

# From Bio-engineering to Architectural Design: Converging Eugenics to Create Meaningful Architectural Form

Wasan M. Mohammed & Ibrahim Jawad Kadhim Al-Yousif

University of Technology,  
Iraq

[ae.21.26@grad.uotechnology.edu.iq](mailto:ae.21.26@grad.uotechnology.edu.iq)

[123367@uotechnology.edu.iq](mailto:123367@uotechnology.edu.iq)

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## Abstract

Research has often used inductive approaches to review the mechanisms of extrapolating architectural forms engaging 'Eugenics' from genetics in the field of biology in architecture as a new approach from bio-engineering. They seek to apply the idea of 'convergence' as a mechanism to create architectural form.

In order to identify this type of relationship, this research, examines the related concepts. It also reviews the understanding of Eugenics as it relates to transition from the theoretical level of convergence as meanings to the level of convergence as forms embodying meanings to create architectural form.

Its aim is to engage the concept of Eugenics with the convergent architecture to extrapolate mechanisms to create form. In this paper, it examines a number of case studies related to the concepts. Different building projects that depend on the principles of Eugenics and convergent architecture (indirectly) have been analysed to examine different extrapolations.

In conclusion, the research presents the mechanism of creating architectural forms according to the relationship of Eugenics and convergent architecture achieved by extrapolating the genotype characteristics and the convergences of the form or meaning of architecture in a manner as represented by phenotype properties.

**Keywords:** Eugenics in architecture, Foreseeing architecture, Formal-Convergent architecture, conceptual-Convergent architecture, Bioengineering architecture.

## Introduction

Contemporary architectural movements have gone through convergences between architecture and various fields such as genetics and language fields. They do so by borrowing and employing mechanisms and strategies from those fields to architecture.

In this context, this study reviews the mechanisms of selecting and improving genetic traits from the genetics and biology fields as well as the mechanisms of producing and extrapolating linguistic texts and sensory traits from language and literature fields in the field

of architecture. The research reviews the concepts of Eugenics and convergent in architecture to extract a vocabulary. It seeks to employ them as indicators that work as a mechanism to foresee the immanent form in the light of the pattern of the relationship between eugenics and architecture. The aim of this research is to extrapolate a mechanisms to create form through engage the concept of Eugenics with the convergent architecture.

### **A Review of Literature**

This section reviews the literature that dealt with the main research concepts "eugenics and the convergence" through an analysis of the relationship between these two concepts directly or indirectly indicative of reaching the mechanism of foreseeing the immanent form.

Although, there is a serious lack of detailed studies relevant to this research, because of the rarity and a shortage of specialized studies that dealt with proposals related to the effect of eugenics and convergence on the creation of the architectural form directly. Therefore, the research referred to the fields of knowledge close to the field of architecture. Accordingly, this research was reviews the studies that are the closest to the subject of research as follows:

- **The study of Qasemi, Amal (2021)**

The study has dealt with the most important ideas brought by the French philosopher Roland Barthes in the field of structuralism analysis of visual texts. He has focused on the meaning of structural analysis of scientific material, which depends on implicit analysis, as it is based on discovering the relationship between symbols in the discourse itself. This is one of the aspects of discourse, the structural relationships between symbols as products of meanings, which are done by induction and not by conclusion.

The study adopted the establishment ideas of Roland Barthes that have become a base in the field of structuralize analysis of visual texts. These ideas are based on the fact that the image of the visual text carries two extrapolates massages. The study didn't discuss the concept of convergent and its relation with eugenics of architecture.

- **The study of Sheiaa, Sudad (2020)**

The study of Sheiaa (2020) titled "The formal convergent to the duality of men and women between Mesopotamian art and contemporary Iraqi painting" has dealt with the subject of the formal convergence as an extrapolate mechanism. It reveals the aspects of the formal convergence to the duality of men and women between the Mesopotamian art and contemporary Iraqi painting. The study offers a content analysis of form to determine the formal convergence of research samples that follow several axes. Among them are the axes of form that sets standards to measure the method of implementation of the form (sample) expressed by choices, manifesting through two categories: realistic comprised of simulations, symbolism, or expressive articulations and abstract comprised of completely distorted, or partially distorted forms.

In this study, they were developed to extrapolate mechanisms to measure the amount of formal convergence between the selected samples. The study concluded that the convergences were embodied in the external form of both dualities, and concluded that most of the different artistic productions were of psychological and religious connotations. However, the study did not address the concept of Eugenics and only made brief indirect implicit references to the concept of neutrality by presenting the conclusions of the study.

- **Study of Al-Ani, Imad (2015)**

In contrast, the study of Al-Ani (2015) has included adapting some rhetorical concepts architecturally such as quotation's concept and inclusion's concept, by presenting different architectural models that included these two concepts, making the convergence between language and the architectural text in terms of using architectural quotations. The study has interpreted that the designer borrows parts of a famous religious or historical building to reuse it in a new design, or to quote some concepts, as is the case with the poet or prose from other

sciences and knowledge to ensure his new design such as physics, mathematics and modern critical schools. This is indeed similar to deconstruction.

The study also introduced the term architectural embedding and interpreted it that the designer takes part of a modern or contemporary architectural design to ensure his new design. The study has proven that it is possible to adapt some rhetorical concepts architecturally. However, the study did not address the development of new architectural critical foundations or the mechanism of foreseeing the architectural text based on rhetorical terms.

