Discovering design concept for immovable objects

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Abstract

We explore and discuss the possibility of discovering new design concepts for existing immovable objects. Existing immovable objects include such items as buildings or stadiums that are unable to be relocated. By analogy, the positional relationship of some automotive components, such as a door mirror or front lamp, are also unable to be changed. By introducing a web-based application, along with the map of a city or a drawing sheet, we propose a flow model for a design concept informed by art and architectural construction methods. We discuss how the flow model of such a design concept would be applicable for immovable objects by referring to cases of city design and automotive product design. We suggest that an intermediate level of knowledge is a key resource for discovering a new design concept based on connecting immovable objects with their surroundings, which, in this paper, refers to an object’s entire context.

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1. Introduction

How can design be applied to a city concept? Cities cannot be transformed physically by readjusting land or rebuilding. Helsinki, the capital of Finland, was awarded the title World Design Capital in 2012*. That city has invested 18 million Euros to drive its program involving 550 projects, 2,800 events, 290 organizations, and 14,500 networks and is now known as a design-driven city*. The design concept consists of design education, user-oriented

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services and comprehensive solutions utilizing methods inherent in design. Although land adjustment or rebuilding is not realistic for renovation, a number of program management activities can stimulate the image of a city, and the design concept involved becomes important as a vital and powerful function for rediscovering and refreshing existing objects. In this regard, addressing how to stimulate a design concept, how to express a design concept, and how to connect with different immovable objects are essential factors for rediscovery.

In this study, we explore and discuss the possibility of discovering a new design concept for existing immovable objects by introducing a web application developed using art and architectural construction methods. The next section introduces these methods, along with previous research. Section 3 proposes a flow model for discovering a new design concept for immovable objects based on relevant construction methods. Section 4 shows examples that can be applied to the flow model to re-design existing objects such as a city or a vehicle, and discusses relevant issues for implementation. Section 5 concludes with further research.

2. Construction method

Here we introduce three types of construction method that can be used to inspire the design concept, connect with different immovable objects and express the design concept.

2.1. Landscape montage technique as an inspiration for a new design concept

The landscape montage technique (LMT) is a construction method in the area of psychotherapy that can be an effective tool to assess patients. LMT is also a method used to construct a landscape, which may include rivers, mountains, rice fields, roads, houses, trees, pedestrians, flowers, animals, stones or rocks (Figure 1) on a white canvas. Additional objects can be drawn, one after the other, and colours painted on those objects at the end, according to the instructions.

![Fig. 1. Landscape Montage Technique](image)

What is important here is for the drawer to construct an entire space with their mind including, possibly, such formations as a plateau or horizon, which are not mentioned by the instructor. In addition, as the canvas is not editable, the drawer cannot move the drawn mountain or river so that the individual feels some distortion when the instructor mentions a rice field or road, which seems to be drawn in the same space (area) as the mountain or river that has already been drawn on the canvas. This is the objective of LMT. Let the drawer come up with a new design concept to overcome the distortion in their mind by reconsidering the construction and providing a new interpretation of immovable objects.

2.2. Surroundings connect different immovable objects

One architectural construction method focuses on the surroundings of several buildings that are located in a certain block as a set space. Figure 2 shows the surroundings painted black.

This idea can be extended to connecting buildings into a cluster, to which, in turn, are applied different objectives. It could be applied to a public space with a promenade, or a riverbed. The city of Helsinki proposed a domed chapel as a symbol of retreat and the public square that constitutes its surroundings as a place for people to gather in the central part of the city. People tend to pay attention to the fashionable dome, but the public space around it, which is...
non-descript, can be the sort of surrounding that connects different immovable objects. Thus, attention to surroundings is worthy of consideration.

Fig. 2. Surroundings coloured black

2.3. A web application for expressing a design concept

Games are tools that can inform the future character of a design interface. Analogy can sometimes be used to inspire new concepts. A web application called Analogy was developed as both a game and an analogy, whereby the categorization of words has implications for human concept creation skills. The role of words has been discussed in terms of the design process. The Analogy game helps players enjoy the categorization of words by considering not only similarities but also analogies so as to make a new concept from a batch of words. The created concept type, which takes the form of a structural pattern or making sense of a scenario in terms of a story line, depends on whether external hints are given. The interface is shown in Figure 3.

