		9.518	< .001
	EE	0.597	0.053	0.607	11.240	< .001

## +BF, PI, Age:

## Model Summary - NT

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.908
M <sub>1</sub>	0.607	0.368	0.365	0.724
M <sub>2</sub>	0.658	0.434	0.428	0.687

## ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	66.18	1	66.182	126.35	< .001
	Residual	113.67	217	0.524		
	Total	179.85	218			
M <sub>2</sub>	Regression	77.98	2	38.988	82.67	< .001
	Residual	101.87	216	0.472		
	Total	179.85	218			

Note. The intercept model is omitted, as no meaningful information can be shown.

## Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	3.755	0.061		61.179	< .001
M <sub>1</sub>	(Intercept)	1.756	0.184		9.518	< .001
	EE	0.597	0.053	0.607	11.240	< .001
M <sub>2</sub>	(Intercept)	1.405	0.189		7.449	< .001
	EE	0.515	0.053	0.523	9.722	< .001
	BF	0.185	0.037	0.269	5.001	< .001

Note. The following covariates were considered but not included: PI, Age.

## H7: CI → ChR:

## Generalized Linear Model (binomial)

Model Summary - ChR\_prop

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	165.2	229.6	233.0	218		
H <sub>1</sub>	164.3	230.7	237.5	217	0.943	.332

Coefficients

	Estimate	Standard Error	z	p
(Intercept)	1.640	0.553	2.967	.003
CI	0.162	0.166	0.978	.328

## Linear Regression

Model Summary - ChR

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.405
M <sub>1</sub>	0.070	0.005	0.000	0.405

Note. M<sub>1</sub> includes CI

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	0.177	1	0.177	1.080	.300
	Residual	35.576	217	0.164		
	Total	35.753	218			

Note. M<sub>1</sub> includes CI

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.795	0.027		65.575	< .001
M <sub>1</sub>	(Intercept)	1.693	0.101		16.683	< .001
	CI	0.031	0.030	0.070	1.039	.300

+BF, PI, Age and Gender:

## Generalized Linear Model (binomial)

Model Summary - ChR\_prop

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	163.2	226.2	229.6	217		
H <sub>1</sub>	155.9	228.9	249.2	212	7.296	.200

*Coefficients*

	Estimate	Standard Error	z	p
(Intercept)	1.611	0.794	2.030	.042
Gender2	-0.554	0.358	-1.545	.122
CI	0.123	0.177	0.691	.489
BF	0.199	0.147	1.356	.175
PI	-0.075	0.174	-0.430	.667
Age	0.001	0.012	0.121	.904

**Linear Regression**

*Model Summary - ChR*

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.402
M <sub>1</sub>	0.152	0.023	0.019	0.399

*ANOVA*

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	0.817	1	0.817	5.143	.024
	Residual	34.303	216	0.159		
	Total	35.119	217			

Note. The intercept model is omitted, as no meaningful information can be shown.

*Coefficients*

Model		Unstandardized	Standard Error	Standardized <sup>a</sup>	t	p
M <sub>0</sub>	(Intercept)	1.798	0.027		65.996	< .001
M <sub>1</sub>	(Intercept)	1.641	0.074		22.072	< .001
	BF	0.047	0.021	0.152	2.268	.024

Note. The following covariates were considered but not included: CI, PI, Age.

<sup>a</sup> Standardized coefficients can only be computed for continuous predictors.

H9: CI → MR:

**Generalized Linear Model (binomial)**

*Model Summary - MR\_prop*

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	149.7	183.6	187.0	218		
H <sub>1</sub>	149.5	185.4	192.2	217	0.222	.638

*Coefficients*

	Estimate	Standard Error	z	p
(Intercept)	2.330	0.687	3.393	< .001
CI	0.096	0.204	0.474	.636

**Linear Regression**

*Model Summary - MR*

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.378
M <sub>1</sub>	0.030	0.001	-0.004	0.379

Note. M<sub>1</sub> includes CI

*ANOVA*

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	0.028	1	0.028	0.194	.660
	Residual	31.132	217	0.143		
	Total	31.160	218			

Note. M<sub>1</sub> includes CI

Note. The intercept model is omitted, as no meaningful information can be shown.

