Evaluating the Semantic Approach through Horst Rittel's Second-Generation System Analysis

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Abstract: Derived from semantic approach, the system of analysis through a metaphoric link was generated as an applicable method to "objectify" design problems. However, it has been observed that most design problems are *wicked* problems and appropriately we should consider Horst Rittel's principles of second-generation system analysis as a theoretical framework for "taming the wickedness" of design problems. Therefore, the suitability of semantic approach as a practical and explicit approach in dealing with design problems needs to be clarified. This study tried to examine the relation between the semantic approach and Rittel's second-generation system analysis to identify whether semantic approach has capabilities to taming the 'wickedness' of design problems. This study employed conceptual analysis as a method of analysis by mapping the contents of the metaphoric link of semantic approach into Rittel's second-generation system analysis. The analysis result indicates that the semantic approach is suitable as a model approach to taming "the wickedness" of design problems. The reasons are: 1) It capable in dealing with a variety of problems [or interpretations], 2) It posses similarity in taming the problem of design, thus provides communicable design process to others.

Keywords: *Semantic Approach, Second-Generation System Analysis, Design Method*

1. Introduction

Klaus Krippendorff [1] defined the word design as an activity to "make sense of things (object)." Therefore, the process of attributing meaning to objects is somehow, influenced by a personal sense that an individual has inherited and experiences. For instance, an object is meaningful and useful (functionally) as a luxurious object because we emphatically sense its 'meaningful image'. As result, a design 'solution' for one particular problem may appear and manifest in hundreds or thousands of possible designed objects. According to

Richard Buchanan [2], the essence of subjective judgment is dominant in almost every design decision, and therefore, design problems are “wicked and indeterminate.” However, since design deals with various users, there is an urgency to provide a sense of “objective perspective” in order to communicate user needs. For only communicable process can be taught, scrutinized, and improved upon.

Horst Rittel [3] suggests that a sense of objectivity in dealing with wicked problems should be seen as a means of “exchange of information among those concerned in order to reach mutual understanding.” From this, we may understand that designing can be understood as the generation of ideas and of an understanding of “what is” instead of “ what ought to be” and “how to.” As result, attributing objectivity can be related to the process of gathering information in order to produce factual knowledge of learning. Objectivity can be derived through a conscious and gradual learning process---*conditional based learnin*g, instead of an ‘a-ha effect’ or out-of-nowhere process---*conviction based learning.* For instance, a watch is designed and produced through a series of processes in which designers continually raises questions and argues with himself and others over the advantages and disadvantages of alternative “solutions”.

During the 1990s, the advancement of design thinking imposed a communications aspect within the object-user interaction, and therefore, the semantic approach was appraised by many as the best yet available method to deal with the wickedness of design problems. By semantic approach, an object is seen to carry appropriate signs in its meaning. A ‘functional’ object is created through a process of manipulating signs, and humans change signs that are virtual and imaginary into meanings of an object that are physical through visual, sensorial, and tactical senses. Derived from the semantic approach, Uday Athavankar [4] generated a system of analysis through metaphoric links as the applied method to objectify design problems. The essence of this system’s analytical process relies on metaphoric links, which are derived from linguistic expression. At a glance, this analytical model carries sufficient substance of “objectivity”, since all built on a conscious yet gradual process of learning. However, the use of expression as matter of analysis tends to bring about the process of re-subjectification since it depends on personal construct in dealing with linguistic meaning. The once “taming” problems may become wicked again because personal constructs were likely relies on the *aha-effect*, which unfortunately do not land themselves to analysis and elucidation through discussion by others. This “might-be” scenario needs to be clarified before we define the semantic approach as the suitable one, by questioning: how metaphoric link of semantic

approach dealing with the wickedness of design problems? Does it provide enough reasoning for designers, who apply the method, to form, logic, and communicate their judgments in defining solutions? These two fundamental questions will determine whether semantic approach has capabilities in taming the wickedness of design problems. Thus, provides rational explanation whether semantic approach can be used as a practical, suitable, and explicit method for communicating design solutions.

2. Objectives

1. To identify whether the metaphoric link method of the semantic approach presents similarities of substance with the principles of second-generation system analysis in dealing with the wickedness of a design problem
2. To identify whether metaphoric analysis of the semantic approach carries sufficient criteria as an applied and explicit method for communicating design solutions.

