

Reimagining Branding: Generative AI and Hyper-Personalization

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Abstract

This thesis investigates how AI-driven hyper-personalization is transforming branding strategies and consumer relationships. As traditional mass marketing proves increasingly ineffective for engaging diverse, digitally savvy consumers, AI technologies enable brands to create individualized experiences at scale. The research examines how branding can shift from static visual identities into adaptive, dynamic experiences powered by AI, offering new strategies for engaging customers desensitized to generic advertising, fatigued by rapid trends, and overwhelmed by product choice.

Using mixed methods, including case study analysis of Amazon, Netflix, Sephora, and Nike, marketing theory, behavioral economics, and speculative design methodology, the research examines how hyper-personalized branding impacts customer engagement and loyalty. The analysis reveals current personalization strategies and their effectiveness while exploring the behavioral patterns, ethical implications, and systemic shifts occurring as brands evolve from controlled narratives into responsive, data-driven systems.

A WebAR mobile prototype demonstrates hyper-personalization by bridging digital e-commerce with physical shopping experiences, where users scan products to experience AI-generated personalized packaging, imagery, and messaging based on their individual preferences and values. The prototype showcases how hyper-personalization can function as an adaptive brand ecosystem responding to individual contexts while maintaining brand consistency. This reveals that hyper-personalization creates more nuanced consumer connections by adapting brand experiences to individual contexts, but also introduces critical tensions around privacy, data collection, and behavioral manipulation. The research demonstrates that AI enables brands to function as responsive ecosystems rather than fixed identities, fundamentally shifting the designer's role from creating static deliverables to architecting adaptive systems.

Key Words:

Hyper-personalization, generative AI, branding, brand identity, WebAR, augmented reality, speculative design, consumer behavior, adaptive brand systems, data-driven marketing, behavioral economics, packaging design

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Glossary of Key Terms

This glossary defines key technical and industry terms used throughout the thesis. Terms are listed alphabetically.

Artificial Intelligence (AI)

A technology that enables computers and machines to simulate human learning, comprehension, problem solving, decision making, creativity and autonomy. In the context of this thesis, AI refers specifically to the machine learning and generative AI systems used to analyse consumer data, identify patterns, and produce personalised brand outputs in real time (IBM, 2024).

- **Machine Learning (ML):** A subset of AI that involves training algorithms to make predictions or decisions based on data, without being explicitly programmed for specific tasks. In marketing, machine learning enables systems to identify patterns in consumer behavior and improve their predictions over time as more data becomes available (IBM, 2024).
- **Generative AI:** A type of deep learning model that can create original content such as text, images, and video in response to a user prompt. In this thesis, generative AI is used to produce personalised packaging visuals from persona-based prompts, demonstrating how brand identity can be generated individually rather than designed as a fixed artefact (IBM, 2024)

Augmented Reality (AR)

A technology that overlays digital content images, text, or animations onto the real world, viewed through a smartphone camera or wearable device. Unlike virtual reality, AR enhances the physical world rather than replacing it.

- **WebAR:** A version of augmented reality that runs through a web browser rather than a dedicated app, making it accessible without a download.

Behavioral Data

Data generated by the actions individuals take in digital environments — including websites visited, products searched or purchased, time spent on content, location, and social media activity. Behavioral data is the primary input for AI-driven personalization systems, used to build consumer profiles and predict future preferences.

Causal Layered Analysis (CLA)

A futures method developed by Sohail Inayatullah that examines phenomena across four depth levels: Litany (visible surface experiences), Systems (technical and economic

infrastructure), Worldview (competing ideologies and beliefs), and Myth/Metaphor (deep cultural narratives). The method reveals how complex issues operate simultaneously across multiple layers of depth, from visible symptoms to underlying worldviews and myths (Inayatullah, 2004).

Digital Darwinism

A concept coined by Tom Goodwin describing the competitive pressure on businesses to adapt to rapid technological and cultural change or risk obsolescence. In marketing, Digital Darwinism refers to the reality that companies failing to evolve their strategies in line with changing consumer expectations and emerging technologies increasingly lose relevance to more agile competitors. (Goodwin, T. (2018). Digital Darwinism: Survival of the fittest in the age of business disruption. Kogan Page.)

Filter Bubble

A concept describing the increasingly narrow information environment that forms when algorithms consistently serve content matching a user's existing preferences, progressively filtering out different or unfamiliar perspectives. Coined by Eli Pariser, who argued that personalization algorithms create invisible barriers limiting exposure to diverse viewpoints. (Pariser, E. (2011). The filter bubble: What the internet is hiding from you. Penguin Press.)

Futures Wheel

A foresight method developed by Jerome Glenn that explores cascading consequences of a trend or decision across three rings: direct first-order effects, second-order implications, and long-term third-order possibilities including alternative futures. The method makes visible how a single development can lead to multiple divergent outcomes depending on choices made in the present (Glenn, 2009).

Hyper-Personalization

A marketing strategy that uses AI, machine learning, and real-time data to tailor products, experiences, and communications to each individual consumer at the moment of interaction. It goes beyond traditional personalization by drawing on live behavioral signals, current location, browsing activity, time of day, rather than static historical data, adapting dynamically to the individual rather than a predefined segment. (IBM, n.d.; Kotler et al., 2021)

Mass Marketing

A marketing strategy in which a single standardized product and message is directed at the broadest possible audience with no differentiation between consumer groups. Mass

marketing assumes all consumers have broadly similar needs and prioritizes scale and efficiency over individual relevance. Traditional channels include television, radio, and print advertising. (Deloitte, 2015)

Meta Marketing

A concept introduced in *Marketing 6.0* by Kotler, Kartajaya and Setiawan that goes beyond omnichannel marketing to offer a genuine convergence of physical and digital spaces. Where omnichannel coordinates separate channels, meta marketing dissolves the distinction between them entirely, creating a single seamless brand experience that follows the consumer through the world.

Nudge / Choice Architecture

Concepts from behavioral economics describing how the way choices are designed and presented influences decisions without restricting freedom to choose otherwise. In digital environments, nudges include the order products are displayed, default settings, and the timing of offers all which steer consumer behaviors, often without the consumer being aware. (Thaler, R. H., & Sunstein, C. R. (2021). *Nudge: The final edition*. Penguin Books.)

Omnichannel Experience

An approach to retail and marketing that integrates all consumer touchpoints, physical stores, websites, mobile apps, and social media into a single seamless experience, with consumer data and interaction history consistent across all channels regardless of how or where the consumer engages.

Personalization

A marketing approach that uses data about consumer segments or individuals such as purchase history or demographics to deliver more relevant communications and recommendations than mass marketing. Unlike hyper-personalization, traditional personalization operates reactively, responding to past behavior and grouping consumers into predefined categories rather than adapting to each person in real time. (Deloitte, 2015)

Predictive Analytics

The use of statistical algorithms and machine learning applied to historical data to forecast future consumer behaviors, preferences, and purchase intentions. Predictive analytics enables brands to anticipate individual needs before they are expressed, underpinning recommendation engines, dynamic pricing, and proactive marketing.

Prompt Engineering

The practice of designing and refining text instructions called prompts given to a generative AI model to produce a specific output. The wording, structure, and order of a prompt significantly affect what the AI generates, making prompt construction a distinct creative and technical skill in AI-driven design practice. (Black Forest Labs, n.d.)

Phygital

A term describing the convergence of physical and digital experiences, where the boundary between the two no longer meaningfully exists for the consumer. In a phygital environment, digital touchpoints are integrated into physical spaces rather than existing as separate channels. Term used in Marketing 6.0 by Kotler, Kartajaya and Setiawan (2023).

Speculative Design

A design methodology that uses prototypes and scenarios to explore the implications of possible futures rather than to solve immediate problems. Developed by Anthony Dunne and Fiona Raby, it works across probable, plausible, possible, and preferable futures using designed artefacts as provocations that invite audiences to reflect on where current technological trajectories might lead, rather than proposing market-ready solutions. (Dunne, A., & Raby, F. (2013). *Speculative everything: Design, fiction, and social dreaming*. MIT Press.)

Surveillance Capitalism

A term coined by Shoshana Zuboff to describe an economic system in which human behavioral experience is extracted as raw material by technology companies, processed through algorithms, and converted into predictions about future behavior that are sold to advertisers and businesses. Surveillance capitalism reframes the consumer not as a customer being served but as a source of data being harvested, with behavioral modification not just prediction as its ultimate product. (Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power*. PublicAffairs.)

Three Horizons

A futures framework showing how dominant systems transition over time through three overlapping patterns occurring simultaneously in the present. Horizon 1 represents the current dominant system losing relevance. Horizon 2 represents emerging innovations and contested alternatives. Horizon 3 represents marginal experiments that could become the future dominant system. The model emphasizes that all three horizons coexist and interact in the present, shaped by the choices people make now (H3Uni, n.d.).

Chapter 1: Introduction

1.1 Introduction

For most of the twentieth century, brands communicated the same message to everyone. A logo meant the same thing on every billboard, every package, every screen. That era is ending. Artificial intelligence¹ now enables brands to tailor experiences to individual consumers at a scale and precision that was previously impossible, generating different visuals, different messaging, and different identities for different people, in real time. This represents a dramatic shift from traditional mass marketing² strategies, which relied on one-size-fits-all approaches and standardized messaging to reach broad audiences. AI-driven hyper-personalization³ changes how brands create consistency, recognition, and meaningful connections with consumers in an increasingly data-driven commercial environment.

Yet as brands rapidly adopt these personalization strategies, understanding its actual impact on consumer relationships remains limited. The gap between the promises of deeper engagement and the reality of how hyper-personalization affects loyalty and trust remains to be seen.

This thesis investigates AI-driven hyper-personalization to understand its impact on customer engagement and loyalty. It starts by mapping the current landscape and defining key concepts that distinguish hyper-personalization from traditional approaches. It examines how consumers navigate personalized systems, how AI technologies are disrupting established branding strategies, and the broader societal implications of data-driven personalization. Through speculative design methods, a WebAR mobile prototype was developed to test how hyper-personalized branding might manifest and affect consumer relationships. This approach addresses both the opportunities and challenges of building brands in an era where relevance increasingly trumps consistency. To understand where this is heading, it is necessary to first understand the landscape in which it is already happening.

¹ Artificial Intelligence (AI): Technology enabling computers to simulate human learning, comprehension, and decision-making. In this thesis, AI refers to machine learning and generative systems that analyze consumer data and produce personalized brand outputs.

² Mass Marketing: A marketing strategy where a single standardized product and message is directed at the broadest possible audience with no differentiation between consumer groups, prioritizing scale and efficiency over individual relevance.

³ Hyper-personalization: A marketing strategy using AI and real-time data to tailor experiences to each individual consumer at the moment of interaction, going beyond traditional segmentation.

1.2 Current AI & Marketing Landscape

The world is changing faster than ever, and the pace of change is increasing. We see the rise of new technology, longstanding companies failing, and small companies becoming successful. Yet somehow, companies are not keeping up with this change and adapting to this new reality. Companies are struggling to reconfigure and re-engineer themselves as quickly as customer expectations and competitive demands require. This means companies have to think fast, be bold, and challenge themselves (Goodwin, 2018) which is best illustrated by the observation that “Uber operates as the world's largest taxi company without owning vehicles; Facebook functions as the world's most popular media owner while creating no content; Airbnb provides accommodation as the world's largest provider without owning real estate (Goodwin, 2018)”. In this environment, both the markets and customers have become increasingly unforgiving of companies that fail to adapt.

Within this changing context, traditional mass marketing strategies, once the cornerstone of successful brand building, are experiencing diminishing returns in engaging modern consumers. Generic branding strategies consistently fail to create meaningful emotional connections with consumers, as one-size-fits-all approaches prove insufficient for addressing the diverse and evolving expectations of consumers (Kotler et al., 2021). The rise, development, and adoption of AI have transformed the marketing landscape and highlighted the limitations of previous approaches that relied on broad-reach promotions and standardized messaging.

The complex nature of the market is further complicated by several converging factors. Currently, companies are facing generational misalignment, the need to target 5 generations: Baby Boomers, Generation X, Generation Y, Generation Z, and Generation Alpha (Kotler et al., 2021). Each generation has various levels of comfort with technology, different habits, different needs, and different preferences. Each generation is shaped by a different sociocultural environment and life experience, and each responds differently to marketing approaches and customer experiences. For example, younger generations prefer to use Uber or Spotify rather than buying a car or music albums (Kotler et al., 2021). While companies understand that each generation has different demands, wants, and needs, serving all segments effectively through traditional approaches is nearly impossible. That leads to hyper-personalization being a potential solution to this challenge.

The COVID-19 pandemic accelerated this transformation. COVID-19 forced stores to close, forced people to stay at home, and forced people to find different ways to interact.

Consumers switched to online stores, new brands, and new products, which exposed them to more marketing experience and personalized offerings, leading to customers demanding personalized marketing experiences. The transition altered consumer expectations: 71% of consumers now expect companies to deliver personalized interactions, while 76% express frustration when these expectations remain unmet, and 70% of consumers now consider a basic expectation (*The Value of Getting Personalization Right—or Wrong—Is Multiplying* | McKinsey, n.d.). This pandemic-driven shift further led to hyper-personalization being increasingly critical in an era of AI adoption and the increasing digital behaviors, forcing companies to adapt or risk irrelevance.

Beyond the generational divide and pandemic-driven digital shift, there is another challenge in the marketing landscape. Consumer attention spans decline due to information overload because of the multiple sources of communication available from Instagram, TikTok, emails, text messages, ads, and more. The sheer volume of marketing messages competing for attention generates widespread advertising fatigue, reducing the effectiveness of traditional approaches. In this environment where consumers encounter countless unsolicited messages daily, the risk of irrelevant communications damaging brand perception increases dramatically.

Further, the digital era has fundamentally changed the power dynamics between marketers and consumers. As Deloitte (2015) noted, consumers now have increased choice and access to information, with social media and digital devices enabling them to be in charge of product specifications, delivery timelines, and service expectations. Consumers act both as critics and creators, demanding personalized service while expecting meaningful opportunities to shape the products and services they consume. This new ability increases competition for consumer attention, leading to an environment where relevance determines company survival. As the competition for consumer attention increases, businesses face increasing difficulty in achieving meaningful engagement, with the volume of unsolicited messages potentially resulting in damage to the brand, leading to a clear message be relevant or be forgotten (Deloitte, 2015).

Within this changing landscape, artificial intelligence has emerged as both a solution and a complicating factor. AI currently manifests in marketing practices through chatbots, dynamic visual content generation, recommendation engines, and predictive analytics⁴ tools. These technologies enable organizations to transition from mass marketing toward targeted, data-driven approaches that tailor marketing messages based on individual

⁴ Predictive Analytics: The use of statistical algorithms and machine learning applied to historical data to forecast future consumer behaviors, preferences, and purchase intentions.

customer preferences and behavioral patterns. AI assists marketers in identifying customer shopping behaviors and preferences to recommend precisely what consumers want, while continuously analyzing purchasing habits to create new customer categorizations and profile types that reveal hidden relationships between products and consumers (Kotler et al., 2021). Companies are turning to AI to improve and scale personalization, using data to tailor promotions based on customer preferences and habits rather than deploying mass promotional strategies. Through a variety of targeted offers, marketers can create seamless omnichannel⁵ experiences for customers, delivering targeted, streamlined promotions without conflicting or overwhelming information from multiple touchpoints. This approach allows companies to ensure better shopping experiences while generating profits and creating customer loyalty (Unlocking the next frontier of personalized marketing). AI accelerates these processes, enabling marketers to analyze data and deliver personalized content at a scale impossible through manual effort alone.

Hyper-personalization emerges as a response to these limitations of traditional mass marketing", promising to transcend conventional marketing constraints by creating dynamic, individualized brand interactions. In this context, hyper-personalization represents marketers' capacity to create, communicate, deliver, and enhance value across the entire customer journey (Kotler et al., 2021). Tom Goodwin's concept of Digital Darwinism states that this shift toward hyper-personalization requires that "companies need to look ahead to try to be not just agile but predictive, to be comfortable, uncomfortable, and to be constantly finding ways to change the essence of what they are".

1.3 Defining Hyper-Personalization and AI in Branding

Understanding the differences between mass marketing, traditional personalization⁶, and hyper-personalization is necessary for understanding the transformative potential of AI in marketing and branding in today's landscape.

As stated previously, mass marketing is an approach where companies create one standardized product and promote it to everyone in the same way (Deloitte, 2015). This strategy assumes that all consumers have similar needs and can be satisfied with identical products, messaging, and distribution (Kotler et al., 2021). Rather than targeting specific groups, mass marketing focuses on reaching the largest possible audience through broad

⁵ Omnichannel experience: A retail approach integrating all touchpoints (stores, websites, apps, social media) so customer data and history remain consistent regardless of where customers engage.

⁶ Personalization: A marketing approach using consumer data (purchase history, demographics) to deliver more relevant content than mass marketing, typically grouping people into predefined segments.

channels like television, radio, and print advertising (Deloitte, 2015). The strategy operates on efficiency and volume, delivering the same product, price, promotion, and distribution system to everyone regardless of individual preferences or contexts. (Deloitte, 2015). Mass marketing is still used today; however, it is less effective on its own in a digital age, that is focused on personalization.

Personalization involves using consumer segmentation and behavioral data⁷ to target customers with tailored marketing communications and offers (Deloitte, 2015). Unlike mass marketing's one-size-fits-all approach, personalization leverages information such as purchase history, browsing behavior, and demographic data to create more relevant experiences for different customer groups (Deloitte, 2015; Kotler et al., 2021). Businesses modify their messaging and product recommendations based on existing customer data, though products themselves remain mostly standardized. This approach operates reactively, responding to what customers have already done rather than predicting future needs, and typically segment audiences into defined groups rather than treating individuals uniquely (Deloitte, 2015). This approach, while more sophisticated than mass marketing, still relies on categorical thinking that assumes individuals within segments share similar needs and preferences.

The evolution from traditional branding to AI-driven branding represents a fundamental shift in how brands conceptualize identity and consistency. Traditional branding emphasizes standardized visual elements, messaging hierarchies, and controlled brand experiences designed to create recognizable and memorable impressions across various touch points. This approach prioritizes consistency over relevance, ensuring that brand encounters reinforce predetermined associations rather than adapting to individual contexts. Hyper-personalization directly challenges this, replacing uniformity with adaptability as the organizing principle of the brand.

Hyper-personalization is different from personalization, even though sometimes it is used interchangeably. Hyper-personalization is a business strategy that uses emerging technologies to create highly customized, tailored experiences, products or services based on individual customer behavior and preferences (*What Is Hyper-Personalization?* | IBM, n.d.). This AI-enabled approach combines vast data processing capabilities with machine learning⁸ algorithms to identify subtle patterns and preferences that would be impossible

⁷ Behavioral data: Data generated by actions individuals take in digital environments—including websites visited, products searched or purchased, time spent on content, location, and social media activity.

⁸ Machine Learning (ML): A subset of AI that trains algorithms to make predictions or decisions based on data, improving over time as more data becomes available.

for human marketers to detect or operate manually. Hyper personalization relies on AI such as generative AI⁹, machine learning, and real-time data analytics to create highly customized customer experiences. Traditional personalization addresses customers by name or suggests products based on purchase history. Hyper-personalization goes a step further focusing on real-time data such as “browsing behaviors, location, preferences and even contextual factors like weather or time of day” allowing marketers to give unique experiences that can lead to loyalty and trust. The difference is the level of details in the data used and level of personalization involved. Traditional personalization uses basic customer data, such as including a customer’s name in an email or suggesting products based on past purchases, which illustrates traditional personalization. While effective to some degree, this approach is limited by its reliance on static data, which might not accurately capture a customer’s current needs or preferences. As Lindstrom observes in "Small Data," these capabilities allow brands to identify and act upon "tiny clues that uncover huge trends" in individual consumer behavior.

Successful hyper-personalization relies on capturing and analyzing real-time data to tailor customer interactions dynamically. For instance, tracking a customer's browsing activity on a website enables instant personalized product recommendations, with real-time insights allowing businesses to meet customer needs at precisely the right moment, thereby increasing the relevance of their offers. A seamless customer experience across all touchpoints, websites, mobile apps, email, in-store interactions, and social media proves necessary for effective hyper-personalization.

1.4 From Mass Marketing to Hyper-Personalization

The evolution of marketing reflects technological, data, and cultural shifts that have reshaped consumer behaviors and business strategies over the last century. As Kotler articulates in Marketing 5.0, marketing has progressed through distinct phases: Marketing 1.0 represented product-driven approaches; Marketing 2.0 shifted toward consumer orientation; Marketing 3.0 was human-centric, built around segmentation, targeting, and positioning, as well as the 4Ps (product, price, place, and promotion), Marketing 4.0 marked the transition to digital through an omnichannel approach; and Marketing 5.0 represents the current era, where technology is leveraged to serve humanity. Kotler defines it as the application of human-mimicking technologies to create, communicate, deliver, and enhance value across the customer journey (Kotler et al., 2021). This includes AI, natural language processing, sensors, robotics, AR, VR, IoT, and blockchain -

⁹ Generative AI: A type of AI that creates original content such as text, images, and video in response to user inputs.

technologies that replicate the capabilities of human marketers while delivering personalized, contextual experiences to each individual. "Together these phases illustrate that marketing evolves in response to both technological advancement and cultural change, with each shift reflecting a broader change in the balance of power between brands and consumers, shaped by the economic and social conditions of the moment it emerged from (Kotler et al., 2021)."

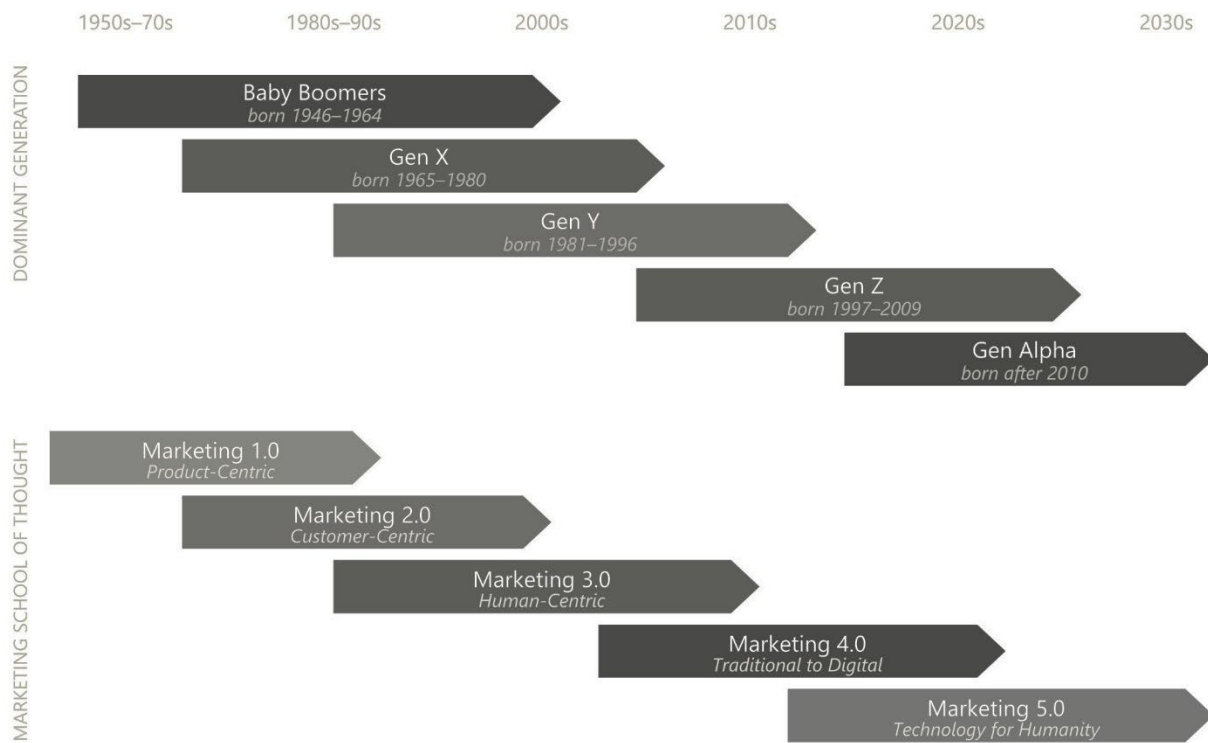


Figure 1
Marketing evolution timeline. Adapted from Kotler, Kartajaya & Setiawan (2021).

The product era started in the 1950s and was focused on baby boomers and their parents. The goal was to create perfect services and products that deliver the highest value to consumers (customer satisfaction). This era focused on product development and life cycle management, and the 4Ps. Companies emphasized product features, manufacturing quality, and functional benefits under the assumption that superior products would naturally attract customers. This approach reflected production-oriented business models where marketing served primarily to support sales rather than be a driving force for business success. However, a significant limitation of this era was that the product-centric focus often led companies to encourage consumption beyond actual consumer needs, contributing to the rise of consumerism culture (Kotler et al., 2021).

The next shift occurred around the mid-1960s and 1970s, as marketing began to shift towards a consumer-oriented approach due to the rise of anti-consumerism movements. It was also influenced by the 1980s recession, which meant lower consumer spending power challenged what marketers knew/understood. It led to understanding segmentation, targeting consumers, and positioning. Companies focused on learning more about their customers, not focusing on creating the perfect product/service for everyone. It also led to companies creating better relationships with consumers over time to retain them and prevent them from switching to competitors. This shift represented recognition that customer satisfaction, rather than product superiority alone, drove business success.

