

HUMANITIES ESSAY

The Rise of the Architectural Fact

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Through a Mediationist Theory of Architecture based on Jean Gagnepain's much wider theory of mediation, this theoretical essay discusses the idea that is referred to here as the *architectural fact*. Its first section therefore presents the five hypotheses of Gagnepain's theory of mediation and also the definition of architecture that he has suggested. The second part of the essay provides a more detailed definition of the architectural fact and an explanation of the rational principles of its emergence. It involves a clarification of the fundamental notions of *form* and *formula*, key concepts of the Mediationist Theory of Architecture. Deepening our understanding of the architectural fact, the essay's third section attempts to explain how it arises within the design process. To do so it provides a contrasting study of, firstly, a series of Palladio's villas, and secondly, the different versions of the Kimbell Art Museum as designed by Louis I. Kahn and his team.

Keywords: Architectural fact; Mediationist Theory of Architecture; Jean Gagnepain; form; formula; Jean-Nicolas-Louis Durand; Andrea Palladio; villa; Louis Kahn; Kimbell Art Museum

Introduction

Architects feel it better than anyone, but everybody can have a grasp of it. Before the theory and its words, beyond the drawing and its lines, below the styles and their uses, beneath the project and its aims, between the concreteness of things and the abstraction of forms, stands the *architectural fact*. It comes to our minds while making or using any piece of architecture (furniture, building, garden, city, landscape) and it remains independent of what we say about it, how we represent it, to whom we intend it, and what we decide to do with it. In typical usage, architects tend to refer to it as *concept* or *parti*.

Engineering and humanities subjects tend to neglect or to miss this intangible and particular fact. On one hand, research in architectural engineering focuses on natural phenomena, such as material resistance, light intensity or ambient temperature, studying their impacts on a building's stability and on the inhabitant's physiology. For methodological reasons, it reduces the buildings to physical systems and their occupants to mere organisms. In doing so, it ignores the building's design process, which involved the decisive intervention of a human mind. On the other hand, humanities subjects focus on different aspects of the cultural context of architectural production. If philological studies address the corpus of architectural theory, then the history and sociology of architecture describe, diachronically or synchronically, the social conditions of architectural production, or the appropriation of its products. Construction law assesses the applicability of rules and regulations, and philosophy discusses the ethical issues raised by architecture. Ergo, by approaching architecture in an incidental way, humanities subjects miss the inside mechanisms of architectural design and fail to describe the architectural fact in any depth. The study of architectural facts *in se* calls for a theory that takes into account both their rational nature and their architectural specificity.

The purpose of this essay is to define and illustrate the concept of *architectural fact* through a Mediationist Theory of Architecture which is based upon Jean Gagnepain's much wider theory of mediation. The essay's first section briefly presents the five hypotheses of the Gagnepain's theory of mediation and also the definition of architecture that he has suggested. The second part provides a more detailed definition of the architectural fact and an explanation of the rational principles of its emergence. It involves a clarification of the fundamental notions of *form* and *formula*, key concepts of the Mediationist Theory of Architecture.

Deepening our understanding of the architectural fact, the essay's third section attempts to explain how it arises within the design process. To do so it provides a contrasting study of, firstly, a series of Palladio's villas, and secondly, the different versions of the Kimbell Art Museum as designed by Louis I. Kahn and his team.

Frame

Jean Gagnepain (1923–2006), who studied for a PhD in general linguistics and later became professor at the Université de Rennes 2 in Haute-Bretagne, France, developed a significant theory of mediation that describes the instinctive functions and rational faculties involved in the production of anthropic facts [1–3].

Gagnepain's theory of mediation is based upon five hypotheses.

The first confirms the distinction between human beings and other mammals. While mammals have the neuronal capacity to focus, through their sensation, motion, incorporation, and emotion, on concrete entities that can be called *things*, humans, due to the complexity of their cortex, have access to abstract entities that Gagnepain calls *forms*. For human beings, those forms generate a totally different brain process that Gagnepain calls *rationality*. Human behaviours are no longer instinctive, they are 'mediatised' by forms. In the vocabulary of Gagnepain, like in Ferdinand de Saussure's linguistics [4], the word *forms* does not refer to perceivable aspects, such as in the Gestalt psychology of Wilhelm Wundt. It refers to empty entities, similar to moulds.

The second hypothesis of Gagnepain's theory of mediation states that our rationality is 'diffracted' into four *reasons*: language, art, society, and law. The diffraction of our rationality also leads to the distinction between four kinds of forms that are, in Gagnepain's vocabulary: grammatical, technical, ethnic and ethical. For instance, phonemes and words are grammatical forms.

The third hypothesis states that the process of our rationality is dialectic. It includes two contradictory phases, called *poles*. On the first, called *instance*, forms are discriminated from one another (formalisation). On the second, called *performance*, forms are filled in with things (formulation), which produces what can be called the *cultural facts*. The four reasons proceed in this dialectic way, so that language includes both a *grammatical* pole and a *rhetoric* pole; art, a *technical* pole and an *industrial* pole; our social faculty an *ethnic* pole and a *politic* pole; law, an *ethical* and a *moral* pole. Each reason producing a specific fact, it means there are, according to his theory of mediation, four kinds of cultural facts: concepts (*messages*), products (*ouvrages*), habits (*usages*), and verdicts (*suffrages*).

The fourth hypothesis states that, by nature, the four reasons associate two autonomous but complementary aspects (called *sides*). Language treats both the sound (signifier) and the meaning (signified) of the sign; art deals with both the means and the goal of the tool; society deals with the status and the duty of the person; and law with the penalty and the virtue of the norm.

The fifth hypothesis is that our rationality is a two-way process, called *axes*, on each side and each phase of each reason. In a taxonomic way, it differentiates (defines qualitatively) formal and factual *identities*. In a generative way, it separates (determines quantitatively) formal and factual *unities*.

One of the most original features of Gagnepain's approach is to corroborate his hypothesis through clinical experiments conducted with patients suffering from neurological and psychiatric disorders, in collaboration with Olivier Sabouraud (1924–2006), a neurologist specialised in aphasia (language disorders) and neurology professor at the Centre Hospitalier de Rennes-Pontchaillou in France.

The combination of these five hypotheses constitutes a model of the rationality that explains the complexity of human behaviours and the diversity of anthropic productions. Based on these explicit hypotheses, and with a high degree of clinical corroboration, this model can be used as a conceptual framework in anthropological studies. To date, it has been applied to various fields of the humanities: in linguistics [5–7], archaeology [8], sociology [9–11], information and communication science [12], and epistemology [13]. This essay will examine its use for understanding architecture.

In the three volumes of his masterwork, *Du vouloir dire (On the Will to Say)* [1–3], Gagnepain undertakes an 'epistemology of human sciences' based upon his model of rationality. Classifying the different objects of the humanities subjects, he identifies a specialisation of our artistic faculty dealing with the *production of habitat* (i.e. dwelling), which he names *tectonic*, and indeed regularly refers to as *architecture* [1]. In Gagnepain's vocabulary, the word *production* does not refer to the effective manufacturing of an artefact, but rather to the rational process of its intellection. The word *habitat*, for its part, refers to all kinds of artefacts intended for housing, including furniture, rooms, buildings, city, landscape and even vehicles. According to the definition suggested by Gagnepain, architecture is neither a discipline nor a profession, but a particular ability of human beings, used by anyone producing a habitat, whatever its scale or its functions may be.

Gagnepain does not go any deeper into architectural matters. However, his definition of *architecture*, provided in the context of his theory of mediation, allows the development of a Mediationist Theory of Architecture (hereafter MTA) to explain the rational operations involved in the production of habitat, and to provide scholars with observational criteria and explanatory arguments that can be used for case-study purposes. Going further than phenomenological and structuralist approaches, it allows to describe, beyond the concreteness of things and the abstraction of forms, the emergence of the architectural fact. This translation into architectural terms via the MTA has been carried out since 2006 – most notably in a book titled *Théorie du fait architectural: Pour une science de l'habitat* [*Theory of the Architectural Fact: Towards a Science of Habitat*] – by Renaud Pleitinx, one of the co-authors of this present essay, which is thus the first-ever explanation in the English language [14–17].

