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Design Psychological Principles Supporting Human Survival Instinct: Safety Needs in Design Practices

Jeongmin LEE[1], Wujin CHU[2]

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Abstract

Purpose: This study investigates how design can address human safety needs, integrating psychological principles and practical design examples. Drawing from Maslow's hierarchy of needs and regulatory focus theory by Higgins, it explores safety beyond physical protection, including psychological comfort and stability. **Research Design, Data, and Methodology:** The research examines how these cognitive instincts can be applied in design practices and retail store design, through design case studies and literature reviews for design psychological principles. **Results:** The paper categorizes safety-related cognitive instincts of design users into three key areas: cognitive frugality, which emphasizes the brain's tendency to conserve mental resources so that they can be used in more critical situations; perceptual agility, which enables quick detection and interpretation of environmental cues, especially the cues related to threats and dangers; and psychological defensibility, the ability to create a sense of control over one's surroundings. **Conclusion:** By understanding these psychological principles, designers can create designs and retail environments that not only meet aesthetic and functional needs but also support and enhance human well-being by addressing deep-seated survival instincts. Therefore, the study could provide valuable insights for designers aiming to create designs and retail spaces that foster safety, security, and overall human flourishing.

Keywords: Design Psychology, Retail Space Design, Retail Branding, Safety Needs, Survival Instinct

JEL Classification Code: M30, M31, M37, Z11

1. Introduction

The pursuit of safety represents a universal human drive rooted deeply in our evolutionary history. According to Abraham Maslow's hierarchy of needs, once basic physiological needs such as air, water, and food are satisfied, individuals seek to secure their safety through stability, order, and freedom from fear. These needs are fundamental, forming the bedrock upon which humans aspire to achieve higher social and self-fulfilment needs.

This fundamental need has profoundly influenced human behaviors and decision-making processes, shaping the trajectory from early human settlements to contemporary urban design. In modern terms, this instinct is evident not only in reactions to physical dangers but also within our intricate psychological landscapes (Lee et al., 2024).

Therefore, this research aims to explore how thoughtful design can address our instinctual need for safety. It will be

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1 First Author. Professor, Industrial Design Dept., Gachon University, South Korea, Email: 64jmlee@gachon.ac.kr
2 Corresponding Author. Professor, Management Dept., Seoul National University, South Korea, Email: wchu@snu.ac.kr

done through a comprehensive review of the literature and various design case studies. This integration of psychological insights and practical design examples intends to merge theoretical concepts with real-world applications within the field of design.

The current study proposes that the notion of safety extends beyond mere physical protection to include psychological comfort and stability. It also explores a broader spectrum of psychological survival instincts, including cognitive frugality (our inclination to preserve mental energy for a rainy day), perceptual agility (the ability to quickly identify and react to environmental stimuli), and psychological defensibility (creating a sense of control over one's safety).

Ultimately, this study aims to enrich the discourse in design psychology by proposing the possibility of design to satisfy the fundamental human needs for survival. Thus, the contribution of this research could lie in its potential to inform designers about the psychological impacts of their works and to guide them in creating designs and retail spaces that do more than aesthetics and functions — they can create environments that support, protect, and enhance human life, thereby fostering environments where humans can thrive.

2. Theoretical Framework: Hierarchy of Needs & Regulatory Focus Theory

Maslow's hierarchy of needs is an important theoretical framework for understanding the deep-seated human desire for survival. It posits that human behaviors are motivated by a hierarchy of needs, starting from the most basic physiological requirements to the highest aspirations for self-actualization (Fig 1). This theory proposed a pyramidal structure, and each lower level must be fulfilled before moving on to the next higher level.

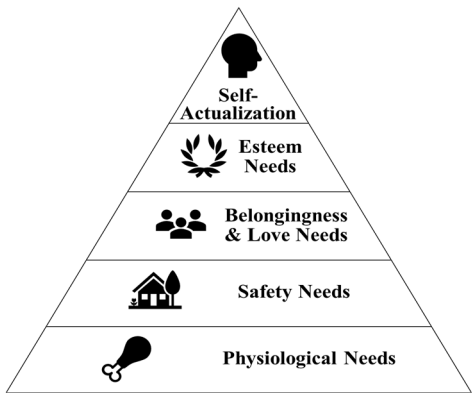

Figure 1: Maslow's Hierarchy of Needs [Image Drawn by the Author]

At the base of Maslow's pyramid lie the physiological needs — the most basic necessities such as air, water, and food. In the context of design, these needs translate into creating environments that maintain air quality, temperature control, and adequate shelter. Ascending to the second tier, we find safety and security needs. In design terms, these needs influence the creation of spaces and products that ensure users feel secure and protected.