Human-centric marketing was the next major shift in marketing following the financial crisis in the 2000s. It focused on Generation Y, as they had a low trust in companies because of easier access to information and financial industry scandals. This generation demanded that companies create products/services that have a positive societal and environmental impact. This approach transcends demographic and psychographic segmentation to consider consumers as complex individuals with unique circumstances, emotional needs, and evolving preferences. Human-centric marketing emphasizes empathy, authenticity, and meaningful engagement rather than persuasive messaging or transactional relationships.

The next major shift was the move between traditional approaches and digitalization. Introducing omnichannel approaches to serve customers both online and offline throughout their purchase journeys. The COVID-19 pandemic dramatically accelerated these changes, forcing rapid adaptation as customers migrated to digital and touchless options.

This current era is defined by the integration of emerging technologies such as AI, augmented reality, and the Internet of Things, to create interactive, data-driven, and increasingly personalized consumer experiences. Yet it also presents a contradiction where digitalization offers unprecedented advancement and possibilities while simultaneously generating anxiety about job displacement, privacy erosion, and societal disruption. It centers on leveraging emerging technologies, including AI, natural language processing, sensors, robotics, augmented reality, virtual reality, Internet of Things, and blockchain, to enhance communication and deliver enhanced customer experiences. These technologies aim to emulate the capabilities of human marketers, yet the human element remains indispensable. It also happens at a critical time where marketing confronts multiple challenges simultaneously: a digital divide, the coexistence of multiple

generations with divergent preferences, and growing socioeconomic polarization. The goal is to create a new seamless, compelling customer experience.

AI can uncover hidden patterns in customer behavior from collected data, but only human intelligence can properly contextualize, interpret, and apply these insights, as human behavior remains highly contextual and nuanced. (Kotler et al., 2021).

1.5 Research Questions

- What AI-driven models and strategies can achieve practical hyper-personalization aligned with brand goals?
- How does hyper-personalized branding via AI impact customer engagement and loyalty compared to traditional mass marketing?

These questions are investigated through a combination of theoretical frameworks and a speculative design methodology, using a WebAR prototype to explore what hyper-personalized branding might look and feel like in practice.

Chapter 2: Literature Review and Contextual Review

To begin addressing these questions, the following chapter examines how hyper-personalization is already being applied in practice, drawing on case studies from companies that have implemented AI-driven personalization at scale, as well as the emerging tools and technologies shaping its future. These cases and toolsets were chosen because they represent different industries, scales, and approaches to personalization, providing a range of perspectives on what AI-driven branding looks like when deployed commercially.

2.1 AI-Driven Brand Experiences: Case Studies

Amazon Prime

Amazon Prime is a successful example of hyper-personalization at scale, increasing e-commerce growth, and contributing to profitability. Amazon utilizes AI-driven strategies to maintain customer engagement, loyalty, and reduce subscriber loss across its 200 million global members. Amazon Prime was launched in 2005 and has since evolved into a broad ecosystem offering expedited shipping, streaming media, and exclusive shopping benefits that bring in significant customer loyalty. Prime members spend twice as much annually on Amazon compared to non-members, with the program generating over \$12.7 billion during Prime Day 2023.

However, even with strong subscription numbers, Amazon faces ongoing challenges with subscription retention. Customers cancel for various reasons: economic pressures, subscription fatigue, competitive alternatives, and more. Each lost subscription represents both immediate revenue loss and diminished long-term customer value. Amazon's solution to this issue is utilizing a data-driven personalization strategy to re-engage lapsed Prime subscribers by leveraging artificial intelligence (AI), machine learning (ML), and customer analytics through individually tailored approaches. These interventions include:

AI-driven systems classify users into high-risk and medium-risk churn categories, churn referring to the rate at which customers cancel or stop using a service, based on declining usage patterns, reduced purchase frequency, and engagement signals. By identifying at-risk members before they cancel, Amazon can deploy targeted interventions and recommend customized re-engagement offers tailored to individual usage histories and preferences.

Former members receive personalised communication through email and mobile notifications, highlighting the specific Prime features they previously used most. Amazon also deploys retargeting advertisements across social platforms and search engines, reminding users of membership advantages relevant to their interests.

Amazon adjusts Prime offerings based on regional preferences and economic conditions. Asian markets see integration of food delivery and locally popular streaming options, whereas Middle Eastern subscribers access exclusive Arabic-language programming designed for cultural relevance.

Amazon's personalized retention strategies demonstrate how data-driven hyper-personalized approaches can improve customer relationships and drive long-term profitability at scale. By tailoring experiences to individual behaviour and preferences, Amazon maximizes perceived value while building sustainable long-term subscriber relationships. The effectiveness of this approach is evident in its retention outcomes; over 60% of reactivated subscribers maintain their memberships for at least another year, directly increasing customer lifetime value through sustained recurring revenue and higher per-transaction spending. The combination of predictive analytics, personalized interventions, and continuous optimization creates a retention framework that minimizes subscriber loss while maximizing the value each customer brings to the platform. This approach proves that AI-powered personalization can deliver both immediate engagement results and lasting business impact at scale in an increasingly competitive digital landscape (Davidson & Rajeswari, 2025).

Sephora

Sephora demonstrates how omnichannel personalization can be both successful and profitable. The company maintains consistent personalized experiences across 1,700 stores in 30 countries, mobile apps, and online platforms through sophisticated data integration. The Beauty Insider loyalty program serves as the foundation, tracking customer preferences, purchase histories, and interactions across all touchpoints with real-time synchronization. When shoppers browse online, purchase in-store, or use the mobile app, their information updates across the system instantly.

This integration extends to in-store experiences where sales associates access complete customer profiles during face-to-face interactions, viewing online browsing patterns, previous purchases, and digital engagement history. Staff can provide highly personalized recommendations informed by the customer's entire brand relationship rather than just their current visit. The mobile app bridges digital and physical channels by enabling

product reservations for in-store pickup, appointment scheduling for beauty services, and virtual try-on features that leverage data from both online browsing and in-store consultations. For example, when customers complete a makeover appointment, detailed product and technique records are saved to profiles that are accessible across all platforms and to the customer. Beauty Insider reward points accumulate and are redeemed universally, whether customers shop online, through the app, or in physical stores.

This unified omnichannel approach ensures that personalization remains consistent as a customer's preferences, rewards status, and interaction history follow them seamlessly, whether they engage with Sephora digitally or physically. The program's effectiveness is evident in its 25-million-member base, which generated 80% of Sephora's total transactions in 2018, demonstrating the profitability of integrated cross-channel personalization. (Danziger, n.d.)

Nike

Nike demonstrates hyper-personalization by enabling customers to design their own clothing and footwear through platforms like NikeiD. The brand launched a 3D sneaker customization tool that generates real-time visual previews of personalized designs that customers can share socially. This personalization approach extends into Nike's physical flagship stores. The New York City flagship store offers personalized experiences through NikePlus, which is Nike's loyalty program that delivers individualized benefits based on member preferences and purchase history. Program members can access curated product selections based on current local favorites, reserve items for locker pickup using their membership credentials, and scan QR codes to check product availability in their preferred specifications for delivery to fitting rooms or pickup locations. The store enables members to complete purchases through their mobile devices using saved payment information, eliminating traditional checkout lines. Nike also offers personalized consultation services where members can book individual appointments with product experts and view footwear options customized to their unique measurements and style preferences. This approach demonstrates how personalization can span product customization, data-informed inventory management, and individualized service experiences across digital and physical brand environments. (Danziger, n.d.)

Netflix

Netflix uses data from millions of users to personalize every part of the platform. It tracks everything from what you play, stop, search, or scroll past, and uses that to decide what content is shown, how it's presented, and where it appears. For instance, no two users see

the same homepage; layout, artwork, and recommendations all adjust based on what each person watches. For example, subtle changes in thumbnails, such as which character is featured or the color palette used, are tailored to individual viewing habits to increase click rates. Most users aren't actively choosing content; they are being guided toward it through data-driven decisions built into nearly every part of the experience. Netflix runs constant tests on layout, menu structure, and row placement to further improve engagement. The entire experience is shaped by data to keep viewers watching, engaged, and less likely to leave. (Artwork Personalization at Netflix | by Netflix Technology Blog | Netflix TechBlog, n.d.)

Spotify

Spotify demonstrates how hyper-personalization can scale across hundreds of millions of users while still feeling individually relevant to each one. Rather than offering a single interface, Spotify constructs a distinct version of the platform for every person based on what they play, skip, search, and save. At its scale of 381 million users and a library of over 70 million tracks, machine learning processes nearly half a trillion events every day, incorporating contextual signals such as time of day, device type, and listening context to shape recommendations in real time. (Spotify Engineering, 2021).

This hyper-personalization runs through the entire product. The Home feed and Search adapt continuously to individual behavior, while Discover Weekly delivers a freshly generated playlist each week drawn entirely from each user's listening patterns. Spotify has extended this further with Blend, a feature that merges two users' listening tastes into a shared playlist, and DJ, which pairs algorithmic recommendations with an AI voice that introduces and contextualizes tracks, making automated curation feel like a personal experience. (Spotify Newsroom, 2023, How Spotify Uses Design).

Wrapped is where Spotify's hyper-personalization operates most visibly at scale. Every year, the platform transforms each user's listening data into a highly individualized visual story: top artists, top songs, total minutes listened, listening personality, and genre breakdowns that are unique to each person. No two users receive the same Wrapped. The experience turns a year of behavioral data into shareable content designed to feel celebratory rather than intrusive. This has turned Wrapped into one of the most anticipated brand moments globally, with users discussing and sharing it across social media before it even launches. What makes this approach significant is that it uses the user's own data to create something they want to share. Spotify is not telling people who they are; it is visualizing what they already did in a format that feels rewarding rather than extractive. Spotify extends this logic throughout the year through interactive artist-specific

experiences, applying the same infrastructure to create cultural moments beyond the annual release. (Spotify Newsroom, 2023, Spotify's Interactive Experiences).

The effectiveness of this approach is evident in the scale of engagement Wrapped generates annually, having grown into one of the most anticipated and widely shared brand moments globally. What distinguishes Spotify's approach is that users actively celebrate the visibility of their data rather than finding it intrusive. Where hyper-personalization often triggers privacy concerns when made visible, Wrapped demonstrates that the same data-driven personalization can feel like recognition rather than surveillance when framed as reflection and celebration. This demonstrates that hyper-personalization at scale can function as both individual experience and collective cultural phenomenon when framing emphasizes what users gain rather than what they give up. (Spotify Newsroom, 2023, *Spotify's Interactive Experiences*).

2.2 Toolsets and Emerging Signal Maps

Horizon Scanning is a foresight process focused on identifying early warning signs of change and emerging signals that have innovative or disruptive potential to grow in scale (UNDP, 2022). Rather than cataloguing what already exists, it asks what current developments imply about where things are heading distinguishing between what is already established, what is beginning to emerge, and what remains on the horizon as a possibility. This section applies that lens to the current landscape of tools and technologies shaping hyper-personalized branding. Across generative AI, mixed reality, data infrastructure, and omnichannel experience design, the signals are already visible and accelerating. Each of the following areas represents not just a current capability but an emerging trajectory, a signal of both what branding is becoming and what the technology making it possible is evolving into, and the foundation on which the speculative prototype in Chapter 4 is built on.

Generative AI

Generative AI transforms marketing by automating the entire content supply chain, from creation to distribution and management, while analyzing vast amounts of unstructured data from social media and customer communications (IBM, 2024, Generative AI in Marketing). It automates routine tasks like writing product descriptions, blog posts, social media updates, and ad copy based on specific keywords and brand style, freeing teams for strategic work while continuously improving as it learns brand voice and customer preferences. Technology generates custom images and videos tailored to brand aesthetics, compressing campaign development timelines from weeks to hours or days.

Where traditional AI segments audiences into broad groups, generative AI enables micro-segmentation for real-time marketing to specific individuals, delivering highly targeted experiences across channels at scale. This personalization includes customized content like recipes based on grocery orders, product recommendations from individual feedback, and adaptive content where websites, emails, and apps adjust displays in real time based on user interactions. AI also excels at predictive analytics, analyzing market data and competitor pricing to forecast consumer behavior and industry trends, helping organizations identify high-value data and plan proactive campaigns, while scaling to handle growing audiences across multiple languages and responding to customer feedback in real time (IBM, 2024, Generative AI in Marketing). IBM's implementation of Adobe Firefly produced 200 unique visual assets and over 1,000 personalized marketing variations in minutes, each optimized for specific audience segments and individual preferences, achieving 26 times higher engagement compared to generic creative, while Carvana created 1.3 million unique AI-generated videos tailored to individual customer journeys (IBM, n.d., IBM Reimagines Content Creation). Both cases show that generative AI can produce personalized content at a scale and speed that was previously impossible.

Mixed Reality

Mixed reality merges physical and digital worlds, allowing digital content to be mapped directly onto a user's real environment in real time (IBM, 2024, What is Augmented Reality). Positioned as an umbrella term that encompasses a spectrum of immersive technologies including augmented reality and virtual reality, it enables brands to deliver context-aware, personalized content that adapts to a user's exact environment, intent, and behavior, responding to where someone is, what they are looking at, and what they are likely to need next, rather than presenting the same experience to every consumer. Its retail applications already demonstrate this, allowing customers to virtually try on products, place furniture in their homes, or interact with personalized product information at the point of decision, giving brands the ability to offer try-before-you-buy experiences that are responsive to who the individual is and where they are (Deloitte Insights, n.d., Augmented Shopping).

The Rise of Augmented Reality (AR) And Virtual Reality (VR)

AR¹⁰ and VR are changing how brands tell stories and build relationships with consumers by opening up new possibilities for interaction and engagement that go beyond what static or screen-based experiences can offer (Deloitte, n.d., The Future of Customer

¹⁰ Augmented Reality (AR): A technology that overlays digital content—images, text, or animations—onto the real world, viewed through a smartphone camera or wearable device, enhancing the physical world rather than replacing it.

Engagement). AR enables contextual presence, overlaying personalized digital content directly onto a consumer's real environment, while VR enables behavioral immersion, placing the consumer inside a fully brand-created world (IBM, 2024, What is Augmented Reality). Together they allow brands to deliver tailored, real-time experiences based on individual behavioral patterns and context, expanding how brands can communicate, demonstrate, and engage with consumers as individuals. Widespread smartphone adoption paired with AI capabilities generates the consumer data that powers these experiences, and brands like Nike, as explored in Chapter 2.1, are already applying AR to enable customers to design and interact with individualized products in real time, demonstrating the range of interaction these technologies make possible.

Personalization At Scale

Personalization at scale refers to the ability of brands to deliver individualized experiences to large numbers of consumers simultaneously through the use of data analytics and artificial intelligence. Rather than relying on broad audience segmentation, this approach enables brands to tailor messaging, product recommendations, and digital interactions to individual behavioural patterns, preferences, and predicted intent. Advances in AI and real-time data processing are making this level of personalization increasingly feasible, allowing brands to adapt content dynamically as consumers interact with digital platforms. The growing adoption of AI-driven marketing technologies further indicates how personalization may be becoming embedded in everyday brand interactions. Each consumer interaction produces behavioural data that can inform subsequent experiences, enabling brands to refine messaging and anticipate potential needs over time. As predictive capabilities improve, personalization appears to be moving beyond reactive customization toward more anticipatory forms of engagement across digital and physical touchpoints. Research indicates that 75% of consumers are more likely to purchase from brands offering personalized content, while 40% of organizations report plans to integrate generative AI into their operations (McKinsey, n.d., The Next Frontier of Personalized Marketing). Taken together, these developments point toward hyper-personalization becoming an increasingly visible feature of contemporary branding practices.

Omnichannel Experiences

Omni-channel experiences have shifted from a competitive advantage to a foundational expectation, where consumers move seamlessly between online, mobile, and physical touchpoints and expect the brand to recognize them across all of them (Kotler et al., 2023). Each interaction adds to the broader understanding of the individual, and brands that connect these touchpoints in real time can respond in ways that reflect the full relationship rather than a single moment. When a consumer never loses context moving between

channels, interactions feel continuous, and personalization becomes more meaningful and relevant. Sephora shows this in Chapter 2.1, where the same consumer profile guides online recommendations, app interactions, and the advice a sales associate provides in store, demonstrating how coordinated omni-channel experiences translate directly into more individualized brand engagement (Danziger, n.d.). Brands that integrate channels effectively strengthen customer loyalty and stand out from competitors, making omni-channel not just an operational capability but a foundation for the individualized experiences that hyper-personalization depends on (Kotler et al., 2023).

Data

How brands collect and own consumer data is fundamentally changing, and with it the infrastructure that hyper-personalization depends on (McKinsey, n.d., *The Next Frontier of Personalized Marketing*). With third-party cookies ending, referring to the browser-based tracking technology that allowed brands to follow and target consumers across the web, retailers are beginning to rely more on first-party data collected directly from customers through loyalty programs, website visits, and app interactions. As cookie tracking disappears, brands must build data strategies around direct customer interactions rather than passive surveillance. At the same time, consumers are becoming more aware of the personal cost of sharing information, and personalization strategies now depend on consumers willingly choosing to share their data, making transparency and trust central to how brands operate. As data practices become more visible and subject to regulatory and public scrutiny, trust in how brands handle personal information is emerging as a competitive advantage (Zuboff, 2019; McKinsey, n.d., *The Next Frontier of Personalized Marketing*).

Chapter 3: Behavioral Economy and AI Consumer Logic

3.1 Shifts in Consumer Response to Personalization

The adoption of AI-powered personalization has transformed consumer expectations and behaviors. Research shows that 71% of consumers now expect personalized interactions from brands, and 76% get frustrated when companies fail to deliver them (The Value of Getting Personalization Right—or Wrong—Is Multiplying | McKinsey, n.d.). This is clearly seen when Netflix curates' content specifically tailored to individual viewing habits or when Amazon remembers past purchases and suggests complementary products; consumers experience real benefits through time saved searching. To the consumer, the benefits are tangible and immediate, such as better product recommendations that match their preferences or more relevant content that reduces endless scrolling or faster service through remembered preferences, and other tailored offers based on their interests.

Behavioral economics helps explain this consumer pattern through loss aversion which is when people feel potential losses more intensely than equivalent gains (What Is Behavioral Economics? | University of Chicago News, n.d.). When consumers use personalized systems, the immediate benefits feel real and valuable while the potential privacy risks feel abstract and distant. This means consumers continue to engage with personalization because what they gain is the right product quickly, relevant content easily, timely offers that to them outweigh what they might lose. As well as the positive experiences using it in the moment, it helps encourage them to continue using personalized systems/strategies.

However, consumers aren't passive in using personalized systems. They are becoming more aware of how personalized systems work. Especially younger generations who know that their digital actions generate data that are influencing their future experiences. They know that liking posts, clicking ads, or buying products sends data to AI algorithms that are using it for recommendations. Whereas some consumers are fully accepting of this new technology, seeing it as a fair exchange where sharing data gives better experiences, other consumers want more control, using privacy settings to manage what they share and the option of consent. This range of responses and reactions to personalization reflects different comfort levels and values between personalization and data sharing, with the generational divide playing a significant role in how people navigate and respond to personalized systems.

3.2 AI Consumer Logic

Artificial intelligence changes how brands understand and predict consumer behavior by organizing fragmented behavioral data into comprehensive consumer profiles. AI works through continuous learning cycles where machine learning algorithms identify patterns invisible to human marketers, creating what Agrawal et al. (2022) describe as "prediction machines" that change behavioral signals into probabilistic forecasts about future actions, preferences, and purchase intentions. These systems leverage vast datasets encompassing browsing history, purchase patterns, social media interactions, location data, and temporal factors to construct dynamic consumer models that evolve in real-time as new data streams become available

In this digital era, data has become what Ajay Agrawal in the book *Prediction Machines* terms "the new oil," the essential fuel that powers AI systems and personalization in marketing and branding. It has three roles: input data for predicting, training data for training the AI, and feedback data for improving accuracy. This type of consumer data becomes more valuable as it accumulates as more and better data leads to better predictions. Every consumer interaction generates data that feeds into AI systems: browsing history, purchase patterns, social media interactions, location data, time spent on content, devices used, and countless other behavioral signals. The more data these systems collect, the more accurate their predictions become, creating powerful incentives for companies to gather as much consumer data as possible.

The way AI learns behavioral patterns operates through continuous feedback loops. Every interaction a consumer has with digital platforms generates data: what they click, how long they pause on certain content, what they purchase, what they abandon in shopping carts, what time of day they are most active, what devices they use, and countless other behavioral signals. Machine learning algorithms analyze these data streams to identify correlations between different behaviors and outcomes. The system might discover, for instance, that consumers who browse certain product categories on Sunday evenings are significantly more likely to make purchases on Monday mornings, or that people who watch specific types of content are statistically more receptive to particular advertising approaches. For example, when Spotify recommends music based on listening history, it guides users toward certain content while filtering out alternatives, creating filter bubbles¹¹ where consumers encounter increasingly narrow options. The algorithm assumes past

¹¹ Filter bubble: An information environment that forms when algorithms consistently serve content matching a user's existing preferences, progressively filtering out different or unfamiliar perspectives.

preferences predict future desires, reinforcing existing tastes rather than broadening horizons.

Machines and humans have complementary strengths in prediction tasks. Machines excel at analyzing large datasets and identifying complex interactions between multiple variables, their advantage grows as data becomes richer and more dimensional. Humans, however, outperform machines when data is limited and when understanding the underlying process that generates the data provides a predictive edge. Identifying where AI adds the most value through speed and pattern recognition, and where human judgment, empathy, and contextual understanding remain irreplaceable.

3.3 Disruptive Branding Strategies and Systemic Shifts

AI-powered personalization is disrupting traditional branding models by transforming brands from fixed identities into adaptive systems that present differently to each consumer. Traditional branding focused on having consistency; brands established fixed identities through standardized visual elements, messaging hierarchies, and controlled touchpoints designed to create uniform associations across all consumer encounters (Kotler et al., 2021). This approach assumed that brand value came from recognizable uniformity, where seeing the same brand elements repeatedly across different contexts built trust and loyalty. Now, with the adoption of AI and rise of hyper-personalization, it inverts this logic, changing brands from static into dynamic, adaptive systems that can have different identities to different consumers based on algorithms and data of individuals, such as preferences, behaviors, and contexts. The design strategy shifts from static deliverables (a logo, a campaign, etc.) to a personalized system. This also changes the role of designers who now must consider how brand elements will function not as fixed elements but as variables within generative systems that produce context-specific outputs (IBM, 2023).

This represents a shift from fixed brand storytelling to what can be called emergent brand narratives. Traditional branding focuses on companies controlling their brand story by carefully managing every touchpoint and message. For example, marketing departments created campaigns, design teams established visual standards, and brand managers ensured consistency across channels. Whereas now with AI personalization, it shifts this dynamic by allowing brand narratives to co-create themselves through interactions between algorithms, personalized data, and individual consumers.

Zuboff (2019), in the book *The Age of Surveillance Capitalism*, argues that this represents a fundamental transformation in the relationship between consumers and commerce. In her framework of surveillance capitalism, consumer behavior becomes raw material that companies extract, process through algorithms, and convert into predictions about future behavior. Consumers are not the customers in these models. They are simultaneously the source of valuable data and the targets of marketing efforts designed to increase engagement and purchases. This inversion of traditional market relationships means that rather than companies serving consumer needs, consumer behavior is harvested to serve business objectives of maximizing data extraction and prediction accuracy. For example, Netflix's artwork personalization by testing thousands of thumbnail variations and measuring click-through rates, the platform identifies which visual cues trigger engagement for specific user profiles, creating individualized behavioral nudges that operate below conscious awareness (Artwork Personalization at Netflix, n.d.).

Also, as Tom Goodwin states, this transformation represents "Digital Darwinism" where companies must adapt rapidly or face extinction. Companies wanting to stay with traditional branding approaches find themselves unable to compete with competitors leveraging personalization to create individually tailored experiences. The consistency that once built trust now reads as irrelevant or tone-deaf to consumers accustomed to having experiences adapt to their preferences. Now, brands that treat all consumers identically struggle to maintain engagement in an environment where personalization has become the expected standard. The challenge becomes for companies not to maintain uniform brand expression but to ensure a coherent brand structure when there are various variations. This requires what Goodwin terms "comfortable discomfort"; companies must accept constant adaptation while preserving core brand values that guide algorithmic decision-making. The alternative is sticking to traditional branding models in an AI-driven landscape, which risks irrelevance as competitors are leveraging personalization to capture consumer attention and loyalty through individually tailored experiences that static brand identities cannot match.

3.4 Ethical and Societal Implications of AI-Personalized Futures

As hyper-personalization becomes more widely used and companies gain increasingly detailed behavioral data for personalization systems, critical concerns emerge about ethics and privacy. Whether consumers truly understand what they are agreeing to and whether they are willing to trade privacy for convenience. Additional questions arise about trust, consent, manipulation, and the power dynamics between corporations and individuals.

The scale of data collection has now increased significantly beyond simple purchase histories or website visits. Companies now track location data in real-time, monitor browsing patterns across multiple platforms, analyze social media interactions, collect biometric information from fitness trackers and smart devices, and many other behavioral signals. These data points combine to create comprehensive profiles of individual consumers that capture not just what people buy, but how they interact, who they interact with, what content they consume, and how behaviors change across different contexts. Shoshana Zuboff describes this as “surveillance capitalism,” (Zuboff, 2019) an economic system where human experience becomes raw material that companies extract, process through algorithms, and convert into predictions about future behavior that are then sold to businesses.