Forms, Formulas and Facts

In order to define the *architectural fact* and to explain the rational principles of its emergence, it is necessary to clarify, in the field of architecture, the MTA's concepts of *form* and *formula*, which ultimately justify the methodological distinction between morphological and pragmatological studies.

Dealing first with the concept of *forms* – and taking Gagnepain's theory of mediation as an epistemological framework – the MTA's first assumption is that architectural *forms* exist as fundamentally technical. They are the products of our artistic rational faculty. Following Gagnepain's theory, architectural *forms* are rational entities that are abstractly discriminated, meaning: disregarding any of the things in the world outside our brains. Because of their abstraction, these forms cannot be discriminated positively but negatively; in other words, they are what they are not. Thus, the first characteristic of architectural forms is to be fundamentally empty, without content. As they are polyvalent, they can be filled in with all sorts of things (material, function, people, etc.). Their second characteristic is that they exist through their negative relationship with other forms. Therefore, architectural forms are always a part of a set of forms, called 'structure', which, by definition, contains more than one form:

Structure: (form 1 ≠ ... ≠form n), where n> 1.

Following Gagnepain's definition, the word *forms* does not refer here to a visible or tangible aspect of things, such as in Heinrich Wölfflin's architectural aesthetics [18]. Describing empty entities, the MTA's concept of forms is closer to Leon Battista Alberti's *lineamenti*, 'produced by the mind' [19], and also to Quatremere de Quincy's definition of *type*, of which the latter states: 'In architecture, the word *type* also refers to some general forms and characteristics of a building' [20].

However, the MTA assumes that two kinds of architectural forms exist (as per Gagnepain's fourth hypothesis). The ones that concern the means of architecture, building, and the other that concerns the end or the goal of architecture, housing. This leads to the division of the structure of architectural forms into two separated structures: the one gathering the building forms and the other, the housing forms. Moreover, the MTA distinguishes two sorts of form: ones that are qualitatively discriminated, which are differentiable identities, and the others that are quantitatively discriminated, which are separable unities (fifth hypothesis). Finally, MTA distinguishes four specific and autonomous architectural forms, leading to four independent formal structures, as summarised in **Table 1**.

In traditional western architecture, the usual building identities, which can be called *types*, are square/round; transparent/opaque, and so on – whereas the usual formal unities, often called *elements*, are soil, walls, columns, roof, etc. Furthermore, housing identities, called here *modes*, are open/closed; covered/uncovered, and so on – whereas housing unities, called *positions*, are rooms, halls, terraces, patios, loggias, etc. All these formal identities and unities are the minimum ones. They cannot be discriminated, differentiated or separated any further without vanishing. Nonetheless, formal identities can be subsumed in order to define upper

Table 1: Architectural forms according to the MTA [Source: Courtesy of the authors].

	Building	Housing
Identity	types (archetypes)	modes (models)
Unity	elements (arrangements)	positions (compositions)

identities (categories), such as building *archetypes* and housing *models*, while formal unities can be associated in order to create upper unities (systems), such as a building *arrangement* and a housing *composition*.

The effectiveness of architectural forms allows us to study architectural works from a morphological point of view. The purpose of morphological studies is to analyse the architectural corpuses of habitats in order to reconstitute the structure of forms involved in their production. The analysis can focus separately on building forms or housing forms and can take either a taxonomic (qualitative) approach that addresses the identities and their classification, or a generative (quantitative) approach that addresses the unities and their articulation.

Striking examples of such reconstitutions are the plates presented in the second part of the first volume of *Précis des leçons données à l'école Polytechnique* by Jean-Nicolas-Louis Durand [21]. In particular, Plate 2, entitled '*Combinaisons verticales de colonnes, d'arcades, de voûtes, etc.*', shows different architectural parts in plan and elevation (**Figure 1**). First, all of these *parts* drawn by Durand are authentic *forms*. They are presented without taking into account their potential material content (stones, bricks) or construction process. Second, each relates to a specific building form. Hence, his Plate 2 is about the *building* side of architecture rather than the *housing* side. Third, these *parts* are units, referred to the above elements. They are presented in order to emphasise their separability. Fourth, all these distinctive elements are put together into an upper formal unit that Durand called 'combinations'.

Plate 13, entitled '*salles*', shows various different rooms in plan and section (**Figure 2**). First, all of these rooms are *forms*, presented without taking into account their potential content, such as the activities or the status of the people they could host. Second, these rooms are *housing* forms. Indeed, what must be observed in this plate is space, the position enclosed by walls rather than the walls themselves. Third, these rooms are *housing* identities, displayed together in order to show their differences. Fourth, all these different rooms are inflections of a housing model: the room.

Durand's inventories of building elements and housing modes are obviously limited by stylistic constraints. The architectural formal structures he reconstitutes belong to his time, his country, and fit with his idea of his students' future civic duty.

Turning now to examine *formulas*, it is important to stress that according to the MTA, *architecture* is a rational process leading to the production of habitat. As such, it deals with forms, but cannot be reduced to them. MTA describes architecture as a formulation process, which consists in assigning forms to a given architectural content or conversely assigning content to given architectural forms. On one hand, architectural formulation refers to a set of things, called *parameters*, which constitute the conjuncture in a project.

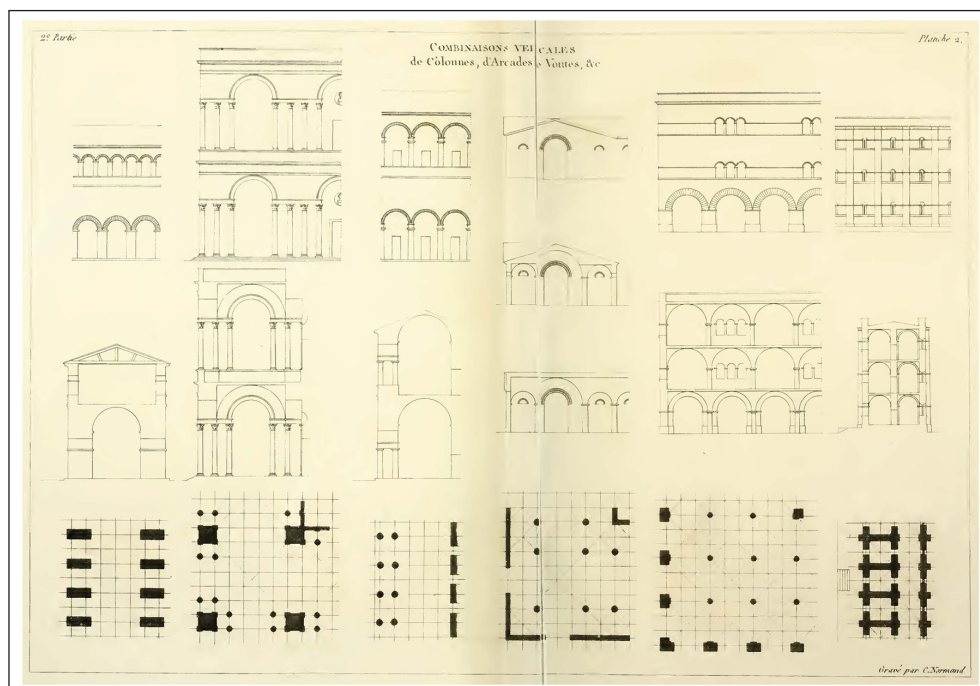


Figure 1: '*Combinaisons verticales de colonnes, d'arcades, de voûtes, etc.*' [Source: Durand, J-N-L. *Précis des leçons d'architecture* données à l'École polytechnique, Plate 2].

