keywords

System Theory, Cybernetics, Architectural Design, Game, Interfaces, Interactions, Generative Algorithms, Spatial Quality, Spatial Configuration

reflective.0

This paper is a network of 35 articles and their relations. Articles, based on the method that they adopt, are grouped in 4 categories: descriptive, analytic, synthetic, reflective. Articles are enumerated so the relation can be indicated between them [29]. The enumeration is not suggestive of any kind of hierarchy, priority or sequence. The relations are indicated with a bracket containing a number. Reader can follow (or not) the relation of his choice to find the next article to read [1].

descriptive

1. Glanville, accurately describes the design process as an aimless wander through the forests of wonderland. He claims that the design is that wonderful spot that the designer discovers in this forest [31] (Glanville, 1997). This forest is unknown and unlimited but the designer has pencil and paper with him (Glanville, 2007). With them the designer creates a circular relation, in which he draws the first lines and then he switches role and becomes the observer and then he looks at himself through the drawing lines [22]. He would reflect on those lines/himself not with reason or argument but with other lines so he again changes his role back to the observant [28]. As he carries on with this circular relation, the temporal boundaries of the observer and observant gets blurry [23].

2. Different thinking procedures can be described as such an oscillating system [1] of observer and observant [28], but the relevance of this concept to design is the intermediary medium of such a circular system, pencil and paper. They are external devices [7] which are the non-excludable part of this oscillating system. They will help the designer to be an observant by letting him draw and an observer by letting him see the lines.

3. The oscillating system [1] between the observer and the observant has been facilitated by the intermediary medium [2] that pencil and paper has formed. Through this project, I have tried to frame and utilize the computational medium as such an intermediary medium. Computational medium [14] which will enable
the designer to be an observer and computational medium which will enable him to be observant. This approach will introduce some possibilities [4][5][6] along with some adversities [7].

4. The computational medium [3] will enable us to keep a record of this conversation between the observer and the observant. This recordings will make the system more transparent and it will pave the way for further investigations into, first, the mechanisms which the designerly thinking is utilizing [25], second, the decisions behind certain consequences in design and last the weights of criteria through the decision making process [1].

5. In addition, the computational medium [3] will enable us to integrate the inhabitants [13] of the building, directly in the design process system and let them voice their concerns and preference. This will democratize the design process [16], meaning that it will move the designer away from the conventional omnipotent role [33] in the project [8]. Although, the designers position may get ostensibly unstabled [29], this mechanism will give him a role in overseeing [10] and curating [21] this system.

6. Furthermore, the computational medium [3] will enable us to integrate the environment [12] as an active element of the system and go beyond defining mere environmental standards and trying to adhere to them. Furthermore, it will enable the design to have a site specific strategy toward environment and it will also open a methodological gate to soft and hard sciences and their models of the environment.

7. The down side of the computational medium [14] is that usage of it is not as instinctive as pencil and paper, hence the interface of it needs to be as spontaneous as a pencil. Spontaneous in two senses; first, it needs to be immediate, meaning that the temporal distance between action and effect needs to be as close as possible to zero. Second, the interface needs to be structured based on an instinctive mentality [15]. This means that although the interface may not be simple but, given a fair amount of time of getting acquainted with the interface, the designer should be able to express himself and reflect on his actions smoothly through this medium. This quality of spontaneousness is necessary for observer and observant to become undistinguishable [1].

8. Through the computational medium, different people and different elements are integrated in a system and they are interacting with each other toward an
equilibrium [32] which describes an optimal state for the design [31]. This mechanism will make the design process more of a collaboration toward finding an inclusive synthesis, than an authoritative creation toward a self defined perfection [5]. Hence, I prefer to use the word game [9] to describe this system, since it will deliver the sense of playfulness and collaboration.

**analytic**

9. The game is the outermost layer of the system [26]. It includes all the elements and relations of the system.

[game]

10. The first element of the game is the architect. He is the observer of this system in a second order cybernetic sense of it. He is not a newtonian objective observer but a participating observer through the process.

11. The second element of the game is the architectural system [19]. The architecture (building [30]) will be a regulated representation [21] of the state of this system [31].

[architect] [architectural system] [game]

12. The first element of the architectural system is the environment. The intended meaning of the word “environment” is the more literal meaning of it as “anything that environs the architecture”. This element is going to be implemented as a dynamic computational model of the tendencies and behaviors of environment [6]. It is discernible that environment is a system of its own, including elements like greenery, sun, gravity, street, other buildings and etc which each of them is modeled as an agent interacting with each other and these models can be imported from different branches of soft and hard science [34].

13. The second element of the architectural system is the enironed. The intended meaning is “anything that the architecture will environ”, mostly users of the
architecture [5]. This element will be implemented as a geometric interface [17] that enables the inhabitants of the architecture to voice their opinions and preferences through the design process.

14. In the Glanville’s example, the intermediary medium [2] for the designer to act and reflect is paper and pencil [1]. Here I will use computation as the intermediary medium for in-system relations and inter-system relations [24]. The benefits of computational medium are that it will enable us to establish these multilayer system [25], hold up the relations [15] of them and then represent [21][30] it so we can reflect on the design, rules [21] and the system itself [1].

15. In this system, due to the essence of the computational medium [3], the relations are the vessels for transferring information between elements. This information is mostly transferred by two different type of dataframes, geometric dataframes [20] and ruleset dataframes [21]. A geometric dataframe stores data as the attributes of an object within a cartesian coordinate system. A ruleset dataframe, stores a logical expression of a certain guideline for interaction of geometric elements [17][18].