A key question emerges as to whether consumers can trust companies to handle this data responsibly as corporate incentives often conflict directly with consumer privacy interests. Companies profit from collecting, analyzing, and monetizing behavioral data, creating pressures to gather as much information as possible while limiting transparency about its use. Privacy policies and terms of service create an illusion of informed consent and accountability, but these documents are deliberately written to be incomprehensible to average consumers while legally protecting companies from liability (Zuboff, 2019).

Even when companies have good intentions about protecting data, the question of technical capability remains. Data breaches have become disturbingly common, with major corporations announcing that millions of customer records have been compromised. These breaches expose sensitive personal information such as financial data or passwords or health records or location histories etc. The scale of data collection needed for hyper-personalization means that when breaches happen, they affect massive numbers of people at once. A single security failure can compromise the personal information of hundreds of millions of individuals. Additionally, companies often discover breaches months or even years after they occur, meaning consumer information is already circulating before anyone knows their data has been stolen.

These ethical concerns have no simple solutions. As Zuboff (2019) says, surveillance capitalism represents a fundamental shift where companies extract data and shape behavior rather than simply serving consumer needs. The challenge becomes balancing the benefits of personalized experiences against the risks of privacy, security, and autonomy as hyper-personalization continues to evolve.

Chapter 4: Speculative Prototyping: Methods & Approach

4.1 Conceptual Development

This prototype explores speculative futures through an augmented reality experience, drawing on Dunne and Raby's speculative design approach, personas, and iterative design methods. The goal is to create an interactive Generative AI and AR prototype that visualizes what hyper-personalized branding futures could look like rather than providing market-ready solutions.

The prototype is a WebAR¹² mobile application that demonstrates hyper-personalized branding in action. It shows what happens when brand identity becomes fully adaptive, where the same physical product looks completely different depending on who's viewing it, with visuals that respond to individual preferences, values, and contexts in real-time. You scan a product with your phone using AR. The system recognizes the product and generates personalized brand visuals based on you, the packaging is then designed in your aesthetic style, shown in settings where you would use it, with messaging that explains why it's made for you and highlights the features that matter to your specific needs.

The development of this prototype involves collaboration with Muhammad Minhajuddin from Algoma University. From Summer 2025 through to December 2025, Minhajuddin helped with the WebAR programming and implementation. This collaboration enabled me to focus on the conceptual design, generative AI and prompting aspects of hyper-personalized branding while the collaborator helps with the coding and technical infrastructure needed for the speculative prototype. The methodological foundation guiding this work is speculative design, a practice that shaped every decision in the prototype's development, from the choice of tools to the framing of the experiences it creates.

¹² WebAR: Augmented reality that runs through a web browser without requiring app downloads, overlaying digital content onto the physical world through a smartphone camera.

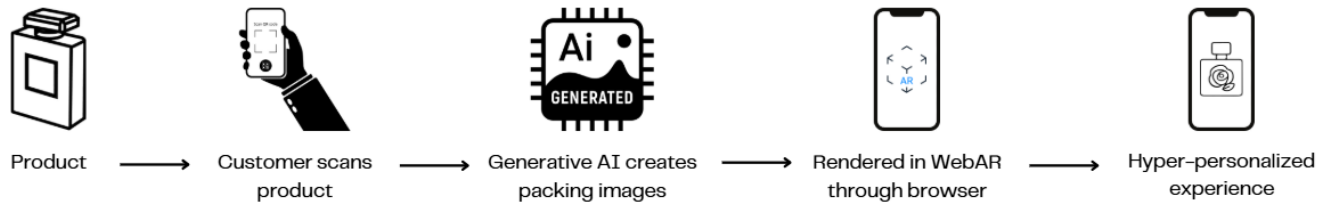


Figure 2
 Prototype process flow: from product scan to hyper-personalized AR experience.

4.2 Speculative Design Framework

Speculative design uses design prototypes and proposals to imagine potential futures and explore their implications before they become reality. Rather than offering solutions to existing problems, it uses designed artefacts to open questions about where current trajectories are heading and whether that is where we want to go.

Following Dunne and Raby's approach in *Speculative Everything*, the method uses a framework of probable futures (what will likely happen), plausible futures (what could happen), possible futures (what might happen based on current science), and preferable futures (what we want to happen). This framework was chosen for this project because hyper-personalization is not a distant or imagined technology. It already exists and is already being deployed commercially, as the case studies in Chapter 2 demonstrate. Its continued growth is probable. The question is not whether it will happen, but what it will become, and at what cost.

Dunne and Raby's framework provide a structure for holding that question open rather than resolving it. It creates space for people to experience and respond to a future before it becomes the norm, asking who is shaping these futures and in whose interest. As Dunne and Raby ask, "what does preferable mean, for whom, and who decides? Currently, it is determined by government and industry, and although we play a role as consumers and voters, it is a limited one." That question sits at the core of hyper-personalization: a technology being built and deployed using personal data, with very little input from the people that data belongs to about what they actually want from it. By building a prototype that sits within this spectrum, it becomes possible to show people what data-driven technology is already capable of, and to invite a critical response to it rather than simply accepting it as inevitable.

This thesis and prototype sit in the plausible-to-possible area of the spectrum. The technologies demonstrated, generative AI image production, WebAR delivery, and persona-driven prompt engineering¹³, are not speculative in the sense of being unproven. They exist. What is speculative is their application to branding at the scale and intimacy this prototype imagines: a system where every consumer encounters a different version of the same brand, shaped entirely by their data. Placing the prototype here, between plausible and possible, is a design argument in itself: close enough to the present to be credible, far enough to be worth questioning. Dunne and Raby describe these kinds of prototypes as "functional fictions," artefacts that are not real products but function as believable simulations of a possible world. As they write, speculative design can "pull new technological developments into imaginary but believable everyday situations so that we can explore possible consequences before they happen." This prototype operates in exactly that way: it is not proposing a product, it is proposing a question.

Future Cone

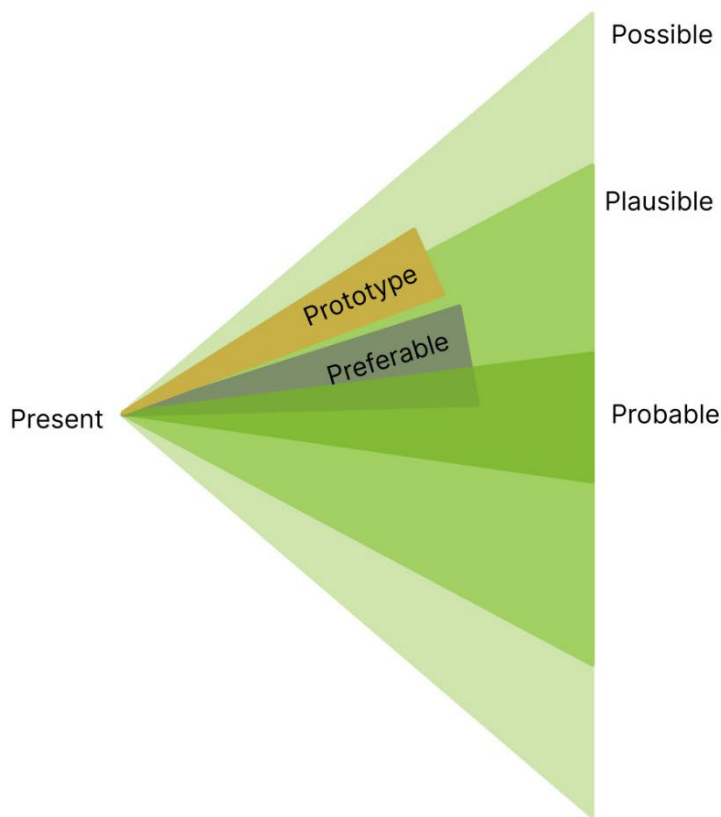


Figure 3
Speculative design futures cone showing the positioning of this prototype (adapted from Dunne & Raby, 2013)

¹³ Prompt engineering: The practice of designing text instructions given to generative AI to produce specific outputs. Word choice, structure, and order significantly affect results.

Dunne and Raby's framework position this prototype between plausible and possible, but Futures Wheel and Causal Layered Analysis (CLA) foresight methods help structure what that means in practice. These methods build on the Horizon Scanning in Chapter 2.2, which identified hyper-personalization as a significant emerging signal in branding. Where horizon scanning asks, "what's changing?", these methods ask, "what does that change lead to?" and "what assumptions make this change possible?" Together with Dunne and Raby's speculative approach, they create a structure for exploring hyper-personalization critically rather than simply demonstrating it.

The Futures Wheel is a method developed by Jerome Glenn in 1972 for identifying and mapping the consequences of trends, events, or decisions (Glenn, 2009). The method works by placing a central concept in the middle of a page and drawing spokes outward from it. At the end of each spoke sits a primary impact, something that directly results from the central development. From each primary impact, secondary spokes extend outward, showing what happens next. This continues through tertiary impacts and beyond, creating concentric rings of consequences that grow more distant from the original event but remain causally connected to it. The pattern creates a visual map showing how consequences ripple outward from a central development, with some effects feeding back to amplify or dampen the original trend.

The core of the method is that it reveals patterns that are not obvious when thinking about change/emerging technologies in simple cause-and-effect terms. Consequences do not all happen at once; they unfold over time in sequences, and some effects loop back, impacting the original trend (Glenn, 2009). This makes the Futures Wheel method particularly useful for exploring developments like hyper-personalization, where the surface-level change (personalized brand outputs) triggers effects across multiple aspects, such as technological, economic, cultural, and ethical, that interact with each other in ways that are difficult to predict and visualize but important to consider.

For this project, the concept at the center is hyper-personalization applied to branding. The first ring shows what happens directly as brands begin generating individualized outputs based on consumer data. Traditional brand consistency shifts because the same product can look completely different depending on who's looking at it. Designer roles begin to change as the work shifts from creating fixed brand assets to building systems that generate those assets. Consumer expectations begin to shift as people become accustomed to brands that adapt to them rather than staying the same for everyone.

The second ring shows what those primary impacts lead to. As brands move toward individualized outputs, shared brand culture begins to change. Data becomes increasingly valuable as it becomes the currency powering hyper-personalization systems. Companies compete not just on products but on the depth and quality of behavioral data they can collect (Chapter 2.1). This creates tensions: some consumers may willingly trade privacy for convenience and relevance, accepting data collection as the price of personalized experiences (Chapter 3.1). Others may resist, demanding stronger privacy protections and transparency about data use (Chapter 3.4). As consumer expectations shift, engagement metrics become increasingly important, changing how brands measure success from "do people know this brand?" to "do individuals interact with it?"

The third ring extends into less certain but possible territory. If data remains freely collected and minimally regulated, surveillance capitalism could become the dominant business logic, consumer behavior as raw material that companies extract and process into behavioral predictions, they monetize (Zuboff, 2019; Agrawal et al., 2022). But if privacy protection intensifies instead, if regulations limit data collection or consumers collectively refuse to share behavioral information, what happens to hyper-personalization systems that depend on that data? Do they collapse? Do they find other ways to generate relevance? If shared brand meaning fragments entirely, does the concept of "the brand" as something collectively understood dissolve, or does it evolve into something new, brands with core identities that express differently for different people while maintaining recognizable values? These aren't predictions; they're possibilities that depend on choices being made now about regulation, consent, business models, and ethics.

The Futures Wheel doesn't predict which of these will happen. It maps possibilities, showing the range of consequences that could unfold if current patterns continue. When someone experiences the personalized packaging this prototype generates, the wheel provides a way to think through what that implies at a larger scale: not just "is this convenient?" but "what does this change about brands, about marketing, about how value gets created and captured?"

Future Wheel

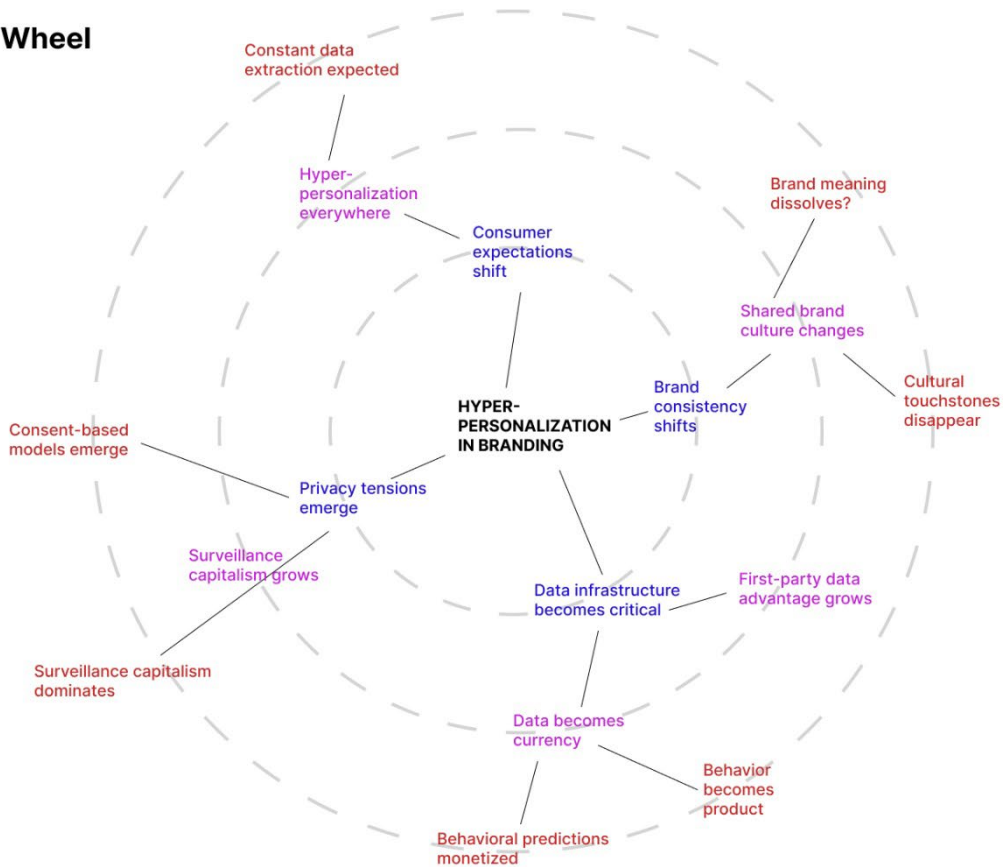


Figure 4
Futures Wheel exploring consequences of hyper-personalization in branding (adapted from Glenn, 2009)

Where the Futures Wheel maps outward consequences, Causal Layered Analysis examines hyper-personalization across different layers to understand what makes hyper-personalization possible and what sustains it. The method, developed by Sohail Inayatullah, examines issues across four levels: the litany (observable events), systemic causes (structures and institutions), worldview (ideologies and discourses), and myth/metaphor (deep cultural narratives) (Inayatullah, 2004). Each layer reveals something different about why hyper-personalization exists and what it means.

At the litany level, the surface, hyper-personalization shows up as the visible hyper customized experiences people encounter directly. Recommendation engines suggesting products based on browsing history, preferences, and behavior. Personalized ads that follow people across platforms. This is what most discussions about hyper-personalization focus on: whether it's needed, whether it feels invasive, whether it's worth the convenience. This is also the level where this prototype operates experientially, when

someone scans a product and sees packaging generated in their aesthetic style, shown in their context.

At the systemic level, the structures enabling these surface experiences to become visible. Machine learning infrastructure processes behavioral data in real time (Chapter 4.3). Platform business models shift toward first-party data collection as third-party cookies disappear (Chapter 2.2). Organizational structures change, and marketing teams operate on engagement metrics rather than brand consistency (Chapter 3.3). Technical systems connect customer touchpoints across channels to create unified profiles, as demonstrated in the Sephora and Amazon case studies (Chapter 2.1). These structures don't get discussed as often as surface experiences, but they're what make hyper-personalization possible at scale. The prototype makes this layer visible by demonstrating what these systems produce when they operate not as abstract infrastructure but as tangible brand outputs that depend entirely on that infrastructure functioning.

At the worldview level, competing ideologies about what hyper-personalization is and what it's for come into focus. One worldview frames it as consumer empowerment - brands serving customers better by knowing them individually, delivering relevance instead of generic mass-market products (Kotler et al., 2021). This perspective sees data collection as mutually beneficial: consumers trade information for better service, companies trade service for loyalty. The other worldview frames it as extraction and control, surveillance capitalism, where companies collect behavioral data not to serve needs but to predict and shape future behavior for profit (Zuboff, 2019). This perspective sees consumers not as customers being served but as data sources being mined. These aren't just different opinions; they are fundamentally different beliefs about what these systems are and who they benefit. The choice between them shapes how hyper-personalization gets designed, regulated, used, and discussed. The prototype operates in this contested space, it can be experienced as empowering (a brand that finally understands me) or as invasive (a system that knows too much), depending on which worldview the observer brings to it.

At the myth/metaphor level the deepest layer the cultural stories that give hyper-personalization its emotional resonance emerges. One myth operating here is that to be known is to be valued. The idea that when someone remembers your preferences and anticipates your needs, which demonstrates care and attention. Hyper-personalization taps this myth directly. When Netflix shows you different artwork than it shows someone else, when Amazon remembers what you bought last time, when this prototype generates packaging in your aesthetic, the myth suggests: *they know you, you matter as an individual*. But algorithmic knowing isn't human knowing. The system predicts behavior

from data patterns. It doesn't understand you or value you. The myth provides cultural legitimacy for what is fundamentally a business optimization strategy using data to increase conversion rates and reduce churn. The prototype makes this myth tangible. It generates brand experiences that feel personalized and intimate, creating the same emotional pull that commercial systems rely on, this brand gets me. By making that feeling experiential rather than abstract, it allows people to reflect on whether they actually want brands to know them this way, and what it means when that knowing is algorithmic rather than human (Inayatullah, 2004).

These layers matter because they show why debates about hyper-personalization are difficult to resolve. Hyper-personalization operates across all four layers simultaneously. A hyper-personalized recommendation isn't just a surface feature (litany) - it requires infrastructure that extracts and processes data (systemic), reflects beliefs about what consumers want and deserve (worldview), and taps into myths about recognition and value (myth/metaphor). The complexity is that interventions at one layer don't resolve tensions at others. Better privacy policies (systemic) don't address whether algorithmic knowing should feel like being valued (myth). More transparent data practices (litany) don't settle whether personalization is empowerment or extraction (worldview). This is why debates remain unresolved: the issue exists across all four layers at once, and each layer operates according to different logics that don't align (Inayatullah, 2009).

Causal Layered Analysis

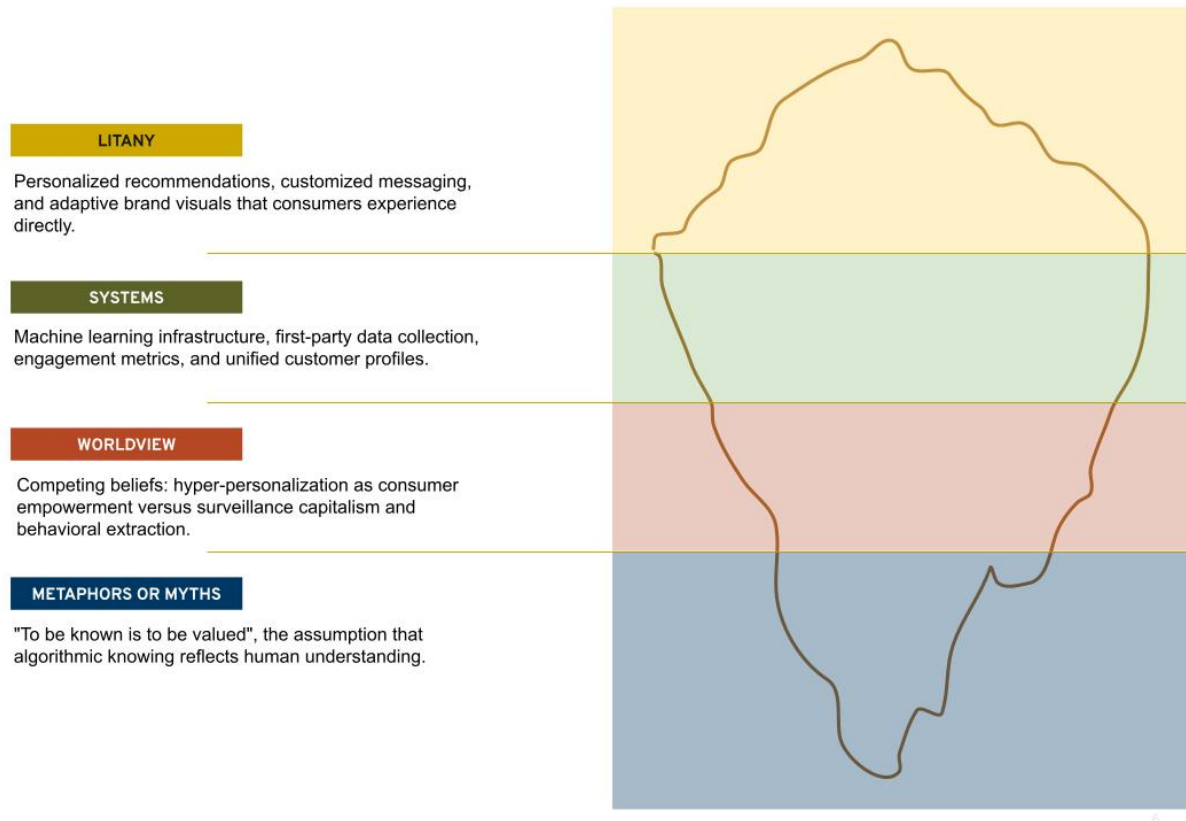


Figure 5
Causal Layered Analysis of hyper-personalization in branding. The iceberg model illustrates how most systemic forces infrastructure, worldviews, and cultural myths, remain hidden beneath visible surface experiences, similar to how most of an iceberg's mass exists below the waterline. The waterline is represented by the horizontal line separating the Litany layer (visible, beige) from the Systems layer (submerged, green). (adapted from Inayatullah, 2004)

Together, the Futures Wheel, Causal Layered Analysis, and Dunne and Raby's speculative design framework create a structure for the speculation this prototype invites. The Futures Wheel shows where hyper-personalization could lead, the range of possible consequences depending on how current tensions get resolved. Causal Layered Analysis shows what makes it possible and what sustains it: the technical systems, the economic structures, the competing ideologies, and the deep myths. Dunne and Raby's framework position the prototype between plausible and possible, creating space not to predict or prescribe, but to invite critical response to what these systems already make possible.

The prototype is designed to let people experience this emerging reality before it becomes the default, to make it tangible enough to respond to. When someone scans a product and sees a brand experience built around their data, they are not just observing hyper-personalization as a concept; they are encountering it as a felt experience. That encounter surfaces questions that are difficult to engage with in the abstract: Do I want brands to

know me this well? What happens to my data after this interaction? Who decides what version of a brand I see, and why? By making these questions experiential rather than theoretical, the prototype creates the conditions for the kind of critical public engagement that the ethical concerns raised in Chapter 3 demand. Consent, transparency, and data ownership are not just policy questions; they are design questions, and they are easier to debate when people can see and feel what is at stake. This is the critical purpose of the prototype: not to demonstrate what hyper-personalization can do, but to position it as a set of choices that can still be questioned, shaped, and contested.

4.3 Exploring AI Systems, Tools & Software

The next step in the prototyping process was identifying which generative AI model could best bring it to life. The model chosen would determine the visual language of the entire prototype, the range of aesthetic outputs possible, and ultimately whether the system could materialise brand visuals that felt genuinely distinct and intentional. To ensure a fair and consistent comparison, the same prompt was used across all models tested, making model behaviour the only variable. Selecting the right generative AI model was not a purely technical decision it was also a design one. The model chosen would determine the visual language of the prototype, the range of aesthetic outputs possible, and ultimately whether the system could materialise the distinct brand identities each persona demanded. Several models were tested before a final selection was made.

Five generative AI models were evaluated, all of which were current and publicly available at the time of testing. It is worth noting that generative AI is a rapidly evolving field. Models are constantly being updated, improved, and revised, and what is available one month may be significantly different the next. The level of visual consistency and quality achieved in this prototype would not have been possible just a year prior, which speaks to how quickly these tools are advancing and why their implications for branding are becoming increasingly urgent to examine.

Company	Model	Key Issue	Decision
Black Forest Labs (BFL)	FLUX (Pro 1.1)	Most consistent across visual quality and text accuracy. Selected for this prototype.	Selected
Google Gemini AI	Nano Banana	Strong aesthetic outputs but visual style shifted noticeably	Rejected

		between generations of the same prompt.	
Stable Diffusion	3.5	Good prompt control but outputs lacked the refined quality needed for packaging, with surfaces appearing flat on closer inspection.	Rejected
Luma AI	N/A	Specifically designed for marketing and branding, making it a strong candidate. However, subtle errors emerged on closer review: distorted hands, extra fingers, and anatomical inconsistencies in lifestyle imagery.	Rejected
Open AI	DALL-E 3	Visually polished but struggled with text rendering, producing missing, misspelled, or illegible typography within packaging designs.	Rejected

A consistent pattern emerged across testing: at a distance, all five models produced outputs that appeared visually compelling. It was only on closer inspection that noticeable differences became apparent. The errors were subtle rather than obvious, requiring a second look to notice. This is precisely what made it a significant issue for a branding context, where consumers encounter packaging at close range and where a distorted detail or illegible brand name, even if not immediately noticed, erodes trust in the product and brand. BFL FLUX Pro 1.1 was selected because it was the most consistent across both visual quality and text accuracy, the two elements most critical to brand identity in a packaging context.