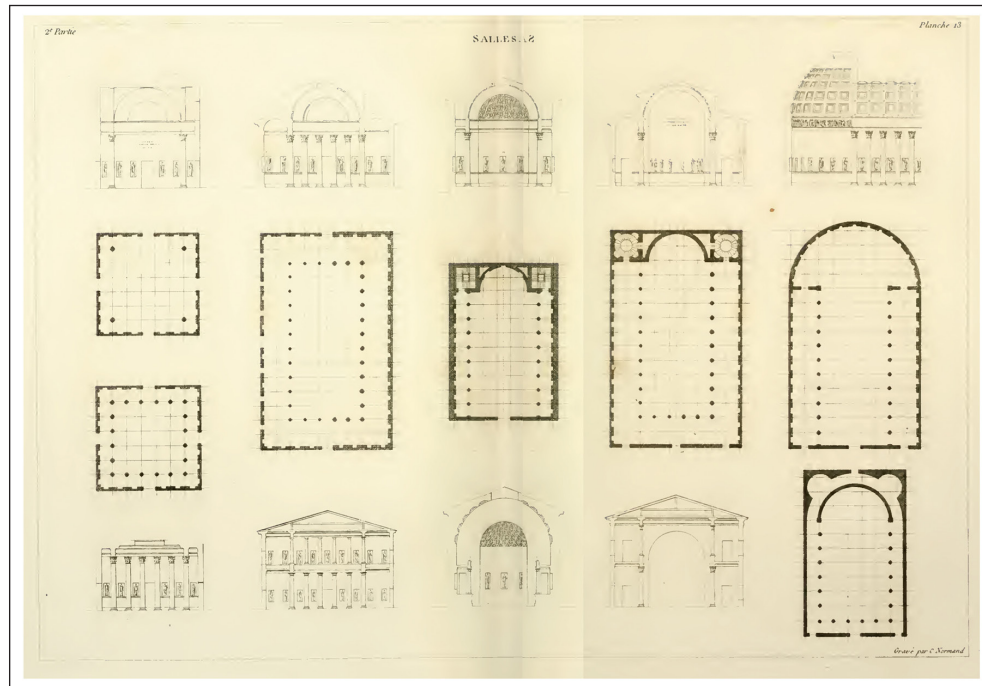


Figure 2: 'Salles' [Source: Durand, J-N-L. *Précis des leçons d'architecture données à l'École polytechnique*, Plate 13].

Such parameters are by definition diverse and multiple. For the sake of convenience of description, this diversity can be reduced to five parameters: the building materials, the housing function, the constructor, the inhabitant, and finally the vector (which includes different features of the formulation context such as the site, budget, building delays, etc). In theory, these parameters are of equal importance. In practice, they are prioritised by the particular project, which will value some of them while neglecting others:

Conjuncture: (parameter 1, ..., parameter n), where $n > 1$.

On the other hand, the architectural formulation consists in selecting a set of forms, named here as *formula*, which is assumed to fit with the conjuncture:

Formula: (form 1, ..., form n), where $n > 1$.

The main characteristic of a formula is to be equivalent to other formulas, taking into account the conjuncture in a particular project. It means that a formula can be replaced by alternative formulas. From a morphological point of view, these alternative formulas are different; but with regards to the conjuncture, they are considered equivalent. The difference between alternative formulas may be slight or huge. Sometimes, alternative formulas are the variations of a unique, given archetype. Other times, they are completely different, qualitatively and quantitatively speaking. We shall call a set of equivalent alternative formulas a *formulation group*:

Group: (Formula 1 = ... = Formula n), where $n > 1$

There is thus a central symmetry between forms and formulas. Whereas forms are abstractly discriminated from each other by ignoring the world, formulas are selected by taking into account a concrete conjuncture. Moreover, whereas the forms contained in a given structure are different from each other, the formulas, belonging to a given group, are considered equivalent.

While forms justify *morphological* studies, formulas justify *pragmatological* studies, whose goal is to reconstitute the formulation group of a corpus of habitats. The study can focus separately on building formulas or housing formulas and can take either a taxonomic approach that addresses the identities or a generative one that addresses the unities. The criteria of such a study is the reference to one or several conjectural parameters.

A notable example of pragmatological study is given by plates in Durand’s other major book, *Recueil et parallèle des édifices de tout genre, anciens et modernes* [22]. In particular, Plate 38, entitled ‘*Théâtres modernes*’, shows different formulas (**Figure 3**). Despite the formal differences between the *parti* drawn for various theatres, these formulas are considered equivalent in regard to the theatrical function and thus constitute altogether an authentic formulation group.

It is to be highlighted that the formulas gathered by Durand, if different, remain quite similar from a morphological point of view. They belong to a conventional model, a standard. This kind of conventional categorical formulation group is usually called *typology*. But in theory, the formal similarity between formulas is not required to constitute a formulation group. The only condition for including formulas in the same group is to be considered equivalent regarding a conjuncture. Thus, it allows for totally different formulas to be in the same group.

Having defined the key concepts of forms and structure, on one hand, and of parameters, conjuncture, formulas, and group, on the other, it is now possible to define, in a very simple way, the *architectural fact*: it is the rational entity that emerges from the equivalence of formulas. It does not lie in any one formula; instead, it transits from one formula to another. The architectural fact is not the tangible and visible thing that one can experience sensitively. It is a *mental thing* that arises from the possibility to give to any work of architecture another form without modifying its identity or unity:

Group: (Formula 1 =... = Formula n) ⇔ Fact, where n>1

MTA assumes that two kinds (fourth hypothesis) and two sorts (fifth hypothesis) of architectural facts exist: ones that concern the means of architecture, i.e. *building*; and the others that concern the end goal of architecture, i.e. *housing*. The ones that are qualitatively defined, which are differentiable identities, and the others that are quantitatively discriminated, which are separable unities. Finally, MTA distinguishes four specific and autonomous architectural facts, as summarised in **Table 2**.

Looking back at Plate 38 of *Recueil et parallèle*, the fact that emerges from the formulation group created by Durand is verbally explained by the title of ‘*Théâtres modernes*’. The fact, in this case, is an architectural

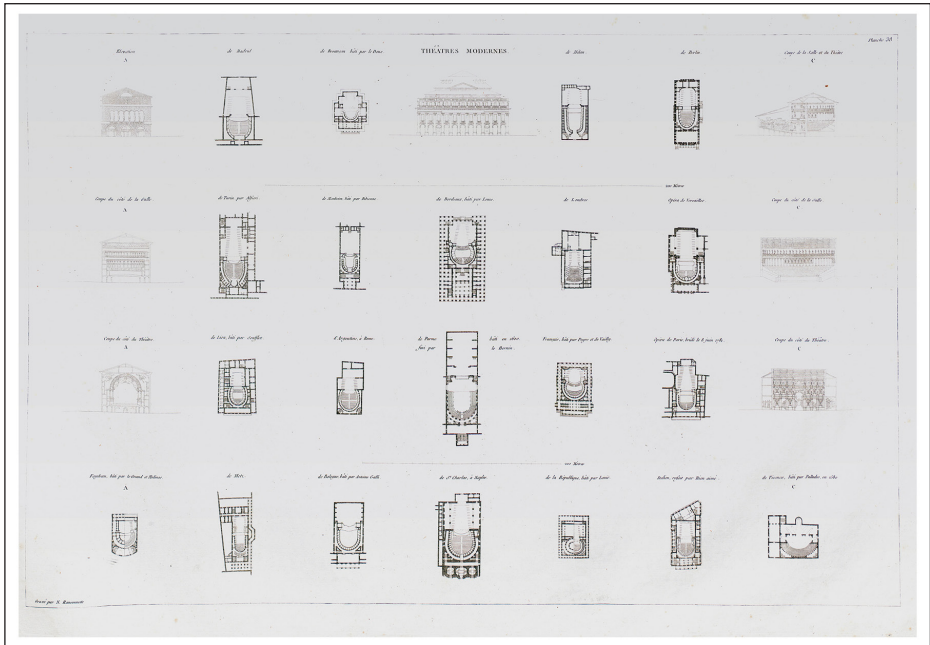


Figure 3: ‘*Théâtres modernes*’ [Source: Durand, J-N-L. *Recueil et parallèle des édifices de tout genre, anciens et modernes*, Plate 38].

