Synomorph of Behaviour Setting in Architecture Enhance the Green Design

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Abstract. This paper intends to discover how the synomorph of behaviour setting in architecture could enhance the green design, with respect to space usage satisfaction and idleness of space. This research carried out through desk study and descriptive methods, as continuation of author earlier researches. Behaviour setting of a space exists as soon as a synomorph (same in structure and shape) between standing pattern of behaviour of user and physical milieu of space meet in circumjacent, a kind of fittingness. Barker developed behaviour–setting theory to explain small–scale social system, as well as the study of behaviour in its natural environment. Barker defines behaviour setting as independent units of space, with temporal and spatial boundaries, that have great coercive power over the behaviour that occur within them. The synomorph occurs in a behaviour setting offering fittingness between behaviour and the setting that could enhance the setting. The aim of this study encourages the architects to always consider to achieve synomorph in their space designs; the synomorph besides could increase space user’s satisfaction as well the value of spaces so that architects could avoid the idle space as one of codes in the green design.

1. Introduction
Architects, urban designers, and planners nowadays have been facing the very vast growing cities within the needs to delve in green paradigm designs and plans. They have to face these things together with respective responsibilities, though they are still bonded in either a spatial system or not that formed the cities.

In fact, there are many theories concern about spaces, both indoor and outdoor. Concerning outdoor space, Ashihara has differed positive space comprehended as a planned space provides as functional and has clear boundaries, which considered developing centripetally. Whilst negative space, comprehended as extendable space and does not provide specific functional, has no clear boundaries, which considered developing centrifugally. Basically, indoor positive and negative space has similar paradigm. Positive space considered as provides specific functional, negative space considered as does not provide specific functional [5]. In other side, spatial behaviour offering a stage called synomorph. The stage of synomorph (similar in structure and shape), is the stage when “standing pattern of behaviour” circumjacent “physical milieu”, in short behaviour circumjacent physical milieu, considered as the best performance of space as behaviour setting. Circumjacent means surrounding (enclosing, environing, encompassing) [6].

Barker has developed behaviour–setting theory to explain small–scale social system, as well as the study of behaviour in its natural environment. Barker has defined also the behaviour setting as independent units of space, with temporal and spatial boundaries, that have great coercive power over the behaviours that occur within them [6]. Barker was not happy with the dominant tradition of laboratory. The research only focuses on artificially controlling and isolating the parameters of
behaviour. Barker was rather keen on studying behaviour “in situ” or in “real situations”, with all the complexity of factors that shaped it. Social systems theory, in social science, is the study of society as a complex arrangement of elements, including individuals and their beliefs, as they relate to a whole (e.g., a country). While social architecture is the conscious design of an environment that encourages a desired range of social behaviours leading towards some goal or set of goals. Based on those extents this study will be in architectural scale.

Green architecture offers many benefits, to be exact financial benefits that will not happen in conventional buildings. The benefits include energy and water savings, reduced waste, improved indoor environmental quality, greater employee comfort means productivity, reduced employee health costs, and lower operations and maintenance costs [5]. This study more relates to indoor and outdoor space usages, carried out through literature studies and performed in descriptive manner. The aim of this study invites the designers, should keep achieving the synomorph in every space design in various scales.

2. Method
This study is performed over and completed by literature review including the author’s earlier researches, and presented in descriptive manner [1], [2], [10]. This research is part of similar studies and researches carried out earlier by author intentionally. Hopefully in the future, the study could be continued in more rigorous way and give contribution to green architectural designs, usage satisfaction and space quality at the most.

3. Results and Discussion
Relationships between space, time, and the manner of people towards space and time are considered as spaces we face nowadays, and not merely positive and negative space and others space theories concerning just physical component. Recently, the space concept is delineated in relation with time, spatiotemporal. Understanding the space concept, physical spatial elements should be introduced, besides thoughts toward space and time should be analyzed by environmental psychology. Spatiotemporal passed on place is differentiated from the space concept; this could also mention that place attachment is initiated with the certain time spending in a certain space. All these concepts are the major concerns in understanding the human needs and wellbeing of oneself in an environment [1].