It is also worth noting that each generative AI platform structures its prompting differently. Each model has its own syntax, logic, and sensitivity to how instructions are written, meaning that achieving good results requires understanding the specific requirements of each platform rather than applying a universal approach. This informed how prompt engineering was developed as a distinct part of the process in this project which is covered in section 4.4.

It also important to remember that generative AI models including BFL are trained on datasets that reflect existing cultural and aesthetic biases.

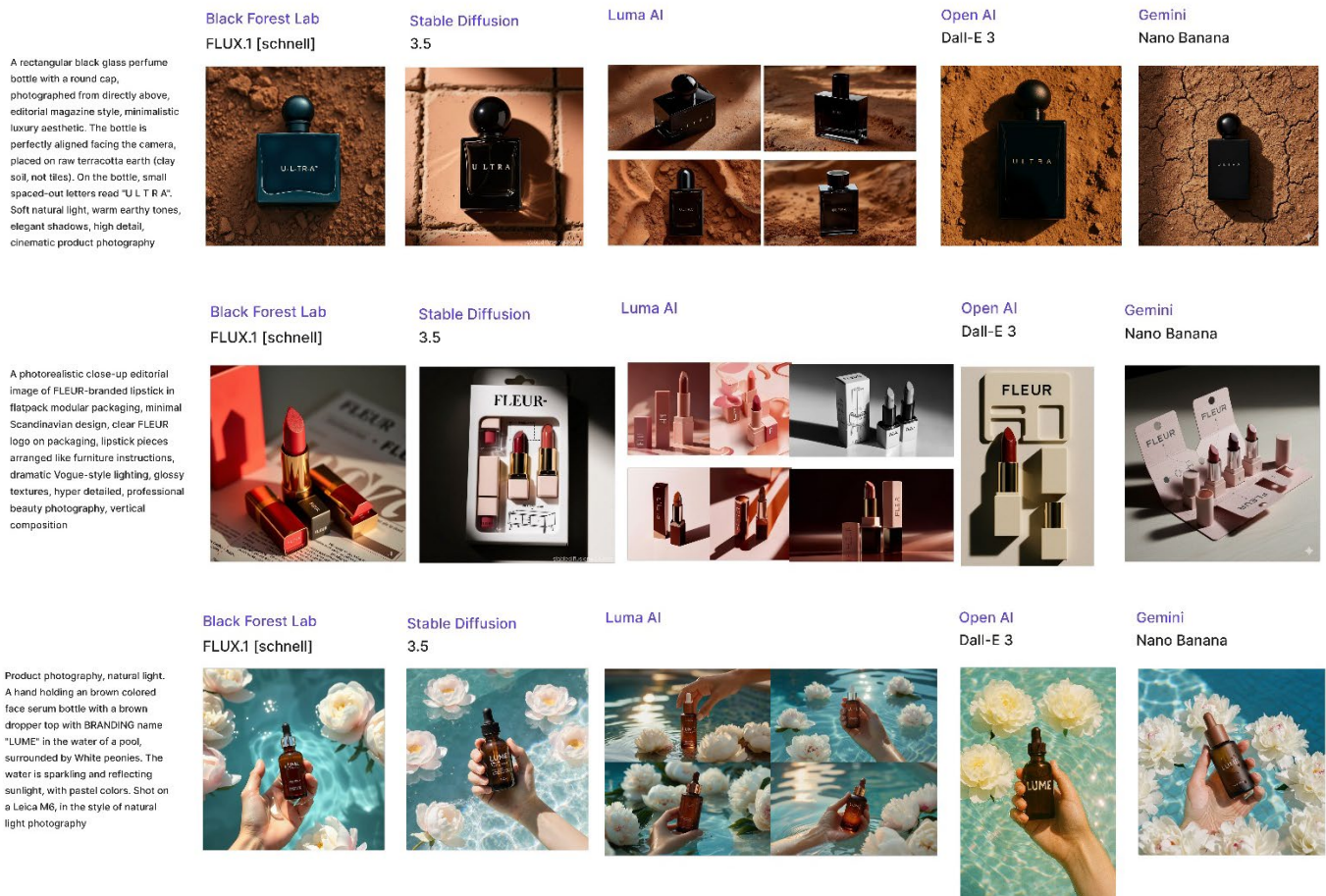


Figure 6
Comparative generative AI model testing

4.4 Personas, Prompt Engineering, and Iterative Design

Hyper-personalization works by converting individual data into tailored experiences, and this prototype applies that same logic to branding. At its core, this means translating who a person is, their values, their aesthetic preferences, their relationship to data, into a visual

brand experience built specifically for them. In this prototype, personas function as that data, standing in for the behavioral profiles a real commercial system would draw on. This section documents how that translation was made: how personas were built, how their attributes were converted into prompt language, and how that language was iteratively refined through the making process to produce most consistent and realistic results.

Persona Creation

I created three synthetic personas to represent different users and customers. In a time where 71% of consumers now expect personalized interactions (McKinsey), these personas explore the spectrum from data-comfortable users to privacy-conscious users across various design styles. Each persona becomes data that then informs the AI image generation prompts, ensuring the visual content reflects diverse perspectives on how individuals might experience adaptive brand identities. Their needs, contexts, and comfort levels with data-driven personalization shaped by what kinds of dynamic brand visuals the AR experience would generate and display.

Each persona represents a different consumer with distinct values, aesthetics, and design sensibilities, acknowledging that hyper-personalization must account for the reality that people experience and respond to branding differently. Since this project is academic rather than commercial, real consumer behavioral data was not accessible. I built these synthetic personas to represent the kinds of consumers a real personalization system would encounter, making it possible to explore and critically examine the process without access to commercial data.

When hyper-personalization reduces a person to a set of prompt parameters, it enacts what N. Katherine Hayles describes as the posthuman condition. Hayles argues that the posthuman emerges when human identity becomes defined not by embodied experience but by information patterns, when who we are is reducible to data. In other words, the person becomes an information pattern that the AI then materializes as brand imagery. This prototype makes that condition tangible: the persona is not treated as a whole person with a history and a context but as a structured set of attributes that the system processes into a visual output.

The Minimalist

Quiet, Refined, Timeless, Quality

Drawn to brands that care quietly and refine. Purchases are deliberate, slow, and preceded by research. Invests in pieces that age well. Rejects disposability and "fast anything."

What Drives Them:

- Enduring value, quiet confidence, material honesty, timeless modernity

What They Notice:

- Tone before trend, texture before color, silence before message

Language That Resonates

- "Built for quiet confidence."
- "Simplicity is our form of care."

Materials

- Linen, cotton, natural finishes, embossed and debossed details

Style

- Matte surfaces, soft light, balanced
- geometry, mid-century, and Art Deco influence

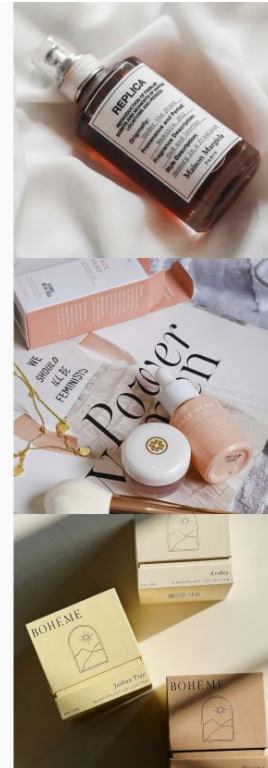


Figure 7
Persona card, The Minimalist

The Curator

Story-Driven, Collectible, Discovery

Drawn to brands that feel authored. Purchases feel collectible—they want to complete sets, gather volumes. Enjoys limited editions tied to narrative arcs. Engages deeply with backstory and world-building.

What Drives Them:

- Storytelling first, creative discovery, collectible identity, nostalgic discovery

What They Notice:

- Concept before color, symbolism before surface, narrative before material

Language That Resonates

- "Chapter Three: The Lost Weekend."
- "Summer 1987. Somewhere on the coast."

Materials

- Tactile labels, printed inserts, aged effects, packaging that doubles as art

Style

- Illustration-led, graphic-forward, high-contrast layouts, collage compositions, poster-like design



Figure 8
Persona card, The Curator

The Maximalist

Bold, Colorful, Expressive, Joyful

Drawn to brands that celebrate color and sustainability. Purchases driven by discovery: thrift finds, statement prints. Values layering and personal creativity. Builds collections through addition, not editing down.

What Drives Them:

- Color as language, pattern confidence, sustainable joy, playful composition

What They Notice:

- Patterns before plain, color before neutral, texture before flat, vintage before new

Language That Resonates

- "More is more."
- "Saturate, layer, repeat."

Materials

- Velvet, corduroy, recycled textiles, tactile surfaces

Style

- Full-bleed color, layered prints, asymmetric layouts, dense composition
- Typography: Playful Sans Serif with personality, stylized Serif for character
- Materials: Velvet, corduroy, recycled textiles, tactile surfaces

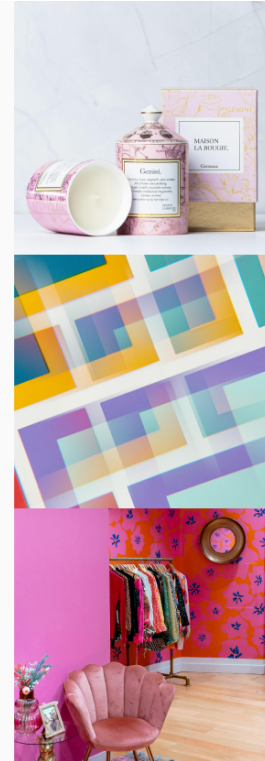
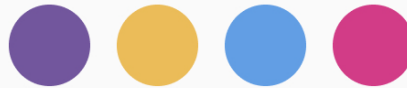


Figure 9
Persona card, *The Maximalist*

From Persona to Prompt

Translating persona attributes into prompt language was the core design decision of this project. Each persona's identity characteristics, their aesthetic preference, colour associations, lifestyle context, and design sensibility, were mapped directly onto prompt parameters that the BFL FLUX Pro 1.1 model would use to generate brand visuals. This process made visible how personalization systems reduce human complexity to data attributes.

I created three personas to represent distinct points along an aesthetic spectrum: The Minimalist ("quiet, refined, timeless, quality"), The Curator ("story-driven, collectible, narrative, discovery"), and The Maximalist ("bold, colorful, expressive, joyful"). These three were chosen deliberately to produce visually distinct outputs rather than subtle variations -- minimalist restraint at one end, narrative-driven curation in the middle, maximalist expression at the other. This range was a design decision in itself. I wanted the prototype to make the fundamental premise of hyper-personalised branding immediately visible: that the same product can look completely different depending on whose data is shaping the experience. A more nuanced set of personas might have revealed more complex overlaps but would have made that core argument harder to see.

Before translating personas into prompts, I created mood boards for each to better understand how their values would translate visually. The challenge was determining which persona attributes actually mattered to a visual system. The Minimalist is described as seeking "quiet confidence" and "enduring value," but what does that mean visually? I had to decide: does minimalism translate to negative space, monochromatic palettes, or geometric forms? Does "data-comfortable" affect visual style at all, or does it only matter for interaction design? Drawing on my undergraduate background in graphic design, I made choices based on design trends I recognize and visual languages I am familiar with. For example, The Minimalist's core motivation of "attentive care" and preference for "matte surfaces, soft light, balanced geometry" translated into the prompt language "clean geometry, muted brass tones, negative space, sans-serif typography." The Maximalist's "color as language" motivation and "bold, saturated palettes" became "warm atmospheric lighting, rich jewel tones, tactile texture."

This translation process was iterative, and this meant going back to the persona documents when prompts weren't working. Generative AI is unpredictable even with carefully constructed prompts. A prompt that successfully generated minimalist packaging in one iteration might produce overly decorative results in the next. When this happened, I revisited the persona's core motivations to identify which attributes were being lost in translation. For The Minimalist, early prompts that emphasized "elegance" produced ornate Art Deco imagery rather than the restrained geometry the persona values. Refining the prompt to emphasize "negative space" and "matte brass" rather than "elegant" or "refined" produced outputs closer to the persona's aesthetic. What this showed is that generative AI reads words through whatever associations its training data built which don't always match what a designer knows. The word "bold" might generate maximalist energy for one persona but aggressive typography for another, depending on surrounding prompt context.

For The Minimalist, the persona's preference for "matte surfaces, soft light, balanced geometry" and materials that communicate through "natural textures: linen, cotton, paper" translated into clean off-white linen paper, embossed botanical linework, and restrained typography. The persona document describes a consumer who invests in "pieces that age well" and rejects "fast anything," which I interpreted visually as a preference for the kind of packaging that feels archival and unhurried, as though every design decision had been considered twice before being committed to. Looking back, I notice my interpretation leaned heavily on a particular tradition of European apothecary and botanical design. Someone with a different design background might have translated "matte surfaces, soft

light, balanced geometry" into something entirely different: architectural photography, or Scandinavian modernism, or Japanese aesthetics.

For The Curator, the persona's insight was "they are drawn to brands that feel authored and alive" and their symbolic vocabulary of "artifact," "chapter," and "world" translated into a deep indigo night-sky ground layered with symmetrical Art Nouveau botanical illustration, jewel-tone florals, and gold dust details. The persona states that "every purchase feels like acquiring a chapter, an artifact, or a story fragment," and that they "notice concept before color, symbolism before surface, narrative before material." This directed me toward a visual language with accumulated history built into its Art Nouveau specifically because it sits at the intersection of the persona's stated preference for design that mixes "retro meets modern, handcrafted meets polished, archival meets contemporary." The packaging needed to feel like it already had a story before the consumer picked it up.

For The Maximalist, the translation was the most difficult and the most iterative. The persona document states that "color is the primary design tool, not an accent," and that the consumer embraces "prints, stripes, florals, and geometrics," with "layouts and designs that can be asymmetric, layered, and energetic." My initial interpretation was, overlapping patterns, competing visual systems, maximum surface density. This consistently caused the model to collapse and to produce noisy and illegible outputs. The persona's own symbolic lexicon includes "layer" defined as "visual and narrative depth; stacking meaning and texture," and "saturate" as "color at full strength; visual intensity" but these qualities proved impossible to render faithfully through literal pattern stacking. The resolution came from abandoning surface complexity entirely in favour of atmospheric colour banding: horizontal scanline texture in muted teal, dusty coral, and hazy mustard, delivering the persona's "bold, saturated palettes" through depth and atmosphere rather than competing elements.

Persona Attribute	Core Attributes	Prompt Language Used
Minimalist	"Quiet confidence," "natural textures," "matte surfaces, soft light, balanced geometry"	"Off-white linen paper, blind embossing, botanical line-art, negative space, apothecary serif"
The Curator	"Storytelling first," "nostalgic discovery," "illustration-led, graphic-forward"	"Deep indigo ground, Art Nouveau symmetrical florals, jewel tones, gold dust, night sky texture, tarot card aesthetic"

The Maximalist	"Color as language," "bold saturated palettes," "prints and texture layers"	"Horizontal ribbed scanline texture, muted teal, dusty coral, hazy mustard, lenticular color banding, compressed serif typography"
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The Minimalist persona generated two distinct visual interpretations during the prompt refinement process: an Art Deco-influenced version emphasising geometric forms and brass accents directly drawing on the persona's stated value of "timeless modernity" and its direction to "use visuals that merge modern with mid-century and Art Deco geometry" and a monochromatic version focused on soft light, botanical illustration, and negative space, drawing on "material honesty" and the preference for "matte, tactile, and natural finishes." Both aligned with the persona's core values but expressed them through entirely different visual languages. I kept both as separate presets within the prototype. But this decision exposed something important about hyper-personalization systems more broadly. When behavioral data supports multiple valid visual directions, the system must still choose one and it does so without acknowledging what it left out. The user receives one version of themselves, with no indication that other equally valid versions existed.

Ultimately, the prompt choices reflect my own design background and assumptions about what these personas would value visually. There is no neutral translation from persona to prompt. Someone always decides what attributes matter and how they should be represented, and in this prototype, that someone was me. This is a limitation not just of this project but of hyper-personalization systems generally: the designer's perspective is always encoded into what the system interprets as the user's preference.

One persona type is notably absent: the privacy-conscious user who refuses data sharing entirely. I considered creating this persona but realized it would not generate visual outputs, as hyper-personalization requires data to function. This absence is itself significant. It exposes a structural limitation of hyper-personalized branding: the system cannot serve users who opt out. The best brand experiences a privacy-conscious consumer could receive in this system is no personalization at all, which raises the question of whether hyper-personalization is truly adaptive or simply exclusionary toward anyone unwilling to participate in data exchange.

Prompt Engineering

Each generative AI platform has its own approach to prompting what works in one model does not necessarily transfer to another, as each has its own logic, syntax, and sensitivity

to how instructions are written. Understanding these platform-specific requirements was essential before any meaningful testing could begin. For BFL FLUX specifically, prompts are structured in a specific order: subject, action, style, and context. As Black Forest Labs note, "the order of elements in a prompt is as important as the elements themselves; the model privileges what appears first."

For package design generation, this meant starting prompts with the product subject, then adding visual elements like color palettes and design aesthetics, followed by mood and atmosphere. BFL also responds best to positive descriptions rather than negative ones instead of stating what should not appear, prompts had to specify what should, for example "minimalist clean packaging" rather than "no busy designs." Throughout the process, prompts were iteratively refined based on output quality, adjusting which elements came first and how specifically style references were described. This ensured the generated packaging reflected both the individual persona and a cohesive brand aesthetic across all variations.

Subject + Action

Create a flat 2D Art Deco perfume front panel design, focusing on symmetrical geometric composition and luxury product presentation.

Style (Visual Layer first)

Feature a matte deep-plum vertical stripe paired with razor-thin matte gold lines, placed against warm cream rectangular blocks in sharp Deco alignment. Three text lines centered on the gold axis: "FABLE" in large geometric Deco serif at top, "VIOLETTE N.17" in spaced caps at center. Between the two text areas: a single Art Deco sunburst or stepped diamond medallion motif in champagne gold, fine line detail, centered. "Eau de Parfum · 100 ml" as one single line in fine gold micro-text at base.

Context (Technical Layer next)

Symmetrical composition, no empty space. Flat lay, top-down perspective. High resolution, sharp edges, print-ready, balanced spacing. Matte finish, no photographic textures. No extra logos, no repeated text, soft tonal contrast.

Atmospheric Layer: Convey refined Art Deco luxury, geometric precision, and restrained elegance. The tone should evoke heritage perfume packaging symmetrical, confident, timeless.

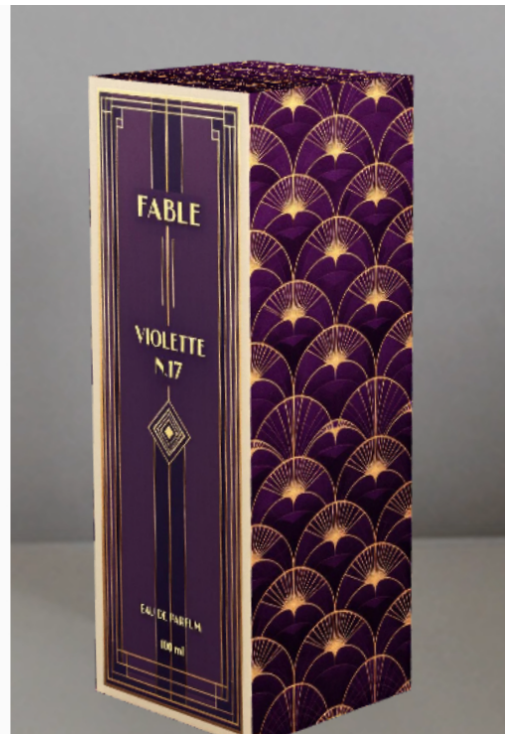


Figure 10
BFL FLUX prompt structure demonstrating persona-to-visual translation across Subject + Action, Style/Visual, Context/Technical?

The prompt refinement process also revealed something about how generative AI interprets language that has direct implications for personalisation systems. For The Curator, early prompts that used the word "botanical" consistently produced photorealistic

flower photography, overriding the persona's explicitly "illustration-led, graphic-forward" visual style. The word carried stronger associations with nature photography in the model's training data than with the illustrative tradition the persona values. Anchoring the prompt on "vintage book cover," "tarot card aesthetic," and "1920s decorative print" eventually produced outputs aligned with the persona's stated preference for design that "rewards curiosity" and contains "hidden details" and "layered meanings." This mismatch between a persona's descriptive language and a model's statistical associations is not a technical problem that better prompting fully solves it is a structural characteristic of how these systems work, and it means that any hyper-personalisation system built on generative AI will require a human translation layer, whether or not that layer is acknowledged.

There is also a practical constraint worth reflecting on. The prototype runs on FLUX Schnell by default, a four-step model optimised for speed. Writing prompts for Schnell required a fundamentally different approach than writing for a higher-step model detailed descriptive sentence produced worse results than short, high-signal keyword clusters, because the model resolves fine detail poorly at low step counts. This meant that the more layered and identity-specific a persona's aesthetic, the harder it was to render accurately at the default setting. The Curator's "collage-like compositions that tell visual stories" and "typography that supports the tone of the narrative" required switching to FLUX Pro 1.1 to produce outputs with sufficient detail and linework quality. This matters because the fidelity of the personalised output is partly determined by the model tier, not just the quality of the persona data or the prompt the richest, most identity-specific visual directions are also the most technically demanding to generate faithfully.

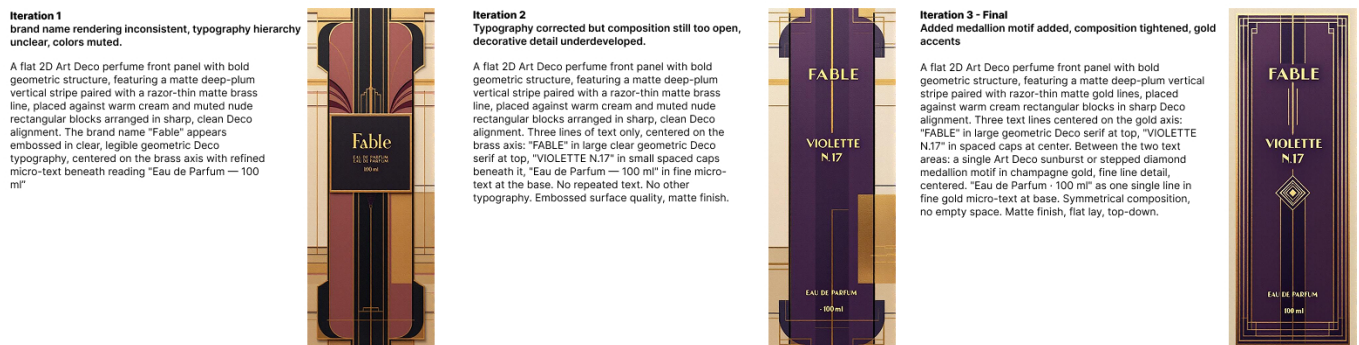


Figure 11
Iterative prompt refinement process for the Minimalist persona.

Johanna Drucker argues in *Graphesis* that visual form is never neutral, that it always encodes an argument and while Drucker was writing about traditional visual forms, that principle extends in an unexpected direction when applied to AI-generated imagery.

Applying that thinking here, prompt engineering functions as a new form of brand brief, translating identity data into visual language. In traditional brand design, a brief communicates the strategic and aesthetic intent to a designer who then makes creative decisions. In this system, the prompt performs that same function, but the recipient is an AI model rather than a human. The prompt is the brief; the output is the visual argument. Every decision that goes into writing a prompt, which attributes to include, in what order, with what language, shapes what the brand communicates and to whom. What AI makes visible is that this argument was always present in branding. The medium has changed; the intent has not.

4.5 AR Development and Technical Implementation

The prototype initially began in Unity for its robust AR toolkit and advanced rendering capabilities. However, we switched to AR.js mid-development due to better accessibility and deployment constraints. AR.js offered a web-based solution that was easier to test and share without requiring app downloads, which is critical for a speculative prototype meant to spark discussion. This came with trade-offs: Unity's advanced features and smoother tracking were sacrificed for AR.js's browser-based accessibility and faster iteration cycles.

Two tracking approaches were tested to determine which would work best. Marker-based tracking uses a specific visual pattern that the system recognizes and tracks extremely reliable and stable, maintaining accurate tracking even as you move your phone, though it requires placing a physical marker on or near the product. AI-based tracking uses computer vision to recognize the actual product itself without needing any marker, which from a user perspective is much more seamless. However, its significantly less stable performance depends heavily on lighting conditions, viewing angles, and how visually distinctive the product is. In testing, it became unreliable or failed entirely in poor lighting or at certain angles. Marker-based tracking was chosen for this prototype because it is stable and reliable, allowing the focus to remain on testing the personalized branding experience itself rather than inconsistent tracking.