Table 2: Architectural facts according to the MTA [Source: Courtesy of the authors].

	Building	Housing
Identity	fashion (work)	facility (sectors)
Unity	piece (assemblage)	place (network)

identity, called *facility* according to the MTA's vocabulary, which can take the form of one or another formula drawn by Durand.

It should be noted that the MTA's concept of *facility* meets the common notion of *building type* [23, 24], but is both more general and specific than the latter term. On one hand, *building type* refers to a *housing* identity that is mainly based on the function of the building, whereas *facility* refers here to an *architectural* identity that can be related to a wide variety of conjunctural parameters – including not only the function (theatre/farm), but also the inhabitants (palace/mansion), the site (lodge/chalet), the building cost, etc. On the other hand, facility is one of the four kinds of architectural facts that can not only be taxonomic but also generative (facility/place) and can not only concern *housing* but also *building* (facility and place/fashion and piece).

While forms, due to their abstraction, are *polyvalent*, the architectural fact is, by definition, *polymorphic*. It means that the same fact can transit through different formulas and, so doing, can take on different forms. Therefore, through successive formulations, the architectural fact can be formally diversified (different formal identities) or complicated (more formal unities). Likewise, and on the contrary, it can be formally homogenised (same formal identities) or simplified (less formal unities). The status of an architectural fact is closely related to the extension of its formulation group. Indeed, a fact may be general or global if the range of formulation is wide, or it may be specific or local if the range of formulation is constrained. It thus can be generalised or globalised by including more formulas in its formulation group or it can be specified or localised by excluding formulas. Thus, the inclusion and exclusion of formulas are the fundamental operations of architectural thought. Moreover, because forms are fundamentally polyvalent, it is possible to include the same formula, which is still a set of forms, into different formulation groups. It is also possible to include a formula belonging usually to one specific formulation group into another. This possibility opens the door to architectural transfer and displacement, as analogues of linguistic metaphor and metonymy.

In his *Recueil et parallèle* [22], Durand also included Plate 37 on '*Théâtres antiques*' (**Figure 4**). Like his Plate 38, this one shows different formulas, constituting a formulation group, but in this case defining the architectural identity of ancient classical theatres. Following Durand's pragmatological classification, there are thus two kinds of theatres – antique and modern – both defined by a specific group of formulations. However, considering these two groups as one would lead to the definition of a more general identity, the architectural category: theatre. Looking more closely at Plate 38, it appears that the theatre formula drawn in the bottom-right corner, which is the one Palladio designed in Vicenza, transfers the archetypal formula of ancient theatres into the modern formulation group, as a kind of architectural metaphor.

The operations of architectural formulation and their result, the architectural fact, are part of the activity of our artistic faculty, which is, to some extent, independent of our rhetoric, politic and moral skills. Therefore, the concept of *architectural fact* as defined above aims to be more fundamental than the common terms of

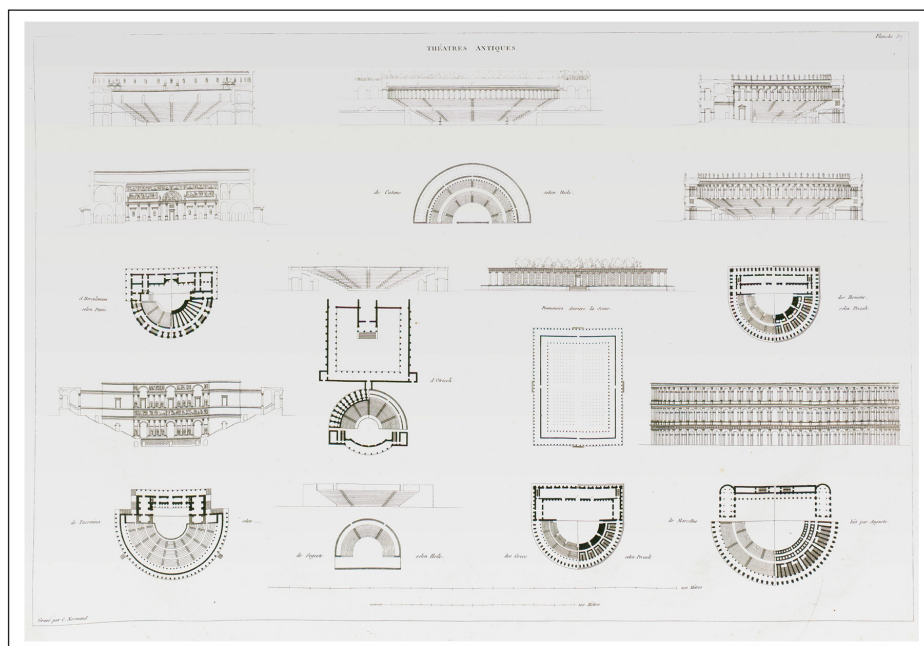


Figure 4: '*Théâtres antiques*' [Source: Durand, J-N-L. *Recueil et parallèle des édifices de tout genre, anciens et modernes*, Plate 37].

concept or *parti*, being axiologically neutral and more specifically architectural. In the field of architecture, the French word *parti* commonly refers to the architectural fact as the object of a decision that involves the mediation of our faculty of judgement (law). The word *concept*, for its part, refers to the architectural fact as already verbally conceptualised, which involves our faculty of language. Free from any decisional or cognitive-linguistic connotations, the expression *architectural fact* designates the architectural content of what one might call the *concept* or *parti*.

Series and Versions

Using their faculties of formalisation and formulation in a piece of reflexive work, scholars are able to reconstitute the underlying structures of built forms and identify the explicit groups of formulas of an architectural corpus, belonging to a given place, time and people. Yet, according to the MTA's assumptions, anyone who is engaged in creating a work of architecture by binding together forms and things, is constituting both structures and groups – and is thereby producing architectural facts throughout the design process. In such a manner, the MTA allows us to further comprehend this creative process and to emphasise the role that the architectural fact plays within it.

Viewed in this sense, a design process can be seen as a set of operations that lead, step by step, through successive reformulations, to the constitution of a group of formulas from which architectural facts can emerge. *A priori*, two cases are possible. In the first, the formulation group is constituted by a series of distinct projects which can then be analysed together. In the second case, it is constituted by the different versions of the same project. These two possibilities will thus now be illustrated through two case studies: the first concerns the series of Andrea Palladio's villas in the Veneto region of northern Italy, and the second the successive versions designed by Louis Kahn for the Kimbell Art Museum in Fort Worth, Texas.

Series (*Palladio's villas*)

The series of Palladio's villas constitute a formulation group in which each formula participates in the definition of the architectural identity (*facility*) of the 'Villa'. In the case of the long-term working process of an architect like Palladio, the successive, sometimes obsessive, formulations can be seen as an attempt to visit the wideness of a field opened and ruled by an architectural fact.

At the end of the 15th century, both the fall of the Eastern Roman (Byzantine) Empire and the rise of Portugal and Spain – boosted by the discovery of new sea routes and the 'New World' in the Americas – weakened the economy of the Venetian Republic. The members of the Venetian proto-capitalist aristocracy hence redirected their investment towards other sources of profit: industry (wool, glassware, leather, woodwork, printing) and agriculture, in which technological progress was notable at the time. Rich patricians placed their hopes in crop yields in the fertile plains of the Veneto and built sumptuous villas on their lands.

Palladio was their chosen architect. Between 1534 and 1572, he designed 34 country houses in the Veneto. Among these, half of them – 17 in total – are merely *palazzi* intended as suburban or rural retreats, such as, for example, Villa Pisani, Villa Montagna, Villa Malcontenta, Villa Cornaro and Villa Capra ('Rotonda'). Guido Beltramini usefully highlights the formal similarity between the plans of Villa Cornaro and those of Palladio's Palazzo Antonini in the centre of Udine [25]. Characteristic of Palladio's *palazzi* designs in the Veneto is the transfer of elements belonging to the conventional formulas of Classical temples: stylobate, columns, entablature, pediment, etc.