16. The most intrinsic relation is the relation of environed [12] and environment [13]. These two will form a circular control relation. Each of them needs to express its tendencies as information through a geometric dataframe [15] and transfer it to the other one. Here, the exchange of datasets is the conversation. Conversation will continue until the system reaches an equilibrium [32].

17. Environed [12], which is mostly the users of the space, will use a geometric interface to express his preferences of the size, configuration, quality and relation of spaces. Their preferences is then translated into the geometric medium and sent to environment.
18. Environment [13], which is a set of dynamic simulations of different natural phenomena, will receive geometric datasets and will process how much this will affect the context. Therefore, it will generate reactive forces if the effects are harmful. These forces will resize, reconfigure and change the spatial qualities that environed has specified. Then these geometric datasets will be sent back to the environed. Thus, the cycle will be completed.

![Diagram](environed) → ![Diagram](environment)


![Diagram](architectural system)

20. The computational medium [14] will provide the means to densify the conversation in time [7] and in space. In this sense the design process will be similar to architect-less [27] buildings in the primeval ages [26] with a difference that here the medium to transfer information is computational but back then the medium was physical [2]. Since the medium of this conversation is not physical, the architecture will be a spatial-physical representation of the geometric dataframes transferred within this conversation [19].

21. Architectural system and the architect will form a circular control relation [1][28]. The architect will define the rules that the architectural system inner conversation is based on and he will also define the methods and guidelines of the spatial-physical representation. Then he will transfer this information through a set of ruleset dataframes to the architectural system [15]. The architectural system from the other side will receive the rulesets, and then regulate the conversations based on those rulesets. Afterwards, based on the indicated methods of representation, the architectural system will present the results of conversations to the architect. This will enable the architect to reflect [4][25] on
the effects of his rules on the environment, environed and the architecture system as a whole [1].

22. The core of the design process system is this circular conversation between the architect and the architectural system.

23. Coming back to the Glanville description, within the design process system, the architect is the designer, computational medium is pencil and paper, the architectural system is the sketch [1] and ultimately the game is the bigger system including all of them [9].

**reflective**

24. It is necessary to acknowledge that this research, in its essence, was an investigation into possibilities of creating a circular relationship with the architect and architecture based on a computational medium as an intermediary medium [14].

25. The computational medium [15] will even provide a systematic fluidity that can enable us to make a bigger system [23] around the current system for two main objectives. First is transparency. This fluidity will make it possible to survey the dataframes and the consequences of decisions of the architect and reflect on them. Second is amendments. With such a system, we can implement those
reflections and amend the game toward a better design process system. The time limitations has prevented me to walk in those directions.

26. From the perspective of John Frazer, the evolutionary biology has two main nested systems. The inner system is the development of each specimen within the environment. The second system is the bigger loop which includes smaller steps such as birth, development, competition and finally survival of the specimen. This second system is called evolution (Frazer, 1995). To draw a direct connection, in this game the DNA of the specimen is the ruleset defined by the architect and given to the architectural system [21]. Therefore, the conversation of the environment and the environed is the development phase [16] which is happening in the architectural system. On the higher level the conversation between the architect and the architectural system is the evolution [21].

27. The ultimate goal for the game is to become an autopoietic system as Maturana describes them, “self-reproducing and self-maintaining” (Maturana & Varela, 1980) [26]. Applying such a concept to design process is in sharp contrast with the conventional understanding of it [20]. The conventional understanding sees the design as an exterior product of the design process system. Maturana describes this kind of systems as allopoietic systems. (Maturana & Varela, 1980)

28. Given the Humberto Maturana’s Theorem Number One: “Anything said is said by an observer.” and Heinz von Foerster’s Corollary Number One: “Anything said is said to an observer.” (von Foerster, 1973); This paper forms a metasystem containing the author (observer) describing the game [23], the game being described to the author (observer) [27].

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[author] ↔ [game]
[  paper]
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29. McGann in his book The Textual Condition, demotes the governing power of the author over the text. Citing Maturana & Varela, he claims that texts are autopoietic “mechanisms operating as self-generating feedback systems that cannot be separated from those who manipulate and use them” (McGann, 1991). McGann’s description will pave the way for two notions regarding this
paper. First is that the choice of writing this paper in numbered articles is a choice of medium of the system, which is reflecting the discrete nature of discussion [0]. Second, the decision of not explaining the technical details of the computational model is an (ab)use of the black box concept [34].

30. There are two possible places that construction necessities of architecture can be foreseen. First is the ruleset that the architect will emplace for the architectural system’s inner conversation [31]; second is treating them as a post-design process within the architectural representation methods [21]. The resolution of this matter needs empirical evidence from testing the prototype and/or may vary from case to case [34].

31. The control that the architect has over the rulesets of the architecture system would contribute to his control over the state-space of the architecture [8]. Different rules will provide different methods for probing and exploring this state-space, therefore for every rulesets possibilities are different [30].

32. Equilibrium is the state of a system [31] in which all competing forces [17][18] are evened out.

33. It is necessary to acknowledge the fact that this paper is describing an alternative design process which is circular in contrast to linear [0][1][19][22][24]; it is process-based in contrast to product-based [27][33]; it is dynamic in contrast to static [12][16][18]; it is heterarchical in contrast to hierarchical [0][5]. Thus, this article is also hinting at the fact that there is an overarching system [28] within which the writer is writing this paper [29] to reflect on the status quo and depict an alternative paradigm.

34. This paper does not include technicalities of the simulations, interfaces and the design itself [29].

References

Brussels, Belgium: Hogeschool voor Wetenschap en Kunst, Departement Architectuur, Campus Sint-Lucas Brussel