3. Methods

This study employed conceptual analysis as a method of analysis [6] by mapping the contents of metaphoric link of semantic approach into Rittel's second-generation system analysis, to identify the relation between approaches. The result was placed into relational diagram according to cluster of content categories to understand how semantic approach distinguish the planning process. For this study, a cluster content category is derived from Rittel's [3,5] two distinct phases of a design problem: *problem definition* and *problem solutio*n. Problem definition deals with identifying and describing a problem as an analytic sequence in which the designer determines all of the elements of a problem and specifies all the requirements that a successful design solution must have. Problem solution deals with generating a solution to a problem as a synthetic sequence in which various requirements are combined and balanced against each other, yielding a final plan to be carried into production.

4. Theoretical Framework

4.1. The Semantic Approach in Design

Design is concerned with the subjective meanings of 'objectively' existing objects [1]. Accordingly, this notation is used to exemplify the necessity of accessing 'sense' and 'meanings' into the process of deliberating a

design decision. Rheinhart Butter [7] noted that approaching ‘meanings’ as the focus of problems is appropriately suitable to clarify and objectify the process of defining object ‘problems’. However, the semantic approach would be very helpful ‘to articulate different aims and criteria’ in order to define the sense of each ‘solution’, because of the fact that people surround themselves with ‘designed’ objects that make sense to them.

Ulrich Neisser [8] suggested that objects always be seen in context (as relates to other things, situations, environments, etc.). Therefore, there will be no definitive meaning for each object because, as Krippendorff suggests, “meaning is cognitively constructed” [1]. What something means to someone corresponds to the sum of its imaginable context [7]. The use of the semantic approach does not aim to handle a definitive ‘solution’. Instead, product semantic approach is used to explore and merge a ‘solution’ as sufficiently coherent in understanding ofthe problems between designers and users. Explorations of something new and the “a-ha” experiences of having understood the idea (or problem) respectively exemplify the circular process of sense making. Accordingly, he noted “the designer *form* is the designer’s way of objectifying problems by disowning their own meanings in the process of making sense for others.” [1]

In order to apply the semantic approach into the design process, one should understand first that the concept of meanings is not based on binary classification but it is a matter of degree [4]. Accordingly, visual clues will play an important role in defining core meanings and in evaluating potential categorization of meanings. However, according to Athavankar, because we deal with a complex system of links and problems, it is hardly possible to see the concept of the semantic approach as autonomous and to act independently, because design has a dynamic response to external factors. A designer who looks for a new interpretation of a concept must understand how to untangle some of the present links [or problems] and cautiously build new tangles, “hoping that the new statement will influence and interest the users.” [4]

After initially asserting the role of the semantic approach in design, Athavankar proposed a framework of applying semantic concepts into the design process – *metaphoric link*s. Metaphors are used because they allow people to view an object in a new way, and therefore, they not only create a new understanding of a design but also reveal a different viewpoint about the concepts of meanings for which they are linked [4]. There are five steps in metaphoric links: first, defining *the concept as a linguistic expressio*n. This suggests that each problem be detached as an expression of language, which allows people to view the problem in a different way and construct

interpretations. The second step is *the identification of visual clu*es. This suggests that in order to understand the problem, one should identify visual clues by involving users as the source of information. A metaphor used to comprehend a complex concept itself provides access to potential visual imagery and clues upon expressed products, events, or activities. The third step, *selecting potential visual clue*s, suggests that by identifying visual clues through the involvement of users, will create an 'objective selection' that conforms to 'social perception'. The fourth step, *assimilating potential visual clues into product form,* suggests that visual clues serve the semantic function of expressed links; and therefore, should be explored by incorporating the typical visual clues associated with the problem attributes. The last step of metaphoric links is *contemplating the e*ffects. This suggests that the assimilation of visual clues into product form should add a new dimension to the current interpretation by acquiring identity and unique position along the gradation. When transferred, the process of assimilation implies that these visual clues are "remodeled and conceptually integrated and not just superficially applied." [4]

4.2 The Nature of Wicked Problems and Second-generation System Analysis

According to Buchanan, design has no special subject matter of its own apart from what a designer conceives it to be [2]. Thus, the subject matter of design is potentially *universal* in scope because design thinking may be applied to any area of human experience. As a matter or fact, there are no definitive conditions or limits to design problems. Design problems are then, uncontrollable, cannot be manipulated and cannot be simulated [3, 6]. In order to 'solve' the problems, designers tend to use 'intuitive logic' consistently and dominate their decisions by perceptual and experiential aspects of thought [4]. Therefore, in the process of defining design problems, designers tend to "discover or invent a particular subject out of the problems and issues of specific circumstances"[2].