*Coefficients*

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.868	0.026		73.102	< .001
M <sub>1</sub>	(Intercept)	1.827	0.095		19.250	< .001
	CI	0.012	0.028	0.030	0.440	.660

+BF, PI, Age:

**Generalized Linear Model (binomial)**

*Model Summary - MR<sub>prop</sub>*

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	149.7	183.6	187.0	218		
H <sub>1</sub>	132.7	174.6	191.5	214	17.05	.002

*Coefficients*

	Estimate	Standard Error	z	p
(Intercept)	1.476	0.932	1.584	.113
CI	-0.060	0.233	-0.259	.796
BF	0.607	0.181	3.357	< .001
PI	-0.497	0.214	-2.324	.020

*Coefficients*

	Estimate	Standard Error	z	p
Age	0.023	0.014	1.601	.109

### Linear Regression

*Model Summary - MR*

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.378
M <sub>1</sub>	0.163	0.027	0.022	0.374
M <sub>2</sub>	0.239	0.057	0.048	0.369

*ANOVA*

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	0.829	1	0.829	5.931	.016
	Residual	30.331	217	0.140		
	Total	31.160	218			
M <sub>2</sub>	Regression	1.780	2	0.890	6.543	.002
	Residual	29.380	216	0.136		
	Total	31.160	218			

*Note.* The intercept model is omitted, as no meaningful information can be shown.

*Coefficients*

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.868	0.026		73.102	< .001
M <sub>1</sub>	(Intercept)	1.710	0.069		24.615	< .001
	BF	0.047	0.019	0.163	2.435	.016
M <sub>2</sub>	(Intercept)	1.792	0.075		23.815	< .001
	BF	0.077	0.022	0.267	3.475	< .001
	PI	-0.068	0.026	-0.203	-2.644	.009

*Note.* The following covariates were considered but not included: CI, Age.

H10: NT → BER:

### Generalized Linear Model (binomial)

*Model Summary - BER\_prop*

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	62.79	77.27	80.66	218		
H <sub>1</sub>	61.77	78.25	85.03	217	1.017	.313

*Coefficients*

	Estimate	Standard Error	z	p
(Intercept)	2.585	1.234	2.094	.036
NT	0.355	0.344	1.032	.302

**Linear Regression**

*Model Summary - BER*

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.199
M <sub>1</sub>	0.071	0.005	0.000	0.199

Note. M<sub>1</sub> includes NT

*ANOVA*

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	0.043	1	0.043	1.097	.296
	Residual	8.587	217	0.040		
	Total	8.630	218			

Note. M<sub>1</sub> includes NT

Note. The intercept model is omitted, as no meaningful information can be shown.

*Coefficients*

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.959	0.013		145.698	< .001
M <sub>1</sub>	(Intercept)	1.901	0.057		33.171	< .001
	NT	0.016	0.015	0.071	1.048	.296

+BF, PI, Age:

**Generalized Linear Model (binomial)**

*Model Summary - BER\_prop*

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	62.79	77.27	80.66	218		
H <sub>1</sub>	58.32	80.80	97.74	214	4.468	.346

*Coefficients*

	Estimate	Standard Error	z	p
(Intercept)	3.385	1.672	2.024	.043
NT	0.362	0.383	0.944	.345
BF	0.378	0.309	1.223	.221
PI	-0.653	0.374	-1.748	.080

### Coefficients

	Estimate	Standard Error	z	p
Age	-0.004	0.023	-0.158	.874

## Linear Regression

### Model Summary - BER

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.199

### ANOVA

Model	Sum of Squares	df	Mean Square	F	p
.	.	.	.	.	.

Note. There is only an intercept model, no meaningful information can be shown.

### Coefficients

Model	Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.959	0.013	145.7	< .001

Note. The following covariates were considered but not included: NT, BF, PI, Age.