The player is initially presented with 20 randomly placed words, each on a small square card with no objective relevance. Players begin considering the structure by relocating word cards on the screen to obtain a wider outlook. Players then categorize the words into clusters by freely dragging word cards, based on the players’ subjective awareness of analogies. For example, if a player tries to combine the word card “SUSHI” with another word card “BASEBALL”, a connection between a sushi restaurant in your country and the Japanese baseball player Mr. Masahiro Tanaka, who was transferred this spring from a Japanese local team to the New York Yankees, may be made. The combined concept is revealed as “Advance abroad”. Hence, four clusters are formed with one item left aside. The player is forced to review their interpreted meaning of the card left aside to include it with other clusters. Thus, players are forced to reconstruct combinations of word cards. This can be considered as a distortion, similar to that mentioned in relation to the LMT, which can be used to stimulate new ideas. By reconstructing the combinations, all items are categorized into three clusters by means of a new concept, which is formed by players who were not aware of it at the beginning of the game.

Fig. 3. Process view of the analogy game
3. Flow model of a design concept

The previous section introduced the roles of distortion, connection and analogy, from different research domains, as ways to formulate design concepts for immovable objects. By referring to these outcomes, we have built a flow model of a design concept, as shown in Figure 4.

Looking at Figure 4, the flow from (i) to (ii) is the same as a concept creation model shown in the screen image in Figure 3, where the model contains the effect of distortion. Twenty words relevant to the city (or immovable objects) are selected and set on a card on the screen. Once three concepts have been created by playing the Analogy game, according to the process mentioned in the previous section, these concepts then constitute sub-concepts for the city. The higher-level concept that covers three concepts as a whole can be called a “catch phrase” for the entire city.

Next, the plan for a city is prepared (iii), and the nodes in the left side cluster (A), produced by the Analogy game, are mapped onto the plan by comparing the meaning of the words with the relevant place (iv). The nodes in the middle cluster B are also mapped onto the plan in the same manner as (v).

There are possible nodes, coloured blue, that are commonly related with both A and B, taking into consideration the meaning of an immovable place, and depending on what the concept of the clustering word cards is determined to be. The Analogy game was originally considered to be based on hard clustering. However, to apply nodes for immovable objects this time, soft clustering is reasonable, as an immovable place could have multiple meanings, such as a historical or famous place, or an important point of traffic. For example, the chapel in Helsinki has multiple meanings, among others, as a holy place, as a unique design object, and as the focal point of the public plaza. The node (or place) that is covered by several clusters is an important factor contributing to the sub-concept for the city design. This contribution of the said nodes might support problem solving in relation to the distortion.

4. Discussion

Here, we discuss the relationship between the flow model of the design concept and possible applications to city and automotive design. Then, the relevant issues in this research are also discussed.

4.1. City design

In Japan, the Urban Design Centre, an agent of the Ministry of Land, Infrastructure, Transport and Tourism, sponsors an open competition for the purpose of stimulating citizen’s interest in urban development and making the landscape more vital and beautiful. The competition has called for proposals once per year in June since 1993. Here, we briefly introduce the awarded proposal and discuss how the flow model could be applied to city design.
In the 2005 competition for the west side block of the city of Kamakura, in Kanagawa Prefecture, a proposal presented by Mr. Tetsutaro Kawaguchi, of Reiach and Hall Architects, was awarded with the minister prize. As depicted in Figure 5, you can see on the mid-right side three plans abstracted from the awarded proposal, shown on the left hand side, where historical places as one cluster in addition to a busy spot with people as another cluster are combined and mapped onto one plan of west Kamakura, resulting in the elucidation of a higher order concept, which is, celebrating historical character with festivity.

Comparing the above case with the flow model, this case suggests that the flow model could function as part of the city design project with regard to clustering and conceptualization. Even though distortion may be experienced when trying to relate word cards that are distributed in different locations on the plan, the flow model would support the creation of a new concept by means of clustering, depending on the provided word cards. Some specific word cards occur solely in the historical place or busy spot, but some other specific word cards overlap in these two clusters. However, even though the word cards are overlapping two clusters, a conceptualization connecting the two clusters can come into effect through higher order cognition, which is the aim of the flow model.

4.2. Automotive product design

City design focuses on conceptualizations in line with immovable positions on a map. The layout and position of each automobile component or part are immovable artefacts. For example, a side-mirror should be on both sides of a car body, a front lamp should be at the front of the car and the front windscreen is placed behind bonnet, which means many positioning constraints are unavoidable as in LMT.