Rittel dubbed those types of problems as wicked problems in which there is no consensus on what the problems are and how to resolve them. To deal with such, he identified ten principles of second-generation system's approach [3]. The first principle, *the symmetry of ignorance* is occurred when the expertise and ignorance are distributed across all participants. The second principle is *user participation* in which user involvement is maximized by applying a bottom-up approach. Third principle states that the planner needs to incorporate *the transparency of process* in which each step should be understandable and communicable for all. The fourth states *the process of objectification* in which the process of defining problems explained and communicated to others as a 'consequence' of deliberating judgment. The fifth states that there should be *no scientific planning* in design

problems because the problems fall into deontic premises where 'ought-to-be' statements are involved. The sixth states that the planner represents *a problem-helper not a solver ("mid-wife problem").* Therefore, the 'planner acts to bring about problems rather than offering solutions. The seventh principle states that there should exist *the seasoned respectlessness* or *casting doubts* attitude. It suggests that the 'planner' personify a moderate position between rational and intuitive action. This attitude links to the eighth principle of second-generation system approach—*moderate optimis*m. It suggests that the planner should not only exemplify casting doubts but also understand these doubts. The ninth principle states that there should have *conspiracy of model planning.* The planner should look at problems as ventures in which the anticipation of all consequences are shared and embarked with others. The last principle states that *planning is an argumentative process* in which differences in assumptions are debated to reach optimum 'judgment'.

To support his arguments, Rittel asserted that there were two alternating basic activities in defining design problems [3]. First, a generation of variety in which the impulse of ideas is generated to develop courses of actions and solutions. Second, a reduction of variety in which an exertion of 'judgment' is generated to construct evaluation filters. Rittel noted both activities as "the foundations of the system approach of the second generation", which support argumentative and facilitate the identification of questions, responses, and arguments.

5. Discussion

To examine the relation between both approaches, the following identify both metaphoric links analysis and the principles of the second-generation system approach (as shown in Table 1), and then clustered into Rittel's two distinct phases of a design problem: problem definition and problem solution (as shown in Table 2):

a) The first step of the metaphoric links approach, *concept as a linguistic expressio*n, suggests that as an expression, the problem will be stated argumentatively, varied to interpretations, and therefore, has no definitive formulation. This step applies three principles of the second-generation system approach: the use of *non-scientific planning*, the appraisal of *argumentative process*, and focus on extrapolating problems instead of limiting them to definite formulation *(mid-wife problems*).

Table 1. The relational map between principles of second-generation system analysis and metaphoric links

	Concept as linguistic expression	***Identification of visual clues***	***Selection of potential visual clues***	***Assimilating into product forms***	***Contemplating the effect***
Symmetry of ignorance	●	●	○	○	○
User Participation	○	●	○	○	○
Transparency of Process	○	●	○	○	○
Objectification	○	○	●	●	○
No scientific planning	●	○	○	○	○
Mid-wife problem	●	○	○	○	○
Seasoned respectlessness	○	○	○	○	●
Moderate optimism	○	○	○	○	●
Conspiracy model of planning	●	○	○	○	○
Planning s argumentative process	●	○	○	○	○

b) The second step of metaphoric links, *identification of visual clue*s, suggests that in order to understand a problem one should involve the user as the source of information by identifying their perceptions upon expressed products, events, or activities. This step applies the principle of *user participatio*n, imposing the *symmetry of ignorance* between user - designer, communicating a *transparent process* to users, and detaching problems into the *conspiracy model of planning* by sharing 'the risks and consequences' with users.

c) The third step, *selecting potential clue*s, suggests that to create 'meaningfulness', 'criteria' should be established in order to objectify 'judgment'. This step applies the principle of *objectification* by instituting the foundations for judgment.

d) The fourth step, *assimilating potential visual clues into product for*m, suggests that the alternate 'design solution' should incorporate 'chosen' typical visual clues associated with problem attributes. Inevitably, the goal of this step is to resolve problems through 'objectified' criteria. Therefore, this step applies the principle of *objectification* from the second-generation system approach.

