

THE VALUE OF UNINTENDED HUMAN BEHAVIOUR IN EVERYDAY PRODUCT DESIGN

Zulkarnian HASSAN, Shahrman ZAINAL ABIDIN, Rusmadiyah ANWAR and Verly Veto
VERMOL

Formgiving Design Research Group, Universiti Teknologi MARA, Malaysia

ABSTRACT

Everyday product design strives to identify a fit between people and technology towards higher usability and more human-centric design approaches regarding product concept ideation. Notwithstanding, limited discussions on unintended human behaviour in interaction design studies and ambiguous methods to interpret the daily phenomena in design activities deter a sound understanding of human-product interaction and communication: a vital criterion for designer's education purpose. This study aims to disclose a pattern of unintended behaviour design (UBD), emphasize its values from various multidisciplinary design expert viewpoints, offer novel design thought parameters concerning everyday design, and expand the current body of literature on design education to develop innovative everyday product designs.

Keywords: Unintended human behaviour, everyday product, user experience, interaction design

1 INTRODUCTION

Individuals interact and communicate with multiple product types for various purposes daily. For example, empty bottles are innovatively utilized to separate egg yolks from their whites, Coca-Cola is employed as a substitute for household cleaning detergents and wire hangers are transformed into disposable towel holders. Such inadvertent discoveries render human life as meaningful and convenient rather than the creations derived from empirical trial-and-error studies. Specifically, a washbasin could be used beyond its intended purpose of washing hands and faces to clean clothes, bathe babies and take ablutions (for Muslims). However, non-designers unintentionally engage in the creation of novel functions with innovative product usage (see Figure 1) [1].



Figure 1. Example of unintended use of product in everyday contexts

Everyday design is not a novel phenomenon in design-oriented studies with a fair acknowledgment of diverse design concept connotations. Regarding the term 'everyday design' under unselfconscious design, users inadvertently employ present product functions in novel ways for goodness of fit [2]. Suri [3] coined the term 'everyday thoughtless acts', which implies perceptions of intuitive designs and individual behaviours and experiences for optimal ideas and alternatives. The notion was then empirically explained as unexpected behaviour [4], designing for appropriation [5], unorthodox use [6], non-international design, design by use [7], and unselfconscious interaction [8].

The design process is perpetuated through projects, re-usage, customization, appropriation, do-it-yourself, and everyday designs without undermining designers' intentions [9]. Design activities that strive to attain a specific objective in specified circumstances extend beyond designers to other relevant and professional design and non-design areas. Users are acknowledged as 'actors' in everyday product development following the interest and enthusiasm in designing user experience, which leads designers to holistically comprehend and interpret human behaviours and interactions by examining unforeseen

elements with the potential to inform the product development team. The widely-utilised everyday design notion by scholars relates to human behaviour where users consciously (or unconsciously) and intentionally (or unintentionally) engage with everyday objects. This study employs the term ‘unintended behaviour design’ or UBD to emphasize its attributes. Unintended behaviour denotes (i) inadvertence as a purpose or goal without deliberate intention (ii) or an impromptu behaviour demonstrated without planning. In Leon Seltzer, “the state of mind that gives rise to creativity does not occur consciously and critically but occurs when the mind is unconscious, not evaluating, unintentional or spontaneous” [10]. Notably, research on unintended human behaviour towards product usage remains lacking compared to the intended counterpart. The ‘unintended behaviour’ underpinning human activities could potentially be factored into product design strategies. Based on past research, the UBD impact on user-designer proves to be ambiguous following a lack of strategy in comprehending user interpretation and behaviour from designer viewpoints. Given that the paucity of such discussions cause designers to disregard its potential and value, this study attempts to justify UBD values together with the key determinants of everyday product design. The proposed study would elaborate on implicit user interpretations of individual behaviours from designer perceptions to recommend how designers could examine the other side of human values and expand their design thoughts to another level.

2 AIMS AND OBJECTIVES OF STUDY

This study strived to present (i) a novel design thought parameter, (ii) guidelines for new product development, (iii) the expansion of design education, (iv) a sound comprehension of user response, and (v) the exploration of design-based activities towards unintended human behaviour-mainstream product interactions within an impromptu setting. The current study also aims to determine the (i) key determinants and characteristics of unintended use interactions in daily life and (ii) explore designers’ interpretations and responses towards unintended use behaviour interactions. The reasons underpinning unintended use reasoning in design activities would be further assessed to facilitate designers’ interpretation in product design conceptualization. The researchers would also identify the viability of establishing a UBD guideline encompassing approaches, methods, and skills for designers’ guidelines.