The third tier addresses social needs, such as love, belonging, and interpersonal relationships. In design, catering to social needs involves creating spaces and products that enhance social interaction, support community building, and encourage emotional connections among individuals. The fourth tier, esteem needs, involves the desire for recognition, respect, and self-esteem. That is, individuals seek acknowledgment for their achievements and aspire for self-confidence. Design can support these needs by facilitating the display of achievements and promoting feelings of self-worth and competence.

Self-actualization needs, the pinnacle of Maslow's hierarchy, represent the fulfillment of personal potential and the expression of individual talents and creativity. Design interventions aimed at this level should encourage exploration, creativity, and autonomy, fostering environments where individuals can pursue their passions and achieve personal fulfillment.

Understanding these human needs is essential for designers because our surroundings profoundly influence our psychological and behavioral responses. This research specifically concentrates on "safety needs," the second tier in the pyramid. The emphasis on safety is not just about preventing physical harm but also about creating a sense of predictability and order, which reduces anxiety and stress and hence enhances a sense of safety. In that respect, this study suggests that we need another important theory to fully understand the aspects of human safety needs — the "regulatory focus theory" developed by E. T. Higgins (Brockner & Higgins, 2001), which elucidates aspects of human motivation and decision-making processes.

According to this theory, individuals primarily engage in one of two motivational orientations: "promotion focus" or "prevention focus." A promotion focus is characterized by the pursuit of growth and the achievement of desired goals. In contrast, a prevention focus is concerned with circumventing potential losses or failures. By integrating regulatory focus theory into design practices, designers can tailor environments to align with users' motivational orientations. For instance, a workspace designed with a promotion focus may feature collaborative zones, creative outlets, and opportunities for skill development. In contrast, a prevention-focused design may prioritize clear signage, ergonomic considerations, and error-prevention measures.

The study argues that to thoroughly address safety needs,

designs must integrate both prevention and promotion strategies. Prevention strategies aim to avoid risks and hazards, while promotion strategies increase psychological comfort and empower individuals with a sense of control. Through such an integrated approach, design solutions can safeguard individuals while simultaneously bolstering their sense of security, confidence, and overall well-being.

3. Types of Cognitive Instincts for Safety Needs

This section explores the range of cognitive instincts that underpin our safety needs, revealing a broader scope than commonly recognized. This study categorizes relevant cognitive theories into three distinct categories.

3.1. Cognitive Frugality

The first category, "cognitive frugality," delves into how human cognition inherently seeks to economize mental resources, in line with cognitive miser theory (Fiske & Taylor, 1991, 2020; Corcoran & Mussweiler, 2010). The cognitive miser theory argues that given the human brain's limited processing power, people naturally employ simple and effort-saving strategies in decision-making to save cognitive energy for more demanding tasks. Common strategies include the use of heuristics, stereotyping, selective attention, and satisficing, among others. These mental shortcuts prioritize quick, efficient reactions over detailed analysis.

In design, recognizing cognitive frugality facilitates the creation of user-friendly products and environments that are easier to understand and interact with. Employing familiar design patterns, for example, reduces cognitive load, allowing users to navigate spaces or use products with minimal mental effort.

3.2. Perceptual Agility

The second category that we propose is "perceptual agility." It encompasses cognitive theories regarding the swift detection and interpretation of environmental cues, which enable quick, effective responses.

From the perspective of evolutionary psychology, familiar stimuli are often equated with safety, while novelty requires attention. That is, humans naturally prefer familiar environments because they are perceived as less threatening, while new or unfamiliar stimuli trigger alertness. Therefore, in design, strategic use of colors, lighting, and spatial arrangements can guide our attention to critical safety features, or they can be used to create a familiar and comforting atmosphere. This approach would enhance the overall sense of environmental security.

3.3. Psychological Defensibility

The third category, "psychological defensibility," involves creating environments that foster a perceived sense of control over the environment. That is, this category focuses on how individuals establish psychological boundaries and defensible spaces.