Alongside these palace-like villas, however, Palladio built 17 other country houses in a manner that better deserves the ancient Roman title of *villa*, precisely because they fulfilled the agricultural function of a farm. The difference between the two kinds is indeed obvious, in that the villa is a palace with *barchesse* [barns]. In fact, by combining these two architectural elements, Palladio invents a new one, just like by combining the words 'gentleman' and 'farmer', the term *gentleman farmer* was formed. As Pier Vittorio Aureli notes: 'These adjoining loggias were an essential component of Palladio's villas, providing both a sense of context and a semiotic distinction that allowed these buildings to be classified as villas rather than palaces' [26].

This connection between a palace and its barns is not at all essential, nor obvious. It follows an idea that Palladio explains in the first and only recommendation given in his *Quattro Libri* about designing a villa:

'The master's house must be made suitable to his quality, and proportioned to the number of his retinue, in the same manner as the city houses, whereof we have treated before. There must be proper cover made for everything belonging to the villa, in proportion to the income from the land and number of [farm] animals, joined to the main house; that the master may easily go everywhere sheltered, without being hindered from minding his business by either snow or rain, or the

scorching heat of the sun. This will also serve to shelter the wood, and other numberless country provisions which too much moisture of the air or the heat will spoil; besides that, such arcades will make the building look much greater.' [27]

This very simple idea—the ability for the gentleman farmer to go everywhere sheltered—is one of the architectural facts of which Palladio then explores the different formulas for doing so, thereby constituting, from one order to another, the formulation group corresponding to a new architectural identity: the Palladian villa.

This formulation group excludes by definition the formulas corresponding to the palace (i.e. a villa without barns). Yet, it includes a wide variety of formulas that are, from a morphological point of view, very different from one another. As Ackermann says: 'they are few instances of repeated plan, motive or composition in mass' [28]. However, that variety can be reduced to a few architectural sub-categories which depend less on formal aspects than on the way that the idea (the fact) of the Palladian villa is carried out. **Table 3** (which uses the design dates provided by Beltrami [25]) and **Figure 5** show Palladio's formulation group, albeit with a classification that is limited here, for the sake of descriptive convenience, to the 17 villas described in *I Quattro Libri*.

Villa Godi is known as Palladio's first of this kind, and indeed is also the only one that is representative of its particular group. As shown in the plan in the *Quattro Libri*, the formula of the Villa Godi displays the various components of the Palladian villa (i.e. palace and barns), elements which used to be scattered around at that time, in a carefully symmetrical order. However, here the palace and the barns are separated by a courtyard. If the idea of placing together the palace and the barns seems already present in Villa Godi, the requirement of covering over the route between them is not met at all.

Villa Pisani (1542, Bagnolo), Villa Ragona (c.155, Ghizzole), Villa Trissino (c.1553, Meledo), Villa Badoer (1554, Fratta Polesine) and Villa Thiene (1556, Cigogna) constitute a second group. These villas share the same formal characteristic: although the palace and the barns are still separated, they are now linked together by arcades that start more less at the bottom of the monumental staircase leading up to the palace. In the earlier versions of these villas, the arcades spread sideways and then turn a corner, whereas in the latest versions the arcades are curved. The integration (formal association) of the palace and the barns

Table 3: Formulation group and sub-groups of Palladio's villas as included in *I Quattro Libri* [Source: Palladio A., *I Quattro Libri*; table compiled by the authors].

Fact 1	Fact 2	Fact 3.1.1	Fact 3.1.2	Fact 3.2	Fact 3.3	Date of design
Godi						1537
	Pisani					1542
					Thiene	1542 ?
				Saraceno		c.1548
		Angarano				1548
				Poiana		1549
	Ragona					c.1553
	Trissino					c.1553
			Zeno			1554 ?
			Mocenigo			1554 ?
	Badoer					c.1554–55
		Barbaro				c.1554
	Thiene					1556
				Emo		1556
					Repeta	1560 ?
					Sarego	1565
		Mocenigo				before 1570

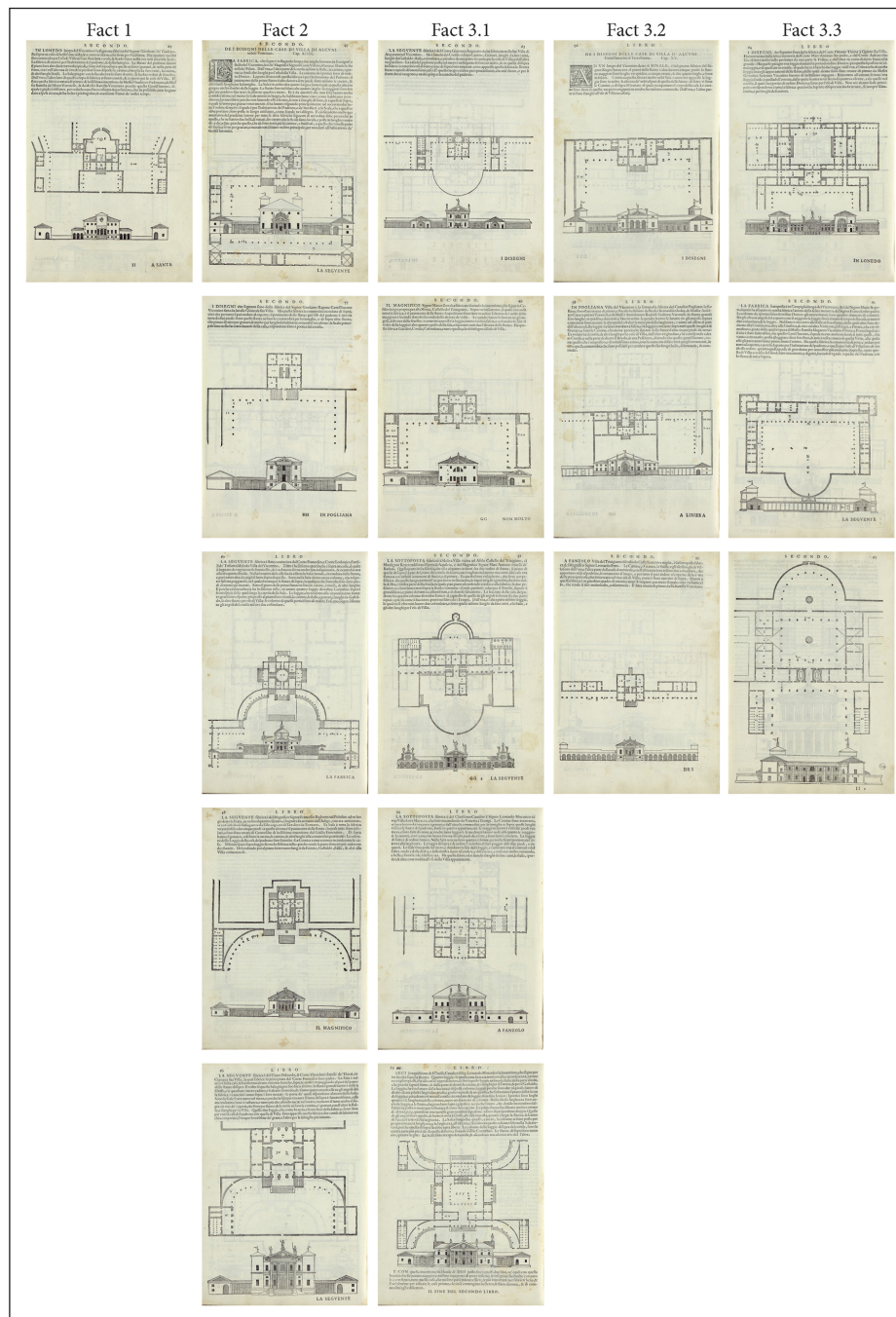


Figure 5: Palladio's formulation groups and sub-groups [Source: Palladio A., *I Quattro Libri*; plans collated by the authors].

is thus only granted by the geometric adjustment of the entrance staircase and the arcades: regular width, same central axis. Such an 'at-a-distance' composition leaves to each part of the villa their full formal degree of freedom. On one side, the palace keeps its basement and remains a belvedere. On the other, the barns stay on the ground floor, which is a requirement for their utilitarian function. Yet even if the barns are, so to speak, 'just downstairs', the idea of being sheltered everywhere is not fully achieved.