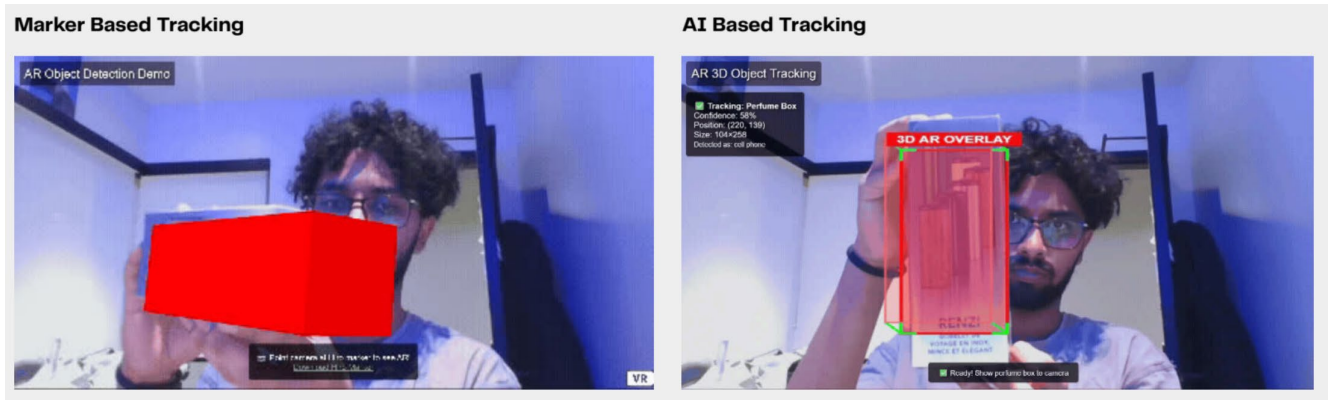


Figure 12
Comparison of marker-based tracking (left) and AI-based tracking (right) in AR prototyping

WebAR was chosen as a practical and accessible alternative to native AR development, it removes the barrier of an app download and allows the prototype to be shared and experienced easily, which is essential for a speculative prototype designed to provoke discussion rather than function as a finished product. The limitations that come with it, lower rendering fidelity, sensitivity to lighting conditions, and the requirement of a physical marker, are expected at this stage. This is prototype in development, designed to make an idea tangible and open to critique rather than to simulate a market-ready application.

The table below summarises all tools used across the prototype development process from September to December 2025, alongside their primary purpose and key limitations.

Tool	Purpose	Limitation
BFL FLUX (Pro 1.1)	AI image generation	Training data reflects dominant visual cultures
AR.js	WebAR rendering	Lower fidelity than native AR apps
Synthetic personas	Simulated user data	Real behavioral data not accessible
Figma	Persona and UI design	Static mock-ups only

Chapter 5: Designing Fictional Brand Futures

5.1 Anticipatory Interfaces for E-commerce

The following section walks through each of the three personas used and the distinct brand experiences the prototype generates for each. The same fictional fragrance brand “Fable” is used across all three. The product is identical however the brand experience is not it is hyper-personalized.

The Minimalist

Art Deco: Quiet, Refined, Geometric, Timeless

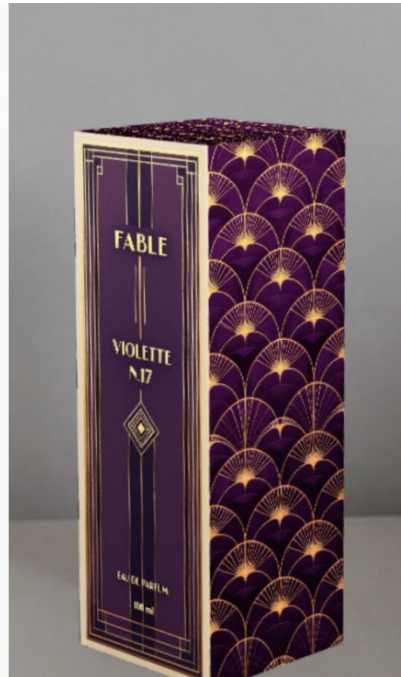
Drawn to brands with precision and intention. Values design that feels timeless rather than current structured, composed, and built around enduring form over passing aesthetic.

Visual Language

Balanced geometry and timeless modernity with mid-century and Art Deco influence. Navy, cream, and brass with one bold accent. Matte tactile surfaces. Typography as structure clean, legible, intentional.

Prompt Summary

Matte deep-plum vertical stripe, razor-thin matte gold lines, warm cream rectangular blocks, sharp Deco alignment, Art Deco geometric serif typography, stepped diamond medallion motif in champagne gold, fine line detail, symmetrical composition, matte finish, flat lay



The Minimalist

Quiet, Refined, Archival, Natural

Drawn to brands that feel unhurried and honest. Every purchase is considered — chosen for how it ages, not how it trends. Finds beauty in natural materials and the quiet confidence of things made to last

Visual Language

Matte surfaces and soft light with balanced geometry. Natural textures, linen, cotton, paper. Muted palettes of sage, forest, clay, and cream. Sans Serif for clarity, Serif for sentiment. Material honesty over decoration

Prompt Summary

Off-white linen paper, blind embossing, botanical line-art, negative space, apothecary serif, muted brass accents, matte finish, restrained geometry, archival tone



The Curator

Story-Driven, Collectible, Discovery

Drawn to brands that feel authored and alive. Purchases feel collectible, they want to complete sets and gather volumes. Engages deeply with backstory and world-building.

Visual Language

Illustration-led and graphic-forward with high-contrast compositions. Moody teals and charcoals for noir themes, sun-faded oranges for nostalgia. Literary serif paired with expressive display type and archival cues. Tactile labels with aged effects and packaging that doubles as art.

Prompt Summary

Deep indigo ground, Art Nouveau symmetrical florals, jewel tones, gold dust, night sky texture, tarot card aesthetic, vintage book cover, 1920s decorative print, fine linework, layered illustration"



The Maximalist

Bold, Colorful, Expressive, Joyful

Drawn to brands that celebrate color and sustainability. Purchases driven by discovery. Values layering and personal creativity. Builds collections through addition, not editing down.

Visual Language

Full-bleed color with layered prints and asymmetric, densely composed layouts. Jewel tones, mustard, teal, burnt orange, and magenta at full saturation. Playful Sans Serif with stylized Serif for character. Velvet, corduroy, and recycled textiles with rich tactile surfaces.

Prompt Summary

Horizontal ribbed scanline texture, muted teal, dusty coral, hazy mustard, lenticular color banding, compressed serif typography, atmospheric color depth, bold saturated palette, layered visual texture



5.2 Prototyping: Interfaces, Interactions, and User Feedback

Informal anecdotal feedback was gathered during critique and presentation sessions with design students and faculty. Rather than formal user testing, responses were collected through conversation and observation as participants interacted with the prototype. Three key themes emerged consistently.

Theme 1: Curiosity and recognition

The first and most consistent response was curiosity followed by recognition. When observers saw their persona reflected in the brand output packaging that matched their aesthetic sensibility, imagery placed in their contextual world the abstract concept of hyper-personalization became tangible. The moment of recognition 'that looks like something I would actually buy' was a repeated response. This confirmed that the using personas as prompt data was working conceptually: individual identity data was successfully translating into distinct visual brand experiences.

Theme 2: Discomfort about data

A second consistent theme was discomfort when observers considered how the system would function at real scale. Participants engaged positively with the prototype experience but then raised questions: where does the data actually come from in a commercial version of this system? Who owns the data? Can a consumer opt out? This gap between enjoying the personalised experience and feeling uneasy about its data and feeling creepy is the aim of this speculative prototype. The prototype made that tension felt rather than merely described.

Theme 3: Questions about brand authenticity

A third theme was scepticism about brand identity. Several observers questioned whether a brand that looks completely different to every consumer is still a brand in any meaningful sense. 'Is this still Essence, or is it just my version of Essence?' This question connects directly to Research Question 2 and to the broader theoretical argument of the thesis: that hyper-personalization does not simply improve brand communication it fundamentally changes what a brand is.

It is worth noting the limitations of this feedback sample. Observers were primarily design students and faculty, already had some understanding in speculative design methods and some comfort with emerging technological systems. Their responses may not reflect how consumers with different relationships to technology, data, or brand culture would experience the prototype.

5.3 Speculative Outcomes and Fictional Brand Futures

The Three Horizons model provides a framework for understanding how dominant systems transition over time. Rather than treating short, medium, and long-term futures as fixed time periods, the model shows them as three different patterns happening simultaneously in the present. All three horizons exist now, some people working to maintain what's

dominant, others experimenting with alternatives, and others building what might replace the current system entirely. What makes the model useful is that it describes actual behaviors happening right now, not abstract predictions. The people working in each horizon operate from different priorities and values. Those defending Horizon 1 want stability and proven approaches. Those experimenting in Horizon 2 see opportunity in change. Those building Horizon 3 imagine entirely different futures. How these groups interact is shaped as much by culture, power, and competing interests as by economics or technology.

Horizon 1 represents traditional branding as described in Chapter 1.4: brands built on consistency, standardized visual identities, mass marketing, and functioning as shared cultural touchstones. A logo means the same thing to everyone. This is the system brands have relied on for decades, but it's losing relevance. As Chapter 3.1 showed, consumer expectations are shifting, what once felt reliable now feels generic.

Horizon 2 is where the prototype and the case studies from Chapter 2.1 operate. Netflix's personalized thumbnails, Amazon's predictive recommendations, Sephora's unified profiles, Nike's customization platforms, these are experiments responding to changing expectations. What happens to these experiments varies. Horizon 1 brands adopt some of them to extend their existing model, adding personalization features while keeping traditional brand consistency. Other experiments point toward something more fundamental, laying groundwork for Horizon 3 where hyper-personalization isn't an add-on but the entire system. This is the contested present where the opportunities (deeper engagement) and risks (surveillance capitalism, privacy erosion) from Chapter 3 become real and debatable. The prototype sits here deliberately: plausible enough to be credible, speculative enough to question.

Horizon 3 represents the long-term direction these patterns could take. It's built from experiments happening now that seem marginal or fringe but that might turn out to be better suited to the emerging world than what's currently dominant (H3Uni, n.d.). Right now, these are small-scale experiments, what the model calls early signals of what could become widespread. For branding, this is where meta marketing¹⁴, ambient personalization systems, and the convergence of physical and digital spaces operate, currently at the edges but gaining momentum.

¹⁴ Meta marketing: A concept from Marketing 6.0 describing the convergence of physical and digital brand experiences into a single seamless environment, going beyond omnichannel coordination.

Whether Horizon 3 becomes reality depends on choices being made now in Horizon 2. Will these systems be built with transparency and meaningful consent? Will designers think critically about what they're creating, or just optimize for engagement? Will regulation intervene before these systems become too embedded to change? The Three Horizons framework shows that hyper-personalization isn't a finished development, it's a trajectory that current choices will determine (H3Uni, n.d.).

3 Horizons

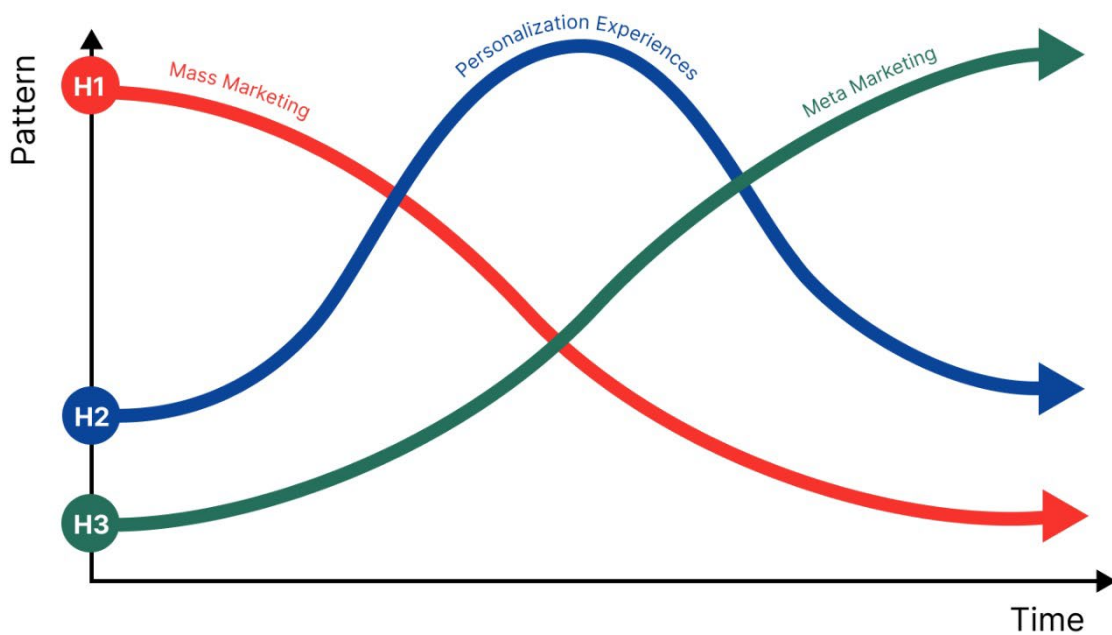


Figure 13
Three Horizons framework applied to the evolution of branding (adapted from H3Uni, n.d.)

This is why the prototype matters. It doesn't predict Horizon 3 or advocate for it. It makes visible what the current Horizon 2 trajectory implies, making it tangible enough to experience and debate. As Dunne and Raby argue, speculative design's purpose is to make these futures visible while there's still time to shape them, not after they've become inevitable.

To understand what Horizon 3 could look like, consider what's already emerging. The prototype demonstrated in this thesis is not something that does not exist. Hyper-personalization is already here, already being deployed commercially, already shaping how people experience brands. What this thesis captures is a technology at an early stage of something much larger.

Kotler, Kartajaya and Setiawan describe the next stage in Marketing 6.0 as meta marketing, going beyond omnichannel to offer a genuine convergence of physical and digital spaces, providing more interactive and immersive customer experiences across both. The consumer this future is built around is what they describe as the phygital native, someone who lives across physical and digital spaces simultaneously, for whom incorporating digital touchpoints into physical experiences is not a novelty but an expectation. Wearable technology and AR glasses are the next step in that direction, overlaying a personalised digital layer onto physical spaces and bringing the curated online experience into the world rather than keeping it on a screen.

In practical terms this means walking into a store and seeing products arranged around your preferences, promotions generated for your values, packaging designed in your aesthetic in real time. What is currently omnichannel marketing in the future becomes meta marketing, where the physical and digital are no longer separate experiences at all.



Figure 14
Speculative concept of hyper-personalized in-store experience



Figure 15
Speculative concept of hyper-personalized outdoor advertising

Marketing 6.0 also identifies digital fatigue as a growing reality, the sensory overload of audiovisual content targeting only vision and hearing is pushing brands toward multisensory approaches that can only be fully delivered in physical environments. This makes the physical store not less relevant but more so, as the site where hyper-personalization becomes truly immersive and sensory. On-site printing technology already exists in other industries, the logical extension is a store where you see a hyper-personalized version of a product through AR, approve it, and have it printed and packaged on site within minutes.

As Dunne and Raby ask, what does preferable mean, for whom, and who decides? That question becomes harder to answer the more seamless and invisible these systems become. As this thesis explored in 4.2, the prototype creates space for people to experience and respond to hyper-personalization before it becomes the norm, but as these systems move from a phone screen into physical environments, wearables, and multisensory retail spaces, the opportunity to pause and question becomes smaller. The more ambient the system, the less visible the decisions behind it. This is not only a question for designers, but also a question for everyone: brands, consumers, regulators, and the public. That is exactly what this prototype asks. Is this what we want? Because at

some point, in some form, it is coming. Designing for hyper-personalization means building the systems and logic that determine how a brand shows up differently for every individual person, and that comes with a responsibility that goes well beyond aesthetics. Whether that future is preferable or avoidable depends entirely on whether transparency and consent are built into these systems before the technology becomes too embedded to question.

Chapter 6: Conclusion & Reflection

6.1 Summary of Findings

What started as an investigation into how AI-driven hyper-personalization is reshaping branding, and what that means for consumer engagement and loyalty, opened up into a broader set of questions about data, identity, and what brands are becoming.

The case studies in Chapter 2 show that hyper-personalization is already happening at scale. Amazon predicts which subscribers are likely to cancel and deploys individually tailored re-engagement strategies before they do. Netflix personalises every element of the interface based on individual viewing behavior. Sephora maintains consistent personalised experiences across physical and digital channels in real time. Nike extends personalization into product customisation and in-store experience. Spotify transforms a single platform into millions of distinct individual experiences, turning behavioral data into cultural moments through features like Wrapped. What these cases share is a system of behavioral data, machine learning, and individualised output that adapts continuously. The prototype developed in this thesis applies that same approach to brand identity itself, generating different visual brand experiences from a single product based on who is looking at it (the persona).

The literature also consistently shows that personalisation drives higher engagement. Consumers respond more to content that feels relevant, and brands that personalise effectively see measurable increases in conversion, retention, and lifetime value. But the prototype revealed something the case studies do not address directly. When observers encountered personalized brand experiences, their first response was often curiosity and recognition, followed quickly by questions about where the data comes from, who owns it, and whether a brand that looks different to everyone is still a brand in any meaningful sense.

What the research, case studies, and prototype together suggest is that hyper-personalization is not simply a more effective version of mass marketing. Traditional branding was built on consistency, the same identity for everyone who encountered it. Hyper-personalization changes that entirely. The brand becomes adaptive, individualised, and algorithmically generated, and as Chapter 5 explored, that trajectory is only going to deepen as the technology moves from screens into physical spaces. As Zuboff (2019) argues, the systems making this possible are not neutral, they extract behavioral data as raw material, raising questions about privacy, consent, and power that marketing strategy

alone cannot answer. Whether that is preferable depends on questions that go beyond marketing strategy, and that is precisely where this thesis leaves the conversation open.

6.2 Closing Thoughts

This project was approached from a design perspective rather than a marketing one. That shaped every decision made throughout, from choosing speculative design over market research, to using synthetic personas over real behavioral data, to building a prototype that provokes questions rather than proposes solutions.

Building this prototype made one thing clear: **hyper-personalization in branding is not a future scenario. It is already here, already shaping how people experience products,** and this thesis is trying to raise questions that the industry has not fully answered. What this thesis captures are one moment in that process, early enough that the direction is still open.

The questions this thesis raises do not have clean answers. Who decides what version of a brand someone sees? What happens to shared brand culture when every experience is individualised? Is a more relevant experience always a better one? As Kotler, Kartajaya and Setiawan describe in Marketing 6.0, the next stage moves beyond screens entirely into physical spaces, multisensory retail environments, and wearable technology. As that happens, these questions become harder to avoid and the opportunity to respond to them gets smaller.

What feels most important coming out of this project is not a conclusion but a starting point. **Hyper-personalization will continue to develop with or without critical engagement from designers, brands, and consumers.** The prototype exists to make that development visible and to invite a response before the technology becomes too familiar to question. Whether the future it points toward is preferable is not for this thesis to decide. But it is a question worth asking now, while there is still room to shape the answer. **Hyper-personalization is not going away. The question is whether the people building these systems will choose transparency and consent over optimisation and extraction before the technology becomes too embedded to question.**

6.3 Next Steps

The current prototype demonstrates hyper-personalization through adaptive packaging visuals, but future iterations could extend this approach across the entire experience. This might include AR-generated backgrounds that reflect each persona's environment such as a minimalist makeup desk for one persona or a maximalist vanity for another, creating spatial context alongside visual identity. Hyper-personalized messaging could appear as pop-up text explaining why the product is right for them: "This clean formula complements your minimalist routine" or "This bold shade amplifies your expressive aesthetic. Even the app interface itself could adapt, presenting different start screens and navigation structures based on persona, so that hyper-personalization becomes the organising principle of the entire interaction, not just the final output. The prototype could also evolve beyond perfume packaging to explore a broader range of products, testing how hyper-personalization interacts with form, function, and spatial context in multiple categories.

The informal, anecdotal feedback gathered during critique sessions was valuable but limited, reflecting observations from (primarily) design students familiar with speculative methods. Broader and more diverse user testing would reveal how the experience lands for people with different relationships to data, branding, and technology. Iterative testing across contexts would generate actionable insights into how personalization affects perception, narrative engagement, and the user's sense of identity within the experience, refining the interface logic to be coherent, meaningful, and adaptable at scale.

Beyond prototype development and testing, the materials created here have the potential to be used as hands-on research and teaching tools. The prototype functions as a platform for exploring hyper-personalization, AR experiences, and omnichannel engagement, connecting abstract brand strategy with tangible design outputs. Strategy often stays abstract while design is intuitive; this prototype connects the two, making it possible to ask concretely what a brand would look like for different identities, and how far personalization can stretch before it changes what a brand fundamentally is. Applied in workshops or innovation processes, it could help practitioners and students explore hyper-personalization not as a theoretical concept but as a felt experience, making abstract ideas about consumer identity and brand adaptation tangible and debatable. The personas developed for this project also have potential beyond their role here, as a standalone learning tool, a structured persona deck that helps students and practitioners design for specific consumer identities, explore aesthetic values and emotional drivers, and engage directly with the ethical and creative tensions that hyper-personalization introduces.

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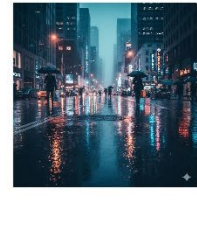
Appendices

Appendix A: Full Generative AI Tests

<p>A rectangular black glass perfume bottle with a round cap, photographed from directly above, editorial magazine style, minimalistic luxury aesthetic. The bottle is perfectly aligned facing the camera, placed on raw terracotta earth (clay soil, not tiles). On the bottle, small spaced-out letters read "U L T R A". Soft natural light, warm earthy tones, elegant shadows, high detail, cinematic product photography</p>	<p>Black Forest Lab FLUX.1 [schnell]</p> 	<p>Stable Diffusion 3.5</p> 	<p>Luma AI</p> 	<p>Open AI Dall-E 3</p> 	<p>Gemini Nano Banana</p> 
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<p>A photorealistic close-up editorial image of FLEUR-branded lipstick in flatpack modular packaging, minimal Scandinavian design, clear FLEUR logo on packaging, lipstick pieces arranged like furniture instructions, dramatic Vogue-style lighting, glossy textures, hyper detailed, professional beauty photography, vertical composition</p>	<p>Black Forest Lab FLUX.1 [schnell]</p> 	<p>Stable Diffusion 3.5</p> 	<p>Luma AI</p> 	<p>Open AI Dall-E 3</p> 	<p>Gemini Nano Banana</p> 
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<p>Product photography, natural light. A hand holding a brown colored face serum bottle with a brown dropper top with BRANDING name "LUME" in the water of a pool, surrounded by White peonies. The water is sparkling and reflecting sunlight, with pastel colors. Shot on a Leica M6, in the style of natural light photography</p>	<p>Black Forest Lab FLUX.1 [schnell]</p> 	<p>Stable Diffusion 3.5</p> 	<p>Luma AI</p> 	<p>Open AI Dall-E 3</p> 	<p>Gemini Nano Banana</p> 
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<p>a street photography style photo of a rain-soaked city street under a cloudy night sky, with the gleaming reflections of city lights, sky scrapers and neon signs on the wet pavement, sony alpha 1,f16</p>	<p>Black Forest Lab FLUX.1 [schnell]</p> 	<p>Stable Diffusion 3.5</p> 	<p>Luma AI</p> 	<p>Open AI Dall-E 3</p> 	<p>Gemini Nano Banana</p> 
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The image captures a serene beach scene at sunset. In the foreground, there is a patterned quilt spread out on the sand, bathed in the warm golden light of the setting sun. On the quilt rests a white sunhat with a scalloped brim, a pair of stylish sunglasses, and a folded newspaper or magazine with the headline "Paradise." The sandy beach stretches out toward the ocean, where gentle waves roll in and rocks sit along the shoreline. The sky glows with soft hues of orange and pink, reflecting on the sand and giving the whole scene a dreamy, tranquil atmosphere. It evokes a mood of relaxation, leisure, and a perfect beachside escape. f16, canon camera

Black Forest Lab
FLUX.1 [schnell]



Stable Diffusion
3.5



Luma AI



Dall-E 3



Gemini
Nano Banana



a pool looking over an edge with mountains and beach in the distance, sony alpha 1

Black Forest Lab
FLUX.1 [schnell]



Stable Diffusion
3.5



Luma AI



Open AI
Dall-E 3



Gemini
Nano Banana



Appendix B: Personas Profiles

Persona 1

Brand Persona Name: The Minimalist - Quiet, refined, timeless, quality.

Positioning Insight: This is not a consumer of trends.

- They are drawn to brands that care quietly and that refine, rather than perform.
- For them, simplicity is not the absence of design, but the highest form of discipline.
- Every purchase reflects values of longevity, comfort, and integrity.
- They notice tone before trend, texture before color, silence before message.

Core Motivations

Motivation	Implication for Brand/Design
Attentive Care	Brand experience should feel conversational, not transactional. Express empathy through clarity in both language and design.
Quiet Confidence	Confidence is expressed through balance and precision. Every design element should feel intentional, stable, and composed.
Enduring Value	“Less, but better” is not minimalism for its own sake. Every element: visual, verbal, material, must justify its place
Timeless Modernity	Use visuals that merge modern with mid-century and Art Deco geometry. The product must feel designed for decades, not seasons.
Material Honesty	Use matte, tactile, and natural finishes. Texture should communicate quality and authenticity.

Consumption Behaviour Patterns

- Drawn to packaging that communicates through typography and tone rather than decoration.
- Prefers to discover brands through authenticity, not algorithms.
- Purchases are deliberate, often slow, and preceded by research.
- Invests in quality and pieces that age well: natural fibers, hardcover books, and made-to-last design.
- Rejects disposability and “fast anything”: fashion, design, or communication.

Design & Communication Grammar

Visual Style:

- Matte surfaces, soft light, balanced geometry.

- Minimalist, Mid-century, Art Deco (modern but not sterile)
- Muted color palettes (sage, forest, clay, cream, navy) with one bold accent.
- Typography: functional elegance: Sans Serif for clarity, Serif for sentiment.

Tone of Voice:

- Calm, clear, and confident.
- Say less but mean more. Every word should have purpose and space to breathe.
- The tone invites attention without asking for it.

Examples:

- “Built for quiet confidence.”
- “Made to last beyond the moment.”
- “Simplicity is our form of care.”
- “Quietly confident, intentionally made.”