- **The Study of Mohammed, Wasan (2014)**

While the study of Mohammed (2014) was the only architectural research that search in the topic of architecture. And tried to investigate the genotype characteristics and phenotype element in traditional architecture through an inductive approach based on the descriptive analysis through borrow an equations from biology to the field of architecture. To concluded the relation between genotype and phenotype in architecture.

The study has dealt with the convergence in architecture with the organism that has genetic traits passed down to successive generations and these qualities are what determine the style of architecture in terms of belonging to a certain pattern or architectural movement or the times spirit. The study concluded that there are two types of genetic expressions of the architectural text. One of this was called architectural genotype, which are the basic concepts and ideas carried by architecture knowledge. They are only aware and invisible such as the characteristic of containment and openness towards the interior and privacy .

The study shares with the subject of the research in terms of the convergence in understanding the subject and its interpretation from a scientific point of view. But its differentiations with current research are didn't discuss the role of eugenics in determine the relation between the convergent eugenics' architecture

**Table 1:** Summary of Previous Studies / Source: Authors

	Study	Subject	Methodology	Goal and limits of the knowledge gap
1	<b>Study of Qasimi, Amal (2021)</b>	Discovering the relationship between symbols in the visual texts according to the structuralism theory.	inductive approach based on the descriptive analysis	<b>Goal:</b> the structural relationships between symbols as products of meanings. <b>Knowledge gap :</b> The study did not study the concept of 'eugenic and convergent';
2	<b>Study of Sheaa, Sudad (2020)</b>	The formal approach as a mechanism of extrapolation and revelation of aspects of the formal approach to the duality of man and woman in Mesopotamian art.	inductive approach based on the descriptive analysis (questionnaire)	<b>Goal :</b> Drawing an extrapolating mechanism according to the principle of the formal approach <b>Knowledge gap :</b> The study did not address the concept 'eugenic'.
3	<b>Study of Al-Ani, Imad (2015)</b>	Adapt some rhetorical concepts architecturally (quotation and inclusion in architecture)	Inductive approach based on descriptive analysis (system of images sample)	<b>Goal:</b> convergent between language and architectural text <b>Knowledge gap:</b> The study didn't address the development of new architectural critical foundations or a mechanism for foreseeing the architectural text
4	<b>Study of Mohammed, Wasan (2014)</b>	The relation between genotype, phenotype from biology to the field of architecture.	inductive approach based on the descriptive analysis	<b>Goal:</b> investigate the genotype characteristics and phenotype element in traditional architecture <b>Knowledge gap:</b> The study did not address the concept 'eugenic'

### **Research Aim and the Hypotheses**

The aim of the research is to engage the concept of eugenics with the convergent architecture as an extrapolate mechanism for the different architectural forms to foresee them.

To achieve this research aim, it is assumed that:

- Architecture, like a living organism, can be inherited through generations, and it is possible to use eugenics to determine such inherited traits.
- Architectural form is similar to linguistic text that can be extrapolated and interpreted.

### **Research methodology**

The research adopted an inductive approach to resolve the research problem. The research's methodology is driven by the theoretical framework and the previous studies which interpreted the vocabulary of extrapolation of the architectural text according to the eugenic concept and convergence. To examine the research hypotheses the research has discussed two specialized studies which are the closest to the research topic. One of them is in the field of structuralism's philosophy which considers architectural text as close as structuralism's linguistic texts. The second is in the field of architecture and design.

After conducting a series of critical analysis, the research derives the main and secondary ideas related to the subject of the research. Then, involve applying them to a set of architectural samples, to explore the extrapolation of the different architectural text, according to the relationship between the two concepts mentioned above. This came through using "Delphi Method" which relies on a panel of experts; it thus, produces conclusions that serve as an information base to formulate the aim of the research.

### **Theoretical Framework**

According to the research hypotheses' this research has exposed many literatures that deal with the terminological definitions and scientific meaning of the main research concepts. And, how it is employs in the field of architecture as a living organism. Indeed, this vision is related to considering the convergence in the architectural forms and structure, which is likened to the linguistic structure.

### **Vocabularies and Related Concepts of Eugenics**

Comprehensive dictionary of meanings (2010-2023) defines the meaning of Eugenics (terms of living) as: the study of methods of improving genetic qualities by selective breeding, (especially as applied to human mating). Synonyms of 'eugenics' (noun) are: life science and bioscience. Francis (1904) was the first to introduce this term on his scientific program defining it as the science of improving human strains. The word 'Eugenics' derived from the Greek origin means 'authentic' or the 'origin source'. Black (2003); states that it is the application of methods and concepts of selection in order to improve its genetic characteristics. In fact, the application of Eugenics is supposed to contribute to reducing the phenomena of decadence.

The idea of obtaining an optimal human race dates back to the Greek philosopher Plato, and then this science was developed as the modern version of 'Eugenics' in the late nineteenth century by the British scientist Galton. The target of Eugenics through science was to improve the human lineage by getting rid of the so-called 'undesirable traits' and increasing the 'desirable qualities'. Kevels and Hood (1992) defined it in their book 'the code of codes: scientific and social issues in the human genome project' as "the set of ideas and activities aimed at improving the quality of the human race by addressing its biological genetics" p. 56

From the previous discussion, it is clear that Eugenics refers to improving production through the selection of good qualities and employing them in subsequent generations. Indeed, this is a vision that refers to the foresight of a virtuous breed of product that carries the desired immanent qualities in society.