Designing for psychological defensibility requires creating environments that provide clear sightlines, offering semi-private spaces, and maintaining adequate boundaries. For instance, strategic spatial arrangements, such as giving private nooks within public spaces, could enhance the sense of safety. These considerate designs could empower individuals to feel more comfortable and in control of their surroundings.

3.4. Matrix for Design Psychological Theories Regarding Safety Needs

Building on Higgins' regulatory focus theory and the three cognitive categories proposed above, we suggest a matrix for categorizing cognitive theories pertinent to safety needs (Table 1). This matrix will provide a structured framework for this research's subsequent analysis of cognitive theories related to practical safety considerations in design.

Table 1: Matrix for Design Psychological Theories Regarding Safety Needs

	Promotion Focus (Security-seeking Focus)	Prevention Focus (Threat-avoiding Focus)
Cognitive Frugality		
Perceptual Agility		
Psychological Defensibility		

4. Cognitive Theories & Design Cases Regarding Safety Needs

This section analyzes cognitive theories that underpin human safety needs, with a focus on their relevance to design practices. Our method involved an extensive review of literature within the fields of design psychology and consumer behavior. Initially, we selected books on design psychology that had achieved an Amazon rating of at least 4.5 out of 5. This criterion led to five key texts: Lidwell,

Holden & Butler (2010), Weinschenk (2011), Wendel (2020), Whalen (2019), and Yablonski (2020). Additionally, we incorporated psychological theories from consumer behavior textbooks, including works by Hoyer et al. (2018), Kardes et al. (2015), Mothersbaugh et al. (2020), and Solomon (2019). Although these books formed the initial theoretical foundation, a comprehensive literature review of academic journal articles was also conducted to further refine and supplement the analysis.

From this review, we selected 14 design-related cognitive theories that specifically address human safety needs. While there were more theories concerning safety needs, we chose to focus on those that have direct applications in design cases. The findings are presented in Table 2.

Building on Higgins' regulatory focus theory and the three cognitive categories proposed above, we suggest a matrix for categorizing cognitive theories pertinent to safety needs (Table 1). This matrix will provide a structured framework for this research's subsequent analysis of cognitive theories related to practical safety considerations in design.

Table 2: Design Psychological Theories Regarding Safety Needs

	Promotion Focus (Security-seeking Focus)	Prevention Focus (Threat-avoiding Focus)
Cognitive Frugality	- Cognitive Heuristics: Availability Heuristic & Representativeness Heuristic - Selective Attention & Figure-Ground Perception - Sensory Adaptation	*
Perceptual Agility	- Mere Exposure Effect - Law of Prägnanz - Design Anthropomorphism	- Threat Detection & Anger Superiority Effect - Contour Bias - Uncanny Valley - Von Restorff Effect - Reaction to Imbalance - Top-down Lighting Bias
Psychological Defensibility	- Prospect-Refuge Theory - Personal Space Theory	*

4.1. Theories Related to Cognitive Frugality

This segment discusses theories associated with cognitive frugality, which examines how human cognition strategically conserves limited mental resources. This conservation helps allocate energy to more critical tasks when needed. The study examines three theories: cognitive heuristics, selective attention & figure-ground perception, and sensory adaptation. These theories are characterized by a promotion-focused orientation, emphasizing proactive behaviors that enhance the possibility of survival by creating advantageous conditions.

4.1.1. Cognitive Heuristics

Cognitive heuristics are mental shortcuts that allow the brain to make quick decisions with limited information, a result of our natural inclination to be cognitive misers (our inherent tendency to conserve cognitive energy). While this limited information processing may seem unsatisfactory, heuristics are not inherently adverse to human survival. At times, we engage in detailed, systematic processing for important decisions. More commonly, however, we depend on heuristic processing for everyday small choices, which enables rapid decision-making without the need for exhaustive cognitive resources (Tversky & Kahneman, 1974). That is, to focus mental energy on more important decisions for survival, people have to conserve it on less important matters.

Among the various heuristics, two prominent types that design can apply are the availability heuristic and the representativeness heuristic. The availability heuristic refers to the influence of readily accessible information over more accurate but less accessible data. Emotionally charged, frequently encountered, or recent information is more easily recalled, thus dominating our memory and overshadowing objective facts.

Availability heuristic profoundly influences judgments in marketing and design. For example, charity advertisement designs often feature personal stories with emotional details, making global issues seem more tangible and prompting greater empathy. Similarly, in retail, promotional materials using bright, bold colors, especially red, are designed to be memorable and readily recalled, enhancing their impact on consumer decisions.