e) The last step, *contemplating the effect*s, suggests that the alternate 'design solution' should add a new

dimension to the current ‘solution’ by acquiring identity and a unique position along the gradation [of ‘solutions’]. When transferred, the process of contemplating effects implies that those visual clues are remodeled and conceptually integrated and not just superficially applied. Accordingly, this step suggests that although the problems have been ‘objectified’ through selection and the assimilation process, the problems still require ‘intuitive’ action, and therefore, indefinite formulation of a ‘solution’. By this statement, the last step of metaphoric links implies the principle of *seasoned respectlessnes*s, which leads to *moderate optimism* upon ‘resolving’ the problems. It suggests that there will be no defined ‘solution’ or single interpretation; instead it depends on users to *re-interpret* the process.

The mapping result was placed into cluster content categories as follow:

1) The first step *(concept as linguistic expressio*n) and second step *(identification of visual clue*s) of metaphoric links falls into the phase of problem definition, which suggest the symmetry of ignorance between user –designer, assure the involvement of the user, assure the transparency of the designing process, and acknowledge design problem as a non-scientific planning. This cluster appropriately focus on extrapolating the problems instead of limiting them into formulated-solutions and make certain that the argumentations are definitely understood by others as well. For instance, designing a watch might result in hundreds of possible leads to follow to when using linguistic expression to identify possible visual clues of “what should be design”, such as sexy, hi-tech, classic, pop, beach, etc., by presenting them to model-users. Through these steps, one can facilitate arguments, responses, and intuitive reasoning with others, and clearly combat the wickedness of design problem by recognizing them as they are instead of formulating into a definitive one.

2) The third step *(selection of potential visual clue*s), the fourth step *(assimilating potential visual clues into product fo*rm), and the fifth step*(contemplating the effect*s) of metaphoric links fall into the phase of problem solution. They suggest that we should objectify the problem in clear manner, acquire a series of solutions instead of one, and acknowledge multiple solutions that are actually remodeled and conceptually integrated. For example, the possible visual clues of “hi-tech” watch design needs to be formulated into clear problem definitions which were vary according to what users adopt the meaning of such expressions. The process of selecting potential clues, assimilation into product form, and contemplate the effect, allows the “designers” to starts at the top and select as many of the top priority features as they think can be developed. For instance, visualizing the colors, the forms, and

characters of “hi-tech” expression. This provides a basis for rethinking the visual features and priorities, even if the problems are not well understood. At the same time, it offers a method for model-users or other parties to discuss the problems and reach consensus, creating a way for solutions to emerge, as is necessary for wicked problems resolutions.

Table 2. The clusters of two distinct phases of a design problem

Problem Definition	*Problem Solutions*
● ***Concept as linguistic expression*** (e.g. Designing a watch with “sexy” expression. What is “sexy”?) ● ***Identification of potential visual*** clues (e.g. sexy is round, smooth forms with red color as in Marilyn Monroe’s lips)	● ***Selection of potential visual clues*** (e.g. designing a watch with bio-forms, depicting woman’s body parts, using reddish color, with no-sharp edges, etc) ● ***Assimilating potential visual clues into product forms*** ● ***Contemplating the effect*** (e.g. post-occupational evaluation on model-users, etc)

6. Conclusion

By mapping the metaphoric links of semantic approach into Rittel’s second-generation system analysis , it can deduce that semantic approach can be applied as the alternative approach capable in dealing with the “wickedness” of a design problem. This ‘suitability’ appears because:

a) Semantic approach is initially ‘capable’ in dealing with a variety of problems [or interpretations], searching for uniqueness to concede the indeterminacy of ‘wicked’ problems. The metaphoric links of the semantic approach appropriately respond to the foundations of the second-generation system approach, suggested by Rittel [3]. Metaphoric links appropriately respond to the content of Rittel’s two distinct phases of a design problem by addressing the systematic procedures in generating and reducing variety.

b) There is direct association on both approaches, in which metaphoric links allows designers to identify and tame the wickedness of design problem. It also allows designers to communicate their reasoning in tackling design problems, the logic of their works, and the formation of their judgments. Thus, it laid necessary degree on how design processes be made communicable to others.

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