3 RESEARCH BACKGROUND

3.1 ‘Unintended behaviour’ from psychology perspectives

Gibson’s [11] book, ‘The Ecological Approach to Visual Perception’, presented the term ‘affordance’ in psychology to justify people’s environmental perspectives based on the possibilities for action through object and space affordance, which are reliant on users’ physical capacity. Affordance implies user competence with an object. For example, a pair of pliers enables users to perform specific actions: tightening and opening, knocking, and throwing. In the design community, Norman [12] coined the term in his book, ‘Psychology of Everyday Things’, where object ‘affordance’ denotes users’ perceivable action possibilities as a novel potential. Nevertheless, Gaver [13] rectified the misconceptions entailing the Gibson-Norman affordance connotation through his framework: false affordance exists when action is palpably depicted despite its impossibility. Figure 2 illustrates the affordance theory and how an object facilitates user actions that differ from its intended function.

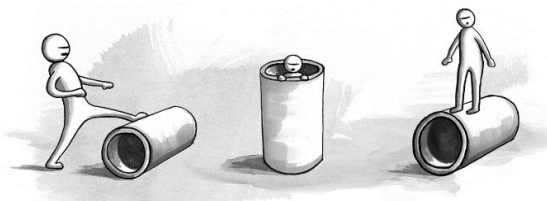


Figure 2. The concept of affordance

Unintended behaviour demonstrates similarities in the given context where object-oriented capacities cause inadvertent usage. Nevertheless, both connotations require due consideration in the design process as the action could only be performed if the object permits it and the user is cognizant of its competence. Based on human creativity-oriented studies, human (locus of control and metaphoric thinking capacity) and situational (time restrictions and situational engagement) elements impact daily interactions: intended behaviour, creative consumption, self-expression, and experience [14]. Individuals would plot object performance possibilities based on their model concept of object performance. The affordance

concept denotes object attributes and human interactions to implicitly create the potential actions associated with perception and ability. People create novel object competence to complement their requirements across other settings in the wake of affordance under UBD. Such capacities could catalyse novel design possibilities and insightful ways for designers to develop a specified purpose.

3.2 Research on human interaction and behaviour factor of everyday product

The term ‘interaction design’ was derived from a user interface design-software integration in the early 1980s. Nevertheless, recent research contended the aforementioned connotation to be a common misinterpretation where interaction-oriented designs solely concern software interface and its subsequent intricacies [15]. The interaction process occurring in daily routines motivates people to engage with, adapt to, and internalize their immediate environment. Essentially, interaction design aims to foresee individuals’ product usage, experience modification, and self-designing. Norman’s book, ‘The Design of Everyday Things,’ presents three design levels: visceral, behavioural, and reflective. Specifically, “the interaction at behavioural level is the home of learned skills, triggered by situations that match the appropriate patterns. Actions and analyses at this level are largely subconscious. Even though we are usually aware of our actions, we are often unaware of the details” [12]. The behavioural level denotes the controlled element of unconscious human actions that perform situational assessments to develop a goal-based approach that could be effective in the short run with minimal actions. Behaviour design entails usability, usage effectiveness and pleasure, performance, and object workability. Notwithstanding, designers themselves struggle to outline their association with relevant experiences and predict product functionality. The process of transforming and appropriating objects from design has expanded the current body of knowledge across multiple disciplines in interaction design for the past years [9]. Although design-based studies serve to explore how individuals interact with designed objects using observation and analysis, new functions, and innovative and creative re-use, the interaction did not occur parallel to designer intentions following insufficient resources, human factors, daily experiences, and specified contexts. Although most scholars are positively conscious of creative product behaviour for novel functions [16][17], the designed artifact is utilized as opposed to designers’ initial plans or expectations following an inadequate comprehension of everyday design towards unintended behaviours. Design engineers opine that the design principle for creative unintended use could be significantly developed and applied to complement future design works. The experience of emergent behaviours during product interaction would project future potential values for designers.

