APORIA IN ARCHITECTURAL DESIGN

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INTRODUCTION

In this paper, I will be looking at the notion of aporia, as traditionally understood, and how it may apply in the field of architectural design. First, I will explain what aporia is and then clarify its role in inquiry, as originally conceived in Plato and Aristotle, emphasizing its way of searching by encountering an impasse and articulating and formulating an intractable puzzle.

In book Beta of his *Metaphysics*, Aristotle says: "Those who search without first engaging with aporiai are like people who don't know where they need to be going; moreover, they do not even know whether or not they have found what they are searching for. For the end [of a search] is not clear to such a person, but it is clear to the person who has first raised aporiai."[1] If we accept Aristotle's claim that aporia is indeed necessary for inquiry and if design is a form of inquiry, then it is reasonable to expect to find aporia in design.

In section two I consider the domain for the emergence of aporia which will show us where to look for aporia in design. I will also indicate laws of thought that traditionally apply in the setting of this domain. Not all laws of thought are universally accepted in contemporary logic, and some relevant distinctions must be noted. It is important to note that the domain includes classical and formal logic extended to modal logic, but excludes paraconsistent logical systems. Setting aporia's domain will allow me to identify both the source and necessary conditions for the emergence of aporia and, in

turn, the necessary conditions for finding aporia in design.

Section three presents a clear case of aporia in architectural design. I will show that, given the initial distinctions and certain rules that apply, any problem with clearly defined design intention would present a good enough source to demonstrate this type of puzzle in architecture. The conflict inherent in cornering the classical Ionic order presents such an example of aporetic reasoning in architectural design. Aporia, therefore, can be shown not only to be useful and routinely used, it is also of instrumental value in the practice of architectural design.

Section four investigates whether aporia is also intrinsic to design theory. If it is the case that aporia has intrinsic value for design, then it should somehow be present in the more abstract subject matter of design itself. Its existence might be revealed within an attempt to establish the foundations of a design theory. After making a distinction between dilemmas and aporiai, one of these attempts will be examined to determine if the question of the subject matter of design and its unclear ontological status may indeed produce an aporetic situation.

If this proves to be the case, it shows that design is intrinsically aporetic. An ancient myth of Prometheus tells us that the "wisdom of the arts," such as house building indeed have something intrinsically aporetic. In Protagoras's speech given by Plato in his dialogue *Protagoras,*[2] human beings receive gifts from the Titan Prometheus (the Fore-thinker),[3] namely fire, and, often forgotten, the arts (τέχνη). This was a compensation for the lack of other human abilities, since these had already been distributed to other living creatures by his twin-brother, Epimetheus (the After-thinker).[4] For our purposes, it is important to underline two aspects here. Firstly, this story explains to us some of the fundamental tensions of the human condition; in our actions, we seem to be spread between planning and reflecting upon our plans; in our emotions, we are sometimes split between desire and fear; and in our thoughts, we are often torn between thinking ahead and an afterthought. But more importantly, this story is relevant as Prometheus himself seems to be in perplexity, in the state of aporia.[5] Out of his aporia he reasons out and finds a solution: fire and arts are to be given to human kind. Both the "wisdom of arts" and fire (which, in Plato, is an image of knowledge or insight) were instilled in human kind. Thanks to this, people invented house building and many other crafts. In some, perhaps remote sense, both human access to knowledge and the human condition are related to aporetic states of mind as their original source.

