





IMPORTANCE OF COGNITIVE ERGONOMICS IN PACKAGING DESIGN

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Abstract: *The consumer's interaction with packaging should be simple and intuitive. However, packaging is frequently designed in such a way that it is difficult to use, with text and labels that are difficult to see or understand. As a result, the prospective consumer may be discouraged from purchasing the product, or if the purchase has already been made, the ineffective handling of the packaging may result in a negative user experience, e.g. some users struggle to open the packaging. Due to the inability of the user to access the contents of the packaging, the user often experiences a feeling of frustration which may lead to accidents and injuries. This paper emphasizes the importance of cognitive ergonomics in packaging design. Cognitive processes, which involves how people think, make decisions and react, can be predicted, and lessons learned from studying these predictable responses can be integrated into good design.*

Key words: packaging, cognitive, ergonomics

1. INTRODUCTION

Packaging protects the product while also promoting its identity (Suzianti et al., 2015). During the product purchasing process, the consumer is making decisions while looking for a variety of similar products that are classified in the same product category (Kuvykaite et al., 2009). While serving many other functions such as ensuring the security of the product (Bozhkova, Spiridonov & Shterev, 2017), packaging is crucial for drawing consumers' attention and delivering the product's content (Wang & Chou, 2010; Chind & Sahachaisaeree, 2012). Among those available alternatives, the consumer would recognize attributes presented through packaging, which would later serve as the foundation for selecting a certain product from all available options (Wang & Chou, 2010; Chind & Sahachaisaeree, 2012).

Packaging plays a significant role in daily life and has the potential to impact people's quality of life. There are basic human factors that must be considered when designing packaging: physical abilities, mental abilities, personality and mood as well as cognitive processes. Neglecting these factors can have expensive design repercussions in terms of both financial cost and consumer performance and discomfort. Poorly designed packaging can lead to product spillage and waste, and at worst, physical injuries. This is followed by the need to expend time and effort to deal with the consequences, as well as the financial cost of having to repurchase the product. Almost inevitably frustration occurs, which is amplified and made worse by successive problems, potentially generating emotional anxiety and a negative state of mind. Failing to open and use packaging has some of the most significant psychological repercussions on consumers' quality of life, leading to a loss of autonomy and low self-esteem (Theobald & Winder, 2006).

2. COGNITIVE ERGONOMICS

Cognitive psychology is a branch of psychology that explores a wide variety of mental processes and enables us to comprehend how our brains retrieve information from the outside world, how we attempt to make sense of this information, and ultimately how this information affects our behaviours, such as when we are faced with product packaging that we wish to purchase, open, and use (Karwowski, 2005). Cognitive ergonomics is the study of how well a product's use matches the cognitive abilities of its users. Cognitive ergonomics focuses on the effects of mental processes such as perception, memory, information processing, reasoning, and motor response on interactions between people and other elements of a system (Karwowski, 2005; Hollnagel, 2003; Karmakar & Chowdhury, 2022).

Rather than being a design discipline, cognitive ergonomics is a knowledge base for designers to use as guidelines to ensure optimal usability of a product. Attention, information processing, sensation, perception, affordances and predictability of human errors are the most relevant aspects of cognitive ergonomics that relate to how we chose and use a product, areas that can teach us how to improve the design of packaging (Figure 1). (Theobald & Winder, 2006). Each aspect will be described in greater detail.



Figure 1. Aspects of cognitive ergonomics explaining consumer-packaging interaction

2.1 Sensation and perception

The initial step in our retrieval of information from the outer world is through sensation, which refers to the immediate response of our sensory receptors, located in our ears, eyes, nose, tongue and skin. As soon as we receive input from any of these senses, higher order cognitive processes jump into action, and we ‘perceive’ this input (Theobald & Winder, 2006). Perception is the interpretation of stimulations from surrounding environment. It is the point at which the raw sensory information is given meaning and is dependent on the individual, with his or her differing experiences, abilities, culture and expectations, or even the emotion that the consumer is experiencing at the time, as well as situational factors connected to the scenario concerned. As we could sense different products by means of different senses, perception can be divided into five kinds: visual perception, auditory perception, touch related perception, smell perception, and the perception of taste (Theobald & Winder, 2006; Karmakar & Chowdhury, 2022).