In order to guarantee a perfectly sheltered route for the gentleman farmer, the palace and the barns required effectively to be attached. This necessity defines a third set of formulas in the series of Palladio's villas. How could a palace, with a basement and barns that need to be at ground-floor level, be sufficiently connected? In response to this question, Palladio offers three architectural answers that constitute three distinct formulation sub-groups.

Villa Angarano (1548, Bassano), Villa Zeno (1554, Donegal), Villa Barbaro (1554, Maser), Villa Mocenigo 'sopra la Brenta' (1554 ?) and Villa Mocenigo at Marocco (before 1570), constitute a first sub-group in which the solution to connecting the palace to the barns relies upon placing all upon the same base.

This involves removing the base of the palace or else reducing its height, thereby renouncing the other requirement of the villa to be a *belvedere* (although in the case of the Villa Barbaro this was overcome by placing it on the side of a hill). In this sub-group, a formal distinction can be made between the formulas in which the barns are connected to the rear range of the palace (Angarano, Barbaro and Mocenigo 'sopra la Brenta'), and those in which the barns are connected to the front range (Zeno and Mocenigo at Marocco).

Villa Saraceno (c.1548, Finale), Villa Poiana (1549, Poiana Maggiore), and Villa Emo (1556, Fanzolo) constitute a second sub-group in which, this time, the barns are directly connected to the base of the palace. This involves increasing, sometimes dramatically, the height of the base of the palace. In the case of Villa Emo, in particular, the top of the base corresponds directly to the top of the pillars in the arcades, which then mechanically increases the height and the length of the outdoor staircase. In these three formulas, the fact of strolling sheltered is fully achieved while, at the same time, the idea of a palatial *belvedere* is also emphasised.

Villa Thiene (1542, Thiene), Villa Repeta (1560 ?, Piazza Vecchia) and Villa Sarego (1565, Santa Sofia) constitute a third and final sub-group. Their existence perfectly illustrates the polymorphism of the architectural fact. Indeed, they fulfil the requirement of the gentleman farmer going everywhere sheltered, but in a completely different formal way. In this sub-group, the arcades, which in other formulas are used as a means to connect the palace to its barns, become the elements that unify, in plan as well as in elevation, the different parts of the building. The visual predominance of the arcades tend here to fade, if not erase, the formal distinction between the palace and the barns. In Villa Repeta, especially, the apartments of the master's house take the same form (height, width, arcade) as the barns, making it difficult to know where the different functions of the villa are located.

In his book, *Architectural Principles in the Age of Humanism*, Rudolf Wittkower attempts to show that Palladio's palaces and villas all were based upon the same 'geometrical pattern', as derived from the composition of Villa Godi [29]. For the sake of demonstration, Wittkower gathered the schematic plans for 11 of the palazzi and villas, irrespective of their function. Despite their apparent differences, he still considered them to be similar – and defined, in so doing, a singular 'model' for the Palladian villa.

However, it is clear that what Wittkower sees as *the* Palladian model is merely *one* of the various models that Palladio used. Wittkower also neglects, consciously or not, those villas by Palladio that do not match his description. But what is more important is the fundamental difference between Wittkower's inventory and the formulation group outlined above: his classification is morphological, while that given here is pragmatological. As a result, Wittkower's analysis, focusing on the variations of a model (formal *housing* category), includes the Villa Rotonda, which can be, from a morphological point of view, considered as alike to the 10 other buildings he had collated. However, he significantly excludes the Villa Repeta which, from this point of view, cannot be classified among the variations on the model. On the contrary, by focusing in this essay upon formulas dedicated to a specific function, the Palladian villa formulation group needs to exclude Villa Rotonda, but yet admits it other, different models as pertinent formulas, including that of Villa Repeta. Moreover, the taxonomic structure that Wittkower reconstitutes does not convey any underlying fact or idea, whereas the formulation group that Palladio constituted through his different work was in fact governed by an architectural fact that he stated explicitly in the *Quattro libri*: for the gentleman farmer to easily go 'everywhere sheltered'.

By looking chronologically at these different formulas for the Palladian villa, it is difficult to find in their succession something akin to an evolutionary process, starting from a primitive state and going on to reach, after significant improvements, a state of full accomplishment. In fact, between 1537 and 1565, Palladio designed simultaneously several kinds of villas. Rather than reducing the number of acceptable formulas, he seems instead to have tried to push the boundaries of the villa's formulation group, thus giving to his idea its full generality.

Versions (Kahn's Kimbell Art Museum)

Taken together, the versions of the Kimbell Art Museum designed by Kahn and his team constitute an authentic formulation group, including the different formulas the museum could have adopted. From the equivalence of these formulas rises the architectural fact, the idea, that governs this work. But, in the course of a design process, the successive formulations have less purpose in exploring the spectrum of alternative formulas rather than progressively increasing the specificity and the accuracy of the architectural fact itself. In this case-study, alongside the improvement of the structural system and the cycloid sheds, the successive versions clarify the relationships that the building has with the elements surrounding it, in particular with the park in which it is supposed to be located.

In 1966, Kahn and his associates were commissioned by the newly appointed director of the Kimbell Art Museum, Richard Fargo Brown, to design in Fort Worth, Texas, a building that was intended to host that foundation's collection. The site, as described in the 'pre-architectural program', sits almost on the top of a hill dominating the valley of the Trinity River, one mile west from downtown Fort Worth. In the 1920s, it was still a part of an empty parallelogram-shaped open space surrounded to the north by Camp Bowie Boulevard, to the south by Old Weatherford Road (now Burnett Tandy Drive), to the east by Burleson Avenue, and to the west by what is today Montgomery Street. This district is administratively divided into two parts. The largest part, covering two-thirds of the surface area, belongs to Camp Bowie, and has a rectangular shape. The smaller part, belonging to the city of Fort Worth, has a residual triangular shape. Later on, these two areas were physically separated by West Lancaster Avenue, right on Camp Bowie's boundary line, and connecting this suburban zone to downtown.

In 1936, the rectangle area became the location of the Will Rogers Memorial Center, a complex of buildings designed by architect Wyatt C. Hedrick. Originally, the centre had a coliseum and an auditorium symmetrically placed on either side of a monumental tower (**Figure 6**). At the forefront, two collonaded pavilions, respecting the symmetrical order of the composition, guarded the entrance.

In front of the Will Rogers Memorial Center, on a triangular plot, was a substantial park. Its composition was closely related to the building's design. In front of the tower lay a lawn, bordered by two streets with axes perfectly aligned with those of the coliseum and auditorium. These streets linked the center's entrance to Camp Bowie Boulevard. Along both streets were sidewalks, again rigorously aligned and with symmetrical entrance pavilions (**Figure 7**). Trees were then planted on both sides of the road and the sidewalk. The symmetrical layout of the park guaranteed the iconic presence of the Will Rogers Memorial Center on Camp Bowie Boulevard.

In 1958, however, the original triangle configuration was divided into five parts separated by four north-south roads. The site lying on the westernmost side, close to the top of the hill, is triangular in shape and is still empty today. The area on the opposite was divided into three parts all occupied by low-cost housing. In the middle site, the lawn of the Will Rogers Memorial Center was expanded. Two long pathways to that building were placed on either side of this front lawn, with trees along them planted on a grid, like in an orchard (**Figure 8**).

From 1961–64, the gallery space of the Amon Carter Museum was built on the western triangular site, offering through its arch an open view of downtown Fort Worth. The museum was also provided with a



Figure 6: Aerial photograph of the Will Rogers Memorial Center in 1941 [Source: University of Texas at Arlington Libraries].