Aporia is a Greek word, and it literally means "no passage" or "no way out" (ἀ-, "a-"=no, without) + πόρος (póros="passage").[6] Plato, committed to the method of dialectic, never spells out an exact definition of aporia. He rather demonstrates aporiai through conversations between the interlocutors in his dialogues. Some of the dialogues begin with aporia, some are centred on it, while others end in it. On the other hand, Aristotle provides a few definitions of aporia: one in *Metaphysics*, quoted above;[7] and another one in his *Topics*, when he defines aporia as a state of mind caused by "equality of opposite reasonings."[8] Plato strictly distinguished knowledge from opinions in his *Republic*.[9] His elaboration on the poverty of the senses in the Myth of the Cave[10] comes after the distinction between the realm of opinions from the realm of knowledge in the famous divided line analogy.[11] The realm of reality which is accessible to the senses, the apparent world, is subjected to experiential opinions, while the intellectual, or, for Plato, the only real world, is accessible through knowledge (Figure 1).[12] The only entities that really exist are universal Forms or ideas. Thanks to their high ontological status, these Forms represent the only possible object of knowledge, as only what is perfectly real can be properly known. In the divided line analogy, a clear hierarchy of cognitive capacities (παθήματα τῆς ψυχῆς) and their corresponding objects is established. Images, shadows and reflections of things are less real than things themselves; images of Forms are more real than *things*, but less real than Forms themselves, and so on. In addition, each cognitive capacity has its own mode of cognition and way of searching. The lower end of cognitive capacities, concerned with sensible particulars, is reserved for imagination (εἰκασία) and belief (πίστις). These two capacities are based on observation and together form an

"APORIA – THE STATE OF BEING PERPLEXED, PUZZLED, LACKING RESOURCES, OR BEING AT A LOSS"

opinion (δόξα). The higher end (intellect) is also split into two cognitive capacities—between thinking (διάνοια) and reasoning (νοῦς). The unchangeable objects, corresponding with thinking, are representable in the physical world (by use of drawings, numbers, etc.) and sometimes are referred to as mathematicals or as intermediaries. Discursive thought, with the use of a hypothesis (assumed to be true), is its mode of cognition. The commonly used example to describe this way of searching is mathematics, or Plato's favourite—geometry. Our highest cognitive capacity, which is reasoning (νοῦς), has *Forms* (ideas) as its object of searching; it reaches towards the highest realm of knowing (ἐπιστήμη), and it searches through dialectic.

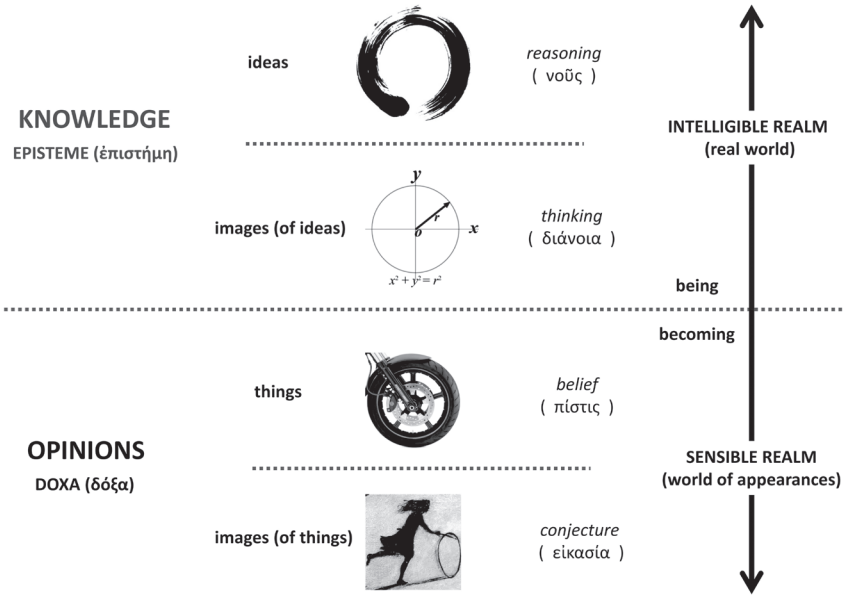

FIGURE 1: PLATO'S DIVIDED LINE. SEE PLATO, REPUBLIC, VII, 509D-511E.

It is precisely dialectic that puts the "mind's eye" in a position to access and "see" the puzzles within this highest realm of reality. The capacity to recognise how exactly a particular puzzle becomes the source of aporia belongs to a "considerable dialectical ability."[13] Aporiai are therefore resolved by means of dialectical investigation.