3.3 Significance of unintended human behaviour in design research

Human behaviour denotes human-environment connections with the potential to express mental, physical, and social capacities and address internal and external stimuli throughout their lifespan. Unintended behaviour is a psychologically-controlled physical activity encompassing potential human creativity and innovation in daily interactions. Suri’s book implies that “things like unintended way usually indicate something about people’s need that designer should take for granted to translate into design opportunities” [3]. Furthermore, users create novel and multi-uses that imply the extent to which people accept novel notions and make innovative and autonomous decisions following their experience and that of others through unintended behaviour. Creative use (unintended behaviour) denotes problems integrations to resolve novel notions [18] and experience new sensations based on use innovativeness-oriented studies [19]. Hirschman [20] proposed the use innovativeness model constituting three primary elements and two behavioural types while creatively employing a current product: (i) various product usage in its context (multiple use) and (ii) product usage outside its context in unintended ways (creative re-use) (see Figure 3).

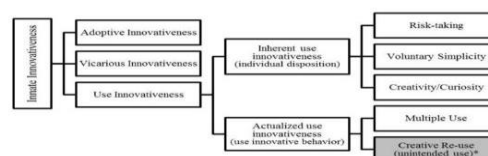


Figure 3. A use innovativeness model

The UBD could not be separated from design education albeit its distinction from professional designs given its part in education. From professional designers’ assumptions, UBD allocates artifacts for alternative usage, which only depicts designers’ misconception of multiple contexts or the designer-user

intention gap. Although UBD merely offers design prerequisites for designers, relevant research is deemed pivotal as designers could not foresee dynamic design usage and contexts. Thus, people are entitled to customize an artifact following their needs. As UBD is a more valuable design resource to be employed with other counterparts (personal experience) compared to novel creations, the proposed study would examine the UBD value in design activities within a broader setting.

3.4 Design for behaviour change

Individual wrong behaviour leads to larger-picture social issues, which all too often struggle with taking actions that are not the result of a lack of motivation or information. The intention-action gap refers to the large gap that exists between people when one's values, attitudes, or intentions don't match their actions. In behavioural change research, people always struggle to turn their motivation into action or to make good decisions. Behavioural science studies in product design help designers understand how users think and how their minds work. To intentionally change behaviour in the best interests of the users, a thorough understanding of how their minds work should be developed. They perform optimally in the wrong context, which can lead to cognitive biases and unintended behaviour or unexpected decision making because of limited attention, memory, and willpower of the user. It demonstrates that the intention-action gap occurs as a result of user minds and environmental influences. There is no such thing as a neutral design. The contextual environment heavily influences user decisions and behaviours. Environments and objects with which users interact should be thoughtfully and carefully designed in order to make the process intentional and beneficial to the people in lines with current design education.

3.5 Interpreted human experience through designer hermeneutic perspective

Martin Heidegger's hermeneutic circle concept (1927), envisions the whole in terms of the reality underpinning an individual's enriched experience on a daily basis. Gadamer further denoted hermeneutic as "the anticipation of meaning or an iterative process based on the horizon of understanding, prejudice, and conversation as a model of understanding [21]. The hermeneutic circle approach in the design process, which constitutes any form or product, denotes the past circumstances of both designer and artifact that constituting the meaning of human experience, mitigation of prejudice, and expansion of the designer's horizon. Designers are aware of the potentially misleading past experiences following human experience despite multiple predictions on product functionality strategies. As such, designers are required to integrate hermeneutic skills and attain congruence between (i) creativity, technologies, and human behavioural interactions and (ii) user's perceptions of daily experiences rather than interpreting personal intentions. Overall, utilizing a product as a medium for user response provides a broad viewpoint for designers parallel to Cross [22]. Interpreted user behavior might include functional quality, performance, efficiency, and ergonomics following Crilly's [23] elaboration on Mono's semantic functions (product factor: form and material) - description, expression, exhortation, and identification. Mono's communication process model outlines product-user communication strategies through transmitted meaning (an optimal conversation) for designers to learn the origins of a personal memory system and ascertain the presence of inspiring, challenging, and expansive ideas with the hermeneutic circle [21]. In this vein, a design functions to translate user needs through hermeneutic circle and interactions with the designer under Shannon and Weaver's model.

4 PROBLEM STATEMENT

Products are regularly employed in multiple ways as opposed to their original functions intended by the designer [1]. Unintended product use implies a daily conversion from normal to abnormal phenomena regardless of person and place [4]. Following Wongkitrungrueng [24], unintended behaviour is regularly disregarded by multiple designers. Product usage satisfaction and dissatisfaction might be portrayed in implicit product functions through unintended behaviour, which is unaddressed by scholars, designers, and organizations, rather than explicit counterparts. Based on Dix [5], an intended use (by designer)-actual use (by users) gap was determined following creative misuse owing to various aspects. The ignorance of intended functions instigates two implications that are deemed disrespectful to designers: i) positive values and ii) negative and risky impacts for users. The situation suggests there is a huge communication gap between users-designers. The question of why designers ignore unintended behaviours in the design process will unravelled from their perspectives. Hence, the UBD context needs to be duly expanded in the design process stages to benefit designers, users, and product sustainability and address the paucity of relevant scholarly discussions: an inevitable gap that must be addressed.