Offering Design Framework

Strategic Layer	Execution Format Example
Product	Minimalist, tactile objects, e.g., cotton/wool home wear, refined skincare vessels, and durable hardcover editions.
Service	Focused, high-touch programs that maintain and extend product life, curation, refill, and repair.
Platform	A calm digital environment, thoughtful resources, process transparency, and design archives.
Narrative	Explores longevity and design built to last, how things are made, maintained, and meant to endure.
Relationship Loop	Slow, intentional cycles of communication, seasonal updates, genuine gratitude, and purposeful engagement.

Symbolic Lexicon

Symbol/Word	Associative Meaning
“Stillness”	The power of pause; refinement through calm.

“Balance”	Emotional and visual harmony; nothing unnecessary.
“Quiet”	Integrity without spectacle; restraint as elegance.
“Care”	What the user feels, not what they see.
“Integrity”	Design that aligns intent and execution.
“Echo”	Resonance of the past in a modern form; continuity as luxury.
“Weight”	The feel of substance trust is made tactile.
“Form”	Structure as beauty; elegance through proportion.
“Ease”	Simplicity achieved through care, not shortcuts.

Preferred Offer Formats

- Curated “tasting” events or experiences (coffee, design, literature) designed for slow engagement.
- Refillable, long-lasting skincare or fragrance lines emphasizing care as luxury.
- Natural textures: linen, cotton, paper, thread
- Blends mid-century utility with Art Deco elegance, geometric, enduring, tactile, minimalist.
- Digital environments that feel analog: soft interactions, minimal notifications, whitespace-driven design.

Alignment & Mismatch Signals

Green Lights	Red Flags
“Built to last.”	“Limited time only!”
“Designed for clarity.”	“Trend-forward statement piece.”
“We listen before we launch.”	“We disrupt.”
“Made to be used and kept.”	“Throwaway convenience.”
“Soft tactility, confident form.”	“Bold! Fun! Fast!”

Persona 2

Brand Persona Name: The Maximalist - Bold, colorful, expressive, joyful

Positioning Insight: This is not a follower of neutrals or rules.

- They are drawn to brands that celebrate color, personality, and sustainability.
- Every purchase reflects values of visual joy, creative reuse, and fearless self-expression.
- They notice patterns before plain, color before neutral, texture before flat, vintage before new.
- For them, visual abundance is intentional, not excessive.

Core Motivations

Motivation	Implication for Brand/Design
Color as Language	Use bold, saturated palettes that communicate mood and energy. Color is the primary design tool, not an accent.
Pattern Confidence	Embrace prints, stripes, florals, and geometrics. Design should layer visual elements without fear of "too much."
Texture Richness	Materials must have presence: velvet, corduroy, visible weaves, tactile surfaces. Flat finishes feel incomplete.
Playful Composition	Layouts and designs can be asymmetric, layered, and energetic. Perfection is less important than personality.
Sustainable Joy	Vintage, second-hand, and upcycled pieces bring unique color and pattern. Sustainability matters when it means more character, not less

Consumption Behaviour Patterns

- Seeks brands that celebrate color-first design, vintage character, and expressive identity over homogenized neutrals.
- Purchases are driven by discovery: thrift finds, statement prints, remix combinations.
- Drawn to packaging and products that use color as a statement, not an accent.
- Invests in pieces that allow layering and personal creativity rather than strict uniformity.
- Rejects fast-fashion sameness; prefers curated, expressive wardrobes that evolve and tell a story.

Design & Communication Grammar

Visual Style:

- Bold and saturated color: jewel tones, mustard, teal, burnt orange, magenta.
- Prints and texture layers: florals, geometrics, stripes, color-blocking, unexpected print combinations.
- Material variety: corduroy, denim, velvet, recycled textiles, tactile finishes.
- Typography: playful and confident, bold, fun, quirky Sans Serif that embraces personality, paired with stylised Serif where character is needed.

Tone of Voice:

- Energetic, direct, and unapologetic
- Language is visual and sensory.
- Every word should flicker with personality and leave space for the audience to bring themselves into it.

Example Lines:

- "More is more."
- "Mix boldly. Match consciously."
- "Saturate, layer, repeat."
- "Vintage finds, modern confidence."
- "Every piece makes a statement."

Offering Design Framework

Strategic Layer	Execution Format Example
Product	Bold statement pieces, vintage-inspired print dresses, color-block outerwear, textured accessories, and remixable wardrobe staples.
Service	Style-remix advisories, vintage sourcing clubs, trade-in or refurbish programmes for second-hand pieces.
Platform	Community hub for collector's swap forums, styling archives, color-story drop announcements, and user-remix galleries.
Narrative	Content on color theory in practice, how to mix prints confidently, building layered looks, and using texture to add depth.

Relationship Loop	Periodic “color drops,” mix-challenge campaigns, vintage trade-in events, and behind-the-scenes stories of materials and sourcing.
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Symbolic Lexicon

Symbol / Word	Associative Meaning
Layer	Visual and narrative depth; stacking meaning and texture.
Revive	Giving a second life to design; reuse as value.
Volume	Presence through color, texture, and pattern.
Patchwork	Collage of identity: combining disparate elements into one story.
Statement	Pieces that speak prints, color, character.
Collect	Curated accumulation; personal inventory.
Mix	Intentional combination of styles, eras, textures.
Remix	Making it your own through combinations
Saturate	Color at full strength; visual intensity
Texture	Material richness, tactility, layered meaning.

Preferred Offer Formats

- Curated wardrobe capsules mixing vintage and new, themed by color or print.
- Homeware or accessories with rich pattern and texture rugs, cushions, trays, jewellery that carry layering and mix-story.
- Interactive styling experiences: drag-and-drop print mixing tools, vintage sourcing tours, community remix events.
- Digital tools for visualizing color and pattern combinations before purchase. Styling guides that show multiple ways to layer and mix specific pieces.

- Packaging and branding that celebrate color, texture, and second-life ethos, bold labels, playful typography, and remix-friendly design.

Alignment & Mismatch Signals

Green Lights	Red Flags
“Color first.”	“Muted palette, minimal every season.”
“Vintage meets now.”	“New only, discard fast.”
“Print, pattern, play.”	“Uniform basics, no character.”
“Styled for you, not for the shelf.”	“Mass trend pieces, look-alike wardrobes.”
“Layer, remix, collect.”	“Match everything exactly, one-size fits all.”

Visual References



Persona 3

Brand Persona Name: The Curator - Story-driven, collectible, narrative, discovery

Positioning Insight: They are drawn to brands that feel authored & alive.

- Design is a form of storytelling.
- A product should feel like a scene, a memory, or a cultural reference reinterpreted through a contemporary lens.
- Every purchase feels like acquiring a chapter, an artifact, or a story fragment.
- They notice concept before color, symbolism before surface, narrative before material.
- Every element should feel intentional, as if it carries a piece of the story and sparks imagination.

Core Motivations

Motivation	Implication for Brand/Design
Storytelling First	The brand must feel authored, not manufactured. Every element should appear deliberate and storied. Themes should be intentional and layered.
Creative Discovery	Design should reward curiosity. Include hidden details, layered meanings, and references that make people want to explore deeper.
Collectible Identity	Products should feel like artifacts worth curating. Offer designs that build into a personal collection or library over time.
Nostalgic Discovery	Draw from shared cultural memory: childhood favorites, vintage aesthetics, retro moments, cinema, or subcultures. Design should feel familiar yet fresh.
Artistic Detail	Craftsmanship matters. Every visual choice, material, and touchpoint should feel intentional and thoughtfully made.

Consumption Behaviour Patterns

- Drawn to brands with an authorial voice and creative vision over corporate sameness.
- Purchases feel collectible: they want to complete sets, gather volumes, or curate a personal collection.
- Enjoys limited editions, chapters, volumes, or seasonal “drops” tied to narrative arcs.

- Attracted to brands with layered meaning rather than purely aesthetic appeal.
- Engages deeply with brand backstory, world-building content, or creative processes.
- Responds to brands that evolve visually while maintaining narrative coherence.
- Enjoys discovering hidden references or layered meaning in design.

Design & Communication Grammar

Visual Style:

- Illustration-led. Graphic-forward. Concept-driven.
- High-contrast layouts with clear focal imagery and intentional negative space.
- Collage-like compositions that tell visual stories, not just create energy.
- Composition structured around narrative emphasis rather than grids or symmetry.
- Concept-driven color palettes that shift per story: moody teals and charcoals for noir themes, sun-faded oranges for nostalgia.
- Mix of eras and styles: retro meets modern, handcrafted meets polished, archival meets contemporary.
- Typography supports the tone of the narrative: literary serif for warmth, expressive display type for character, and archival cues for authenticity.

Tone of Voice:

- Playful, confident, and full of personality
- Language builds atmosphere and invites curiosity and interpretation.
- Words should spark imagination and create emotional context.
- The tone is conversational but never boring, familiar but always interesting.

Examples:

- "Inspired by late-night diners and neon signs."
- "Chapter Three: The Lost Weekend."
- "Summer 1987. Somewhere on the coast."
- "Limited to 500."

Offering Design Framework

Strategic Layer	Execution Format Example
-----------------	--------------------------

Product	Story-driven designs with character and detail: packaging that doubles as art, collectible editions, themed product lines.
Service	Discovery experiences like curated sample sets, personality quizzes, build-your-own collections, or limited drops.
Platform	Digital spaces that feel like exploring rich imagery, interactive elements, nostalgia triggers, and community features.
Narrative	Each release includes backstory, fictional context, or symbolic framework content about the stories behind things and creative processes.
Relationship Loop	Exciting, community-driven communication: launches feel like events, ongoing storytelling through serialized content, and engagement feels rewarding.

Symbolic Lexicon

Symbol/Word	Associative Meaning
"Story"	Every product has a world behind it; design creates context.
"Character"	Personality in design: products with a point of view and identity.
"Discovery"	The thrill of finding something special; curiosity rewarded.
"Memory"	Nostalgia as connection; familiar feelings made new.
"Layer"	Depth through narrative; multiple meanings in one design
"World"	Design that suggests a bigger universe; immersion and atmosphere.
"Collection"	The desire to complete, to gather, to curate personal libraries.
"Artifact"	Objects with story and significance; memorabilia worth keeping.
"Chapter"	A distinct but connected experience; serialized storytelling.

Preferred Offer Formats

- Sample sets or discovery kits designed for exploration and collection.

- Limited edition releases with unique designs, seasonal drops, or numbered runs
- Story-driven packaging: designs inspired by travel posters, vintage ads, album covers, archival graphics, or cinematic imagery.
- Mix of nostalgic and contemporary: retro aesthetics with modern quality and functionality
- Tactile labels that feel archival or collected, with subtle texture or aged effects.
- Printed inserts, liner notes, or short fictional texts accompanying products.
- Illustrated packaging with layered, collage-style graphics that reference the story.

Alignment & Mismatch Signals



Green Lights	Red Flags
"Edition 02" / "Chapter III"	"Always available"
"Part of an ongoing series."	"Standalone product."
"Hidden details to discover."	"All-new look."
"Packaging worth keeping."	"Now trending."
"Inspired by vintage cinema and roadside Americana."	"Contemporary luxury redefined."

Visual Reference



Appendix C: BFL Prompt Testing

Persona 1

Prompt	Image
<p>A flat 2D Art Deco perfume front panel with bold geometric structure, featuring a matte deep-plum vertical stripe paired with razor-thin matte gold lines, placed against warm cream rectangular blocks in sharp Deco alignment. Three text lines centered on the gold axis: "FABLE" in large geometric Deco serif at top, "VIOLETTE N.17" in spaced caps at center. Between the two text areas: a single Art Deco sunburst or stepped diamond medallion motif in champagne gold, fine line detail, centered. "Eau de Parfum · 100 ml" as one single line in fine gold micro-text at base. Symmetrical composition, no empty space. Matte finish, flat lay, top-down.</p>	
<p>A flat 2D Art Deco perfume front panel with bold geometric structure, featuring a matte deep-plum vertical stripe paired with a razor-thin matte brass line, placed against warm cream and muted nude rectangular blocks arranged in sharp, clean Deco alignment. Three lines of text only, centered on the brass axis: "FABLE" in large clear geometric Deco serif at top, "VIOLETTE N.17" in small, spaced caps beneath it, "Eau de Parfum 100 ml" in fine micro-text at the base. No repeated text. No other typography. Embossed surface quality, matte finish.</p>	

A flat 2D Art Deco perfume front panel with bold geometric structure, featuring a matte deep-plum vertical stripe paired with a razor-thin matte brass line, placed against warm cream and muted nude rectangular blocks arranged in sharp, clean Deco alignment. The brand name "Fable" appears embossed in clear, legible geometric Deco typography, centered on the brass axis with refined micro-text beneath reading "Eau de Parfum 100 ml."

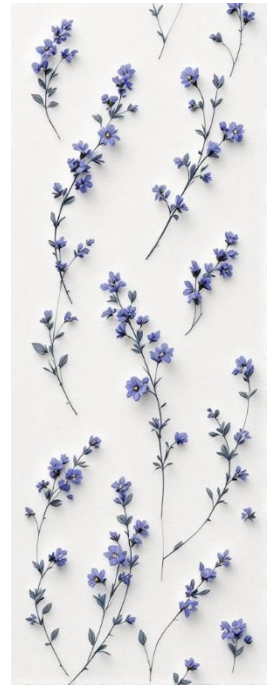


Seamless repeating tile for luxury perfume packaging side panel. Deep royal plum ground. Stacked Art Deco scallop fan arches in rows each fan outlined in warm champagne gold foil, fine radiating inner rules from base to crown, darker plum shadow fill between each petal creating raised dimensional depth. Gold has warm metallic foil quality, physically luminous not flat yellow. Plum ground has subtle velvet micro-texture. Fans are bold, architectural, tightly stacked, fully filling the tile. No text. No illustration. Seamless repeat, flat lay, ultra high resolution.



Prompt	Image
<p>A flat, high-resolution graphic design for the front face of a perfume box. The background is a minimalist off white textured paper with a subtle linen weave. At the top, the brand name "fable" is written bold, elegant black serif font with subtle blind embossing to create depth. Below it, in a smaller matching serif font, is the text "VIOLETTE N.17". The center features a detailed black line-art botanical illustration of violet flowers and leaves, contained within a vertically oriented, slightly darker grey rectangular panel. At the bottom, the text "Eau de Parfum" is centered, followed by "100 ML. 3.4 FL OZ" in a clean, sophisticated, blind embossed serif typeface. Minimalist, artistic, and vintage apothecary aesthetic.</p>	
<p>seamless repeating pattern for luxury perfume packaging, minimalist off-white textured paper background with subtle linen weave, delicate botanical violet flowers drawn as fine black line-art illustration in vintage apothecary style, thin engraved lines forming stems leaves and petals, the illustration is translated into blind embossing pressed into the paper surface, monochrome white-on-white embossed linework, extremely shallow paper relief, elegant sparse composition with small floral clusters and large negative space, flat graphic design aesthetic, top-down view, seamless wallpaper tile for packaging side panel</p>	

Seamless repeating tile for luxury perfume packaging side panel. Off-white cold-pressed paper ground with visible linen weave texture, identical surface quality to the front panel. Delicate botanical violet flower sprigs single stems with small, clustered florets and narrow leaves repeated in a sparse elegant grid across the tile. The entire botanical illustration exists solely as blind embossing pressed into the paper surface: no ink, no color, no printed lines. The flowers are visible only through extremely shallow paper relief soft raised edges catching warm raking light, gentle shadow pooling in the recessed areas between petals, the linen texture continuous and unbroken across both flat and embossed areas. The emboss depth is subtle, refined a whisper not a stamp. Large areas of flat negative space between each sprig. The overall effect is monochrome, tactile, and quietly luxurious the pattern only fully visible when light catches the surface at an angle. Seamless repeat, top-down flat lay, ultra high resolution, no illustration lines, no color, no contrast, paper, and light only.



seamless repeating luxury packaging pattern, minimalist off-white textured paper background with subtle linen weave, extremely fine black line-art botanical illustration of wild violets, high level of botanical detail matching vintage apothecary style, delicate petals, leaves, and stems rendered as precise engraved lines, translated into blind embossing pressed into the paper surface, monochrome white-on-white embossed linework, extremely shallow relief, large negative space between clusters, elegant and sophisticated layout, flat top-down graphic design style, seamless tile suitable for luxury perfume packaging side panels



Persona 2

Prompt	Image
<p>A 2D flat graphic design for a luxury perfume box front featuring an ethereal, atmospheric background of horizontal pinstripe textures that blend seamlessly into one another. The color palette is a soft, diffused gradient of muted teal, dusty coral, and hazy mustard, appearing as overlapping, out-of-focus rectangular glows rather than hard blocks. The entire canvas is covered in a fine, rhythmic horizontal ribbed scanline texture that gives the colors a tactile, lenticular depth. Typography: Centered in the upper third, the brand name "FABLE" is written in a hyper-tall, ultra-narrow, compressed white sans-serif font (Komoda style) with significant vertical elongation; directly below it, the words "VIOLETTE N.17" appear in a tiny, minimalist lowercase font. At the very bottom, "Eau de Parfum" and "100 ml" are centered in a clean, small white typeface. The final image must be a flat, high-resolution 2D graphic with a matte paper grain finish, strictly avoiding hard borders, 3D shadows, or illustrative flourishes.</p>	 <p>The image shows a vertical perfume box design. The background consists of soft, overlapping horizontal bands of muted teal, dusty coral, and hazy mustard, all overlaid with a fine, rhythmic horizontal ribbed scanline texture. The text is centered: "FABLE" is at the top in a tall, narrow, white sans-serif font; "scent violette n.17" is below it in a tiny lowercase font; and "Eau de parfum" is at the bottom in a clean, small white typeface.</p>
<p>A 2D flat graphic design for a luxury perfume box front featuring an ethereal, atmospheric background of horizontal pinstripe textures that blend seamlessly into one another. The color palette is vivid and saturated: bright coral, bold teal, warm marigold yellow, deep burgundy. The colors appear as overlapping, out-of-focus rectangular glows rather than hard blocks. The entire canvas is covered in a fine, rhythmic horizontal ribbed scanline texture that gives the colors a tactile, lenticular depth. Typography: Centered in the upper third, the brand name "FABLE" is written in a hyper-tall, ultra-narrow, compressed white sans-serif font (Komoda style) with significant vertical elongation; directly below it, "VIOLETTE N.17" appears in a tiny, minimalist spaced caps font. At the very bottom, "Eau de Parfum" and "100 ml" are centered in a clean, small white typeface. The final image must be a flat, high-resolution 2D graphic with a matte paper grain finish, strictly avoiding hard borders, 3D shadows, or illustrative flourishes.</p>	 <p>The image shows a vertical perfume box design with a more vibrant color palette. The background features overlapping, out-of-focus rectangular glows in bright coral, bold teal, warm marigold yellow, and deep burgundy, all overlaid with a fine, rhythmic horizontal ribbed scanline texture. The text is centered: "FABLE" is at the top in a tall, narrow, white sans-serif font; "VIOLETTE N.17" is below it in a tiny, minimalist spaced caps font; and "Eau de Parfum" and "100 ml" are at the bottom in a clean, small white typeface.</p>

A 2D flat graphic design for a luxury perfume box front featuring an ethereal, atmospheric background of horizontal pinstripe textures that blend seamlessly into one another. The color palette is rich but not neon: warm coral, deep teal, dusty marigold, muted burgundy saturated but sophisticated. The colors appear as overlapping, out-of-focus rectangular glows rather than hard blocks. The entire canvas is covered in a fine, rhythmic horizontal ribbed scanline texture that gives the colors a tactile, lenticular depth. Typography is the hero of the composition: "FABLE" in a very large, dominant, hyper-tall ultra-narrow compressed white serif filling the full width of the panel, vertically elongated, commanding. "VIOLETTE N.17" in medium spaced caps directly below, confident not small. "Eau de Parfum 100 ml" on one single line in small clean white type at base. All typography crisp, white, large, and legible. The final image must be a flat, high-resolution 2D graphic with a matte paper grain finish, strictly avoiding hard borders, 3D shadows, or illustrative flourishes.




Seamless repeating tile for luxury perfume packaging side panel. Fine rhythmic horizontal ribbed scanline texture, muted teal, dusty coral, hazy mustard blending seamlessly into one another as soft overlapping rectangular color bands. Colors diffused and atmospheric, not hard-edged. Matte paper grain finish. No text, no illustration, no borders. Seamless repeat, flat lay, ultra high resolution.



Seamless repeating tile for luxury perfume packaging side panel. Fine rhythmic horizontal ribbed scanline texture, warm coral, deep teal, dusty marigold, muted burgundy blending seamlessly into soft overlapping rectangular color bands. Rich but not neon, sophisticated and saturated. Matte paper grain finish. No text, no illustration, no borders. Seamless repeat, flat lay, ultra high resolution.



Persona 3

Prompts	Images
<p>A flat, high-resolution graphic design for the front face of a perfume box, rendered on a deep, rich indigo-blue textured paper surface. The design is a perfectly symmetrical Art Nouveau botanical illustration, rendered in fine, elegant lines and rich jewel-tone colors. At the very top, large, clean white serif text reads "FABLE". Directly below it, in a smaller, delicate white flowing script, is "Violette N. 17". The central part of the design is a complex, mirroring arrangement of intertwined, flowing stems, stylized purple violets, and graceful teal and deep-blue leaves. The central floral motif is a cluster of larger violets, radiating outwards into flowing, intricate tendrils. Small, warm-toned orange and coral berry clusters are scattered naturally throughout the foliage on both sides. The entire design is contained within a subtle frame of delicate, swirling blue lines. The dark blue background is covered in a faint, subtle pattern of tiny white dots and elegant radiating lines, like a night sky. At the bottom center, small, clean white serif text reads in two lines: "EAU DE PARFUM" and "100ml • 3.4 fl oz". The graphic is perfectly centered on a clean white field. The design has a hand-drawn yet refined feel, with rich color depth and clear, precise typography. The lighting is bright and even, showing every line of the intricate illustration and the subtle paper texture.</p>	

A seamless, deep navy-blue textile wallpaper pattern in a symmetrical Art Nouveau style, featuring a complex repeat of stylized purple violets, dense teal-green leaves, and small orange-red berries, intertwined with graceful, ornate scrollwork frames. The design is presented in three vertical framed panels with a rich, detailed botanical motif. In the larger central panel, the dominant violet cluster at the core is formed by five detailed blooms (the primary central bloom flanked by four others) surrounded by ornate foliage. This pattern is mirrored exactly in two adjacent, narrower framed panels, which feature smaller, repeating, scaled-down versions of the central violet clusters and swirling stems. The background is a dark navy blue with a subtle gold dust speckle pattern. The lines of the leaves and stems are fluid, forming intricate, symmetrical compositions within the decorative rectangular borders. The palette is composed of rich purples, teals, forest greens, burnt orange, and deep gold on a dark background. The pattern is continuous and repeats perfectly across the surface. The style is that of a premium, screen-printed luxury textile with fine linework and rich colors, like a vintage Art Nouveau fabric design. The perspective is a flat, even view of the pattern, showing its precise repeating structure.