It is traditionally accepted that aporia in Plato has a purifying effect. Supposedly, aporia purifies the inquirer from the pretence of knowledge on the subject of investigation. Often, Socrates's interlocutor, faced with a *Socratic demand for definition*, presents an account about the matter of

inquiry, typically based on personal experience or belief. After Socrates has refuted him, or at any rate put his belief to the test, the interlocutor, having no other alternative, doesn't know how to proceed and is in a state of aporia. The immediate effects of the aporetic state of mind are speechlessness and inarticulateness, but, as Politis points out,[14] these are only adding to the overwhelming feeling of uneasiness and distress[15] or lack of resourcefulness and a strong sense of intellectual incompetence.[16] Generally, the way the interlocutor responds to this disclosure largely depends on his character, but it also points at his intellectual limitations. If the interlocutor exhibits anger and remains paralysed, his chances to progress in dialectics are quite limited. If, on the other hand one accepts one's own lack of knowledge, only then it will be possible for one to progress further in the search. Besides this cathartic role, more importantly, aporia has also a searching (zetetic) function.[17] Namely, aporia is not only a mental state of puzzlement but is indeed a puzzle about the matter of inquiry. The essential property of such a puzzle is the co-existence of two sides, seemingly opposed. The apparent contradiction is present in an aporia when two propositions both seem to be true, but are mutually exclusive. Apparently, when two propositions are contradictory, at least one of them must be false. This is precisely what constitutes aporia—seeming logical impossibility. The decisive move then, in order to resolve aporia, consists in searching for the possibility to eliminate contradiction (e.g., by arguing that both sides of aporia are true).

Let us now look at a classic example of Socratic aporia and its resolution, which incidentally is about Socrates' own wisdom: "What can the god possibly mean and why does he speak in riddles? For I am only too conscious that I have no pretence of wisdom, great or small. So what can he mean when he [Apollo] says that I am the most wise? For surely

he does not utter falsehoods; that would not be proper for him."[18] In analysis of this passage Politis suggests two seemingly contradictory propositions (both apparently true, but mutually exclusive): "(1) 'I know that I am not wise in any way'; and (2) 'The god, who does not lie, pronounces me the most wise.'"[19] He points out that Socrates's "immediate response is to ask what this apparent contradiction can possibly mean, that is how both its sides can be true."[20] Politis goes even further, proposing that this way of posing the problem is also a model of at least one way of solving an aporia—by drawing a distinction.[21]

2. NECESSARY CONDITIONS FOR EMERGENCE OF APORIA

It is now established that the essential property of aporia is the apparent contradiction between two attractive propositions. I will next set the domain and elaborate the conditions for the emergence of aporia, bearing in mind differences between standard and non-standard logical systems.

In classical logic, a proposition can have only one out of two truth-values at any given time and in any given sense—these values are *true or false*: Either Socrates *is* wise, or he is not.

Aristotle's law of non-contradiction (LNC) maintains that it is impossible to hold the same thing to exist and not to exist; or for the same thing to have and not to have the same property; or for the same thing to have a property and a contrary property.[22] Aristotle argues that this principle cannot be strictly demonstrated (for any demonstration presupposes it and makes use of it), but also that it is the firmest of all basic principles.[23] However, some non-standard logical systems partially or in whole reject this principle of non-contradiction (Figure 2). For example, in the logic of Łukasiewicz a proposition can have three distinct truth-values—true, false, and unknown ("neither true nor false").[24] In probabilistic and fuzzy logic a proposition can have an infinite number of different truth-values.[25]

Any paraconsistent logical system (fuzzy logic, intuitionist logic, or dialetheism) are not of interest here not only because the topic of this paper deals predominantly with the notions of aporia in Plato and Aristotle, which in time greatly precedes the emergence of these extended systems of logic in the twentieth-century, but also because classical and standard logic as well as modern science and contemporary thinking are still vastly depending on the truth-values in a traditional sense and have