## Concepts Related to Eugenics

There are some concepts that are related to the concept of Eugenics, as follows:

- **The concept of Genes:** Mendel was the first to call the term 'gene' to express the molecular unit responsible for the transfer of fundamental traits in living organisms. The term 'gene' has been derived from the Greek word 'Genesis', which gives the meaning to be born. This has been used by Wilhelm Johannes in 1909 (Churchill, 1974).  
The concept of a gene is indeed the smallest molecular unit of heredity that has the function of inheritance in an organism and is located within a genetic system. Living organisms rely on genes for trait inheritance where genes retain the information needed to build and maintain organism cells and pass genetic traits on to the offspring.
- **Genotype:** This is the genetic code carried by all living organisms, which forms its elements. According to Mohammed (2014) and Mohammed and Al Nuaimi (2020), this code is invisible. It perceives and does not see; it carries all the genetic traits that the organism genetically transmits from the origin to the branch.
- **Positive Eugenics:** A Kevles (1995:3) says it is "the differential or selective reproduction of so-called superior individuals, in order to improve the genetic balance of the human race". Some scientists such as Istvan (2014) define 'positive Eugenics' as 'the study of socially controlled factors with the aim of improving the natural characteristics inherited for future generations physically and mentally'. "Positive Eugenics aimed to foster greater representation in a society of people whom eugenicists considered socially valuable" (Kevles 1995:3).
- **Negative Eugenics:** According to Istvan (2014), it "aims to reduce the frequency of genes disease in a population in ways that aim to reduce the birth rates of individuals with genetic diseases, such as epilepsy and Alzheimer's disease". In fact, "negative Eugenics sought to encourage the socially unworthy to breed less or, better yet, not at all" (Kevles, 1995)

In the light of the previous explanation, this Paper argues that it is possible to direct 'Eugenics' as a science to draw a map of an ideal society, and integrate it into different fields of knowledge and the possibility of employing the mechanisms of this science in the field of architecture and architectural design. In this respect, the Fig. 1 illustrates the research convergent to the marriage of genes of the architecture of origin (architecture convergent) with the other buildings and its impact on the descendants of architecture according to the theory of convergence. It has an expectation and attraction to determine the path of qualities and improve the product in terms of features and elements that produce the architectural form.

## Procedural Definition of Eugenics

From the previous discussion, and the research hypothesis, Eugenics in architecture is the science of examining and selecting good genes in traditional architecture, which proves efficiency in achieving the requirements of society. It is directed to serve certain social or political goals to maintain the genetic map of the architectural identity of each society away from the disabled genes that carry genes that are not suitable to express the identity of society in the future. However, the difference in the field of architecture is that there is no father and mother for speculative genes, but instead we will have 'origins of genes, which are the genes of the convergent architecture that have resulted from the original architecture such as Islamic architecture. Contemporary genes are the genes that are derived from the spirit of the current age.

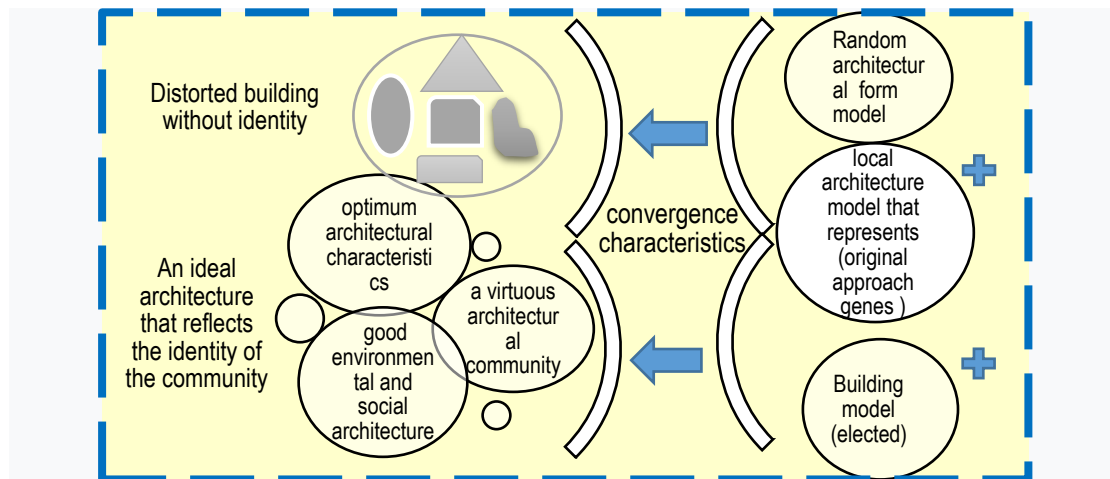


Fig. 1: Research approach to mixing different building models.