5 UNDERSTANDING SIGNIFICANCE FACTORS BASED ON LITERATURE

The substantial aspects entailing UBD value with potential contributions in designing everyday product design are duly revealed. The discoveries here are presented under the study background (i) integrating and interpreting designs and users in every design activity remain ambiguous despite multiple relevant studies, (ii) the human-centred design concept with individual experience is a broad phenomenon that complements people's requirements through a holistic comprehension of behaviour, interaction, psychology, and environmental aspects, (iii) the UBD value should be included as a design requirement in the design process to successfully envision the user-based design concept, (iv) user-oriented and user experience design concepts for design interaction ideas prove to be more valuable than designers' hermeneutic skills, and (v) a critical study should be performed to assess how designers interpret a user's idea by integrating the UBD value in mainstream products through designers' sketching activities.

6 PROPOSED RESEARCH METHOD

A qualitative study would be conducted using a descriptive research design to (i) address pertinent questions and (ii) assess the elements frequently incorporated by product designers in the industry and academicians with emphasis on designers' interpretations of unintended human behaviour values in idea creation through summaries in the literature review. The first approach implies a semi-structured interview session involving local respondents through verbal protocol analysis to examine the key determinants of unintended behaviour in everyday activity. Local product design experts would be interviewed to denote the UBD value and answer why most designer disregards it. The next approach involves naturalistic video observations for data gathering on inherent gesture patterns in unintended human behaviours towards a particular product. Empirical research would parallel users' psychological activities during product interaction. Respondents would be arbitrarily involved in the simulation session of how and why their unintended behaviour occurs towards a specified product based on the designer-controlled environment. This study primarily aimed to aid designers' interpretation of inadvertent behaviours and gesture patterns. The final approach entails video observation and verbal protocol assessment that would be conducted with a sketching activity. The product design experts are required to comprehend the reasons underpinning unintended behaviour and how users could experience the product during this experiment. This technique strived to observe the degree to which product designers interact and communicate with visual language by sketching [25] in the design following the UBD value. Data validation would be conducted with the perceptual product experience (PPE) framework [26] entailing two dimensions (presentation and representation), which involves a presentation on the direct stimuli ability related to experience, interpretation, comprehension, and recognition. Interactive elements, behavioural response, and experience are significantly associated with the presentation dimensions in the proposed study setting.

7 CONCLUSIONS

Designers function as actors who are explicitly engaged in the design process and accountable for their parameter development in design thought by perceiving all the significant opportunities and potentials by exploring and evaluating unintentional human behaviour. The examination of such a phenomenon and its intricacies would induce positive outcomes in product design and other disciplines following past study statements. An in-depth exploration would motivate designers to focus on user experience designs encompassing daily behaviour and interaction. Specifically, a critical descriptive study is necessary to support the argument and affirm the potential in designers' design process. Unintended behaviour remains significant in generating novel ideas and comprehending potential human needs despite inconsistent opinions owing to the complexities in determining unintended behaviour responses within human cognition. Behavioural research under the design process would leverage design education in resolving the issues pertaining to daily behaviour and interaction towards built intuitive designs, user experiences, and understanding user unintentional behaviour with mental, physical, and thought-based interpretations. Unintended behaviour has reflected its distinct value, which has been constantly disregarded by designers who should perceive implicit user requirements by observing their behaviours for innovative design education concepts. Notably, empirical contributions from multiple disciplines, including behavioural science result in multiple methods entailing the multidimensionality of product experience given the shift in design research trends from intended design to human experience.

ACKNOWLEDGMENTS

This research is gratefully supported by Universiti Teknologi MARA [Grant number: 600-IRMI/FRGS 5/3 (463/2019)] and Ministry of Education Malaysia under the FRGS Scheme [Sponsorship File no: FRGS / 1 / 2019 / SS107 / UiTM / 02 / 8].