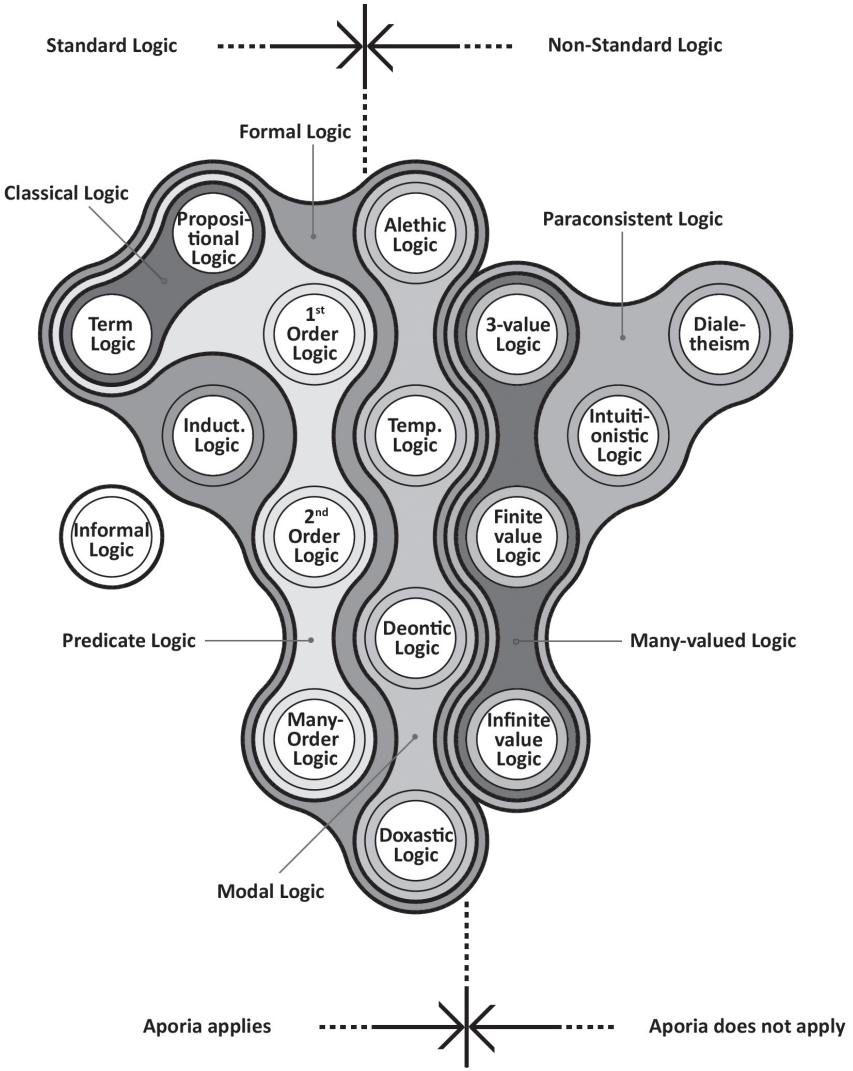

FIGURE 2: CLASSIFICATION OF LOGIC, BASED ON THE INCLUSION OF THE PRINCIPLES OF REASONING (ID, LC, LM), USE OF QUANTIFICATORS AND FORMAL LANGUAGE, AND, FINALLY, DOMAIN OF TRUTH-VALUES (STANDARD 2-VALUED LOGIC SYSTEMS INCLUDING MODAL LOGIC; PARACONSISTENT LOGIC SYSTEMS INCLUDING 3-VALUE LOGIC SYSTEM OF ŁUKASIEWITZ, GÖDEL'S FINITE-MANY VALUE LOGIC, AND INFINITE-MANY VALUE LOGIC (FUZZY LOGIC).

no tolerance for inconsistency within the system.[26] Furthermore, any form of many-valued logic systems must be excluded here, because where the tension between opposing truth-values is downplayed (fuzzy logic), or largely non-existent (dialethism), due to the presentation of another one or many other options (besides *true* and *false*), the notion of aporia, which rests on precisely this tension between the equality of reasoning on opposing sides simply would not apply or even make much sense in any such inquiry.[27] In fact, if there is another way out, besides the two apparently mutually-exclusive propositions being true, the impasse, which is a key feature of aporia, will simply not arise. The aporia also cannot arise when the principle of non-contradiction is excluded from the logical system simply because it wouldn't be possible to distinguish between a contradiction and a non-contradiction, let alone to make a distinction between the apparent and the real contradiction.