H12: NT → ChR:

## Generalized Linear Model (binomial)

### Model Summary - ChR<sub>prop</sub>

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	165.2	229.6	233.0	218		
H <sub>1</sub>	159.9	226.3	233.1	217	5.348	.021

### Coefficients

	Estimate	Standard Error	z	p
(Intercept)	0.771	0.596	1.293	.196
NT	0.385	0.164	2.342	.019

## Linear Regression

### Model Summary - ChR

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.405
M <sub>1</sub>	0.170	0.029	0.024	0.400

Note. M<sub>1</sub> includes NT

## ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	1.034	1	1.034	6.465	.012
	Residual	34.719	217	0.160		
	Total	35.753	218			

Note. M<sub>1</sub> includes NT

Note. The intercept model is omitted, as no meaningful information can be shown.

## Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.795	0.027		65.575	< .001
M <sub>1</sub>	(Intercept)	1.510	0.115		13.104	< .001
	NT	0.076	0.030	0.170	2.543	.012

+BF, PI, Age and Gender:

## Generalized Linear Model (binomial)

Model Summary - ChR<sub>prop</sub>

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	163.2	226.2	229.6	217		
H <sub>1</sub>	154.4	227.4	247.7	212	8.787	.118

## Coefficients

	Estimate	Standard Error	z	p
(Intercept)	1.234	0.838	1.473	.141
Gender2	-0.522	0.355	-1.470	.142
NT	0.263	0.187	1.409	.159
BF	0.149	0.154	0.968	.333
PI	-0.088	0.175	-0.504	.614
Age	0.001	0.011	0.119	.906

## Linear Regression

## Model Summary - ChR

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.402
M <sub>1</sub>	0.158	0.025	0.021	0.398

## ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	0.879	1	0.879	5.547	.019

ANOVA

Model	Sum of Squares	df	Mean Square	F	p
Residual	34.240	216	0.159		
Total	35.119	217			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model	Unstandardized	Standard Error	Standardized <sup>a</sup>	t	p
M <sub>0</sub> (Intercept)	1.798	0.027		65.996	< .001
M <sub>1</sub> (Intercept)	1.534	0.115		13.278	< .001
NT	0.070	0.030	0.158	2.355	.019

Note. The following covariates were considered but not included: BF, PI, Age.

<sup>a</sup> Standardized coefficients can only be computed for continuous predictors.

H13: NT → MR:

**Generalized Linear Model (binomial)**

Model Summary - MR<sub>prop</sub>

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	149.7	183.6	187.0	218		
H <sub>1</sub>	143.8	179.7	186.4	217	5.952	.015

Coefficients

	Estimate	Standard Error	z	p
(Intercept)	0.902	0.694	1.299	.194
NT	0.488	0.197	2.480	.013

**Linear Regression**

Model Summary - MR

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.378
M <sub>1</sub>	0.159	0.025	0.021	0.374

Note. M<sub>1</sub> includes NT

ANOVA

Model	Sum of Squares	df	Mean Square	F	p
M <sub>1</sub> Regression	0.787	1	0.787	5.619	.019
Residual	30.373	217	0.140		
Total	31.160	218			

Note. M<sub>1</sub> includes NT

ANOVA

Model	Sum of Squares	df	Mean Square	F	p
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Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.868	0.026		73.102	< .001
M <sub>1</sub>	(Intercept)	1.619	0.108		15.027	< .001
	NT	0.066	0.028	0.159	2.370	.019

+BF, PI, Age:

**Generalized Linear Model (binomial)**

Model Summary - MR<sub>prop</sub>

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	149.7	183.6	187.0	218		
H <sub>1</sub>	130.1	172.0	189.0	214	19.59	< .001

Coefficients

	Estimate	Standard Error	z	p
(Intercept)	0.570	0.942	0.605	.545
NT	0.370	0.227	1.629	.103
BF	0.504	0.186	2.703	.007
PI	-0.551	0.218	-2.524	.012
Age	0.019	0.014	1.353	.176

**Linear Regression**

Model Summary - MR

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.378
M <sub>1</sub>	0.163	0.027	0.022	0.374
M <sub>2</sub>	0.239	0.057	0.048	0.369

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	0.829	1	0.829	5.931	.016
	Residual	30.331	217	0.140		
	Total	31.160	218			
M <sub>2</sub>	Regression	1.780	2	0.890	6.543	.002
	Residual	29.380	216	0.136		
	Total	31.160	218			

## ANOVA

Model	Sum of Squares	df	Mean Square	F	p
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Note. The intercept model is omitted, as no meaningful information can be shown.

## Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.868	0.026		73.102	< .001
M <sub>1</sub>	(Intercept)	1.710	0.069		24.615	< .001
	BF	0.047	0.019	0.163	2.435	.016
M <sub>2</sub>	(Intercept)	1.792	0.075		23.815	< .001
	BF	0.077	0.022	0.267	3.475	< .001
	PI	-0.068	0.026	-0.203	-2.644	.009

Note. The following covariates were considered but not included: NT, Age.

H15: NT → CIR:

## Generalized Linear Model (binomial)

## Model Summary - CIR\_prop

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	205.1	268.1	271.5	218		
H <sub>1</sub>	204.9	269.9	276.7	217	0.195	.659

## Coefficients

	Estimate	Standard Error	z	p
(Intercept)	1.700	0.605	2.810	.005
NT	0.070	0.158	0.444	.657

## Linear Regression

## Model Summary - CLR

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.482
M <sub>1</sub>	0.029	0.001	-0.004	0.483

Note. M<sub>1</sub> includes NT

## ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	0.043	1	0.043	0.182	.670
	Residual	50.642	217	0.233		
	Total	50.685	218			

Note. M<sub>1</sub> includes NT

## ANOVA

Model	Sum of Squares	df	Mean Square	F	p
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Note. The intercept model is omitted, as no meaningful information can be shown.

## Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.753	0.033		53.814	< .001
M <sub>1</sub>	(Intercept)	1.696	0.139		12.186	< .001
	NT	0.015	0.036	0.029	0.427	.670

+BF, PI, Age:

## Generalized Linear Model (binomial)

## Model Summary - CLR\_prop

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	205.1	268.1	271.5	218		
H <sub>1</sub>	192.1	263.1	280.0	214	13.05	.011

## Coefficients

	Estimate	Standard Error	z	p
(Intercept)	1.101	0.763	1.444	.149
NT	0.099	0.185	0.534	.593
BF	0.044	0.142	0.309	.757
PI	-0.259	0.160	-1.618	.106
Age	0.028	0.011	2.555	.011

## Linear Regression

## Model Summary - CLR

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.482
M <sub>1</sub>	0.205	0.042	0.038	0.473

## ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	2.131	1	2.131	9.526	.002
	Residual	48.553	217	0.224		
	Total	50.685	218			

Note. The intercept model is omitted, as no meaningful information can be shown.

*Coefficients*

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.753	0.033		53.814	< .001
M <sub>1</sub>	(Intercept)	1.478	0.095		15.613	< .001
	Age	0.007	0.002	0.205	3.086	.002

Note. The following covariates were considered but not included: NT, BF, PI.

H8: EE modère l'effet CI → ChR:

**Generalized Linear Model (binomial)**

*Model Summary - ChR<sub>prop</sub>*

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	165.2	229.6	233.0	218		
H <sub>1</sub>	163.7	234.1	247.7	215	1.517	.678

*Coefficients*

	Estimate	Standard Error	z	p
(Intercept)	2.859	2.006	1.425	.154
CI	-0.143	0.649	-0.220	.826
EE	-0.404	0.601	-0.673	.501
CIxEE	0.101	0.187	0.540	.589

**Generalized Linear Model (binomial)**

*Model Summary - ChR<sub>prop</sub>*

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	165.2	229.6	233.0	218		
H <sub>1</sub>	163.7	234.1	247.7	215	1.517	.678

*Coefficients*

	Estimate	Standard Error	z	p
(Intercept)	2.151	0.166	12.996	< .001
CI_c	0.195	0.175	1.113	.266
EE_c	-0.070	0.187	-0.375	.708
CI_cxEE_c	0.101	0.187	0.540	.589

