

Genesis of Ideas in the Design Process, Investigating Their Creative Moment: Methodology

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Abstract: There are few studies about the beginning of creative ideas gestation in architecture; and although it is implicitly included in the design process, it cannot be fully explained by these processes alone. It is considered that the initial idea gestation occurs when the client presents his first applications to the architect, which for the focus of this study is known as genesis of ideas. This study is part of an ongoing investigation. The research seeks to approach the theoretical construction, components, motivators, and structure of the genesis of ideas phenomenon in the process of architectural design, from the phenomenological, hermeneutic, cognitive, and disciplinary approach, supported by Grounded Theory (GT), using a qualitative and descriptive method in design logic. We worked with two groups. For the first one we created the script of the interview in depth. For the second group two new tools were designed to apply to practicing architects: 1) a design exercise, 2) a retrospective interview. Discourse Analysis (DA) and the Constant Comparative Method (CCM) was used to review the data. This document explains how the instruments were designed, as well as how the pilot tests were carried out. It describes the findings found and presents the modifications to the instruments resulting from those findings.

Key words: creative components, grounded theory, genesis of ideas, architecture

1. Introduction

The creative capacities of the human being have been the subject of study for De Bono E. (1999), Gardner H. (2011), Csikszentmihalyi M. (2018) [1-3]. They, among others, have tried to explain the intricacies of creativity, which reflects the importance and great interest in elucidating how the idea creation process operates.

Throughout its history, the design process in architecture has generated different proposals for models of design methods and processes, and their constituent stages [4-8]. The existence of this diversity allows us to understand how the creative process operates. According to Goleman D., Kaufman P. and Ray M. (2013) [9], understanding the creative process

can support freedom of thought and imagination development. For Norberg-Schulz (1989) [10] architecture aims at motivating intention. Nevertheless, when reviewing the literature, it became evident that the phenomenon that initiates ideation has not been thoroughly covered by previous studies. Models of design methods and processes have been of great help in understanding the creative process of architectural design. Their importance lies in the fact that they provide a clarifying panorama within the discipline [3, 5, 6, 8 11-13]. The genesis of ideas is an implicit phenomenon in these processes, however, it is a stage seldom mentioned in these processes as observed in Table 1.

Researchers in cognitive sciences have studied the architectural process [14-16]. Although they provide relevant data, they lack the phenomenological vision of the creative minds of architecture who experience it on a daily basis and can contribute relevant data to the study in question. The aim is to advance towards the

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knowledge of these experiences which Holl S. (2011) [17] calls hidden experiences.

Different creative and design methods were searched for the inclusion of the genesis stage of ideas. It was

found that most of the methods do not include a stage of ideas creation or include it implicitly. Table 1 shows the methods that include the stage of creation of the ideas and adds a personal proposal.

Table 1 Models on creative and architectural design methods and personal proposal.

Wallas (1926), Creative Process	Csikszentmihalyi (1998)	Rodríguez M. (1995), Creative Process	Gugelot (1963), Design Process	Jone, Ch. (1971) Transparent Box Method	Alexander, Ch. (1970) Design Method	Suwa M. (2003)	Cantú, I. (2009) Model for Conceptualization	Cantú (1989) Architectural Design Model	Personal proposal for the design process (2015)
Preparation	Preparation	Questioning Gathering information	Presentation of the problem Definition of the problem and its goals Analysis of the current state	Problem definition Analysis	Problem definition Study of the behavior of all systems in context Hierarchical interaction of subsystems	Design requirements	An attitude of search and exploration Knowledge of the problem	Statement of the problem Information gathering Analysis of the information	Recognition of the problem
Incubation	Incubation	Incubation	Creation of alternatives	Divergence Transformation	Elaboration of diagrams	Demand for interesting ideas	Reflection-verbalization, schematization- abstraction	(A b s e n t)	Genesis of ideas
Illumination Verification	Illumination Evaluation Elaboration	Illumination Elaboration Communication	Evaluation Selection Production planning	Evaluation Convergence Feedback	Development of diagrams up to the project	Search for the essence of the problem Production of solutions	Development of alternatives and evaluation of the alternatives	Synthesis of the project Descriptive memory	Conceptual concreteness Final representation Execution of the project.