To further refine the conditions under which aporiai can arise, a distinction must be made between (1) contradictory claims, which can give rise to aporia, and (2) the situations where opposing sides of reasoning are only contraries or sub-contraries, in which case they cannot give rise to aporia. Let us remind ourselves of the difference between the contradictions and contraries in traditional propositional and predicate logic. Two propositions are *contradictory* when the truth of one implies the falsity of the other, or when the falsity of one determines the truth of other. According to Johnson, "contradictories have exactly opposite truth-values. If A is true, then O is false, and vice versa."[28] For example, in propositional logic, the negation of the proposition "Socrates is wise" would be "it is not the case that Socrates is wise." This forms a contradictory opposition between the propositions. In standard logic, these two propositions are (1) mutually exclusive, which means that only one of them can be true, and (2) mutually exhaustive, which means that nothing else is possible. It becomes clear that if and only if it is the case that two propositions are at least apparently contradictory, then aporia can arise. If the Law of Excluded Middle (LEM)[29] is invalidated (as in intuitionistic logic),[30] then two propositions do not fulfil the second condition—they cannot be mutually exhaustive. There would be a middle ground between the two. Hence aporia cannot exist in such systems. For example, let us look at a slightly different formulation of the two propositions: "Socrates is wise" and "Socrates is unwise." It may be tempting to hold this new pair of propositions as also contradictory. However, that is not the case. They are only contrary. Propositions are *contrary* when they cannot both be true (Socrates cannot be both wise and unwise in the same sense and

at the same time), but there is a possibility for both of the propositions to be false (Socrates being neither wise nor unwise). The latter means that the propositions are not mutually exhaustive; namely, the pressure of apparent contradiction (that is, only one of the otherwise plausible propositions can be true) does not arise as there is a possibility of both propositions to be false. Hence, with merely contrary propositions, aporia cannot arise.

The outcome is the same in predicate logic. Predicate logic extends propositional logic by including the quantifiers (∀ and ∃) which determine whether subject (x) of the categorical proposition is respectively *universal* or *particular* and includes two types of assertions—*affirmative* and *negative*. This results in four types of propositions—Universal Affirmative (All men are wise), Universal Negative (No man is wise), Particular Affirmative (Some men are wise) and Particular Negative (Some men are not wise). There are also four possible types of relationships between these propositions. The relationship between each type is shown on the classical square of opposites in the diagram (Figure 3), which originates from Aristotle, but also figures in modern times, especially in Boolean algebra and in Fregean logic.

As in propositional logic, categorical propositions are *contrary* when they cannot both be true (All men are wise and No man is wise), but there is a possibility for both of them to be false (it may be the case that neither everybody is wise nor that nobody is wise), namely, there is a possibility of the middle ground (perhaps only a few men are wise). This means that aporia cannot arise in the case of the contraries, simply because there is a passage away from the mutual exclusion of propositions. The situation is similar with propositions which are *sub-contrary*. This is the case when it is impossible for both categorical propositions to be false (Some men are wise and Some men are not wise); however,

there is a possibility for both of them to be true. If both propositions can be true, then the mutual exclusion, which was a primary condition for the emergence of aporia, is removed and together with it also the pressure of finding a way out of the impasse has disappeared. It can be concluded that in none of these cases does aporia arise.