**Linear Regression**

*Model Summary - ChR*

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.405
M <sub>1</sub>	0.090	0.008	-0.006	0.406

Model Summary - ChR

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
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Note. M<sub>1</sub> includes CI, EE, ClxEE

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	0.292	3	0.097	0.590	.622
	Residual	35.461	215	0.165		
	Total	35.753	218			

Note. M<sub>1</sub> includes CI, EE, ClxEE

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.795	0.027		65.575	< .001
M <sub>1</sub>	(Intercept)	1.934	0.349		5.543	< .001
	CI	-0.029	0.111	-0.066	-0.258	.797
	EE	-0.081	0.107	-0.184	-0.756	.450
	ClxEE	0.020	0.032	0.245	0.617	.538

+BF, PI, Age and Gender:

**Generalized Linear Model (binomial)**

Model Summary - ChR<sub>prop</sub>

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	163.2	226.2	229.6	217		
H <sub>1</sub>	154.9	231.9	259.0	210	8.311	.306

Coefficients

	Estimate	Standard Error	z	p
(Intercept)	2.609	2.150	1.213	.225
Gender2	-0.520	0.361	-1.440	.150
CI	-0.075	0.671	-0.112	.911
EE	-0.393	0.611	-0.643	.520
ClxEE	0.070	0.192	0.366	.714
BF	0.215	0.148	1.449	.147
PI	-0.048	0.176	-0.276	.783
Age	0.002	0.012	0.196	.844

**Generalized Linear Model (binomial)**

Model Summary - ChR\_prop

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	163.2	226.2	229.6	217		
H <sub>1</sub>	154.9	231.9	259.0	210	8.311	.306

Coefficients

	Estimate	Standard Error	z	p
(Intercept)	1.823	0.798	2.285	.022
Gender2	-0.520	0.361	-1.440	.150
CI_c	0.160	0.181	0.887	.375
EE_c	-0.160	0.202	-0.794	.427
CI_cxEE_c	0.070	0.192	0.366	.714
BF	0.215	0.148	1.449	.147
PI	-0.048	0.176	-0.276	.783
Age	0.002	0.012	0.196	.844

Linear Regression

Model Summary - ChR

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.402
M <sub>1</sub>	0.212	0.045	0.013	0.400

Note. M<sub>1</sub> includes CI, EE, CIxEE, BF, PI, Age, Gender

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	1.582	7	0.226	1.415	.200
	Residual	33.537	210	0.160		
	Total	35.119	217			

Note. M<sub>1</sub> includes CI, EE, CIxEE, BF, PI, Age, Gender

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized <sup>a</sup>	t	p
M <sub>0</sub>	(Intercept)	1.798	0.027		65.996	< .001
M <sub>1</sub>	(Intercept)	1.885	0.356		5.294	< .001
	CI	-0.021	0.109	-0.050	-0.196	.845
	EE	-0.089	0.106	-0.205	-0.846	.399
	CIxEE	0.017	0.032	0.210	0.532	.596
	BF	0.042	0.026	0.139	1.654	.100
	PI	-0.008	0.030	-0.023	-0.269	.788
	Age	3.925 × 10 <sup>-4</sup>	0.002	0.015	0.200	.841
	Gender (2)	-0.091	0.058		-1.556	.121

*Coefficients*

Model	Unstandardized	Standard Error	Standardized <sup>a</sup>	t	p
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<sup>a</sup> Standardized coefficients can only be computed for continuous predictors.