The Grounded Theory (GT) was used for the data to determine the construction of a basic theory that leads to a substantive theory of the phenomenon. According to the principles of the grounded theory it is not required to work with pilot tests but with groups of approximation that bring you closer to the phenomenon. As we approach this complex phenomenon, a hermeneutic approach is utilized to allow a flexible interpretation and the use of intuition. Due to the fact that so far no references have been found that explain the phenomenon of the genesis of ideas from the architectural phenomenology, and given that a gap of knowledge is observed in this respect, it was decided to work from the GT perspective and the constant comparative method (CCM) [18-20].

The constant comparative method (CCM) is a descriptive qualitative thematic analysis method used in the humanities and behavioral sciences in general, but there is little evidence of its use in the discipline of architecture. By means of this method the information is coded, the categories and subcategories are made, which are constantly compared, a categorization is made one more time, and the co-occurrences are determined. The CMM application was decided since it

aims to get us closer to the understanding of the phenomenon of the genesis of ideas and to establish a substantive theory that describes it.

This study is part of an ongoing investigation that looks to understand the ideation phenomenon in architectural design, determine its substantive components, and to establish new methods for the improvement of ideas developing in academic and professional settings. Because it occurs right in the initial part of the creative process, this research has decided to name it the genesis of ideas. The present research seeks to approach the phenomenon from the phenomenological, cognitive and disciplinary approach, but supported by grounded theory. Furthermore, its occurrence at the beginning of the creative process makes it ideal for management analysis. The objective of this paper is to design the script for the in-depth interview and the semi-structured retrospective interview. Here there are presented our designed instruments and how the pilot tests were carried out. It includes descriptions of the findings and any modifications to the instruments.

2. Materials and Methods

2.1 Methodology Design

A descriptive, qualitative method was used, from the phenomenological architectural and hermeneutic approaches, which allow to identify the perception of the participants of the phenomenon of study and to work the interpretation and the intuition. We worked from the principles of the GT, for the study of the theoretical sample. The data were analyzed by means of the AD and the CCM, which enabled the first open coding of the data, and the subsequent axial and central coding, as well as to categorize, subcategorize and determine the co-occurrences of the emerging data.

2.2 Study Subjects

First study group. For the in-depth interview, a group of 17 architects who were experts not only in design but also in a variety of disciplines was selected at an international, national, and local level. They are professionals who have dedicated their entire lives to architectural design, and who have worked in architectural buffets. This group has an average of 30 years of experience.

Second study group. For the selection of the participants it was considered relevant to include architects with experience in the design of spaces, who are accustomed to working quickly in the solution of spatial problems in design workshops. Another 14 architects were chosen for the second instrument. All designers in this group work in design and are also professors from a local university. No minimum or maximum experience was required.

2.3 In-depth Interview

The in-depth interview was scripted in an open manner with consideration of the four research topics: 1) the architectural design process, 2) architecture and its components, 3) creation and creativity, and 4) the creation of ideas and their representation (See Annex A). The interview was conducted in a face-to-face with

free time to answer to the first study group. The exercise was carried out in person and a video recording was used. With some participants a voice recorder was used.

For the data analysis, DA was used, by which the analysis sections are determined, the data is categorized, followed by the CCM to determine the components of the semi-structured interview. The qualitative method was used to investigate the perceptions of designers and their motivators or referents for the creation of ideas. With this method it is not possible to generalize the findings found in the interview, but it allows you to determine the qualitative aspects responsible for the ideas generation.

From these data emerged the semi-structured interview. With this information the interview for the second group was structured.

2.4 Design Exercise and Semi-structured Retrospective Interview

The first draft of the questionnaire begins with questions aimed at probing the design process. The questions and their order emerged from the in-depth interviews of the first interview. It was found that the initial order of the questionnaire was not ideal for obtaining insight into how ideas arise. It is decided to change the order of appearance of the themes, so it begins with questions about the genesis of the ideas and appreciations of how they arise and adds a question about their representation separately. The above is shown in Annex B. Table 2 shows the final design of the interview.