Therefore, aporia has bearing only in cases of apparently contradictory

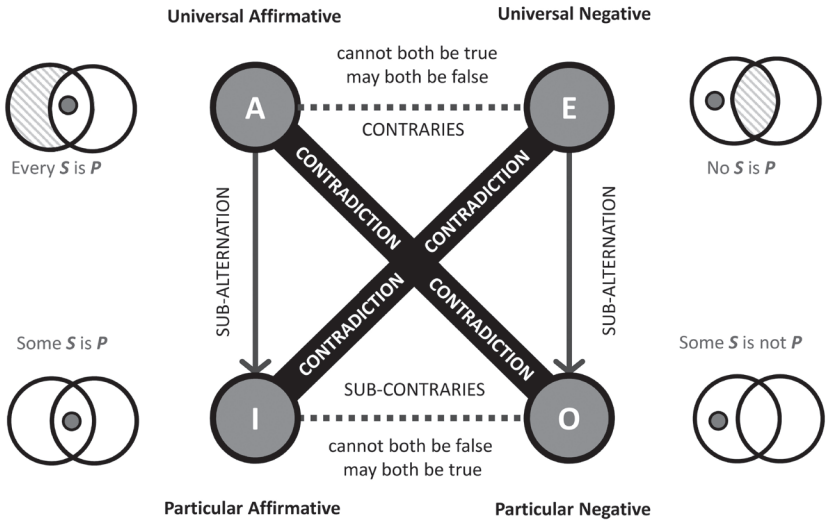

FIGURE 3: TRADITIONAL SQUARE OF OPPOSITION.

propositions, both of which (or sets of which) appear attractive, but neither the tension nor the attraction have been properly investigated or understood. It has been demonstrated that aporiai apply directly within the domain of at least propositional and predicate logic. It naturally follows that aporia will also have bearing in all forms of standard and modern logic that extend the field of classical logic, but retain the laws of thinking such as the law of non-contradiction and the law of excluded middle. Such cases not only automatically apply to Boolean mathematical logic but also, perhaps more interestingly for designers and architects, to the non-classical logical system of modal logic. The application of modal logic in design and architecture is significant because it relates to what necessarily follows and to what might or ought to follow in deductive reasoning. Therefore, modal logic encompasses design propositions (with respects to certain rules or styles) and it is useful in design predictions.

Now that the domain and the source of aporia have been clarified along with its nature, we can look more closely into how aporia applies to architectural design.

3. APORIA IN ARCHITECTURAL DESIGN

An actual design situation may reveal a particular reference of aporia in design. In architecture, the well-known corner conflict inherent in the employ of the classical Ionic order provides a good example of aporetic reasoning in architectural design.

The Ionic order's sensual spiralling volutes that cushion the architrave provide an enduring source of difficulty for designers needing a colonnade to turn a corner—for the traditional volutes only face forward. Traditionally, in Greek and Roman architecture, the corner capital in the Ionic order is different to other capitals as, for example, on the external corner of Palladio's Basilica in Vicenza and in Piranesi's study (Figure 4).

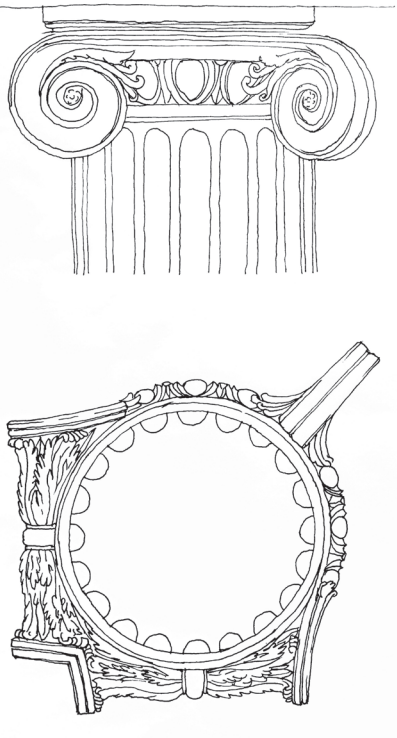

FIGURE 4: SKETCH AFTER OPERE DI GIOVANNI BATTISTA PIRANESI.

The corner problem with the Ionic order arises due to the requirement for each capital (including the one on the corner) to appear the same in all elevations. Because of the lateral position of volutes, the corner capital in the Ionic order cannot be the same if the appearance of the capital is to be equal for all capitals on both front and side elevations. That constitutes a clear case of aporia in design. In the case of the corner capital conflict, aporia can be clearly represented with the following two, apparently contradictory, propositions:

(1) All volutes are positioned in the same manner in all elevations, and

(2) Some volutes (namely corner capitals) are not positioned the same.

One is invited to compare these propositions to the previously given examples in propositional and predicate logic (Figure 3). It is obvious that this example forms an apparent contradiction in the first-order predicate logic and its representation as an aporia clarifies the design challenge that must be addressed. One may elect to confront the aporia in various creative ways or try to avoid the contradictory situation by eliminating the columns altogether from the side elevations, as in Palladio's Villa Capra (La Rotunda) shown in Figure 5.