Source: Authors

### Vocabularies and Related Concepts of Convergence

Definition and meaning of convergence in the comprehensive dictionary of meanings are as follows: b (2010-2023): convergent: [adj] tending to come together from different directions. (Noun) a thinker who focuses on the problem as stated and tries to synthesize information and knowledge to achieve a solution, convergent: consideration - analysis to know. Convergent (idiomatically) it is defined as "a hypothetical method of research, aimed at encompassing a subject above a certain perception and verifying the resulting knowledge without reaching the degree of certainty perception, it is not a "prohibitive university" neither methodologically nor theoretically. Methodologically, the methods of knowledge production and verification are multiple and not uniform. In theory: visualizing the subject and taking note of it partially, not completely (Abbasi, 2011:39)

The convergence comes in several types.

- **Sociological Convergence:** it is an approach to convergence reality, and tries to understand and analyze it objectively, through adopting a theory that it fits with the subject of the study and thus be able to formulate the research within an accurate scientific template (Nassisa, 2015; Okasha, 2012). Al-Murjan (2020) says that the sociological convergence is an attempt to intervene, by relying on appropriate convergences that can contribute to providing explanatory proposals in order to find an acceptable solution to a phenomenon or social problem raised in the society. This is what could be called a historical convergence; a political convergence; a cultural convergence; a mathematical convergence or a formal convergence.
- **Theoretical convergence:** This is any scientific research that has a reference or theoretical background on which it is based. Based on this theory, it can progress in its research. The theoretical convergence in the dictionary of social science terms is meant as a synonym for the intellectual trend and the convergence, as it carries many connotations. Most of these are the representations of that intellectual trend towards a subject or situation, and this trend may be objective or subjective (Badawi, 1982)
- **Research convergence:** This is a research method and technique or a type of research design and output, which is not just a tool for data analysis only, but includes all aspects of research from choosing the research question to answering it (Sarantakos, 2017) According to Nassisa (2015), "The methodological convergent to research is considered a conceptual framework or a speculative and mental method used by the researcher in his study and relied upon to converge the topic to be studied." (p. 9)
- **Formal convergence:** it is "the similarity and proximity between forms and bodies, their implications and how, between the samples of the research community"(Sheiaa, 2020, p. 13)

From that, the convergent in language and research is the means used by the researcher to address a topic based on a theoretical basis, social theory, subjective or objective reference that he deems appropriate in order to understand the topic. As for the level of form, the formal convergent is one of the means of expressing shapes and their connotations through abstraction; transfer or reproduction of forms to convergent the symbolism of the form and its connotations.

### Concepts Related to Convergence

A number of concepts are related to the concept of convergence as follows:

- **Formalism:** Lemon and Marion (1965) define it as the tendency aimed at the predominance of form and aesthetic values over the content of the work and its idea, imagination or feeling. Thus, this reflects the principle of dominant and the ruled (Al-Nuaimi and Mohammed, 2022)
- **Hermeneutics:** As defined by Adel, (2018), it is the pattern in which the deep significance underlying the apparent content and Hermeneutics are revealed dealing with symbolic texts with multiple meanings. Such texts may form a seminal (semantic) unit, as in mythology, have a completely interconnected external superficial meaning and at the same time have a deeper inner connotation. Hermeneutics is the art of interpretation and significance is one art in terms of what it is, whether the text there is a literary or religious work or a legislative text with certain differences between these many areas of texts. It requires that each area develops its theoretical tools appropriate to its own problems, but behind these differences lays an original unity, as all these texts are represented in a linguistic body. This refers to the principle of significance and interpretation
- **Phenotype:** It is anything that describes a characteristic in an organism, such as its morphology, shape, growth, or behavior (Churchill, 1974). Indeed, it is the concrete physical pattern that translates the underlying genetic code inherited in the element. (Mohammed, 2014) unlike genotype. In other words, it means that the physical pattern explains the genetic code.

Through the confluence of meanings interpreted from the previous concepts, research find that these concepts are related to the unity of significance of the form and the deep values interpreted by the phenomenological form, which reflect its internal morphology. Thus, they are the expression of the phenotype.

### Procedural Definition of Convergence

From the previous discussion, and the research hypothesis, the research develops a definition for the concept of convergence, where it is framed as an application of the theoretical basis (genetic) consisting of a set of principles on which the resulting text (form) is based, namely: the dominant and ruled, significance and interpretation, and the physical pattern explaining the genetic code)

Accordingly, the convergent architecture is a “way in which a designer deals with the architectural text, and converge the thing to be represented in the design through the adoption of three levels. The resulting form is based on three principles as follows:

- 1-dominant and ruled,
- 2-Significance and interpretation,
- 3- Apparent pattern that explains the genetic code.

The research has thus reached a relationship between the two concepts. That is that the continuation of a particular architecture over time requires convergence of it through the cases of selecting appropriate qualities (Genes) and improving them (Positive and negative Eugenics) through the levels of (dominant and ruled, semantics and interpretation, and apparent pattern.