Two instruments were applied to the second study group. The first instrument consisted of designing a gallery for the Faculty of Architecture of the UANL. They were given a description of the design topic to be handled, the minimum requirements, and the data of the land or location of the project accompanied by photographs of the place. The time allowed for the exercise was 15 minutes. Immediately after the design was made, a retrospective interview was conducted to

provoke reflection and a tour of what had just been designed.

For the data collection of the design exercise, a video camera with tripod was used, which allowed in the design exercise to place it perpendicularly over the work area and during the interview in front of the participant to record his comments and also his body language. For its analysis, the data was coded, ordered in categories, and subcategories. From this, co-occurrences were reviewed. The 14 questions were emptied in an Excel to work them in segments and then codify and be able to use the CCM. For the final application the TI Atlas will be used.

The expert designer works in automatic so part of what he does he does is unconscious. From the phenomenological approach it is taken for granted from the architecture perspective that in the main motivator of the design for each participant is transcendental. On the other hand, the cognitive approach was used to make the exercise conscious and transparent to the individual through the retrospective exercise questionnaire. Finally, the CCM from the approach of GT, allows to revise the data with form they arise and to compare them of constant manner.

Table 2 Matrix for the development of the interview script, personal proposal. Color labeling; pink: creation and creativity; green: design methods and processes; blue: genesis of ideas and their representation; yellow: architecture and its components.

Chapter of the theoretical framework	1. Chapter of Create and Creativity	2. Chapter on methods and processes	3. Genesis of ideas and their representation									4. Chapter of Architecture and its components		
Research question	In addition to your architectural work, what other creative activities do architects engage in?	What is the design process for practicing AMM designer architects?	What do AMM architects do after analyzing project information?	What aspects of architecture do AMM architects focus on at the start of a project?	How do WMA architects come up with ideas at the beginning of a project?	What are the sources of inspiration used by architects in the AMM?	How do WMA architects translate their initial ideas?	Of the different ways in which architects shape their ideas, which is most useful to them for generating ideas?	What do the architects of the AMM consider should be allowed at the beginning of the design process?	What do the architects of the AMM consider should be prohibited at the beginning of the design process?	How do architects see creative activities influencing the genesis of ideas at the start of a project?	What do AMM architects consider to be the most important aspects of architecture in the design of a project?	What is the opinion of the AMM architects about what architecture should be?	Which project carried out by architects reflects your idea of what architecture should look like the most?

3. Results

3.1 In-depth Interview

The results of in-depth interviews reveal that participants express that ideas only arise, or consider that the problem brings them, but cannot identify how they arise. The data obtained from the interview was very useful for discovering particularities of what is expressed. Furthermore, it helps us to inquire in what is not expressed. A broader understanding of the dialectic that the architect uses to base his designs was achieved. This allowed the introduction of the thematic analysis from the approach of the GT to investigate how the genesis occurs. Finally, the script for the semi-structured interview was made from the data of the first group. With this approach it was possible to understand the perception of each participant and understand the verbal, graphic and particular language of the architects, as well as their ideas.

3.2 Design Exercise

One of the first findings is to observe how the design exercise provokes in the participants the desire to solve the problem. As soon as information about the problem is provided, the designer creates the basis for the generation of ideas. Something to be noticed is that even though the technique for creative initiation was left open, the total of the participants chose to work on the generation of ideas by means of sketching by hand. Another finding was that one single video camera was insufficient evidence to describe the creative process as the participant usually use their entire body to describe what he is explaining, as well as pointing out in the drawing. The first shots forced the researcher to constantly move the video camera. Therefore, it was decided to work with two cameras simultaneously, one that records the participant and another that focuses on

the graphics indicated by the creative at the time of expressing their ideas.