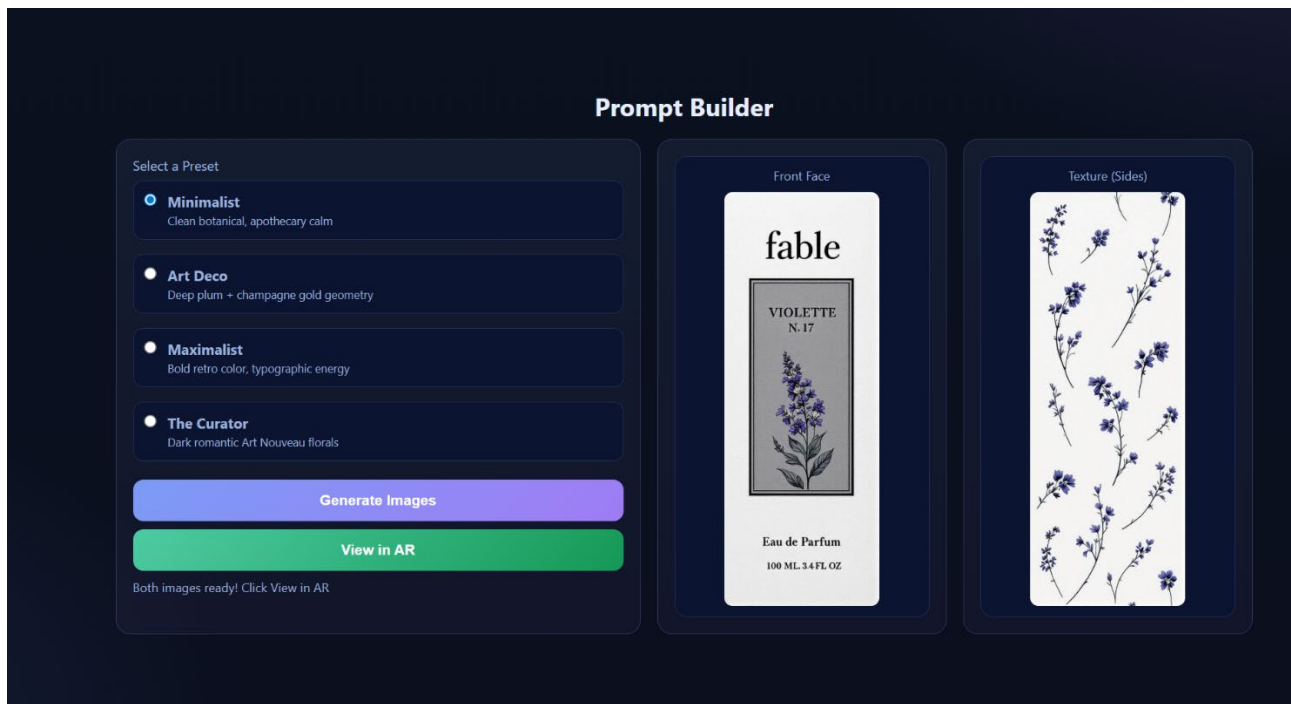
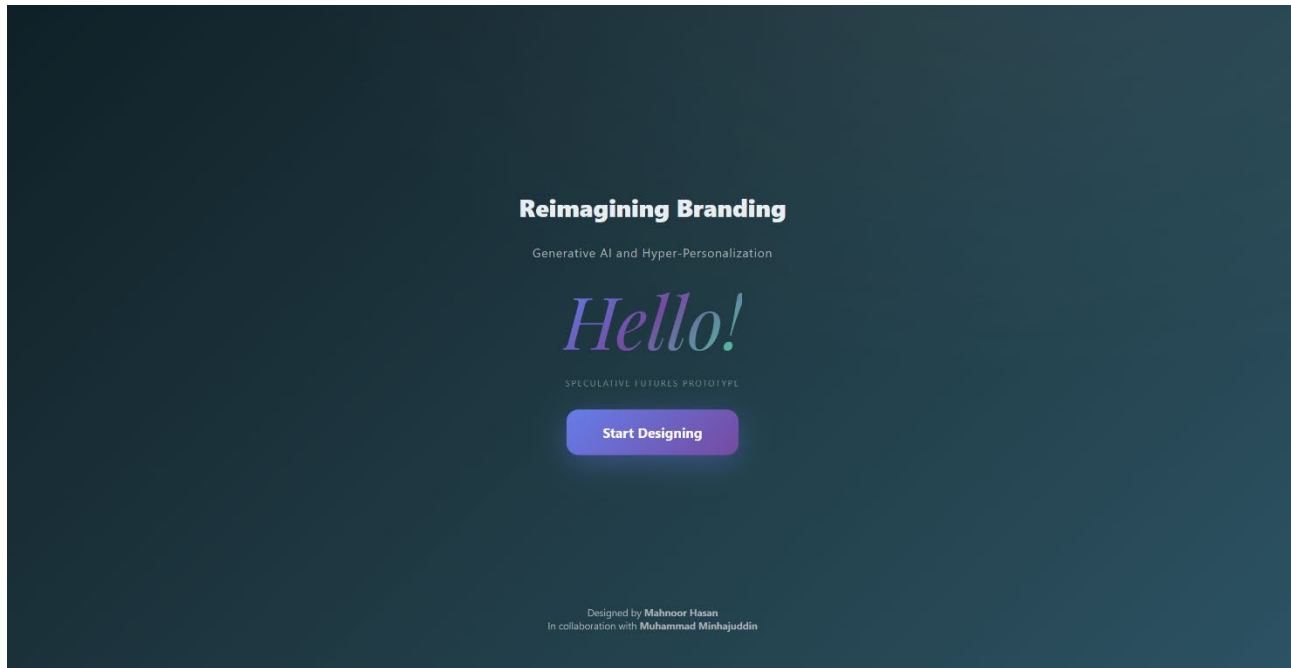
A flat, high-resolution graphic design for the front face of a perfume box, rendered on a deep rich indigo-blue textured paper surface. The design is a perfectly symmetrical Art Nouveau botanical illustration rendered in fine elegant lines and rich jewel-tone colors. At the very top large clean white serif text reads “FABLE.” Directly below it in smaller delicate serif lettering is “Violette N.17.” The botanical illustration is composed of multiple violet flowers and flowing stems arranged as a decorative ornamental pattern, not a single bouquet. Delicate five-petal violets in lavender, lilac, and deep violet appear along graceful curling vines with stylized teal and deep blue leaves. The flowers form an elegant symmetrical arrangement that spreads outward with intricate tendrils and decorative flourishes. Small warm orange and coral berry accents appear as tiny ornamental details scattered throughout the foliage. The background is a deep indigo night-sky blue with a subtle pattern of faint radiating lines and tiny star-like dots that add depth and texture. The illustration has a refined hand-drawn botanical engraving feel with smooth gradients and crisp linework. At the bottom center small clean white serif text reads “EAU DE PARFUM” and below it “100ml 3.4 fl oz”. The overall composition is balanced and vertically centered with generous negative space for the typography. The artwork feels luxurious, magical, and reminiscent of vintage high-end perfume packaging. Flat 2D label artwork, no 3D box, no perspective.



A flat high-resolution graphic design for a perfume box front face. TYPOGRAPHY REQUIREMENTS FIRST: At the very top, large bold white serif text "FABLE" must be fully visible and legible. Directly below in smaller white serif "VIOLETTE N.17". At the bottom, two lines of small clean white serif: "EAU DE PARFUM" and "100 ml · 3.4 fl oz". All text crisp, complete, fully rendered, no cropping, no cut-off. Deep rich indigo-blue textured paper background with faint tiny white dots like a night sky. Central design: perfectly symmetrical Art Nouveau botanical illustration — intertwined flowing stems mirroring exactly on both sides. Central motif is a tight cluster of small and medium purple violets grouped together, no single large dominant flower, multiple blooms of equal size radiating upward. Teal and deep-blue leaves curving symmetrically outward. Small warm orange and coral berry clusters scattered throughout. Subtle frame of delicate swirling blue lines. Hand-drawn refined feel, rich jewel-tone colors, fine elegant linework. Flat lay, ultra high resolution.



Appendix D: WebAR Prototype, UI/UX Interface Design



Prompt Builder

Select a Preset

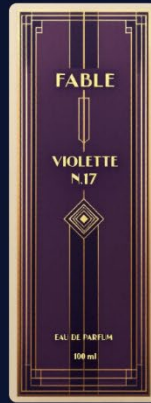
- Minimalist
Clean botanical, apothecary calm
- Art Deco
Deep plum + champagne gold geometry
- Maximalist
Bold retro color, typographic energy
- The Curator
Dark romantic Art Nouveau florals

Generate Images

View in AR

Both images ready! Click View in AR

Front Face



Texture (Sides)



Prompt Builder

Select a Preset

- Minimalist
Clean botanical, apothecary calm
- Art Deco
Deep plum + champagne gold geometry
- Maximalist
Bold retro color, typographic energy
- The Curator
Dark romantic Art Nouveau florals

Generate Images

View in AR

Both images ready! Click View in AR

Front Face



Texture (Sides)



Prompt Builder

Select a Preset

Minimalist

Clean botanical, apothecary calm

Art Deco

Deep plum + champagne gold geometry

Maximalist

Bold retro color, typographic energy

The Curator

Dark romantic Art Nouveau florals

Generate Images

View in AR

Both images ready! Click View in AR

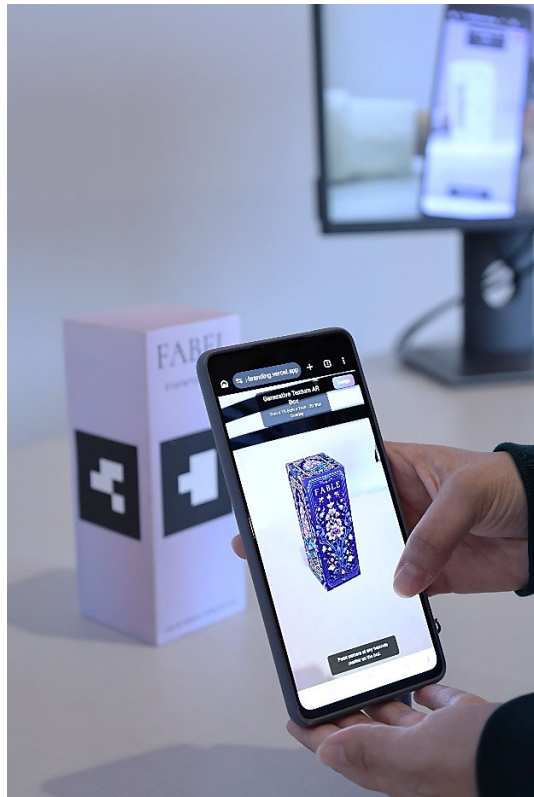
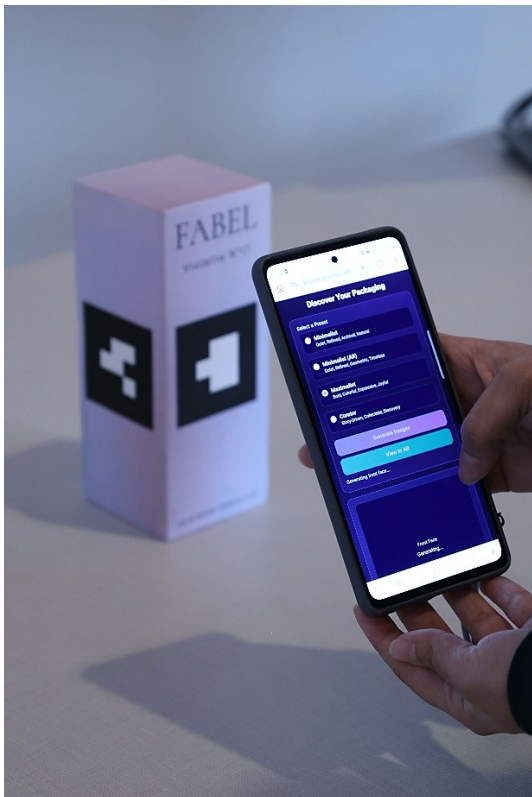
Front Face

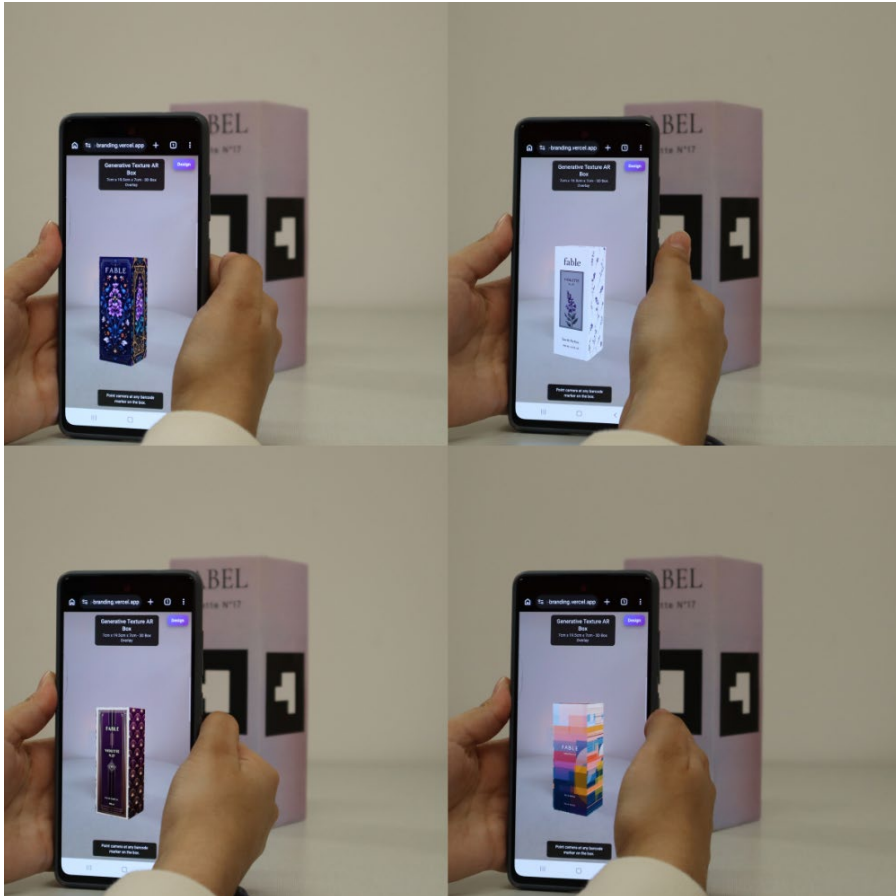


Texture (Sides)



Appendix E: Exhibition Showcase






Appendix F: Muhammad Minhajuddin User Testing Summary

The following pages contain a user testing summary conducted by Muhammad Minhajuddin. This document was provided externally and continues on the next page.


HYPAR: Designing Hyper-Personalized Retail Product Packaging through Generative AI and Augmented Reality

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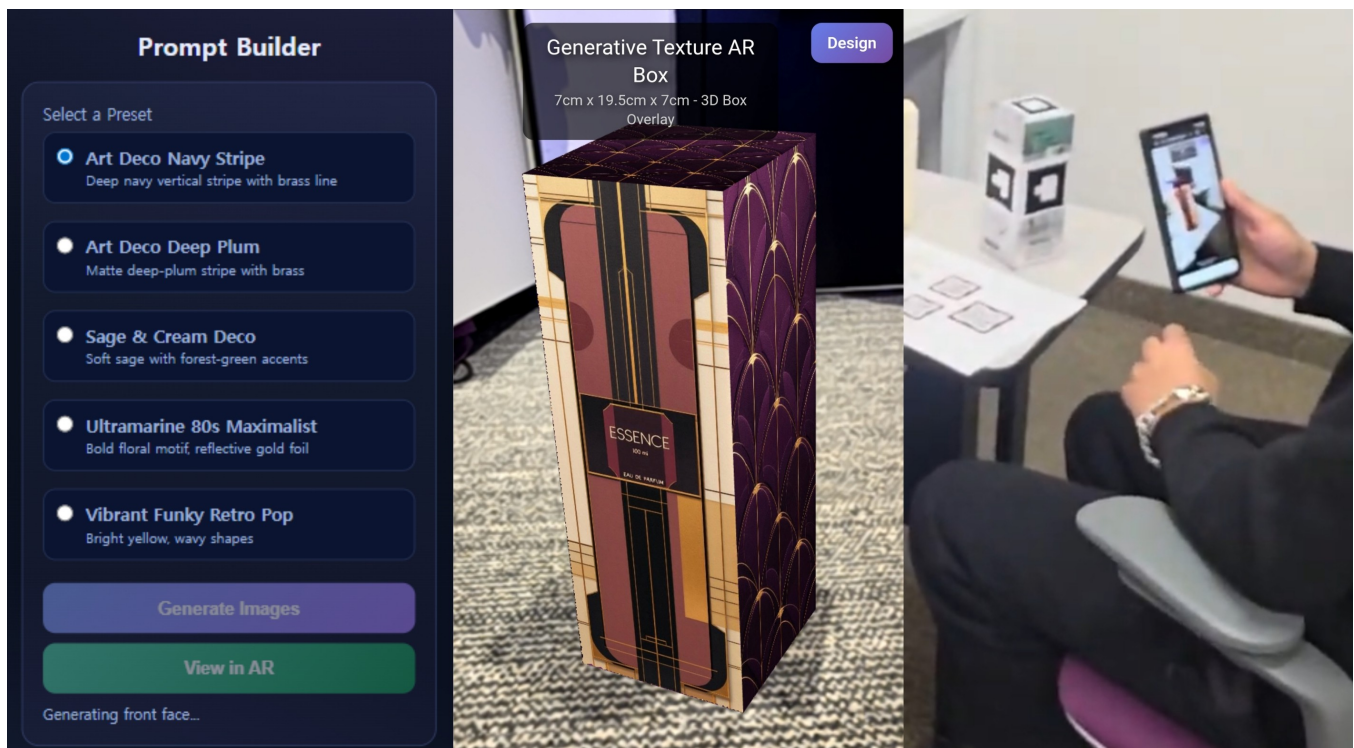


Figure 1: Prompt Landing page, AR Visual of the rendered image and user study example.

Abstract

Personalized product packaging can greatly enhance consumer engagement, but conventional design processes cannot easily tailor

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<https://doi.org/XXXXXXXX.XXXXXXX>

packaging to individual preferences in real time. We present a cross-platform solution prototype using generative artificial intelligence (AI) with augmented reality (AR) to enable real-time creation and visualization of custom product packaging designs. The system takes user prompts as input and produces unique packaging visuals in response. These AI-generated designs are then mapped onto a 3D model of the product packaging, which is rendered in an AR scene using marker-based tracking. This allows users to view their personalized packaging overlaid on a physical product in both standard and mobile web browsers. This approach demonstrates the potential of integrating real-time generative AI with AR to transform retail product customization and enhance personalized consumer experiences.




CCS Concepts

• **Human-centered computing** → **Augmented reality**; *Interactive systems and tools*; • **Computing methodologies** → **Image synthesis**; *Computer vision*; • **Information systems** → *Personalization*.

Keywords

Generative AI, Augmented Reality, Personalized Packaging, Real-Time Interaction, Retail Product Customization

ACM Reference Format:

Muhammad Minhajuddin , Joel Varghese , Mahnoor Hasan, Simone Jones, and Somang Nam . 2026. HYPAR: Designing Hyper-Personalized Retail Product Packaging through Generative AI and Augmented Reality. In *Proceedings of Graphics Interface 2026 (GI '26)*. ACM, New York, NY, USA, 10 pages. <https://doi.org/XXXXXXX.XXXXXXX>

1 Introduction

In the contemporary retail landscape, physical packaging serves as both a brand ambassador and a critical touchpoint in consumer decision-making. Despite rapid advancements in digital marketing personalization, packaging remains largely static and mass-produced, resulting in a one-size-fits-all experience that often fails to resonate with individual consumer identities. This is a significant oversight because consumer satisfaction is closely tied to the alignment of a product's visual aesthetics with personal expectations. Yet, traditional manufacturing constraints make real-time adaptation difficult [7]. The convergence of generative artificial intelligence (AI) and augmented reality (AR) offers a transformative solution to this gap. Generative models, particularly Latent Diffusion Models, have matured to the point where high-fidelity, context-aware visuals can be synthesized instantly from natural language prompts [18]. Simultaneously, AR has evolved into a strategic communication tool capable of enhancing packaging design by overlaying digital information onto physical goods [1].

We present HYPAR (Hyper-Personalized Packaging in AR), a full-stack cross-platform WebAR prototype designed to democratize access to design without requiring dedicated mobile applications. By allowing users to select emotive descriptors (e.g., “elegant” or “nostalgic”), the system generates unique packaging aesthetics in real-time and visualizes them on the physical product via the user's camera. This approach creates an immersive experience that facilitates storytelling through interactive packaging [8].

The system aims to establish a deeper emotional connection with potential retail consumers through the psychological benefits of the endowment effect, where a product is valued more highly due to the user's personal involvement in its creation [17]. HYPAR demonstrates how brands can move beyond static inventory to offer hyper-personalized, emotionally resonant experiences that anticipate the future of spatial computing in retail.

In this paper, a user study was conducted to answer the following research question:

How does an augmented reality system that dynamically generates hyper-personalized packaging influence consumers' first impressions, perceived attractiveness, and engagement with a physical product?

2 Related Works

2.1 Generative AI for Product and Packaging Design

The Denoising Diffusion Probabilistic Models (DDPMs) [11] and subsequent optimization through Latent Diffusion Models (LDMs) [18] have enabled high-fidelity image synthesis from textual descriptions. These models allow for the generation of complex textures, artistic styles, and structural concepts that were previously labour-intensive to produce manually. In the specific context of retail packaging, these generative capabilities are shifting workflows from static templates to dynamic creation. A study demonstrated this potential by developing a packaging design method for tea products based on AI-generated content [9], suggesting that AI can significantly reduce the design cycle and increase creative diversity.

Another work explored the cultural dimensions of generative design, using a multi-dimensional gene model to apply the Phoenix pattern across different platform designs [20]. The shift toward AI-driven design also raises questions regarding consumer acceptance. An empirical analysis of consumer satisfaction with AI-generated packaging across three distinct datasets found that while the novelty of AI design is engaging, satisfaction is closely tied to how well the generated visuals align with product expectations [7]. Recent research has also explored integrating multivariant user interfaces with AI-generated content to further personalize e-commerce experiences [21]. Another study on an AI-driven virtual simulation system for packaging customization emphasized that the future of packaging lies in the ability to rapidly iterate on designs in a virtual environment before physical production [10].

2.2 Augmented Reality (AR) for Interactive Packaging

AR has transitioned from a novelty to a strategic tool in retail, transforming passive product packaging into an active channel for communication. The development opportunities in this space were noted, as AR packaging can overcome the physical limitations of traditional labels by providing virtually unlimited digital real estate for information [15]. Recent studies have specifically utilized AR applications as a means of enhancing packaging design [1] and improving carton packaging structure design [22]. A study differentiated between AR that provides utility (e.g., nutritional facts) and AR that provides immersion (e.g., storytelling or aesthetic enhancement) [2], suggesting that immersive approaches significantly enhance user engagement and recall.

2.3 Personalization, Emotion, and Storytelling

The most compelling opportunity lies in the convergence of AI and AR to facilitate emotional resonance and narrative storytelling. A study explored this through the concept of “unfolding the self,” where interactive packaging serves as a medium for storytelling, allowing users to uncover layers of narrative embedded in the product [8]. This narrative capability is crucial for hyper-personalization, as it transforms a generic product into a unique artifact. Psychologically, this heightened sense of ownership can be linked to the endowment effect, in which individuals value items more highly when they feel a personal connection to them [17].

Some existing systems explored design factors with generative AI [12] and context-aware AR instructions with generative AI [19], including personalized interactive LLM-based explanations for AR [14], demonstrating the feasibility of using AI as the content engine for AR displays. However, these works remain largely application-specific or research-facing, and a gap persists in end-to-end, hardware-free solutions that allow retail consumers to generate, visualize, and apply custom designs to a specific physical product in real time.

3 System Overview

HYPAR (Hyper-Personalized Packaging in AR) system is designed to enable real-time, user-driven customization of retail product packaging through a pipeline that connects generative AI with AR visualization. Fig. 3 further illustrates this process, showing a user prompt for “Art Deco and Navy Stripes” and its corresponding AI-generated packaging visual rendered in HYPAR. The system was implemented as a web application to provide cross-platform access, using Next.js, Three.js, and AR.js, allowing consumers to engage with the experience directly through any web browser. The system makes an Application Programming Interface (API) request to the Together.ai platform to use the Black Forest Labs FLUX.1.1 [pro] model [4], an evolution of the FLUX.1 model suite [5]. FLUX.1 is built on a hybrid architecture of multimodal and parallel diffusion transformer blocks scaled to 12 billion parameters, and is trained using flow matching, a general method for training generative models that includes diffusion as a special case [5]. The FLUX.1.1 [pro] variant operates as a rectified flow transformer in latent space, offering both fast generation (6x faster than its predecessor) and high consistency in output quality through improved prompt adherence and stable latent representations [4]. The FLUX Prompt Framework uses a structured prompting approach: Subject + Visual Elements + Style + Mood. Fig. 2 presents the full system architecture of HYPAR, illustrating the client-side WebAR rendering pipeline, the Together.ai inference API, and the FLUX.1.1 [pro] generative model. It used careful word ordering (prioritizing key elements) and controlled prompt length to ensure consistent, high-quality package design generation.

When a user selects a mood descriptor or types a descriptive prompt, the system converts this input into a high-fidelity packaging texture in real time. The generative model interprets semantic cues to automatically resolve colour palettes and stylistic elements to produce visually coherent output.

Once the texture is generated, the visualization layer maps it onto a 3D model of the physical product. The personalized design is composited onto the actual box in the user’s physical environment via the device’s camera using marker-based tracking. By automating this pipeline and delivering it via a standard web browser, HYPAR provides a lightweight integration path for retailers that requires no changes to existing physical inventory or supply chains.

4 Methodology

The research followed a structured approach to evaluate the HYPAR technology probe for the case of a perfume package. The study design was submitted to and reviewed by the University Research Ethics Board to ensure the privacy of participant data and ethical

conduct (Reference #044-202526). A total of 16 participants were recruited for the study via targeted email outreach.

The technical apparatus required for the study consisted of a hybrid setup: the participant’s own smartphone served as the primary interface for the WebAR application, while a physical perfume box, modified with specific AR markers for spatial tracking, served as the tangible anchor for the digital overlays. The methodology relied on a three-stage preparation phase: generating digital access points through QR codes for consent, application URLs, and feedback forms; preparing the physical assets for tracking; and setting up the backend generative services powered by Together AI.

4.1 Demographics

A total of 16 individuals applied to participate in the user study. Following the initial screening, one applicant was not eligible under the inclusion criteria. Consequently, the study was conducted with a final cohort of 15 participants (13 male, 2 female). The majority (14 of 15) were aged 18-24, with one participant aged 35-44. All participants held at least a college or university degree. When participants were asked about their purchase frequency in the past 12 months, most (8/15) were occasional (1-2 times) or seasonal (6/15), with one participant reporting 6-10 purchases.

To understand the baseline characteristics and consumer habits of the user group, participants completed a pre-study questionnaire before engaging with the technology probe.

Participants reported a relatively low frequency of luxury or specialized fragrance and cosmetic product purchases ($M=2.93$, $SD=1.39$), suggesting the sample represented general rather than habitual luxury consumers. Regarding attentiveness to packaging aesthetics, most participants agreed or strongly agreed that they notice and appreciate small design details in product packaging ($M=3.73$, $SD=1.10$). Notably, approximately 73% indicated that they are more likely to purchase a product if the packaging matches their personal style ($M=3.93$, $SD=0.88$), whereas 53% found current retail packaging options to be too generic or repetitive ($M=3.53$, $SD=0.74$).