3.1 Synomorph of Behaviour Setting
Behaviour setting consists of one or more standing patterns of behaviour. The setting includes physical milieu which exists independently of anyone's perception of the setting. This physical milieu is circumjacent to the behaviour; it is also synomorphic with behaviour. Behaviour–milieu synomorph (same in shape and structure), is short term of “standing pattern of behaviour”—“physical milieu” synomorph. The synomorph is a condition when interdependency occurs between behaviour and milieu forming behaviour setting. The stage of synomorph, “standing pattern of behaviour” circumjacent “physical milieu”, in short behaviour circumjacent physical milieu, considered as the best performance of behaviour setting [8].

The positive standpoint of behaviour setting is the fact that physical science has avoided phenomena with behaviour as a component, and the behavioural science has avoided phenomena with physical things and conditions as essential elements. This far we only have sciences of behaviour–free objects and events (ponds, glaciers, and lightning flashes), and we only have sciences of phenomena without geophysical loci and attributes (organizations, social classes, roles). We lack a science of things and occurrences that have both physical and behavioural attributes [2]. Only some researchers have paid attention to the weight and the influence of the architectural environment over one’s psychology. Furthermore, anthropological, sociological, and psychological researches have reduced some of the mysteriousness of human behaviour but much remains unknown [1].

Behaviour settings are such phenomena. They consist of behaviour–and–circumjacent–synomorphic–milieu entities. We call these parts of a behaviour setting, behaviour–milieu synomorphs or more briefly, synomorphs. The milieu is synomorphic to the behaviour (see Figure 1).
The formation of synomorph can be seen in Figure 2.

**Figure 1.** Diagram of behaviour–milieu or milieu circumjacent to behaviour, called Synomorph, form
Derived from Barker (1987) in Schoggen (1989) [9]

**Figure 2.** Diagram of Forming Synomorph. “Standing Pattern of Behaviour” circumjacent “physical Mileu” from synomorph, the Stage When a Space Becomes a Behaviour Setting. Derived from Barker (1987) in (Schoggen, 1989) [9].
3.2 Synomorph Spatiotemporal Phenomenon

As mentioned earlier, Barker has defined also the behaviour setting as independent units of space, with temporal and spatial boundaries, that have great coercive power over the behaviours that occur within them.

A behaviour setting exists at the interface between the standing patterns of behaviour and physical milieu, wherein the behaviour is happening in the “milieu” and the “milieu” in some sense, matches the “behaviour”. In technical idiom, the "behaviour–milieu interface" is called the synomorph, and the “milieu” is said to be circumjacent and “synomorphic” to the “behaviour” [8]. The synomorph deal with various space phenomenon; both of indoor outdoor. Small, middle, and large-scale society spaces, as well as space in time besides spaces or buildings embraced within activity system. Stage of behaviour settings respect to user satisfaction and avoid idleness of spaces. Following some synomorph phenomenon in various scales which derived from Barker’s.

3.2.1 Dental Office

"Patients get their cavities filled" in a dental office. That condition is standing pattern of behaviour because patients are in the office (the physical milieu) surrounds them, i.e. circumjacent. The pieces of the physical milieu fit the standing pattern (the drill is meant to fit in mouth and drill tooth), i.e. synomorphic with the behaviour. Further, to be considered a behaviour setting, this behaviour–milieu parts or synomorphs must have a specific degree of interdependence that is greater than their interdependence with other parts of other settings. An empirical test can determine the relative vigorousness of behaviour settings, depending on the index of interdependence between and among specific standing patterns of behaviour. By itself, a standing pattern of behaviour is meaningless; it would be like watching a person pretending to go to the dentist's office and having a cavity filled. Also, a dentist's office without possibility of patients would be a meaningless artefact [6] (see Figure 3).

![Dental Office](https://floss365dental.com/wp-content/uploads/2019/10/floss365Dental.jpg)

**Figure 3.** Dental Office [6]

Source: [https://floss365dental.com/wp-content/uploads/2019/10/floss365Dental.jpg](https://floss365dental.com/wp-content/uploads/2019/10/floss365Dental.jpg)

In this case synomorph occurs while a patient is being handled and also while the dentist handles their work related with dental care, both are in dental office and in respective time boundaries. Interdependence between behaviour and milieu within a behaviour setting which occurs in a space will make the space utilized in more precise and correct way, regard as could achieve user satisfaction in standpoint of fittingness and avoiding idleness of space.

3.2.2 Basketball Field
Basketball field and many other sport fields are other best examples of synomorph. The boundary of basketball field (physical milieu or soma component), the spectators and other attributes support the formation of physical milieu. The boundary of the field is boundary of the game (standing pattern of behaviour or behaviour component) as well, all players will act similar behaviour according to and restricted by the rule of the game. The synomorph occurs according to the carrying out of the events, spatiotemporal (see Figure 4).