2.2 Attention and information processing

Our sensory systems are actively gathering information coming from environment which is an overwhelming amount of data thrown at us every second of the day. To handle or manage this amount of information, we require a selective focus (attention) to certain amount of information since we possess only limited cognitive resources and thus have a finite attentional capacity. This capacity must be divided among a variety of tasks, some of which will demand more cognitive resources than others, depending on factors such, the consumer’s level of skill, experience, and familiarity with the product, the consumer’s psychometric profile, etc. Attentional capacity, however, is not solely determined by the cognitive workload that we can handle; it is also determined by the automaticity of the processes that are in place. Cognitive processes differentiate between controlled cognitive processes, which are carried out consciously and intentionally, and automatic cognitive processes, which are not under conscious control. Controlled processes require conscious attention, incurring a greater demand on our cognitive resources and limiting the amount of work we can complete at once. Automatic processing takes place when we carry out tasks that are either very simple or, in our eyes, so well-practiced that we can finish them without paying attention. Therefore, attention, as a part of cognitive process, is important for choosing information of interest and processing huge amount of information, particularly when it comes to distinguishing a product packaging from rival products. As everyone knows, good design can catch the attention of consumers and create strong competitiveness in the target market (Pathak, 2014; Theobald & Winder, 2006; Karmakar & Chowdhury, 2022).

2.3 Perceptual affordances

The term affordance was initially used by Gibson (1977), a cognitive psychologist, in his attempts to describe how people perceived the world around them. Affordances, in Gibson’s terms, could be defined as the cues (or clues) that we use to make sense of the world around us. Physical objects can serve a variety of functions. A rock can be moved, rolled, kicked, thrown etc. The set of possible actions is referred to as the affordance of the object. Affordances provide strong clues to the operation of things: handles are used for lifting and carrying, while lids are used for opening (twisting). When affordances are utilized, the user knows what to do just by looking: no pictures, labels, or instruction is required. Complex things may require explanations, but simple things should not. The design has failed when simple things require images, labels, or instructions. When it comes to the consumer-packaging relationship, consumers must be able to pick up a packaged product and open it without having to think about how to open it or even where to begin opening it. The affordances indicate to us, subconsciously, properties and functions that may not be explicitly stated but are there to be perceived very quickly. When a person

picks up a packaging to open it, the same object may provide different affordances (in this case, cues as to how it might be opened) to different people. However, knowledge of human perceptual processes, capabilities, and limitations, as well as experience with social processes, can be used to predict the most likely interpretation of opening affordances for a specific target consumer group. Affordances should lead the consumer subconsciously to the correct conclusions in terms of opening the products quickly, easily, and safely. Affordances may also be defined as true or false, with true affordances indicating that the packaging texture, shape, colours, etc. provide cues that will, if followed, allow the packaging to be opened easily. As an alternative, packaging that is challenging to open might have misleading affordances (false affordances), which would mean that the majority of customers would be actively misled into attempting to open the packaging incorrectly by the cues provided. False affordances are frequently the main offenders in a poor design. If consumers are unable to figure out how to open packaging or use a product, it should be regarded as having a defective design. However, poor design can also include packaging that incorporates true affordances, but are beyond most consumers' physical capabilities to open - for example, the opening of jar lids, which is often discussed as a problematic action (Yoxall et al., 2006; Chang, Hoa & Su, 2008). In this case, it is obvious how one should open them, but the physical act of doing so is frequently extremely difficult. Consumers will naturally and intuitively know how to open the packaging and be able to do so without having to read any instructions if the packaging has been well designed and displays true affordances (Theobald & Winder, 2006).

2.4 Human errors

Errors in human behaviour are classified into two types: slips and mistakes. The difference between the two is that mistakes are committed on purpose, usually due to a mistaken belief that what the person is doing is correct. Slips, on the other hand, are the result of automatic (or automated) behaviour, which occurs when an individual's goal is correct but there is an error in carrying out the actions required to achieve the goal (Theobald & Winder, 2006; Karmakar & Chowdhury, 2022). It is conceivable, when applied to consumer behaviour, that cognitive limitations could result in errors when opening a packaging. This could happen in one of two ways: first, the consumer might use automatic processing because they are so accustomed to performing specific actions when opening packaging that they experience error due to lack of controlled processing of task-related information. Second, the majority of packaging is opened by customers who are occupied with various other activities, like listening to the radio. Distraction while opening packaging can result in accidents or errors. Some of the factors that can cause error are demographic traits, skills, training, experience, emotional state, and stress (Nemeth, 2004). Misleading information especially in combination with wrong assumptions are likely to induce errors. The nature of the packaging design may also, as previously mention, lend itself to errors. Designers should take the time to simulate any slips that could occur as a result of trying to open and use packaging, and they should then work to change the designs to lessen or completely eliminate the occurrence of such slips.