**Previous studies**

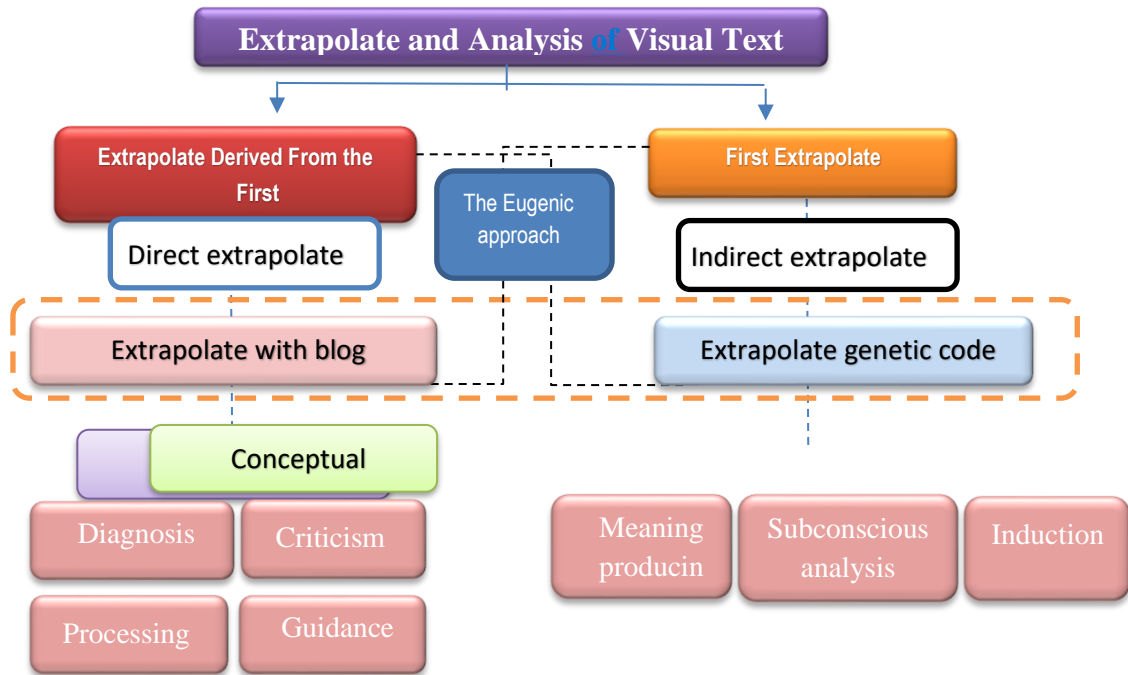
- **The study of Qasemi, Amal (2021) “The logic of Roland Barthes in structural analysis for the image’s text”**

One of the results of this study is the establishment of Roland Barthes ideas that have become a base in the field of structuralist analysis of visual texts. It starts from dispelling the belief that the photographic image is a message without a blog as it reproduces reality automatically, as he clearly sees that this image carries two messages: the first without a blog and the second is equipped with a code and derived from the first. The structuralist analysis of images that include a pattern of signs (written audio, audio-visual, etc.) is done according to the existing context, not in isolation from the sociology of the prevailing culture.

Barthes in his book (*The Pleasure of the Text*, 1973) defined text as a fabric within which ideas are generated and meanings are generated made by the language of the text, where the self is lost amid this fabric of internal relationships. Based on the principle of pleasure, the text becomes infinitely identifiable. Barthes says, "Everyone can testify that the pleasure of the text is not certain to occur, nothing confirms that this particular text will give birth to us again, it is a friable pleasure" (McGraw, Barthes, Miller, 1977, p. 52). Decomposed by mood, habit and the circumstances, it is a fragile pleasure and then comes the impossibility of talking about the text from the point of view of positive science. Since the image is a material thing, the concept of image, according to Abraham Moles, expands to images other than the visual. Thus, it is permissible to talk about the sound image and the solar image. From Barthes' suggestions it can refer to designation the signifying thing or the specific meaning of the content, or the content what the image (visual discourse) represents or which it may seek to represent. This means a major goal of practical relevance, defining the label that stores everything that is included in literal reading or intuitive reading. The specific level represents the relationship between the (signifier and the signified) within the evidence and between (the evidence external reality). As for the implication, it can be determined that it is formed implicitly from all that it can provide for this the content or thing of other symbolic values and ideas, that go beyond their intuitive framework. Also, is that aspect the subjective human being, as it elicits the feelings and feelings of the recipient, as well as his cultural values? This consider these two messages are a simultaneous process, since the image reader simultaneously receives the perceptual message and the message cultural, this process of perceiving a particular thing can be separated from the cultural context and it is also necessary that. The recipient has become accustomed to seeing this thing in order to classify it within his experiences and expertise

This research concludes from this proposition that the fixed rules in the analysis of visual text are based on the fact that the image of the visual text carries two extrapolates. The first extrapolate is to read the original code (without a blog) which is not expressed in forms, but in ideas, it is the (genotype). The second extrapolate is derived from the first, which is expressed in shapes, it is the (phenotype). According to the sociology of the prevailing culture, have to achieve four elements; "diagnosis, criticism, processing, guidance". Fig. 2 illustrates the analysis and extrapolates of the visual text by the logic of Barthes.





**Fig. 2:** Analyzing and extrapolating the visual text according to the logic of Roland Barthes  
Source: Authors

- **The Study of Mohammed, Wasan (2014), Genotype and Phenotype in Architecture and Interior Design: Analytical Study of Traditional Architecture in Arabian Gulf Cities**

Mohammed (2014) has dealt with the convergence in architecture with the organism that has genetic traits passed down to successive generations and these qualities are what determine the style of architecture in terms of belonging to a certain pattern or architectural movement or the times spirit. The study concluded that there are two types of genetic expressions of the architectural text. One of this was called architectural genotype, which are the basic concepts and ideas carried by architecture knowledge. They are only aware and invisible such as the characteristic of containment and openness towards the interior and privacy.