To avoid obstructions in the footing, the installation of a work area was set up and participants will be asked not to invade it while working. At the end of the time allowed, the participants to abruptly interrupted their inspiration and left incomplete ideas. Therefore, it was decided to extend the time to 20 minutes. The generation of ideas was abundant and varied and allowed the graphical analysis to identify the theoretical base on which the participants support their ideas.

3.3 Semi-structured Retrospective Interview

The retrospective and semi-structured interview was carried out immediately after the design exercise, in order to seek an approximation to the origin of the ideas. One of our first findings was the preference of the interviewees for describing their designs instead of the methodology used to reach the design. This led us to modify and change the order of some questions to give more priority to description. Consequently, the questionnaire was reordered, four questions were modified, and the questionnaire was extended to 15 questions.

One of the most important findings was that when performing the retrospective exercise, the participants can more clearly describe the theoretical origin of their ideas than if they only do it in a graphic way. That is, they go from an intuitive state to a cognitive state of it. It was also found that the order of the questions affects the main intention of the study, so it is decided to change the order and consider in the questionnaire first those related to the generation of ideas and their representation. Moreover, to emphasize these aspects, one more question was added. We continue analyzing the data and comparing the theoretical sample, for the application of new improved instruments.

4. Discussion

There is an absence of a theoretical position to help

us give support to our findings in the highly complex process of ideation. The multiple aspects found in the genesis of ideas coincide with the positions of Goleman D., Kaufman P. and Ray M. [9], on the relevance of understanding creative thinking, since this can provide the advantage of favoring the imagination.

The first findings reinforce the idea that the investigation of this creative process brings to light important components diverse and important of the managing action of the architects, and provides insight on the driving force that leads them to create ideas. In this sense, it coincides with the positions of Suwa M and Tversky B. (1997) [14], Dogan F. and Nercercian N. (2008) [15], and Goel V. (1995) [16] that it is necessary to continue investigating design processes and to continue learning.

Likewise, it is agreed with the idea of scholars on the methods and processes of architectural design, who are in favor to continue trying to understand the creative process of architectural doing, and to work more closely with design professionals [16, 21] to approach us more and more towards the knowledge of this phenomenon. This motivates us to propose a model of the genesis of ideas process.

5. Conclusions

The study on the genesis of ideas provides in its first phase of approach, relevant data on the ways of acting at the beginning of the design process and provides much evidence on the aspects on which the creatives of this discipline focus.

In addition, thanks to the findings of the pilot tests, relevant changes to the research were included. For this reason, the number of questions was increased from 14 to 15, alterations were made in the wording and order of these to give more space to the description of how the ideas are generated. It was decided to use two video cameras to record the design exercises and the retrospective interviews, since the participants usually point out the sketches when they expose their ideas. It was determined to increase the time of the design

exercise to 20 minutes, so as not to abruptly interrupt the inspiration. The thematic analysis for the categorization of the data was implemented from the Grounded Theory (GT) approach, and the Constant Comparative Method (CCM) since this method presents a greater systematization to work the theoretical sample, and to determine the codes, categories and subcategories that will allow an approach to the emerging theory in such a way that allows us to approach the substantive theory on the phenomenon of the genesis of ideas.

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ANNEX A

In-depth interview script considering the research topics.

- 1) What can you tell me about the architectural design process? Tell me about your design process?
- 2) Could you tell me what architecture is for you? Can you tell me more about it?
- 3) Could you tell me about the process of creating? What can you consider as creative?
- 4) Can you tell me how is your day to day in the creation of design ideas and their representation? How do you experience it? What else can you add?