H11: CL modère l'effet NT → BER:

**Generalized Linear Model (binomial)**

*Model Summary - BER\_prop*

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	62.79	77.27	80.66	218		
H <sub>1</sub>	61.66	82.14	95.69	215	1.130	.770

*Coefficients*

	Estimate	Standard Error	z	p
(Intercept)	3.828	3.920	0.976	.329
NT	0.057	1.022	0.056	.955
CL	-0.401	1.223	-0.328	.743
NTxCL	0.096	0.359	0.268	.789

**Generalized Linear Model (binomial)**

*Model Summary - BER\_prop*

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	62.79	77.27	80.66	218		
H <sub>1</sub>	61.66	82.14	95.69	215	1.130	.770

*Coefficients*

	Estimate	Standard Error	z	p
(Intercept)	3.951	0.378	10.458	< .001
NT_c	0.270	0.438	0.615	.538
CL_c	-0.041	0.513	-0.080	.936
NT_cxCL_c	0.096	0.359	0.268	.789

**Linear Regression**

*Model Summary - BER*

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.199
M <sub>1</sub>	0.080	0.006	-0.008	0.200

Note. M<sub>1</sub> includes NT, CL, NTxCL

## ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	0.055	3	0.018	0.458	.712
	Residual	8.575	215	0.040		
	Total	8.630	218			

Note. M<sub>1</sub> includes NT, CL, NTxCL

Note. The intercept model is omitted, as no meaningful information can be shown.

## Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.959	0.013		145.698	< .001
M <sub>1</sub>	(Intercept)	1.989	0.174		11.402	< .001
	NT	-0.005	0.043	-0.025	-0.125	.901
	CL	-0.031	0.059	-0.127	-0.529	.598
	NTxCL	0.008	0.016	0.104	0.473	.637

+BF, PI, Age:

## Generalized Linear Model (binomial)

## Model Summary - BER\_prop

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	62.79	77.27	80.66	218		
H <sub>1</sub>	58.21	84.68	108.41	212	4.583	.598

## Coefficients

	Estimate	Standard Error	z	p
(Intercept)	4.570	4.081	1.120	.263
NT	0.112	1.102	0.102	.919
CL	-0.365	1.273	-0.287	.774
NTxCL	0.074	0.380	0.194	.846
BF	0.378	0.321	1.176	.240
PI	-0.660	0.378	-1.745	.081
Age	-0.004	0.024	-0.157	.875

## Generalized Linear Model (binomial)

## Model Summary - BER\_prop

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	62.79	77.27	80.66	218		
H <sub>1</sub>	58.21	84.68	108.41	212	4.583	.598

*Coefficients*

	Estimate	Standard Error	z	p
(Intercept)	4.795	1.747	2.744	.006
NT_c	0.275	0.461	0.598	.550
CL_c	-0.088	0.546	-0.161	.872
NT_cxCL_c	0.074	0.380	0.194	.846
BF	0.378	0.321	1.176	.240
PI	-0.660	0.378	-1.745	.081
Age	-0.004	0.024	-0.157	.875

**Linear Regression**

*Model Summary - BER*

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.199
M <sub>1</sub>	0.148	0.022	-0.006	0.200

Note. M<sub>1</sub> includes NT, CL, NTxCL, BF, PI, Age

*ANOVA*

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	0.190	6	0.032	0.796	.574
	Residual	8.440	212	0.040		
	Total	8.630	218			

Note. M<sub>1</sub> includes NT, CL, NTxCL, BF, PI, Age

Note. The intercept model is omitted, as no meaningful information can be shown.

*Coefficients*

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.959	0.013		145.698	< .001
M <sub>1</sub>	(Intercept)	1.988	0.178		11.161	< .001
	NT	0.003	0.045	0.015	0.072	.943
	CL	-0.022	0.060	-0.088	-0.365	.716
	NTxCL	0.004	0.016	0.058	0.261	.795
	BF	0.015	0.013	0.096	1.127	.261
	PI	-0.026	0.015	-0.148	-1.762	.079
	Age	-1.336 × 10 <sup>-4</sup>	9.465 × 10 <sup>-4</sup>	-0.010	-0.141	.888

H14: CL modère l'effet NT → MR:

**Generalized Linear Model (binomial)**

*Model Summary - MR\_prop*

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	149.7	183.6	187.0	218		
H <sub>1</sub>	143.2	183.1	196.6	215	6.560	.087