The representativeness heuristic involves making predictions based on perceived similarities between specific items and broader categories. When predicting quality, consumers often rely on surrogate indicators such as price, advertising intensity, warranty, brand reputation, and country of origin. For instance, Ricola capitalizes on its Swiss heritage in its package design, using labels such as "Swiss Alpine Herbs" and "Product of Switzerland." These subtle hints suggest Swiss precision, quality, and reliability,

transforming a simple candy into a symbol of Swiss craftsmanship.

4.1.2. Selective Attention & Figure-Ground Perception

Selective attention refers to the cognitive process by which individuals focus on a particular element within their environment while ignoring others (Johnston & Dark, 1986; Simons & Chabris, 1999). That is, the limited capacity of humans to process simultaneous stimuli necessitates the selection of certain elements as foreground elements to attend to, while others are disregarded as background elements. This ability to prioritize sensory data based on relevance is critical for survival, as it allows us to react to the most pertinent aspects of our environment with our finite mental resources.

In design, the effective application of selective attention is essential, as many designs fail to capture consumers' attention. Therefore, effective design should be able to capture people's attention even when there are many other stimuli around it. Attributes such as novelty, contrast, motion, initial exposure, and repetition have proven efficacy in attracting and retaining consumer attention (Lidwell et al., 2023; Weinschenk, 2011). For instance, in marketing, these elements can be strategically integrated to ensure that key messages or branding elements stand out in a crowded marketplace.

The role of selective attention is particularly important in safety-related designs. In automotive design, for example, crucial warnings are accentuated through auditory and visually distinct signals. This design approach ensures that these signals are quickly noticed and easily differentiated from non-essential information, thereby enhancing user safety.

4.1.3. Sensory Adaptation

The third psychological principle related to cognitive frugality is "sensory adaptation." It describes how our perceptual response to a consistent stimulus diminishes over time (Adibi et al., 2021; Nafe & Wagoner, 1941). Initially, when exposed to a new stimulus, our sensory reactions are strong. However, as exposure continues, the perception's intensity decreases as the stimulus becomes "familiar" and is no longer perceived as a threat, thus requiring less cognitive effort. For instance, sensory adaptation explains how urban dwellers can ignore the constant background noise of the city. This phenomenon serves the evolutionary function of conserving cognitive resources, enabling the brain to focus on novel stimuli that might pose a threat or offer an opportunity.

In the context of marketing and design, this phenomenon highlights the challenges of advertising wear-out — the phenomenon where the effectiveness of an advertisement declines with repeated exposure. To combat this, designers often introduce novel elements to a campaign to recapture consumer attention, maintaining a balance between familiarity, which aids in recall, and novelty, which attracts attention. A notable instance of this strategy is Adidas's "Impossible is Nothing" campaign, which, since its inception in 2004, has been periodically refreshed with new athlete stories to stay fresh and engaging while maintaining the same central theme.

4.2. Theories Related to Perceptual Agility

Cognitive theories that are related to "perceptual agility" deal with the rapid detection of environmental cues and the quick interpretation of sensory data to inform appropriate responses. This section analyzed nine theories: three of them have a "promotion-focused" orientation, and six of them have a "prevention-focused" orientation.

Let us first explain "promotion-focused" theories: the mere exposure effect, the law of prägnanz, and design anthropomorphism. These theories are concerned with how humans are naturally drawn to certain forms and patterns that are preferable for their survival. Therefore, they collectively explain that the evolutionary factor constitutes one of the factors that shape customers' preferences.

4.2.1. Mere Exposure Effect

The mere exposure effect posits that humans tend to develop a preference for objects or entities merely due to repeated exposure to them, which forms familiarity with them (Zajonc, 2001). For instance, public reaction to changes in popular brands, such as the Instagram logo update, often starts with resistance but typically evolves into acceptance and even preference after repeated exposure.

This effect is intrinsically linked to human survival instincts. Encountering a stimulus repeatedly without negative consequences can lead individuals to deem it safe, thus enhancing feelings of security and comfort. That is, familiarity with their surroundings typically means fewer threats and greater safety. Consequently, familiarity is essential for satisfying the fundamental human need for safety.