ANNEX B Interview Design

Chapter of the theoretical framework	Research question	Objective	Interview script questions	Questions for the post-exercise interview script	Questions for the analysis of the projection exercise
2. Chapter on methods and processes	1 What is the design process for practicing AMM designer architects?	To determine the general priorities at the moment of designing, as well as the forms and means of inspiration, principles of ideation, and the references that are used in the genesis of the ideas. They will allow us to determine similarities, differences, as well as their particularities between them. A self-evaluation of your own design process. Getting to know how the designer orders his or her design activities.	How is your design process?	What was your design process?	How is the architect's design process?
4. Chapter of Architecture and its components	2 What do AMM architects consider to be the most important aspects of architecture in the design of a project?	To be able to determine which components are considered by AMM architects to be the most important in their design process.	What do you consider to be the most important aspects of architecture in the design of a project?	What do you consider to be the most important aspects of architecture that you used in the design of this project?	What does the architect consider to be the most important aspects of architecture that he considered in his design?
3. Genesis of ideas and their representation	3 What do AMM architects do after analyzing project information?	To know what AMM architects do after analyzing project information	What do you do after analyzing the project information?	What is the first activity you do after you analyze the exercise information?	What is the first activity that the architect performs after analyzing the information of a project?
	4 What aspects of architecture do AMM architects focus on at the start of a project?	Know what aspects of architecture AMM architects focus on at the start of a project	¿En qué aspectos de la arquitectura te centras al inicio de un proyecto?	What aspects of architecture did you focus on at the beginning of the exercise?	What aspects of architecture do you focus on at the beginning of a project?
	5 How do WMA architects come up with ideas at the beginning of a project?	To know how ideas arise in WMA architects at the beginning of a project	How do your ideas arise at the beginning of a project?	How did your ideas come up at the beginning of the exercise?	How is it observed that ideas arise in the architect at the beginning of a project?
	6 What are the sources of inspiration used by architects in the AMM?	To know which are the sources of inspiration used by the architects in the AMM	What are your sources of inspiration?	What were your sources of inspiration?	What are the architect's sources of inspiration?
	7 How do WMA architects translate their initial ideas?	To know how WMA architects shape their initial ideas	How do you shape your initial ideas?	How did you shape your initial ideas?	How do they shape the architect's initial ideas?
	8 Of the different ways in which architects shape their ideas, which is most useful to them for generating ideas?	To know which of the different ways of expressing ideas by architects is most useful when it comes to generating ideas?	And which of the above is most useful to you to generate ideas?	Which way of capturing ideas did you find most useful for generating ideas in the exercise?	Which of the different ways of expressing ideas by architects is most useful for generating ideas?

	9 What do the architects of the AMM consider should be allowed at the beginning of the design process?	Know what the AMM architects consider should be allowed at the beginning of the design process	What do you think is allowed at the beginning of the design process?	What did you allow yourself at the beginning of the design process?	What is allowed at the beginning of the design process?
	10 What do the architects of the AMM consider should be prohibited at the beginning of the design process?	To know what AMM architects consider should be prohibited at the beginning of the design process?	What do you consider forbidden at the beginning of the design process?	What did you forbid yourself at the beginning of the design process?	What does the architect consider should be prohibited at the beginning of the design process?
4. Chapter of Architecture and its components	11 What is the opinion of the AMM architects about what architecture should be?	To know the opinion of the AMM architects about what architecture should be	What's your idea of what architecture should be?	What's your idea of what architecture should be?	What is the architect's idea of what architecture should be?
	12 Which project carried out by architects reflects your idea of what architecture should look like the most?	To know which of the projects carried out by architects reflects the most their idea of what architecture should be like	Which of your projects reflects your idea of what architecture should look like the most?	In which way this exercise reflects your idea your idea of what architecture should look like the most?	In which way your idea of what architecture should look like is reflected by your own projects in this exercise.
1. Chapter of Create and Creativity	13 In addition to your architectural work, what other creative activities do architects engage in?	To know what other creative activities architects practice in addition to their architectural work.	In addition to your architectural work, what other creative activities do you engage in?	In addition to your architectural work, what other creative activities do you engage in?	In addition to the architectural work, in what other creative activities the architect engage.
Genesis of ideas and their representation	14 How do architects see creative activities influencing the genesis of ideas at the start of a project?	To know how architects see creative activities influencing the genesis of ideas at the start of a project.	How do you think these creative activities influence on your ideas at the start of a project?	How do you think these creative activities influence on your ideas at the start of a project?	How do you think these creative activities influence the architect's genesis of ideas at the start of a project?