*Coefficients*

	Estimate	Standard Error	z	p
(Intercept)	2.001	2.280	0.877	.380
NT	0.307	0.607	0.505	.613
CL	-0.297	0.711	-0.418	.676
NTxCL	0.031	0.210	0.147	.883

**Generalized Linear Model (binomial)**

*Model Summary - MR\_prop*

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	149.7	183.6	187.0	218		
H <sub>1</sub>	143.2	183.1	196.6	215	6.560	.087

*Coefficients*

	Estimate	Standard Error	z	p
(Intercept)	2.750	0.216	12.745	< .001
NT_c	0.375	0.253	1.483	.138
CL_c	-0.181	0.287	-0.632	.528
NT_cxCL_c	0.031	0.210	0.147	.883

**Linear Regression**

*Model Summary - MR*

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.378
M <sub>1</sub>	0.175	0.031	0.017	0.375

Note. M<sub>1</sub> includes NT, CL, NTxCL

*ANOVA*

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	0.960	3	0.320	2.277	.081
	Residual	30.200	215	0.140		
	Total	31.160	218			

Note. M<sub>1</sub> includes NT, CL, NTxCL

Note. The intercept model is omitted, as no meaningful information can be shown.

*Coefficients*

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.868	0.026		73.102	< .001
M <sub>1</sub>	(Intercept)	1.936	0.327		5.916	< .001
	NT	-0.001	0.081	-0.003	-0.017	.987
	CL	-0.107	0.111	-0.227	-0.959	.339
	NTxCL	0.022	0.030	0.158	0.725	.469

+BF, PI, Age:

**Generalized Linear Model (binomial)**

*Model Summary - MR\_prop*

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	149.7	183.6	187.0	218		
H <sub>1</sub>	129.6	175.5	199.2	212	20.14	.003

*Coefficients*

	Estimate	Standard Error	z	p
(Intercept)	2.119	2.429	0.872	.383
NT	0.026	0.681	0.039	.969
CL	-0.486	0.774	-0.627	.530
NTxCL	0.102	0.232	0.441	.659
BF	0.504	0.194	2.590	.010
PI	-0.556	0.220	-2.531	.011
Age	0.020	0.014	1.373	.170

**Generalized Linear Model (binomial)**

*Model Summary - MR\_prop*

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	149.7	183.6	187.0	218		
H <sub>1</sub>	129.6	175.5	199.2	212	20.14	.003

*Coefficients*

	Estimate	Standard Error	z	p
(Intercept)	1.992	0.946	2.106	.035
NT_c	0.253	0.278	0.908	.364
CL_c	-0.102	0.314	-0.325	.745
NT_cxCL_c	0.102	0.232	0.441	.659
BF	0.504	0.194	2.590	.010
PI	-0.556	0.220	-2.531	.011
Age	0.020	0.014	1.373	.170

**Linear Regression**

Model Summary - MR

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.378
M <sub>1</sub>	0.287	0.082	0.056	0.367

Note. M<sub>1</sub> includes NT, CL, NTxCL, BF, PI, Age

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	2.567	6	0.428	3.172	.005
	Residual	28.593	212	0.135		
	Total	31.160	218			

Note. M<sub>1</sub> includes NT, CL, NTxCL, BF, PI, Age

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.868	0.026		73.102	< .001
M <sub>1</sub>	(Intercept)	1.821	0.328		5.555	< .001
	NT	-9.678 × 10 <sup>-4</sup>	0.082	-0.002	-0.012	.991
	CL	-0.087	0.110	-0.185	-0.792	.429
	NTxCL	0.017	0.030	0.123	0.568	.571
	BF	0.057	0.024	0.198	2.399	.017
	PI	-0.065	0.027	-0.196	-2.412	.017
	Age	0.002	0.002	0.088	1.283	.201

H16: EE modère l'effet NT → CIR:

**Generalized Linear Model (binomial)**

Model Summary - CIR<sub>prop</sub>

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	205.1	268.1	271.5	218		
H <sub>1</sub>	204.2	273.2	286.8	215	0.901	.825