In the realm of design, the mere exposure effect is also highly influential. For instance, although McDonald's regularly updates its restaurant designs, it retains consistent elements like color schemes and layouts to preserve a sense of familiarity and comfort for its customers.

4.2.2. Law of Pragnanz

The law of Prägnanz (translated from German as "pithiness" or "good figure") is a principle of Gestalt psychology. It suggests that people naturally prefer the simplest and most organized ways of perceiving visual elements (Van Geert & Wagemans, 2023). For example,

while the upper left image in Fig 2 is typically perceived as three overlapping squares because it is the simplest interpretation, an alternative, a more complex view might be possible — one square with two L-shaped figures (see Fig 2, upper right image) (Lidwell et al., 2023). But who would do that? This tendency to seek simplicity is not merely an aesthetic preference but a survival mechanism (Buss, 2005). Historically, being able to quickly interpret one's environment could mean the difference between safety and danger. For instance, detecting a predator in a less cluttered environment allows for a faster response than in a visually complex setting.

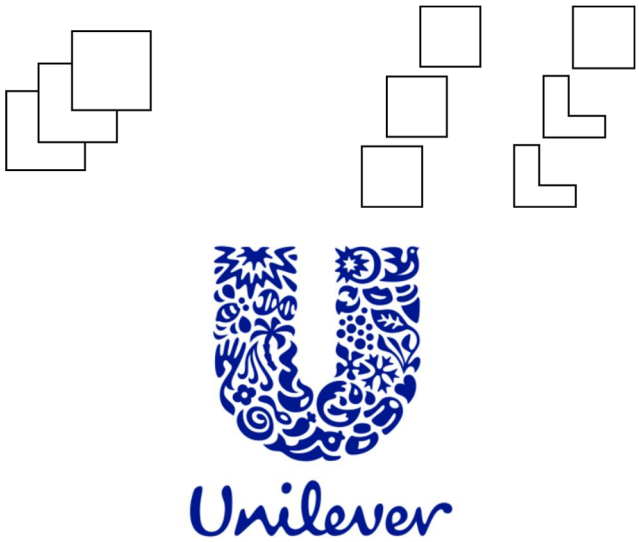

Figure 2: Upper Images: Law of Prägnanz [Image Drawn by the Author] / Lower Image: Unilever Logo [Tawab Daumi / Shutterstock]

The Law of Prägnanz significantly impacts design principles by advocating for clarity and orderly presentation, which fosters better communication. However, overly simplistic designs can lead to disengagement due to their mundane nature. Many successful designs, therefore, maintain a delicate balance between complexity and simplicity to keep the audience engaged without overwhelming them. A good example of achieving this balance is seen in the Unilever logo (Fig 2, lower image), which skillfully combines a mixture of complex elements to form a distinct and straightforward "U," illustrating how intricate components can coalesce into a single, recognizable icon.

4.2.3. Design Anthropomorphism

Design anthropomorphism refers to the practice of attributing human-like qualities to inanimate objects. Humans are inherently social beings that rely on social interactions for survival, predisposing us to favor objects mimicking human features (Aggarwal & McGill, 2007). This phenomenon is evident in our ability to recognize faces in inanimate objects, such as the moon. That is, by recognizing human-like features in non-human objects, people often feel a sense of familiarity and connection, which can lower anxiety and increase a sense of security.

Therefore, incorporating anthropomorphic elements into a design can make environments and products feel more approachable and less threatening. This technique is widespread across various fields of design, evident in animated films like Disney's "Cars on the Road" and "Beauty and the Beast," amusingly designed products like Alessi's Anna G. Corkscrew and Egg Cup, and unique architectural structures like Prague Dancing House. These designs leverage our instinctive responses to human-like features, making spaces and objects more engaging and emotionally resonant.

4.2.4. Threat Detection & Anger Superiority Effect

We now explore the category of perceptual agility within the framework of prevention-focused theories, which are notable for their role in enhancing "rapid threat identification." The human brain functions as a sophisticated alert system, always on guard and finely tuned to perceive potential threats, thus significantly boosting our chances of survival. This study examines six theories under this category: threat detection and the anger superiority effect, contour bias, the uncanny valley, the Von Restorff effect, reaction to imbalance, and the top-down lighting bias.