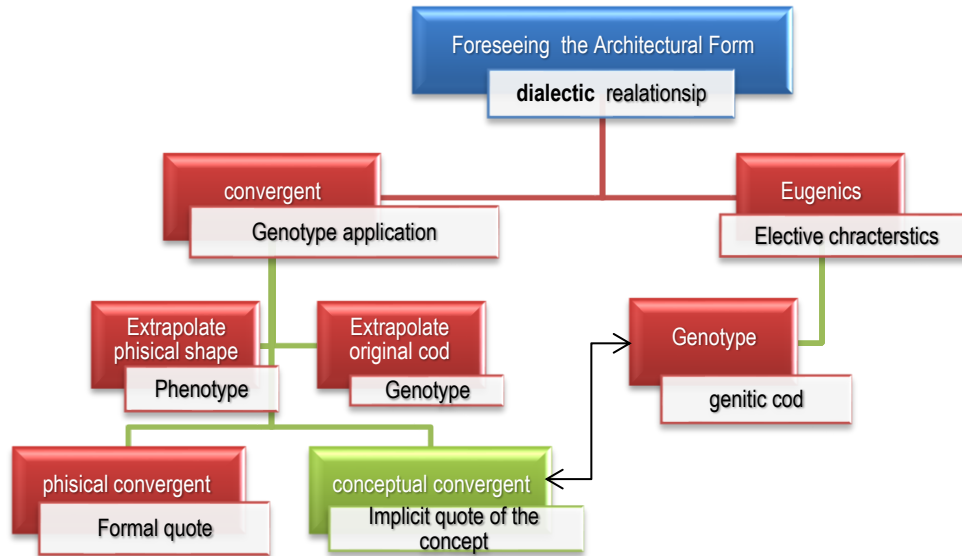
It is one of the genetic characteristics of Islamic architecture, which can be formed in several forms depending on external influences and the spirit of the times. Then it turns into the second form, which is the phenotype in architecture. This is the pattern that is directly perceived because it represents tangible physical elements such as court yard, balcony, Shinshul, decorations and other distinctive qualities and expresses privacy or openness towards the inside or other concepts that represent the genotype. It is characterized by the diversity of its shapes, proportions and colors. The study concluded that the genetic pattern can be formed by more than one type of phenotype, and that the genotype is what gives privacy to the architectural pattern expressing an era or architectural movement or architecture with a distinctive character.

The study shares with the subject of the research in terms of the convergence in understanding the subject and its interpretation from a scientific point of view. The convergence of the architectural text is with the biology of the organism, as it touched on a clear mechanism that illustrates the dialectical relationship between the two concepts directly by borrowing an equation from biology. This has been applied in extrapolating the vocabulary of the heritage architectural text in particular to show new characteristics related to improving architectural production. These are the two equations:

$$\text{Genotype} + \text{Environment} + \text{Random} - \text{Variation} \longrightarrow \text{Phenotype} \text{_____ eq (1)}$$

$$\text{Phenotype} + \text{Variation} - \text{Environment} - \text{Random} \longleftarrow \text{Genotype} \text{_____ eq (2)}$$

In the previous discussion, the research deduced the Fig. 3 which illustrates the nature of the relationship between Eugenics and the convergence in extrapolating different text, where the common relationship between Eugenics appears immanent to the preferred genetic traits. The conceptual convergent based on extrapolating the genetic code and implicit quotation of the concept behind the form is in the architectural text.



**Fig. 3:** The dialectic relationship in foreseeing the different architectural text based on the study of Mohammed, Wasan (2014)/ Source: Authors

After discussion and analysis, the ideas that previous studies have dealt with through various fields have been extracted to compose the most important vocabulary related to Eugenics. It focuses on convergence as a relationship to extrapolate architectural text. Thus, indicators have been extracted from the main and secondary vocabulary consisting of the theoretical framework as shown in the Table 2.

**Table 2:** Indicators of extrapolating the architectural text in light of the relationship between eugenics and convergence / Source: Authors

Term	Main Vocabularies	Secondary Vocabularies	Indicators
<b>Eugenics</b>	Genes	Isolating the text from external to extract the genetic origin (genes)	Self-inductive Self-intentional extrapolate subconscious analysis
	genetic code	Genotype exploration	Extrapolate original cod Inductive- Extrapolate embedded thoughts
	Positive Eugenics	Selection of genes for good traits to improve eugenics	Select and improve embedded concepts Improving the genetic production
	negative Eugenics	Decreased frequency of invalid genes	Edit invalid meanings
<b>Convergent</b>	Dominant and ruled.	Formal convergent	Attention to appearance
			Transfer codes directly
			Phenotype-Formal quotation of elements or symbol

	apparent pattern that explains the genetic code		Clone forms with behavior
			Abstraction of elements and symbols
	Significance and interpretation.	Conceptual convergent	implicit quote (include reference)
			implicit quote (embedded on theoretical background)
			rhetorical implication
			suggestive meaning(signified)

### Measurement Method Used

The research employs a Case study approach. Data is analyzed using inductive methodology involving descriptive analysis of structural orientation. It applied the indicators derived from the literature review and theoretical framework, to evaluate the selected case study. This came through using “Delphi Method” which relies on a panel of experts, (20) of academic and specialized in architectural engineering field, the experts answer questionnaires that ask them about extracted indicators from this study and how much it’s compatible with selected cases study, in two rounds. After each round, the Authors provides a summary of the experts' judgments from the previous round as well as the reasons they provided for their judgments, encouraged to revise their earlier answers in light of the replies of other members of their panel, It thus produces conclusions that serve as an information base to formulate the research aim.