However, once aporia is engaged,

FIGURE 5: VILLA CAPRA (LA ROTUNDA), PALLADIO, 1567.

FIGURE 6: VILLA FOSCARI (LA MALCONTENTA), PALLADIO, 1560.

two alternatives are possible. The first alternative is when the apparent contradiction is not resolved and hence it becomes prominent as in the Temple of Fortuna Virilis or Palladio's Villa Foscari (Figure 6). Some cases, such as the exposed inside corner capital in Palladio's Palazzo Barbaran Porto (Figure 7), reveal the unresolved puzzle in greater detail.

FIGURE 7: PALAZZO BARBARAN DA PORTO, PALLADIO, 1569.

The other alternative is when the apparent contradiction is resolved and contradiction removed by adjusting the architectural element or the way it is used. One of the resolutions of the Ionic capital corner conflict can be found in the work by Palladio's contemporary architect Vincenzo Scamozzi. The evidence for this can be found in his book *The Idea of a Universal Architecture*, where he proposes a new capital for the Ionic order with diagonally positioned volutes.[31] Scamozzi's drawings (Figure 8) and writings on the Ionic capital conflict testify that, not only was he fully engaged with this particular aporia, he also proposed a way of resolving it. It is important to note that the solution to this puzzle was independent of the level of craftsmanship applied. The resolution depended only on an architect's ability to recognise the aporia and engage with it through design.

> *I will now show the plan and elevation of another Ionic capital that is partly copied from antiquity, partly based on Vitruvius and for the rest is a design I have invented and used. To this day it remains different from any other [Ionic] capital ever invented because of the concave profile of the abacus and the corner volutes that look the same whether they are*

viewed from the front or the side, which is not the case when capitals have volutes at the front… It is the kind I have used most frequently in my buildings.[32]

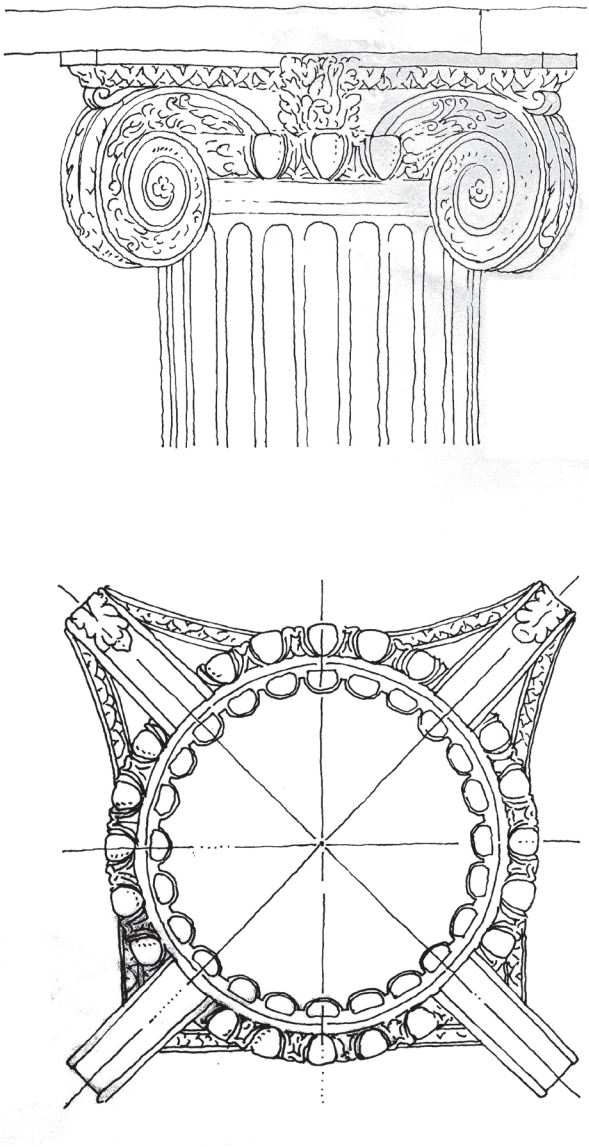

FIGURE 8: SKETCH AFTER SCAMOZZI'S DRAWING OF IONIC CAPITAL, L'IDEA DELLA ARCHITETTURA UNIVERSALE.