The first of these theories, "threat detection and the anger superiority effect," describes how human perception is exceptionally skilled at identifying threats. That is, our sensory system acts like a radar, highly sensitive to potential dangers. This system quickly and accurately recognizes threatening stimuli (like images of predators, snakes, or spiders) over non-threatening ones (such as flowers or trees) and maintains attention on these threats longer (Lidwell, Holden & Butler, 2010). This phenomenon is intricately linked to the anger superiority effect, wherein angry faces are identified more quickly and accurately than those displaying happiness or neutrality due to their potential implication of imminent threats (Hansen & Hansen, 1988). See Fig 3 (upper images). Which tiger keeps your attention more? This heightened sensitivity to perilous stimuli is largely attributed to the amygdala, a component of the brain adept at surveilling for danger and priming the body for a prompt response.

Figure 3: Upper Images: Anger Superiority Effect [Left: Robert Cinega / Shutterstock] [Right: mlorenz / Shutterstock] / Lower Image: Dynafit Logo [Ki young / Shutterstock]

In practical design applications, this perceptual vigilance can be very useful, especially for creating safety signals and alerts. Designers leverage universally recognized symbols of danger, such as lightning bolts for electricity or skulls for poison, to quickly draw and maintain attention, thereby improving the effectiveness of safety warnings. Additionally, designers can abstract and stylize these threatening features to trigger alertness without inducing actual fear. For example, the Dynafit logo (Fig 3, lower image) captures a predator's intense gaze to attract customers' attention effectively, yet it is stylized to prevent triggering real fear.

4.2.5. Contour Bias and Retail Design

Secondly, contour bias is another intriguing aspect in discussing the human ability to recognize threats and safety signals. This bias informs us about a general preference for smoother, curved lines over sharp, jagged edges, which are seen as more aesthetically pleasing and approachable. However, despite this preference, it's the angular and pointy shapes that captivate our attention more strongly and stimulate curiosity (Bar & Neta, 2006).

From an evolutionary standpoint, contour bias may have developed as a survival mechanism. Historically, objects in nature that featured soft curves, such as berries or rounded stones, were often safe, whereas sharp objects like thorns and fangs represented danger, triggering instinctual reactions for self-protection. This ingrained association influences how we respond to visual stimuli today, where rounded shapes are perceived as more inviting and are widely utilized in user interface design, such as website buttons and icons, to enhance user interaction and approachability. In addition, characters in children's animations are often rendered with exaggerated round shapes to appear friendlier and more relatable (e.g., Disney characters like Mickey Mouse, Goofy, or Winnie the Pooh). Smooth layout of retail space is also widely used to direct shopper traffic in IKEA stores.

Despite the general preference for rounded designs, angular shapes have their place in modern aesthetics, too. These designs are effective in keeping users alert and engaged, proving especially useful in scenarios that require heightened attention and thought. For example, the sharp, aggressive lines of Lamborghini cars are designed to command attention and convey a sense of speed and excitement, aligning with the brand's image of high-octane performance and luxury.

4.2.6. Uncanny Valley

The uncanny valley is the third theory related to the human ability to recognize threat signals. This theory, first identified by Mori Masahiro (Mori, 1970), is important for understanding human reactions to lifelike figures. This theory explains the paradox where humanoid objects gain likability as they approach human realism until a point. However, when figures look almost human but not quite, likability drops sharply due to their eerie appearance, a phenomenon rooted in human survival instincts (MacDorman & Chattopadhyay, 2016). Our brains perceive these near-human figures as subtly wrong, potentially signaling disease or danger, which triggers a defensive response.

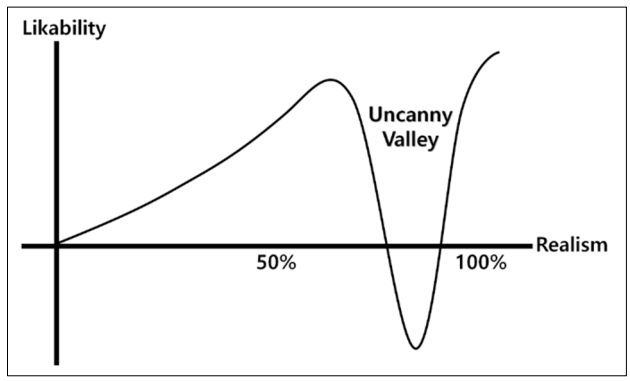

Figure 4: Uncanny Valley Graph [Image Drawn by the Author]

Figure 4 demonstrates this dynamic. In less realistic or abstract figures, such as those in "Toy Story" or "Sailor Moon," likability increases with improved realism. Yet, when realism nears human accuracy without achieving it, the reaction turns negative due to the uncanny resemblance. For example, in the animated film "Polar Express," the filmmakers aimed for a highly realistic depiction of human

characters, but some audiences and critics felt that the characters, while technically impressive, fell into the uncanny valley. The likability then rebounds when realism reaches a nearly perfect human likeness, such as with Madame Tussauds' wax figures. Therefore, designers are advised to either achieve hyper-realism or opt for a more abstract approach to avoid negative reactions from human observers.