### Cases Studies

This paper views architectural projects as being comprised of text. Thus, research has elected a set of architectural projects (architectural texts) to examine the extrapolating indicators. And those projects have been selected based on specificities of production and function (purpose) of the project:

- Formal and functional diversity of the projects to achieve comprehensiveness in the extrapolation of text according to the Eugenics and convergence.
- Different architectural textual contexts of the selected projects and their affiliations to multiple architectural trends in order to achieve a wide range of possible values for measurement.

#### 1. Prophet's Masjid in KSA and Al-Kubaisi Masjid in Iraq

The Prophet’s Mosque in Medina in Saudi Arabia is one of the holiest mosques in the Islamic world due to Muslims’ sense of belonging to their Prophet (Fig. 4). The Delphi method experts answered the questionnaires directed to them by the Authors, and the answers of the group were directed towards the following:

- Eugenic extrapolation of the Kubaisi Masjid is clear.
- The original genetic code is represented by the concept of “spirituality, place sanctity” that comes from the prayer value (The self-worship).
- Convergent extrapolation: Al Kubaisi masjid has employed the phenotype-formal convergence through a formal quotation of the elements (dome and minarets) from the Prophet's masjid. It mimics the honorable spirituality concept of the Prophet's masjid. To extrapolate the conceptual convergence, it has employed spirituality and sanctity that the designer has wanted to converge conceptually by employing the reference quotation for the dome of the Prophet's Masjid and the honorable minarets. This reference includes the reflection of the sanctity of place and its privacy.

The conceptual extrapolation of convergence to the eugenic extrapolation has confirmed the focus in extrapolating the ideas embedded. They are two extrapolations in one extrapolation.



Kubaisi Mosque in Baghdad

Prophet's Mosque in Medina

**Fig. 4:** Formal convergence through formal quotation of elements in religious buildings

Source: wikipedia.org

## 2. Rock's Dome Masjid in Quds and the Gate of the Iraqi Presidential palace in Baghdad.

In the two architectural texts represented by Rock's Dome Masjid in Palestine and one of the gates of the Presidential Palace in Iraq, the extrapolation of the architectural text in the two projects appear (Fig. 5). The Delphi method experts answered the questionnaires directed to them by the Authors about this, and the answers of the group were directed towards the following:

**Converge extrapolate:** there are two types of convergent extrapolate:

- First extrapolation is the formal convergence. The designer of the presidential palace gate has used the formal convergence by directly transferring the symbol - the dome of the Masjid, and thus he has departed from the first purpose of the design: the main function of the Masjid which is to perform prayers and worship.
- Second extrapolation: It is an application of the vocabulary of the conceptual convergence. The designer has chosen the most prominent elements of the Rock's Dome Masjid and has made it above the heads of passers-by through the gate. This is the indication of the suggestive meaning (significance) represented by the honor and sanctity of this place, which comes from the symbol of the dome. This is one of the most prominent religious symbols for the Muslims. Thus, it is close to the significance of the sanctity of the Rock's Dome Masjid as the first qibla for the Muslims.

Eugenic extrapolation appears through the extrapolation of the ideas included in the text indicating the connotations of the honorific building which is the entrance to the presidential palace. This is expressed by the designer through his genetic connotations and symbols indicating luxury, raise and sanctity of the place.

Here, it must be noted that extrapolation includes an expressive integration of the converging extrapolation and the eugenic extrapolation in one extrapolation that serves the same goal. This is sanctity and honor.



Iraqi presidential palace's gates- Baghdad.

Rock's Dome Masjid- Quds.

**Fig. 5:** Eugenics and convergence extrapolation in political buildings

Source: wikipedia.org

### 3. Ishtar Historical Gate in Babylon and the Iraqi Museum's Gate in Baghdad

There is a convergence in historical buildings between the famous historical landmark of the Ishtar Historical gate in Babylon and the gate of the Iraqi Museum in Baghdad (Fig. 7). The Delphi method experts answered the questionnaires directed to them by the Authors about that, and the answers of the group were directed towards the following:

- In this case studies there are two types of convergent extrapolations.
  - First extrapolation is a formal convergence, where the designer has deliberately quoted the historical Ishtar Gate in Babylon, which is to quote the constituent elements of the historical gate and employ them in the gate of the Iraqi Museum.
  - Second extrapolation is the conceptual convergence, where the designer has quoted a distinctive form that is a landmark of the Iraqi Babylonian civilization and has employed it in the museum gate. Thus, it is a historical reference inclusion quote. Quoting it as a gateway to the Iraqi Museum is palatable and acceptable, because the museum is a place for the antiquities of this ancient civilization.
- Eugenics extrapolation appears by extrapolating the genetic code expressing the historical importance of the building. That is, extrapolation includes an expressive integration of the converging extrapolation and the eugenic extrapolation in one extrapolation, where it is represented by the intentional extrapolation of self-indicating heritage, history and effects of society.