When asked about willingness to pay a premium for personalized packaging, six agreed or strongly agreed, five were neutral, and four disagreed ($M=3.33$, $SD=1.11$). While this indicates moderate rather than strong market alignment, the high scores on style-matching preference ($M=3.93$, $SD=0.88$) suggest that the value proposition of a system like HYPAR might resonate more strongly when users can see the personalization applied to a physical product, as explored in the interaction phases of the study.

4.2 User Study

The user study was conducted as a series of individual sessions, each lasting approximately 15 minutes (See Fig. 4). Each session followed a standardized protocol to ensure consistency across the qualitative and quantitative data collection phases. The study was divided into four distinct stages: onboarding, design and visualization, comparative reflection, and evaluation.

4.2.1 Onboarding and Initialization. Upon arrival, participants used their mobile devices to scan a QR code leading to a digital consent form. Once consent was documented, a second QR code was scanned to launch the HYPAR web application in the mobile browser.

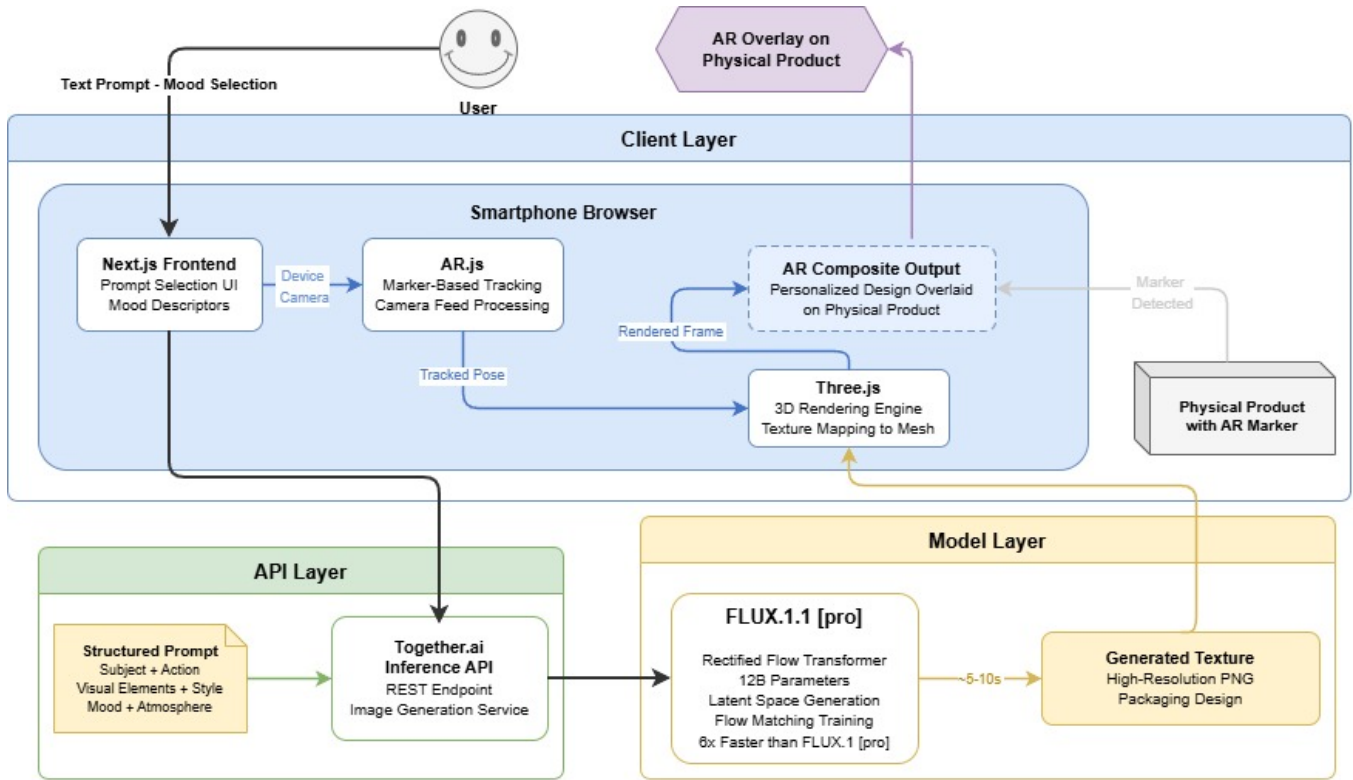


Figure 2: System architecture of HYPAR showing the client-side WebAR rendering pipeline, the Together.ai inference API, and the FLUX.1.1 [pro] generative model.

This phase concluded with the participant providing basic demographic information, including age, gender, and prior experience with cosmetic shopping.

4.2.2 Generative Design and AR Interaction. The core interaction phase involved the participant navigating to the prompt engineering interface. Participants were instructed to select one of the descriptive text prompts, such as “Floral-Romantic” or “Citrus-Energetic,” to trigger the generative process. The system communicated with Together AI to produce a high-resolution texture, a process requiring a waiting period of approximately 5 to 10 seconds.

Once the texture was generated, participants pointed their smartphone camera at the physical perfume box. The application mapped the AI-designed texture onto the 3D model in real-time. To ensure the participant understood the system’s interactive nature, they were encouraged to perform at least one design iteration, generating a new texture to compare with their initial attempt and to test the real-time interactivity.

4.2.3 Comparative Reflection and Feedback. Following the interactive design phase, a standard, non-personalized perfume box was placed alongside the AR-enhanced version. Participants were asked to observe both items simultaneously to compare their emotional responses and their perception of the product’s luxury value between the generic box and their custom design.

The study concluded with a two-part evaluation phase. First, participants scanned a final QR code to complete a post-study questionnaire regarding system usability and engagement levels. Finally, a semi-structured interview was conducted using a qualitative interview guide. During this interview, participants provided verbal feedback on their likes and dislikes, the effectiveness of seeing the design in AR versus a 2D screen, and how such a tool might influence their purchasing decisions or interactions in a real retail environment.

4.3 Data Analysis

The quantitative data collected from the study were analyzed using descriptive statistics to summarize participant responses and identify core trends in system perception. This statistical approach allowed for the calculation of mean scores and frequency distributions, providing a clear numerical representation of user satisfaction and technical feasibility. The primary metric for evaluating the system’s usability was the System Usability Scale (SUS) [16].

The qualitative data, derived from the semi-structured interviews, were analyzed using the Reflexive Thematic Analysis [6]. This process involved a multi-stage approach: familiarization with the interview transcripts, generation of initial codes, and then grouping these codes into broader themes. This qualitative method was chosen to capture the nuance of the user experience, particularly regarding the emotional connection to personalized design

Example prompt

Subject + Action:

Create a flat 2D Art Deco perfume panel design, focusing on clean geometric composition and luxury product presentation.

Style (Visual Layer first):

Feature a matte deep-navy vertical stripe beside a thin matte brass line, paired with warm cream and nude geometric blocks arranged in crisp aligned Deco geometry. Add "Essence" in embossed Art Deco typography, clear and legible, with a subtle stepped embossed accent for refinement. Ensure minimal modern-Deco elegance with strong composition hierarchy.

Context (Technical Layer next):

Generate a front-facing design, no perspective distortion, high resolution, sharp edges, print-ready, balanced spacing, no photographic textures unless matte-styled. For the background, produce a seamless matte deep-navy texture with thin brass Deco linework, repeating/tillable pattern, no logos, no extra text, soft tonal contrast.

Atmospheric Layer:

Convey luxury minimalism, refined elegance, warm sophistication, blending vintage-Deco glamour with modern restraint. The tone should evoke premium perfume packaging—subtle, confident, timeless.



Figure 3: Example of a user prompt (“Art Deco and Navy Stripes”) and the corresponding AI-generated packaging visual rendered in HYPAR.



Figure 4: A participant interacting with the HYPAR prototype on a mobile device during an individual user study session.

and the spatial impact of augmented reality. By combining these two analytical methods, the study aimed to contextualize the numerical usability scores with the specific feedback and perceptions reported by participants.

5 Results

5.1 System Usability

The mean System Usability Scale score was 89.50 (SD=5.11), which falls in the “Excellent” category on the adjective rating scale [3] and corresponds to a Grade A classification [16].

5.2 Thematic Analysis

The qualitative data from the semi-structured interviews were transcribed and analyzed following an inductive approach consistent with Reflexive Thematic Analysis [6]. Initial codes were generated from individual participants’ statements and iteratively grouped into sub-themes that represented recurring patterns. The sub-themes were organized under three overarching themes. A total of 109 coded segments were identified across the 15 participant transcripts. Table 1 presents the final thematic structure (See Figure 5 for frequency table.).

5.2.1 Theme 1: Engagement. This theme comprised five sub-themes, accounting for 46 of the 109 coded segments.

Ownership (14/46 references) was the most frequently coded sub-theme in this theme. Participants reported feeling a stronger

Table 1: Thematic analysis results showing three overarching themes, their sub-themes, and descriptions (N=15).

Theme	Sub-theme	Description
T1: Engagement	Ownership	Participants felt a stronger personal attachment to the product when they had a role in designing its packaging.
	Luxury	The personalized design was perceived as more premium or luxurious than the standard generic box.
	Creative Control	Participants valued the ability to choose mood descriptors and see their creative intent materialized on a product.
	Customization	Multiple participants wanted more granular control, such as colour pickers, font choices, or the ability to upload their own images.
	Iterative Design	The ability to generate multiple designs and compare them was valued as part of the creative process.
T2: Retail Impact	Purchase Intent	Participants indicated they would be more likely to purchase a product if this personalization tool were available in-store.
	Retail Experience	Participants envisioned how this tool could change their interactions with products in a physical retail environment.
T3: Usability	Ease of use	The browser-based approach was appreciated for requiring no app download or special hardware.
	Wait Time	The 5-10 second wait for texture generation was noted by some as a minor source of friction, though it was generally acceptable.
	Tracker Reliability	Occasional “jitter” or tracking loss momentarily broke the immersion for some users.
	Prompt Clarity	Some participants expressed a desire to write their own prompts rather than selecting from presets.

personal connection to the product after contributing to its design. P14 stated: “*Customization always makes me feel that it is for me [...] the generic one makes me feel part of the crowd, and I’m special. Obviously the personalized one makes me feel special.*” Similarly, P12 noted: “*The personalized box was something unique to me, and that box, anyone can have it. So I wouldn’t keep that generic box. I would keep this personalized one somewhere where it’s viewable.*” P15 observed that while generic packaging is commonly discarded, a custom design would be retained: “*If you got this generic one, I know many people would just throw this off, but if you’re getting it custom one, I’m pretty sure many people keep it somewhere.*”

Luxury (7/46 references) captured reports that the AI-generated designs appeared more premium than the standard box. P2 stated: “*I correlate premium with something that’s personalized or that is in less number as compared to those generalized ones.*” P5 described the output as: “*A bit more luxurious, obviously, and the color combination was nice. The design was very subtle, not too hard on your eyes, but it was also catchy.*” However, P7 qualified this, noting: “*The luxury doesn’t just come from the design itself. It comes from the brand,*” suggesting that for some participants, brand reputation remained a stronger determinant of perceived luxury than visual customization alone.

Creative Control (10/46 references) captured participants’ responses to seeing their selected aesthetic preferences rendered on a product. P2 stated: “*The best thing about this application is I can bring in my imagination to life, and I can see what the design that might look good in my head might not look good in my hand. It actually looks good in real life.*” P16 noted: “*I liked how I could design my own perfume model. It was really cool to see.*” P9 reported: “*I was able to customize it based on my taste. There was not just one design thing; you were having five different designs with five different tastes of people.*”

Customization (12/46 references) reflected participant requests for capabilities beyond the current preset options. P2 requested: “*If we are able to import some kind of vector PNG onto it and somehow reflect that onto a box.*” P14 asked for multi-face control: “*What if I want one design on the side and the front of the other design?*” P15 suggested: “*The customer can upload their pictures. They can put their own design in, like using prompts, they can just upload a picture.*” P16 noted that the experience could be extended: “*Having the bottle instead of just the box could make it more immersive.*”

Iterative Design (3/46 references) captured responses to the ability to generate and compare multiple outputs. P13 stated: “*I can nit pick and choose the type of design I want. I can iterate over what I want. So eventually, with going again and again, I can eventually find something that I like.*” P6 noted: “*I think it’s good to see before you purchase, good to go through different options.*”

5.2.2 Theme 2: Retail Impact. This theme comprised two sub-themes with 40 coded segments.

Purchase Intent (17/40 references) captured participant reports regarding purchase confidence. P8 stated: “*I can obviously be confident that this is my product [...] I can just see it, I can just feel it, so yeah, it helps me make a decision.*” P14 noted: “*I could sense that if this was to be printed out, I can foresee kind of the end product that would be in my hand the way I wanted it.*” P15 reported: “*If having this in the retail store actually happens, I would probably do it for every product, because having something custom made for every product is really cool.*” P12 stated: “*I would really use the feature a lot in the shop to personalize my own box.*”

Retail Experience (23/40 references) was the most frequently coded sub-theme in the dataset. Participants described the difference between viewing packaging in 2D versus AR. P2 stated: “*With this I think it takes the level a little bit higher [...] compared to those*

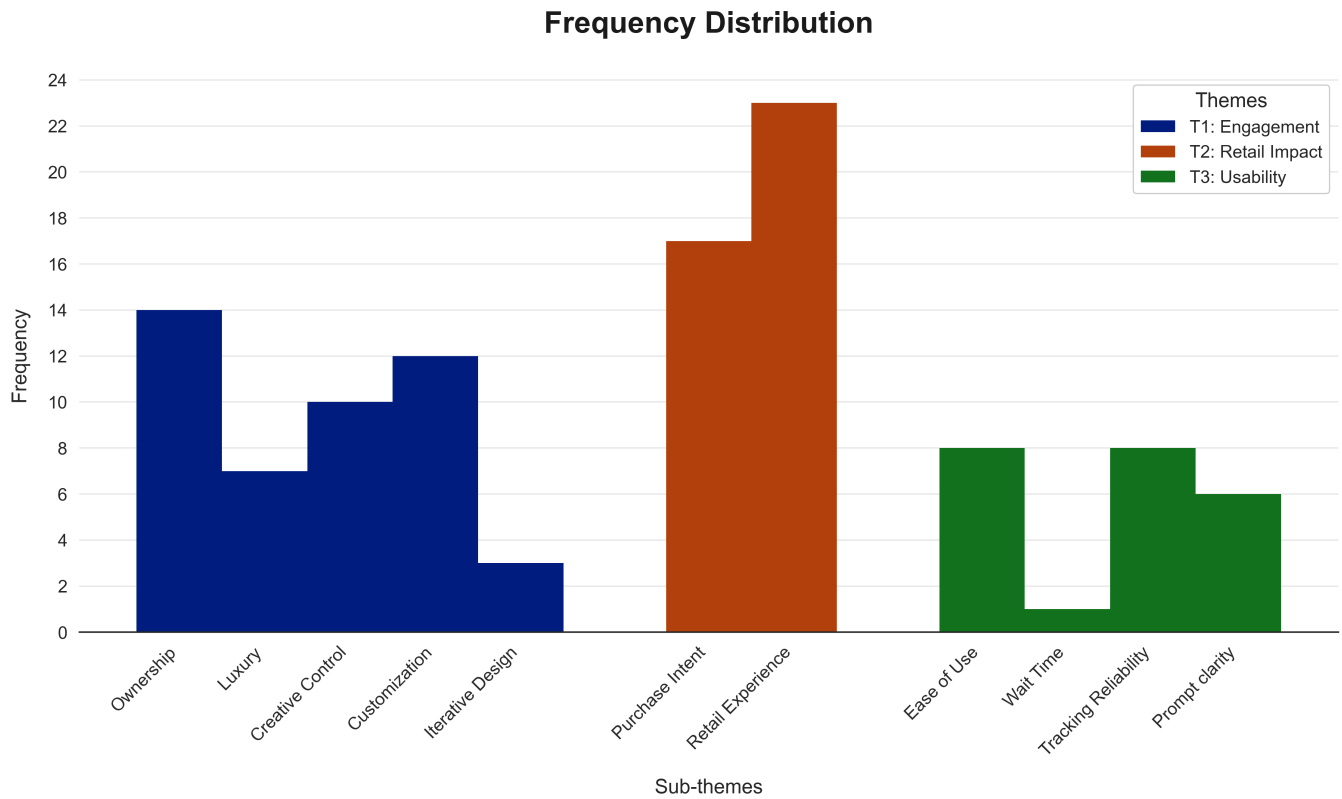


Figure 5: Frequency distribution of sub-themes categorized by the three main themes: T1: Engagement, T2: Retail Impact, and T3: Usability.

3D displays on the website. This actually gives you a feeling that you're holding the product." P14 noted: "It's always difficult, because it's a 2D shape. You're looking at a page, and no matter how you move it around, you just don't know how it will look. This was far easier, because I had the object in my hand." P1 described a potential store application: "If this were to be in an actual store, that is a good way for the store to actually keep their own stuff to themselves," referencing reduced need for physical display inventory. However, P13 raised a counterpoint regarding the in-store context: "The only drawback I would think is, since you're already there in the store, you can, 90% of the time, pick up the actual product in your hand and feel and know," suggesting that in physical retail settings, the AR overlay may offer less added value than in online contexts.

5.2.3 Theme 3: Usability. This theme comprised four sub-themes with 23 coded segments.

Ease of use (8/23 references) captured positive responses to the browser-based interface. P3 stated: "Most of the time when you're using a new application, you need to figure out how to use it. But with this application, there's a lot of flexibility." P14 described it as: "Very simple, straightforward, to understand the form and keep in mind." However, P10 noted a design concern: "The landing page could have been better."

Wait Time (1/23 reference) was reported by P8, who noted: "If I flip these, it was a bit slow on response," referring to the delay when rotating the box during AR visualization.

Tracker Reliability (8/23 references) was the most frequently reported technical concern. P15 stated: "It's kind of glitchy. You feel like when you take your phone and try to scan the design, it's kind of glitchy." P9 described a specific failure mode: "When I was putting my finger on the marker, it wasn't able to detect it [...] for a grip perspective, you just hold it like this, and it wasn't reading it. So I removed my thumb, so it was a misbalance in my hand." P14 reported: "Part of the image used to be cropped, and I had to move it at a certain angle." P8 observed that the system had difficulty with multiple markers: "When it comes to two boxes, it was not able to focus simultaneously." P16 attributed some instability to connectivity: "The box was glitchy, maybe because of the internet."

Prompt Clarity (6/23 references) captured the desire for free-text input. P6 stated: "Because the prompts were already given, there's no flexibility. Maybe if there's something really specific I want, I can't do that because there's only five options." P11 noted simply: "Custom prompting would be better." P13 suggested: "Maybe have an option where the user writes their own prompt on something specific they want."

6 Discussion

This section interprets the results reported above to address the research question: *How does an augmented reality system that dynamically generates hyper-personalized packaging influence consumers' first impressions, perceived attractiveness, and engagement with a physical product?*

6.1 System Usability

From the SUS score interpretation, it was possible to gauge that the system was accessible and intuitive. The ease-of-use sub-theme corroborated this quantitative result, with participants describing the system as simple and immediately learnable. This finding is noteworthy because it would suggest that the technical complexity of integrating real-time generative AI with AR visualization did not translate into an increase in user-facing complexity.

However, the Tracker Reliability was the most frequently reported technical concern, with participants describing jitter, tracking loss under finger occlusion, and texture cropping at oblique angles. These issues did momentarily disrupt the AR experience for some users, while not severe enough to substantially lower the aggregate usability score. Additionally, one participant noted that the landing page design could be improved. These findings suggest that, while overall usability is high, targeted improvements to tracking robustness and interface design are necessary for deployment readiness.

6.2 First Impressions and Perceived Attractiveness

The pre-study data established a baseline where 73% of participants reported being more likely to purchase a product if the packaging matched their personal style, and 53% found current retail packaging too generic. The thematic analysis findings indicate that HYPAR addressed both attitudes. The “Luxury” sub-theme demonstrated that participants associated the AI-generated designs with higher quality and exclusivity. Multiple participants described the personalized output as more premium than the standard box, with the visual subtlety and color coherence of the generated textures contributing to this perception. This finding connects to prior work on the relationship between product expectations and consumer satisfaction for generated packaging [7]. The structured prompt framework of the HYPAR prioritizes subject, visual elements, style, and mood, and appears to have produced outputs that met or exceeded participant expectations for a luxury product. However, this effect was not universal. One participant noted that perceived luxury is ultimately driven by brand reputation rather than visual customization, suggesting that the system’s influence on perceived attractiveness may be moderated by prior brand awareness. In the context of an unknown or emerging brand, personalization can have greater weight in shaping first impressions; for established luxury brands, it can function as a complement rather than a primary driver.

The AR visualization layer further amplified first impressions by allowing participants to assess the design in spatial context. The “Retail Experience” sub-theme revealed that viewing and physically rotating the design in three dimensions on a real object created a qualitatively different impression than viewing a 2D image on a

screen. Participants described 2D representations as *dull and static* (P1) and noted that the AR overlay made the design feel present and real. This spatial quality enabled participants to evaluate the design as it would appear in their physical environment, a level of assessment that static product images cannot provide. This may be supported by the immersive AR and enhanced user engagement [2].

The comparative reflection provided further feedback from participants who viewed the personalized and generic boxes side by side. Participants described the generic box as common and disposable, while the personalized version was characterized as unique and worth preserving. This differential in perceived attractiveness operated even though the underlying physical product was identical in both conditions, indicating that the visual personalization itself, rather than any material change, was the source of the effect.

6.3 Engagement

The thematic data indicate that active participation in the design process fostered emotional attachment and sustained engagement with the product. The “Ownership” sub-theme, the most frequently coded within Theme 1, demonstrated that participants who selected mood descriptors and observed the resulting output felt a personal investment in the design outcome. This finding is consistent with the endowment effect [17], where involvement in the creation of an object increases its perceived value. Participants explicitly contrasted the personalized box with the generic alternative, describing the former as personally meaningful and the latter as interchangeable.

The “Creative Control” sub-theme extended this engagement beyond ownership to the creative process itself. Participants described the experience as an act of self-expression, where the system served as a medium for translating internal aesthetic preferences into a visible, tangible form.

The “Iterative Design” sub-theme, though less frequently coded, highlighted a secondary engagement mechanism. The ability to generate multiple designs and compare them sustained interaction beyond a single generation cycle and provided participants with a sense of convergence toward a personally satisfying result.

Engagement seems to be translated into expressed purchase intent. The “Purchase Intent” sub-theme was highly prevalent, with participants reporting that previewing the final design in AR reduced the uncertainty typically associated with purchasing decisions. The generative AI provides creative agency for the users to translate and project their preferences into design outputs. In addition, AR provides spatial confirmation by anchoring the generated design to the physical product, which appears to produce an experience that is participatory and informative. However, the data revealed boundaries to this effect. P13 noted that in a physical retail setting where the actual product can be handled directly, the AR overlay may offer less additional value than in an online or remote context. This observation suggests that the engagement benefits of the system may be context-dependent, with the strongest effects likely occurring in scenarios where consumers cannot physically access the final product, such as online shopping, gifting, or pre-order customization.

Finally, the “Customization” sub-theme was the second most frequently coded sub-theme in Theme 1, which indicated that several participants felt the five preset options constrained their creative expression. Requests for features such as free-text prompting, image uploading, multi-face design control, and bottle customization suggest that expanding the input design space could further increase the depth and duration of that engagement.

7 Limitations and Future Work

Several limitations of this study should be acknowledged.

First, the sample size of 15 participants, while appropriate for an exploratory technology probe study, limits the generalizability of the quantitative findings. The demographic composition was also skewed toward male participants (13 of 15) aged 18–24 with university-level education, which may not reflect the broader consumer population. Future studies should recruit a larger and more demographically diverse sample to validate these preliminary findings.

The marker-based AR tracking introduced technical friction that was reported across multiple participants. Jitter, tracking loss under finger occlusion, texture cropping at certain angles, and difficulty with simultaneous multi-marker detection were all noted. Future iterations could explore markerless tracking approaches, such as object detection models (e.g., YOLO [13]) or plane detection via WebXR’s hit-test API, to improve tracking robustness directly on the product surface without requiring physical markers.

The current system offers five preset mood descriptors rather than free-text prompting. While this design decision ensured consistent and high-quality generative output, participant feedback indicated a clear demand for greater input flexibility. Some of the recommended features by participants included custom text prompting, the ability to upload personal images or vector graphics, the option to apply different designs to different faces of the box, and the extension of customization to the product container itself. Incorporating these features would require careful prompt engineering to maintain output quality while expanding the design space.

The study was conducted in a controlled environment rather than an actual retail setting. Factors such as ambient lighting, time pressure, social context, and competing products may influence both usability perceptions and engagement in ways that the current study could not capture. One participant explicitly noted that in a physical store, consumers can typically handle the actual product, potentially reducing the added value of the AR overlay. Future work should explore deployment in physical retail environments, as well as online shopping contexts where the AR component may provide greater comparative advantage.

Finally, the current prototype generates 2D textures mapped onto a 3D model. Future work could explore the generation of full 3D packaging models, including custom bottle shapes and structural variations. Integration with emerging spatial computing platforms, such as mixed reality headsets, could further enhance the immersive quality of the visualization.

8 Conclusion

This paper presented HYPAR, a cross-platform WebAR prototype that combines real-time generative AI with augmented reality to

enable consumers to create and visualize personalized product packaging on a physical product. A user study revealed that the system provided the feeling of ownership, enhanced perceived luxury, and increased expressed purchase intent. These findings add evidence that integrating generative AI with spatial visualization can potentially shift retail packaging from static, mass-produced designs toward personalized, emotionally resonant consumer experiences.

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