4.2.7. Von Restorff Effect

The fourth theory related to the prevention-focused human ability to recognize threats is the "Von Restorff effect." According to this theory, our cognitive processes are notably attuned to remembering and prioritizing unusual or distinctive stimuli over commonplace ones (Hunt, 1995). This phenomenon suggests that supernormal stimuli have much more impact on our cognition than normal, familiar ones. Consequently, avant-garde designs, which may initially appear startling, are often more vividly preserved within memory. Furthermore, when exposed to multiple stimuli concurrently, the human brain tends to concentrate on those elements that starkly contrast with their environment. For example, the entrance to the Louvre Museum featuring I. M. Pei's iconic glass pyramid exemplifies the Von Restorff effect. This modern, high-tech structure dramatically contrasts with the surrounding traditional, historical palace buildings. This aspect ensures that it remains a focal point of visual and cognitive engagement and, thus, functions well as a grand entrance.

Evolutionary psychology provides a framework for understanding this response: human cognition is wired to assess whether those novel, unfamiliar stimuli can pose potential threats to survival. Thus, our cognitive system acts almost like a built-in security guard, alert to any deviations from the norm that might require our attention for survival reasons.

4.2.8. Reaction to Imbalance

Let us move to the fifth principle related to the human ability to recognize threats. Human perception is finely tuned to detect imbalances in the environment (Pentak & Lauer, 2016) because it stands out in contrast to our innate desire for order and stability. That is, this sensitivity is an important evolutionary adaptation, enabling early detection of environmental hazards, such as the precarious positioning of a tree or an unstable boulder likely to topple.

This innate capability extends beyond physical safety, influencing our visual and aesthetic preferences. For example, everyday objects that are off-balance, like a misaligned picture frame or an unevenly tied tie, tend to draw our attention even though they are not physically hazardous. This visual imbalance gives us an unexplainable psychological itch, compelling us to correct it if possible.

In the realm of aesthetics, this biological predisposition underlies the preference for balanced designs, which are perceived as more harmonious and stable (McManus, 2005). However, artists and designers also deliberately employ visual imbalance to create a sense of tension. This technique is often used to symbolize conflict, dynamism, or the unexpected within artistic compositions. An illustrative example is the Sharp Centre for Design (Fig 5). The building features a box-like structure supported by seemingly haphazardly placed, colorful pillars. It appears to defy gravity, creating a visual tension that challenges traditional architectural norms. Thus, while humans have an inherent preference for visual balance, intentional visual imbalance in design can effectively enhance narrative depth, provoke emotional responses, and engage audiences.

Figure 5: Sharp Centre for Design, Will Alsop, 2004, Toronto, Canada [Melissa.r / Shutterstock]

4.2.9. Top-down Lighting Bias

Earlier, we talked about the human inclination toward familiar stimuli, underscoring its significance in survival. An additional aspect of this evolutionary adaptation is the top-down lighting bias, a cognitive predisposition where the human brain anticipates objects to be illuminated from above (Lidwell et al., 2023). This bias is rooted in the historical context of the sun being our predominant light source, shaping our perceptual expectations of how shadows and highlights naturally occur.

The ramifications of this bias extend into the realms of design, where it is strategically employed to evoke specific emotional responses. Natural top-down lighting is often used in settings to foster a sense of normalcy and safety. On the other hand, unconventional lighting, such as illumination from below, introduces a sense of the unnatural and can significantly alter the mood of a scene. Video game designers, for example, may use conventionally sourced lighting to indicate safe pathways while employing aberrant lighting techniques to signal danger or mystery. Similarly, filmmakers often use bottom-up lighting setups to heighten tension or convey an ominous mood, intensifying the viewer's sense of foreboding and unease.