Figure 4. Basket Ball
Picture Courtesy: Photo/ANTARA; FOTO/Sigid Kurniawan

In this case synomorphs occur while players are playing basketball and also while spectators watch the game, both are in basketball field and stadium, and in respective time boundaries. Similar to dental office phenomenon, interdependence between behaviour (players and spectators) and milieu (field and stadium) within behaviour settings regard as could achieve user satisfaction in standpoint of fittingness and avoiding idleness of space.

3.2.3 Synomorphs Interjacent of Department Store in Bandung
This case explains about separate physical milieus with respective similar behavior, shopping people and other supports activities, but is within one behavior setting. Department Store is a well-known department store in Bandung City, Indonesia. The department store has many branches which has a common storage. The department stores and the storage are separate and called synomorphs interjacent to the management of Department Store. The department stores and the storage structurally are discrete, but dynamically they are so interdependent in their functioning that, they are parts of the single behavior setting Management of Department Stores.

In this case, standing pattern of behaviour formed in each department stores and the storage. The physical milieu of department stores and the storage structurally exists separately in a network, and the synomorph achieve in single behaviour setting Management of Department Stores. This phenomenon regards as simplified to understand functional aspect of the department stores respect to user satisfaction, and no one of them will have idle space or building since they bind in a network.

4. Conclusion
Green building known as building that refers to architectural design and building construction that has minimum impact on the environment and gives numerous advantages. Among many others energy savings, it improves indoor environmental quality, and lower operation and maintenance costs. In the other side interaction between architectural design and human psychology is significant, but it remains largely unnoticed, even ignored. The correlation between architectural design and psychology is not only consequential moreover is bidirectional. In regard with energy savings, the design should not merely to encounter the physical environmental quality but also psychological environmental as well, such as synomorph which means the occurrence of circumjacent between standing pattern of behaviour (behavioral component) and physical milieu (somatic component) of behaviour setting. Both
components, behavioral and somatic, are not independently arranged; there is an essential fittingness between them. The synomorph cope with spatiotemporal phenomenon, also cope with both of indoor and outdoor small, middle, and large-scale society spaces. The synomorph respect to user satisfaction and idleness of spaces, besides could achieve space usage satisfaction it regards as could enhance the value of spaces either standalone space or space in system of activity, in order that could avoid the idle space as one of codes of the green design.

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References
[1] Abdel Moneim Abdel Kader, Walid. 2005. Architecture and Human Behavior Does Design Affect Our Senses? Faculty of Engineering, Cairo University, pp. 1.
[2] Abioso, Wanita Subadra. 2018: Research on Communal Space in Persistence at desa Adat (Pakeraman) Tenganan Pegringsingan in Pulau Bali Indonesia, Doctoral Dissertation, Institut Teknologi Bandung.
[3] Abioso, W. S., & Triyadi, S. 2017. The Behavior–Milieu Synomorphy of Communal Space in Desa Adat Tenganan Pegringsingan Bali Indonesia. International Journal of Architecture, Arts and Applications, 3(2), pp. 11.
[4] Alexander, C. 1977. A pattern language: towns, buildings, construction. Oxford university press.
[5] Ashihara, Yoshinobu. 1981, Exterior Design in Architecture, Van Nostrand Reinhold Company; Revised Edition, pp. 31–45.
[6] Stokols, D., & Altman, I. (Eds.). 1987. Handbook of environmental psychology, 2. Wiley.
[7] Lang, J. 1987. Creating architectural theory. The role of the behavioral sciences in environmental design.
[8] Popov, L., & Chompalov, I. 2012. Crossing over: The interdisciplinary meaning of behavior setting theory. International Journal of Humanities and Social Science, 2(19), pp. 18-27.
[9] Schoggen, Phil. 1989: Behavior settings, a revision and extension of Roger G. Barker’s ecological psychology, Stanford California: Standford University Press, 147–190.
[10] Ricci, Natali. 2018, The Psychological Impact of Architectural Design, Claremont McKenna College, pp. 3.
[11] Abioso, W. S. 2019. Invisible in Architecture Confront the Green Architecture. In IOP Conference Series: Materials Science and Engineering. 662(4), p. 042019.