Nissan Motors developed an electric vehicle called the LEAF. It was obvious to product developers that air resistance against door mirrors impacts directly on consumption of electricity, which is to be minimized. One idea was that wind against the door mirror, as a source of air resistance, should be controlled by a head-lamp, the shape of which is relatively prominent, as shown in Figure 6. The new line of air flow was affected by the prominent front lamp, and air resistance against the door mirrors decreased along with wind noise, according to the Nissan webpage. How did they work out the solution to this problem?

Another example was introduced in a previous study examining a steering wheel that attracts your attention, i.e., the steering wheel reminds drivers with a vibration on the left side, which indicates a left turn, whereas vibration on the right side indicates a right turn, to improve driving performance and driver experience. How did they come up with the idea of connecting the steering wheel with vibration?

Let us discuss how to apply the flow model to the above product design on LEAF. The flow model forces players to consider the entire context so as to involve all word cards as part of a cluster, and this entire context is what is meant as the aforementioned ‘surroundings’ as an integral factor in design concepts. Suppose that a supplier of a side mirror focused on developing its own product functionality, such as the connection with the door. Suppose too, that suppliers of front lamps also focused on their product’s functionality, such as the effectiveness of the lighting...
system. However, there is a limitation to designing based on the scale of the entire surroundings. The flow model facilitates the discovery of some latent knowledge, commonly related to both front lamps and door mirrors. During this process, the flow model should include word cards that are relevant not only to immovable objects (front lamp or door mirrors) but also to user-oriented motivations, e.g., longer distance with low cost and comfort, which may lead, by induction, to a solution, as illustrated in the above-mentioned Nissan case.

4.3. Attention to surroundings suggest the use of possible word cards, as in the analogy game

The flow model involves conceptualization through word cards and stimulation of new ideas through distortion to formulate a design concept that involves packaging the Analogy game with a plan of a city or a drawing sheet. However, both city and automotive design depend on which word cards are appropriate in the context of the flow model, as the numbers of word cards are limited in the Analogy game.

Touristic monuments or famous restaurants can be easily used as word cards in the case of city design. However, what vocabulary is appropriate to evoke a concept for expressing how it feels to be a citizen in Kamakura? Door mirrors or front lamps can be easily used as word cards in the case of automotive design. But what words are appropriate in relation to concepts like “line of air flow” or “air resistance”?

For these issues, higher order deduction might be needed, e.g., how you might want the city to be, or what you might want cars to offer, and to whom, because those ideas may be relevant, not so much directly to the immovable objects but to one’s attention to surroundings. Here surroundings might not refer to buildings or stadiums but to what would help people feel happy about being in the city through interaction with tangible pervasive media in the city. Paying attention to surroundings with regard to automotive design is not for the purpose of decreasing air resistance, which is part of the product design, but is, rather, for understanding what one wants from a car. For example, you might want to visit your friends by eco-car, without creating pollution or noise, in comfort, without having to worry about fuel cost, and with peace of mind etc. Those are all factors associated with surroundings, which would become key words in the Analogy game. It is helpful to induce “intermediate level knowledge” as constituting important knowledge in design, especially functions (e.g., line of air flow, air resistance), to connect physical immovable objects with surroundings, as shown in Figure 7.

![Fig. 6. Line of air flow on Nissan Leaf (c.f., Nissan motor web page)](image)

![Fig. 7. Relation between surroundings and immovable objects](image)
5. Conclusion

We have discussed city and automotive design and both can be related to each other with regard to surroundings. The city becomes a vital space for rediscovering surroundings. Automotive design requires consideration of three networks, i.e., traffic networks, telecommunication networks and energy (electric) networks\(^1\), which are part of the wider surroundings. Urbanism now taps into technological design thinking, as the time has come to build street level apps and environmental big data for a rapidly urbanizing world\(^6\). Therefore, it is expected that design concepts involving different objects in concert with relevant data availability will emerge in the near future.

Again, design concepts will be identified in terms of how they incorporate data from surroundings. The proposed model is positioned to induce an intermediate level of knowledge to connect immovable objects with context and to incorporate our motivation to discover new design concepts. This paper, however, does not cover how to validate the effectiveness of such methods; that will be a topic for future research.

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