Figure 7: Left pavilion of the Will Rogers Memorial Center and its attendant pathway, which leads now to the Kimbell Art Museum, as seen in 1937 [Source: University of Texas at Arlington Libraries].



Figure 8: Aerial view of the site after the construction of the geodesic dome of the Casa Mañana (visible on far left) in 1958, and before the construction of the Amon Carter Museum of American Art, built in 1961. The two main pathways with their gridded trees can be seen clearly, as indeed can the empty site in the front-centre that was later used for part of the Kimbell Art Museum [Source: University of Texas at Arlington Libraries].

terrace placed on the adjacent area, and the road which previously separated the two areas was removed and replaced by a path that provided access to this new building and its terrace.

Then, in 1964, the city of Fort Worth authorised the Kimbell Foundation to build its museum to sit partly on the lawn area of the Will Rogers Memorial Center and partly on the still-available site on its eastern

Table 4: Formulation group and sub-groups of the successive stages of Louis Kahn's design for the Kimbell Art Museum [Source: Courtesy of the authors].

Fact 1.1	Fact 1.3	Fact 1.2	Fact 1.4	Date of design
Square plan				Spring 1967
	Rectangular plan			1967
		H-plan 1		Summer 1967
		H-plan 2		Fall 1967
			C-plan 1	Fall 1968
			C-plan 2	Spring 1969

side, which was donated freely to the foundation. The reunion of these two parcels involved the removal of the center's eastern pathway, which also caused implied the elimination of a traffic roundabout and the construction of a new access road on that side. If the alley was thus removed, its by now tall trees were maintained. The presence of these mature trees almost in the middle of the unified plot became an important feature of Kahn's project, as they were later, in one way or another, be taken into account in all the draught designs [30].

Between 1966 and 1968, Kahn drew up several versions of the museum. In the *Complete Works* [31], the number of versions was somewhat simplified and thus reduced to 4 key iterations – called respectively 'square plan', 'rectangular plan', 'H-plan', 'C-plan', each in accordance with the shape of the building's footprint (**Table 4; Figure 9**).

In April 1967, Kahn's team presented the first complete version of their design for the Kimbell Art Museum by building a model which showed a square-plan building [32].

From a taxonomic point of view, the architectural fact, even if it went on to be specified further through the successive versions, is already clear in this initial version. The aim is simply to protect the Kimbell Foundation's collection from the Texan sun under what one would call a *society of roofs*, given that Kahn himself said that an architectural plan is a 'society of rooms'. From a morphological point of view, the comparison that Pieczara makes between the Kimbell Museum and the livestock barns located to the south of the Will Rogers Center seems correct [30]. Qualitatively speaking, the Kimbell's formula belongs to the wide architectural category of *sheds*.

Yet, from a generative point of view, the relationship between the Kimbell Museum and the neighbouring elements remained unclear. The building takes all of the surface area offered by the rejoining of the lawn and its adjacent plot, such that there is no park any more – only some residual open spaces around the museum. Nevertheless, two features at least testify of Kahn's interest in the existing elements. Firstly, the main entrance of the Kimbell Art Museum is located so that it faces onto the western side of the square, thereby making a visual connection *at-a-distance* between the Kimbell and the Amon Carter Museum, which stands across Will Rogers Road West – and furthermore, the southern side of the square is aligned with the sides of the Amon Carter Museum, making a geometric link between the two buildings. Secondly, the Kimbell's plan is divided into two parts by two courtyards that are exactly located on the footprint of the road that was removed, and which in doing so clearly valued the long existing alley of trees. However, due to Kahn's push to expand the available gallery space, this first square version was deemed to be far too big compared to the actual area required and too costly for the restricted budget.

In its second version, drawn in Spring 1968, the Kimbell Art Museum's ground plan takes the shape of a rectangle that extends in length along a east-west axis. Compared to the initial version, two important features remain: the entrance is still located on the western side, facing the Amon Carter Museum, and the footprint of the removed road still justifies the presence of two courtyards, which are however, in this version, completely covered. The main difference in this new version is a drastic reduction in floor area, which has a major consequence. The building's downsizing involves therefore an upsizing of the surrounding park, such that the relationship between the museum and the park becomes the same as that between a villa and its garden. This systemic fact emerges from the reformulation of the building and the simultaneous exclusion of the formula of the initial design. This is confirmed by the positioning of the building, almost in the middle of the site, which excludes the previous geometrical connection between the Kimbell and the Amon Carter Museum.

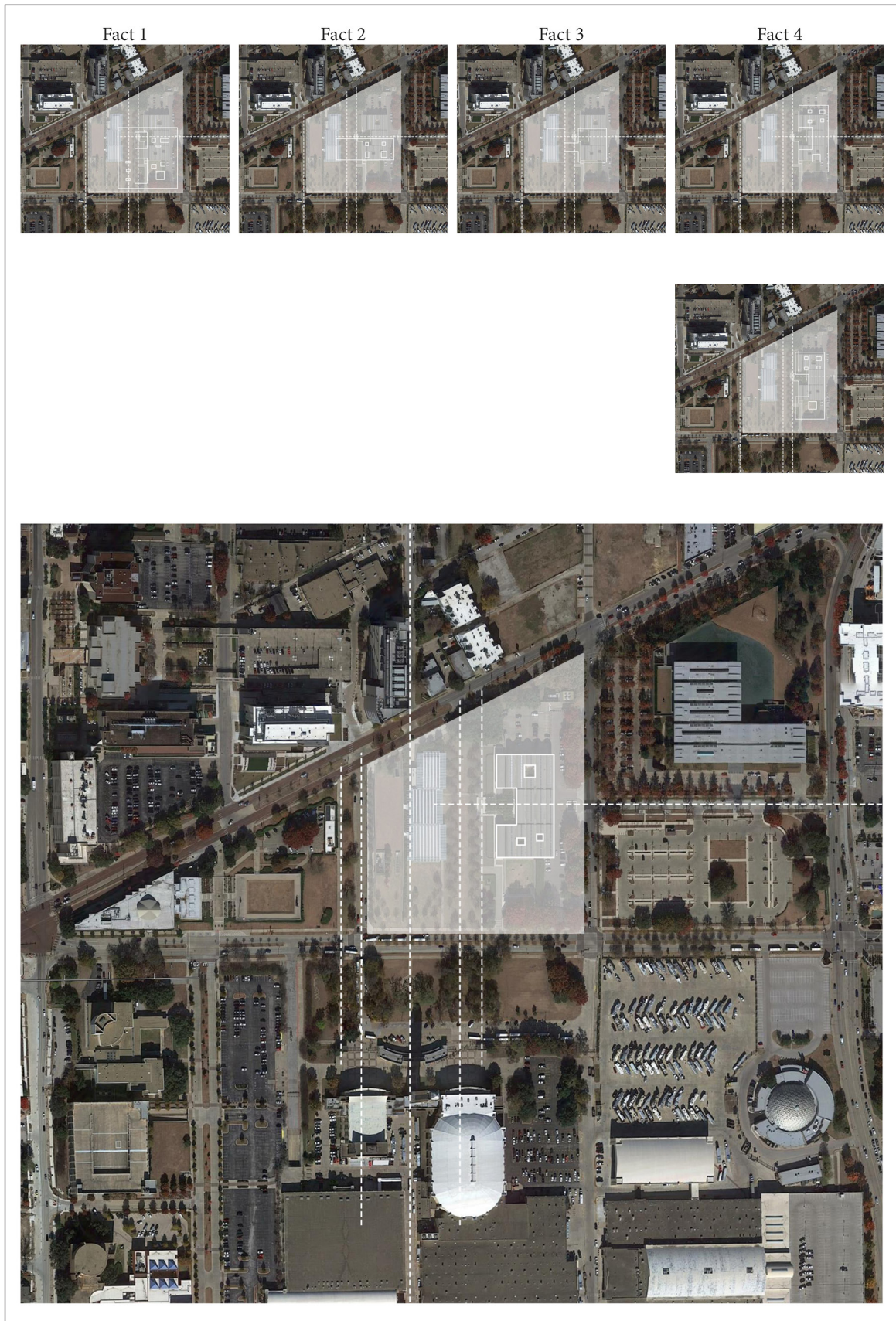


Figure 9: Aerial photograph adapted to show the successive stages of the Kimbell Art Museum's formulation group – the smaller block opposite on the left is the 2103 'extension' by Renzo Piano Studio [Source: Courtesy of the authors].