3. VERBAL AND VISUAL STIMULI OF THE PACKAGING

As self-service marketing grows in popularity, providing adequate product information to customers is becoming increasingly important. It contributes to the creation of a positive brand image, a positive perception, and a compelling reason to purchase a product (Pathak, 2014; Reimann et al., 2010). Fitzsimons et al. (2002) argue in a review paper that consumer choice behaviour is a mix of conscious and unconscious influences, with nonconscious influences playing a significant role. Nonconscious influences are defined as stimuli that the consumer does not consciously perceive, the consequences of consciously perceived stimuli, and decision-making processes that take place completely outside of awareness (Pathak, 2014). According to Kollöffel (2012), consumers tend to rely on information that can be presented either as verbal or visual stimuli. The way information is processed is determined by an individual's thinking style which differs among consumers and according to Witteman et al. (2009) can be divided into intuitive and rational (Kollöffel, 2012; Kahneman, 2003). Intuitive style is defined as automatic, fast, effortless, implicit, and associative processing that involves emotions and is guided by habits. The rational style characterized by reasoning requires slow, laborious, and serial deliberation and processing, which occurs more consciously (Overduin, 2016). Silayoi and Speece (2004) proposed that visual elements of packaging trigger emotional responses while verbal elements trigger cognitive responses during the purchasing decision-making process.

3.1 Visual stimuli

According to Silayoi & Speece (2007), visual stimuli comprise the product design through graphics (e.g. colour, typeface, images) and structural elements (e.g., shape, size, and materials) (Pathak, 2014). They attract attention, evoke sensory expectations, affect perception, and transmit and communicate the companies' messages and its underlying meaning (Chrysochou & Grunert, 2014; Underwood, Klein & Burke, 2001). Visual stimuli have the ability to produce emotions and related physiological responses, they are associated with the emotional component of the decision-making process and those stimuli are often noticed prior to verbal packaging information (Underwood & Klein, 2002; Silayoi & Speece, 2007; Becker et al., 2011). These stimuli frequently have a greater impact than verbal ones and can change a consumer's decision to buy a product (Underwood, Klein & Burke, 2001). For instance, a picture can process sensory data through imagery and produce a complete mental image of the product (Underwood & Klein, 2002; Underwood, Klein & Burke, 2001). A picture could inspire people to imagine what the product would taste like (Olson & Mitchell, 2000). Colour also has the power to influence how people feel or act. For instance, the colours blue and green evoke feelings of security and calm, red and yellow evoke feelings of warmth and cheerfulness, and black is viewed as a symbol of power. Thus, consumer behaviour can be influenced by using suitable colour in packaging design (Pathak, 2014).

3.2 Verbal stimuli

Verbal stimuli include information about the product, its attributes and the packaging technology. Packaging technology transmits information about e.g. the degree of environmentally friendly material. The verbal stimuli are more associated with the cognitive part in the decision-making process (Silayoi & Speece, 2007). According to Verbeke (2008), consumer choices are greatly influenced by information. Nowadays there is an increased attention towards packaging labels (Silayoi & Speece, 2007). This result might be explained by a growing awareness regarding the wellbeing. It is essential to provide a balanced amount of information on the labels since insufficient information might be inaccurate and misleading, while too much information might cause confusion, misuse, misunderstanding, and indifference (Grunert, 2002; Silayoi & Speece, 2007). Additionally, too much information may cause cognitive overload due to limited information processing capabilities (Chrysochou & Grunert, 2014).

4. CONCLUSION

The packaging gives an opportunity to attract and influence potential consumers. Besides being the first impression consumers obtain of the product, packaging is also the last impression before the final purchase decision. By incorporating cognitive ergonomics in packaging design, consumers' attention can be drawn to the product, and ultimately, they could be persuaded into purchasing it. Even more importantly, if the packaging design is in line with the cognitive abilities of the consumer, it will ensure a good user experience, affecting the brand's leadership potential. Cognitive ergonomics ensures that a product's use corresponds to its users' cognitive abilities by utilizing visual information clearly and effectively, allowing the packaging to be used intuitively and easily. The cognitive ergonomics of packaging assists the target demographic in meaningfully understanding and distinguishing one brand from another, as well as associating themselves with the product.

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