Coefficients

	Estimate	Standard Error	z	p
(Intercept)	2.177	1.884	1.155	.248
NT	0.083	0.557	0.149	.881
EE	-0.263	0.616	-0.427	.669
NTxEE	0.028	0.163	0.168	.866

**Generalized Linear Model (binomial)**

Model Summary - CLR\_prop

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	205.1	268.1	271.5	218		
H <sub>1</sub>	204.2	273.2	286.8	215	0.901	.825

Coefficients

	Estimate	Standard Error	z	p
(Intercept)	1.955	0.167	11.713	< .001
NT_c	0.175	0.201	0.871	.384
EE_c	-0.160	0.205	-0.780	.435
NT_cxEE_c	0.028	0.163	0.168	.866

## Linear Regression

Model Summary - CLR

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.482
M <sub>1</sub>	0.062	0.004	-0.010	0.485

Note. M<sub>1</sub> includes NT, EE, NTxEE

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	0.196	3	0.065	0.278	.841
	Residual	50.489	215	0.235		
	Total	50.685	218			

Note. M<sub>1</sub> includes NT, EE, NTxEE

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.753	0.033		53.814	< .001
M <sub>1</sub>	(Intercept)	1.803	0.416		4.330	< .001
	NT	0.016	0.122	0.031	0.134	.894
	EE	-0.059	0.138	-0.113	-0.427	.669
	NTxEE	0.007	0.036	0.077	0.183	.855

+BF, PI, Age:

## Generalized Linear Model (binomial)

Model Summary - CLR\_prop

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	205.1	268.1	271.5	218		

*Model Summary - CLR\_prop*

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>1</sub>	191.1	266.1	289.8	212	14.07	.029

*Coefficients*

	Estimate	Standard Error	z	p
(Intercept)	1.001	2.035	0.492	.623
NT	0.272	0.568	0.479	.632
EE	-0.142	0.637	-0.222	.824
NTxEE	-0.019	0.168	-0.115	.908
BF	0.042	0.142	0.295	.768
PI	-0.229	0.163	-1.402	.161
Age	0.030	0.011	2.679	.007

**Generalized Linear Model (binomial)**

*Model Summary - CLR\_prop*

Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p
H <sub>0</sub>	205.1	268.1	271.5	218		
H <sub>1</sub>	191.1	266.1	289.8	212	14.07	.029

*Coefficients*

	Estimate	Standard Error	z	p
(Intercept)	1.304	0.708	1.842	.066
NT_c	0.207	0.221	0.936	.349
EE_c	-0.214	0.214	-1.001	.317
NT_cxEE_c	-0.019	0.168	-0.115	.908
BF	0.042	0.142	0.295	.768
PI	-0.229	0.163	-1.402	.161
Age	0.030	0.011	2.679	.007

**Linear Regression**

*Model Summary - CLR*

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	RMSE
M <sub>0</sub>	0.000	0.000	0.000	0.482
M <sub>1</sub>	0.241	0.058	0.031	0.475

Note. M<sub>1</sub> includes NT, EE, NTxEE, BF, PI, Age

*ANOVA*

Model		Sum of Squares	df	Mean Square	F	p
M <sub>1</sub>	Regression	2.936	6	0.489	2.172	.047
	Residual	47.749	212	0.225		
	Total	50.685	218			

## ANOVA

Model	Sum of Squares	df	Mean Square	F	p
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Note. M<sub>1</sub> includes NT, EE, NTxEE, BF, PI, Age

Note. The intercept model is omitted, as no meaningful information can be shown.

## Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M <sub>0</sub>	(Intercept)	1.753	0.033		53.814	< .001
M <sub>1</sub>	(Intercept)	1.500	0.432		3.472	< .001
	NT	0.065	0.122	0.121	0.529	.597
	EE	-0.015	0.136	-0.030	-0.114	.909
	NTxEE	-0.006	0.036	-0.072	-0.172	.864
	BF	0.009	0.030	0.023	0.283	.777
	PI	-0.050	0.035	-0.117	-1.420	.157
	Age	0.006	0.002	0.186	2.628	.009