4.3. Theories Related to Psychological Defensibility

Cognitive theories that are related to "psychological defensibility" are about the strategic positioning within a space or the invisible yet palpable lines we draw to feel safe in our environments. This study analyzed two theories with a promotion focus: prospect-refuge theory and personal space theory.

4.3.1. Prospect-Refuge Theory

Firstly, the prospect-refuge theory posits that humans are innately predisposed to seek environments offering a balance of visibility and concealment, termed "prospect" and "refuge," respectively (Dosen & Ostwald, 2013). This dual requirement supports our survival instincts: from a perspective of evolutionary psychology, if you can see potential problems from afar, you have more time to react, and if you are hidden, you're less likely to be attacked. This aspect makes this theory promotion-focused — the emphasis on proactive engagement with the environment. Therefore, the spaces where we can watch without being watched foster feelings of safety, comfort, and attractiveness.

Consider the allure of treehouses and balconies, for instance. These spaces are appealing not only because of their elevated views, which provide a broad visual sweep of the environment (prospect), but also because they offer a secluded, secure space (refuge). This dual benefit is similarly sought in everyday situations, such as the preference for corner seats beside windows in restaurants.

This theory is also important in fields like architecture and urban design. For instance, residential buildings with large windows or expansive balconies employ the concept of prospect by providing wide views. On the other hand, features like blinds, curtains, and tinted glass serve the refuge function by ensuring privacy. Similarly, outdoor structures like patios or gazebos can be placed in a place offering a panoramic view of a garden, but with the bonus of some shade and seclusion.

4.3.2. Personal Space Theory in Space Design

Lastly, let us propose psychological personal space as another theory with a promotion focus. It is an important psychological concept that serves as a line of defense in social interactions (Hall, 1990). That is, it addresses the invisible boundaries people establish around themselves, which helps them manage their interactions with others. This invisible "bubble" defines a zone of comfort within which we feel safe and secure, acting as an unspoken "no trespassing" zone (Fig 6). When this space is infringed upon, it triggers our internal alarms, prompting defensive behaviors such as stepping back or avoiding eye contact to regain our comfort zone.

Figure 6: Personal Space [Image Drawn by the Author]

In the field of architecture and design, understanding these invisible boundaries is very important, particularly in designing public spaces where interaction is frequent. Effective design can incorporate elements like movable screens, plants, or furniture like the one in Fig 7 to delineate temporary personal spaces. Such interventions foster both community engagement and individual comfort, highlighting the importance of personal space in design and social contexts.

Figure 7: Poolside Furniture in Vinpearl Resort & Golf, Nam Hoi An, Vietnam [Picture Taken by the Author, 2024]

5. Conclusion

This research has delved into the psychological principles underpinning human survival instincts, specifically focusing on safety needs in design practices. Through comprehensive literature reviews and analysis of multiple design cases, we have demonstrated that design can significantly cater to these instincts by incorporating cognitive theories related to safety.

Our findings can have practical implications across various design sectors. In architectural and urban planning, for instance, incorporating these principles can lead to the creation of spaces that are not only safe but also offer psychological comfort and stability. Designs that integrate aspects of perceptual agility can enhance the ability to recognize and respond to environmental cues swiftly, thus increasing the user's sense of security. Additionally,

recognizing the importance of psychological defensibility in design can lead to environments where individuals feel a greater sense of control within their spaces. Moreover, the concept of cognitive frugality can influence design by reducing cognitive load, making products and environments easier to navigate and understand, thus aligning with the brain's preference for minimizing mental effort. This can have broad implications for interface design and the organization of information in both physical and digital spaces.

However, this study is constrained by some limitations. Firstly, the application of these cognitive theories may not fully account for the diverse individual and cultural differences in perception and behavior toward safety and comfort. Individuals' reactions to design elements can be varied and influenced by past experiences, cultural background, and personal preferences, which are not entirely addressed by a generalized design strategy. Furthermore, much of the research is based on theoretical explorations and a limited range of case studies, which may not capture the full spectrum of human-environment interactions. Future research should aim to address these gaps by incorporating more empirical studies, particularly experimental designs that can isolate specific design elements' effects on psychological safety.

In conclusion, this study tried to contribute to the broader discourse in design psychology by highlighting how thoughtful design can meet fundamental human survival needs. By continuing to explore and integrate these insights, designers and architects can create environments that not only meet the basic need for safety but also enhance the genuine quality of human life.

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