In the third version of Kahn's design, also presented in Spring 1968, the building's ground plan takes on a H-shape. Between this formula and the previous one, few things were changed from a morphological point of view. The courtyards, still present on the path of the removed road, were now to be uncovered, but the entrance had not moved and, moreover, the size ratio between the building and the park was the same. The fact that the museum was to be like a villa in its gardens remains, despite the formal differences between this formula and the previous one.

In the fourth and final version, the Kimbell Art Museum's plan takes overall the shape of a rectangle whose length is now oriented north-south. However, a large open courtyard cut into the middle of its western side gives the ground plan a C-shape.

From a taxonomic point of view, even if the roof structure in the final version has several sophisticated improvements, the idea of the building is still that of a shed. Yet, from a generative point of view, the idea has completely changed compared to the third version. Indeed, the museum is now positioned on the eastern part of the plot, which means that the existing alley of trees does not go straight through the building any more, but runs right in front of it (**Figure 10**). The lawn in front of the Will Rogers Memorial Center is thus left empty. In this formula, the Kimbell is no longer like a villa in a garden, but rather an imposing institution facing onto the large lawn. But the major fact is that this lawn does not belong exclusively to the Kimbell Art Museum, but also to Amon Carter Museum and above all to the Will Rogers Center. By leaving the lawn empty, Kahn uses his design to create a *society of institutions*.

Furthermore, the place that Kahn allocates to the Kimbell within this society is as modest and respectful as can be. On one hand, the position of the museum on its plot remains unchanged and, moreover, formalises the view from the Amon Carter Museum's gallery to the downtown Fort Worth. Sketches presented in the *Complete Works* testify that Kahn and his associates searched awhile for the right positioning. In one of these sketches, the new building is positioned so as its southern side corresponds roughly to the southern side of the Amon Carter Museum. In another sketch, the centre of the Kimbell is placed right on the axis of Darnell Street. Yet, in all of these sketches, some part of the building sits right in front of the Amon Carter Museum. In the ultimate formula, however, the rear central entrance faces axially onto Darnell Street, and because of areudcton in floor area, the Kimbell does not face the Amon Carter Museum any longer, leaving the view between them completely unobstructed and unoccupied. Moreover, in front of the Amon Carter Museum there is a 'lower stepped garden', with that gallery's higher terrace corresponds symmetrically to the Kimbell's terrace.



Figure 10: Aerial view of the site during construction of the Kimbell Museum of Art (lower left), taken sometime around 1968 [Source: University of North Texas Library].

On the other hand, leaving the main lawn empty allows the Will Rogers Memorial Centre to still have a presence onto Camp Bowie Boulevard, as it had done since it was built. Ironically, this also makes unnecessary the previous costly removal of the eastern road to the center and the whole transformation of access to that building. However, Kahn and his team treated the remaining alleys of trees very carefully. It became, as Kahn wrote to Brown, 'the entrance of the trees'. Again, however, this idea took on several alternative forms. On a site plan dated 25th September 25 1968, a pathway connecting West Lancaster Avenue and Camp Bowie Boulevard is drawn in the place of the removed eastern road. However, again, the ultimate formula proved more subtle. A pathway still joins in a straight line the southern and western highways, but now passes through the front porticos that lead laterally into the entrance court. Close to the building, a second path leaves the first pathway to join a stair that leads frontally to the open courtyard. This second path lies exactly at the place where the previous sidewalk ran, meaning that by continuing to stroll south on the pathway leads one to the small eastern entrance pavilion for the Will Rogers Memorial Centre.

The architectural fact that emerges ultimately from the Kimbell's design process is, as noted above in Kahn's words, a 'society of institutions'. This fact was not there in the 'square' version nor in the 'rectangular' version or the 'H-shaped' plan. It only became clear through the multiple formulas relating to the 'C-shaped' version. The clarification of this fact involved a drastic reduction in its formulation group, from which the previous versions are clearly excluded (**Figure 9**).

Considering this to be the architectural fact of the ultimate design version, the later 'extension' of the Kimbell Art Museum in 2013 by Renzo Piano Studio – placing their block as a kind of mirror-image on the opposite side of the main lawn – is thus questionable. From a taxonomic point of view, Piano's building is so similar to Kahn's that it borders on pastiche, making it only too obvious that they both are part of the same formulation group. Yet from a generative point of view, the new building is located on the common lawn, directly in front of Kahn's, and thus it turns its back to the Amon Carter Museum and obliterates the presence of the Will Rogers Memorial Center onto Camp Bowie Boulevard. The issue here is not to say whether Piano's 'extension' is wrong or right. It is to explain that the new Kimbell's formula is outside the formulation group that Louis Kahn defined. Thus, the fact is different. Piano is trying to play a duet whereas Kahn was engaged in a *concerto*. Indeed, an earlier proposed extension by Romaldo Giurgola in 1989 – although bitterly contested then, and hence abandoned – in choosing to expand Kahn's roof structure to the north and south, leaving the lawn empty, would have undoubtedly belonged more to the Kimbell's formulation group.

The architectural fact does not fall from any sky of ideas. Through a series of works or within a single design process, the fact emerges from the various attempts to bind architectural forms and things into successive formulas. Once the fact has arisen, it becomes a criterion that allows an architect to either accept a potential formula or reject it. The fact, or more usually the idea, remains a guide throughout the design process. However, it can be a generalised fact, like in the case of the series of Palladio's villas, or a specified one, as in the Kimbell's design process.

Conclusion

The aim of this essay was to explain, from a mediationist point of view, the rational mechanisms of the rise of the *architectural fact* and to demonstrate that it is inherent to the architectural design process. It has also allowed the presentation of the Mediationist Theory of Architecture's key concepts of *forms*, *structures*, *formulas*, *formulation groups*, and so on, which, when compared to the more common notions of *form*, *type*, *concept* and *parti*, offer a more accurate lexicon and thus more efficient analytical tools.

In conclusion, the central position of the architectural fact in the field of architectural research needs to be put into perspective, and its emergence as part of architectural creation must be generalised.

The rise of an architectural fact is an autonomous and rational process that needs to be described and properly explained through a specific theory and method. As the rational result, and indeed the acme of the habitat design process, it could be said to be the central and even exclusive object of architectural research. However, the full understanding of an architectural fact implies the study of different aspects of the natural conditions and the cultural contexts that impact upon the formulation of a piece of architecture, similar to the laws of physics and the needs of organisms, but focussing on factors such as theoretical issues, representational techniques, stylistic conventions, and strategic planning. Knowledge of these different aspects clearly requires the help of auxiliary disciplines such as engineering and physiology, as well as philology, iconology, history, sociology, economics, law, psychology, psychoanalysis and philosophy.

In order to show that the emergence of architectural fact is inherent to the process of architectural creation, this essay undertook the pragmatological analysis of two notable examples. In so doing, the risk is

to suggest that the appearance of an architectural fact is an infrequent and singular event, and that every architectural fact is necessarily new or subtle. However, the rational mechanisms that were described are far broader, as they are shared by everyone and in everyday use. As a rational being, anyone who *houses* (i.e. settles and occupies) their habitat produces daily architectural facts that are not necessarily new. On the contrary, architectural facts often belong to our common heritage, such that they are being reproduced rather than produced. Thus, architectural facts are themselves, most of the time, conventional and ordinary. In this sense they are to be found in great architecture and planned cities as well as in traditional vernacular architecture and in informal settlements.

Competing Interests

The authors have no competing interests to declare.

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