**Fig. 6:** Eugenics and formal and conceptual convergence between Ishtar Gate in Babylon and the Iraqi Museum's gate in Baghdad

Source: wikipedia.org

#### 4. Ancient Egyptian Pyramids and the Glass Pyramid in the Louvre Museum

The Delphi method experts answered the questionnaires directed to them by the Authors, and the answers of the group were directed towards the following:

One of the extrapolations raised by the experts in interpreting the shape of the pyramid in the new Louvre Museum is the formal convergence resulting from the reproduction and adaptation of the external shape of the pyramid. Some of them interpret this formal quotation with an implicit convergence according to a theoretical background that the influence of the concept of dialogue of civilizations prevailing today is what prompted the designer to choose this form of ancient Egyptian civilization to be next to the Louvre Museum, which is one of the most prominent cultural landmarks in France. Therefore, it is found that this architectural text includes an extrapolation of a formal and conceptual convergence. As for the application of Eugenics to the shape of the pyramid, it is represented in the self-extrapolation the idea of glory and immortality, which the designer may have wanted to reflect in the history inside this museum by using the glass as a reflective material (Fig. 7).



**Fig. 7:** Morphological imitation and conceptual inclusion in the shape of the glass pyramid of the Louvre

Source: wikipedia.org

After applying the experts' answers about the selected projects, and the measurement concepts and indicators of the multiple extrapolations of the case studies, the results of the extrapolations are shown in the Table (3).

**Table 3:** The Results of indicators applying of the cases studies

Source: Authors

	Design	Main and Secondary Eugenic Concepts	Eugenic indicators	Main and secondary convergent Concepts	Convergent' indicators
	Prophet's Masjid and Al-Kubaisi Masjid	Genetic code- Genotype exploration	Extrapolate original code (The self-worship)	Phenotype- Formal convergent	Formal quotation of elements or symbols (dome and minaret)
				Conceptual convergent	Implicit quote include) reflecting the sanctity of the place and its privacy.
2	Rock Masjid's Dome and Gates of the Iraqi presidential palace	Genetic code- Genotype exploration	Inductive extrapolation embedded thoughts (sanctity and honor)	Conceptual convergent	Implicit quote (include reference to the holy's Rock Masjid's Dome)
				Formal convergent	Transfer codes directly (the dome shape)
3	Ishtar Gate in Babylon and gates of the Iraqi Museum in Baghdad	Genes- Isolating the text from the external	Self-intentional extrapolate for the heritage and history (parallel heritage)	Conceptual convergent	Suggestive meaning (signified is the honor)
				Positive Eugenics	Improving the genetic balance of production (Alignment of the genetic traits with the spirit of age)
4	Ancient Egyptian pyramid and the glass pyramid in the Louvre Museum	Genetic code - Genotype exploration	Extrapolate original cod (concept of history's immortality)	Conceptual convergent	Implicit quote (include reference for the history and heritage)
				Negative Eugenics- Decreased frequency of invalid genes	Edit invalid meanings (edit the concept of inward looking in the pyramids form)

### Findings and Discussion

From the analysis of the previous projects, the following concept has been extracted:

## Eugenics

Eugenics applications have been articulated by:

1. Isolating the text from everything that is external and through:
  - Self- intentional extrapolation of the meanings produced by the architectural text.
  - Intentional extrapolation of the self-expression in the architectural text.
2. Exploring the genotype carried by the architectural text:
  - Reading the original genetic code.
  - Reading the embedded ideas contained in the architectural text.
3. Positive Eugenics in architecture: improving the genetic balance of the product through the reuse of good architectural genetic traits adapted to the spirit of the current age.
4. Negative Eugenics in architecture: Modifying invalid architectural genetic traits or solving the problems of deterioration of genetic traits by adding or modifying them to make them suitable for new use.

## Convergences

Convergence in the architectural text is of two types:

1. Formal convergence: This can include several types:
  - Formal quotation: It is when the purpose of the convergence is to convergent the form from which it is quoted due to the symmetry of the function.
  - Direct code transfer: It is when the code transfer is directly unchanged, which is called direct metaphor.
  - Reproduction of forms with a disposition and a change in the proportions, dimensions or details.
  - Abstraction of elements or symbols.
2. Conceptual convergence: It is through the implicit quotation of the reference of the form or according to a theoretical background or rhetorical inclusion or suggestive meaning indicative of the thing converging. Extrapolation of this type of convergence is for specialists and not for the general public.

## Conclusions

This research has concluded the following:

- 1- It is possible to borrow concepts from other fields out of the architecture, such as the concept of eugenics from the field of biology and the concept of convergence from the field of literature, and applying in the field of architecture to foreseeing the architectural form generations.
- 2- Engaging the concept of eugenics with the convergent architecture as an extrapolate mechanism for the different architectural forms to foresee them.
- 3- The architecture form can be inherited through generations, and it is possible to use eugenics to determine such inherited traits.
- 4- Architectural form is similar to linguistic text, that can be extrapolated and interpreted
- 5- Eugenics architecture convergence is the genotype from which the designer derives the expressive shapes of the aligning genetic code.
- 6- Through the application of eugenics in architecture, it is possible to extrapolate the phenotype derived from the close shape or meaning of the architecture.



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