REFERENCES

- [1] Kim S., Christiaans H., and Kim C. Understanding Everyday Design Behaviour: An exploratory Experiment. *International Journal of Design*, 2021, Vol. 15(1).
- [2] Alexander C. Notes on the synthesis of form. *Cambridge, MA: Harvard University Press*. 1964.
- [3] Suri J. F. Thoughtless acts? Observations on intuitive design. San Francisco, 2005.
- [4] Brandes U. and Erlhoff M. Non-intentional design. *Daab*. 2006.
- [5] Alan D. Designing for appropriation. In *Proc. BCS-HCI*, 2007, pp. 27–30.
- [6] Hentschel C. Unorthodox Use: TRIZ for Non-intended Product Use, *The TRIZ Journal*. 2008.
- [7] Brandes U., Stich S. and Wender M. Design by use. *Basel, Switzerland: Birkhäuser*. 2009.
- [8] Wakkary R., Desjardins A. and Hauser S. Unselfconscious interaction: A conceptual construct. *Interacting with Computers*, 2016, 28(4), 501-520.
- [9] Desjardins A. and Wakkary R. Manifestations of everyday design: Guiding goals and motivations. In *Proceedings of the 9th ACM Conf. on Creativity & Cognition* New York, 2013, pp. 253-262.
- [10] Dan S. The Psychology of Spontaneity: Why Some People Drop Everything and Go By. July 22, 2015. <https://www.elitedaily.com/life/culture/spontaneity-drop-and-go/1130284>
- [11] Gibson J. J. The theory of affordances. In Shaw, R., Bransford, J. (Eds.), *Perceiving, acting, and knowing: Toward an ecological psychology*. Hillsdale, NJ: Erlbaum. 1977, pp. 67-82.
- [12] Norman D. A. The design of everyday things. New York, NY: Basic Books. 1988.
- [13] Gaver W. W. Technology affordances. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, New York, NY: ACM. 1991, pp. 79-84.
- [14] James E. B. and David G. M. Exploring Antecedents and Consequences of Consumer Creativity in a Problem-Solving Context, *Journal of Consumer Research*, 2004, 31(2), pp. 402-411.
- [15] Kamil M. M. J. and Abidin S. Z. Unconscious Human Behaviour at Visceral Level of Emotional Design, *Procedia-Social and Behavioural Sciences*, 2013.
- [16] Selvefors A., Rexfelt O., Renström S. and Strömberg H. Use to use: A user perspective on product circularity. *Journal of Cleaner Production*, 2019, 223(20), pp. 1014-1028.
- [17] Haug A. Defining ‘resilient design’ in the context of consumer products. *The Design Journal*, 2018, 21(1), pp. 15-36.
- [18] Ridgway N. M. and Price L. L. Exploration in Product Usage: A Model of Use Innovativeness: *Psychology & Marketing*, Vol. 11 No. 1, 1994, pp. 69-84.
- [19] Abidin S. Z., Bahari S. A., Ibrahim A., Ghazali A. E. M., Ahmad M. A., Mujir M. S., Delgado M. V. B., Zbiec M., Garrido J., Ortega J. J., Gómez M. V. G., Ratnasingam J., Hashim R., Zakaria S. and Amin M. N. Z. M. (2021). Analysing the Malaysian Higher Education training offer for furniture design and woodworking industry 4.0 as an input towards joint curriculum validation protocol. *Asia Pacific Journal of Educators and Education*, 36(1), 1–24.
- [20] Hirschman E. C. Innovativeness novelty seeking, and consumer creativity, *Journal of Consumer Research*, 1980, vol. 7, pp. 283-295.
- [21] Timmer S. (2015). Hermeneutic for Designer. <https://www.uxbooth.com/articles/hermeneutics-for-designers> By July 22, 2015.
- [22] Cross N. *Designerly ways of knowing*. London: Springer. 2006.
- [23] Crilly N. *Product aesthetics: representing designer intent and consumer response*. Thesis, 2005.
- [24] Wongkitrungrueng A. Exploring how and why consumers create unintended uses of products. *International Journal of Business Innovation and Research*. 2018, 16(4) pp. 453.
- [25] Toyong N., Abidin S. Z. and Mokhtar, S. (2021). A Case for Intuition-Driven Design Expertise. In A. Chakrabarti (Ed.), *Design for Tomorrow - Proceedings of ICoRD 2021 Volume 3* (pp. 117-131). (Smart Innovation, Systems and Technologies; Vol. 223). Springer Science and Business Media Deutschland GmbH.
- [26] Abidin S. Z., Warell A. and Liem A. The significance of form elements: A study of representational content of design sketches. In *Proceedings of Conference on Creativity and Innovation in Design*. 2011, pp. 21-30.