For architects and planners it is quite possible to confuse the state of perplexity which comes from aporia with the perplexity which is a result of a *wicked* problem. Rittel and Webber, in the classic essay "Dilemmas in a General Theory of Planning," described planning problems as wicked problems, which can always be recontextualized in terms of other problems and which therefore admit an utter lack of stopping rules or 'solutions' in the mathematical sense.[33] For efficiency, a distinction between the two is drawn on the relevant points and summarized in a table below (Figure 10). Besides perplexity, the other similarities between the two are that of the possible paralyzing effect of both aporiai and wicked problems and the fact that an aporia may as well remain as unresolved as the wicked problem. It seems that the only intrinsic link between the two is that some wicked problems can indeed turn out to be aporiai, but never the other way round.

'Wicked Problem'	Aporia
impossible to solve	sometimes possible to solve
cannot be formulated	can be formulated
solutions cannot be true or false	solutions can be true or false
caused by another problem	caused by apparent contradiction

FIGURE 9: THE DISTINCTION BETWEEN RITTEL AND WEBER'S WICKED PROBLEMS AND APORIA.

In what seems to be an outline for a framework of a coherent design theory, Per Galle identifies two "dilemmas of references" as he calls them. Basing his case on the presupposition that design is related to predictions (of a certain artefact as its product), and on the fact that designers sometimes in their predictions refer to things, or entities, whose ontological status is at best unclear, Galle proposes two questions as a starting point in search for the common ground of a coherent design theory: (1) "If the singular terms of design predictions do not refer [to an entity], how and in what sense can the predictions be true or even meaningful?" and (2) "If those terms do refer [to an entity], to what category of entities are they referring?"[34] Even though Galle recognises this situation as a "puzzlement," and presents this problem as a challenge to design theorists, he appears to think that this seeming contradiction in questions of fundamental importance to design is a sort of an embarrassment for designers. In a way, he seems to suggest that these "dilemmas of references" at hand are practically a problem of choice, closely associated with ready-made philosophical world views: *Nominalism* and *Realism*. Moreover, theorists of design are invited to untangle this conundrum by selecting a world view from which to create a coherent design theory. Galle claims that this sort of a problem has a more general, philosophical context and that other "philosophical disciplines" might help in resolving it.[35] But, instead of philosophy generally, Galle proposes to use philosophy of language to engage with this fundamental puzzle in design—that is: *What exactly is the subject of Design?* I agree with Galle that, as sciences got Philosophy of Science and languages got Philosophy of Language, perhaps Design needs to get Philosophy of Design. However, I propose that a fundamental philosophical question about design can be addressed through philosophy directly and, likewise, that question about the merits of philosophy in design should be addressed through design itself.

I propose that the problem at hand here is more fruitfully treated, not as dilemma as suggested by Galle, but as an aporia. In order to demonstrate this with clarity, an important distinction must first be drawn between the notions of aporia and dilemma.[36] Despite the fact that both dilemmas and aporiai can produce a state of indecisiveness and perplexity, they are also profoundly different. Dilemma is commonly used in everyday speech to describe a problem of choice, where none of the two given options (not necessarily propositions) are desired or preferred (but not necessarily with any truth value at all). It is sometimes used in rhetoric, as a persuasive device. However, in formal, propositional logic, dilemma

is a form of valid argument always leading to the same conclusion (true), regardless of the truth-value in either of the propositions. In a dilemma we are presented with a choice, none of which may be appealing to us, while in aporia, as we have seen, we are faced with two equally plausible propositions in an apparent contradiction, effectively producing a lack of choice. The troubling case of design entity ontological status cannot be a dilemma, or a problem of choice in any way, as that would mean that there would be no problem in reasoning correctly. The only problem would be to select one of the options. However, both of the "references" seem to be true, and it is obvious that they are mutually exclusive. Namely one cannot assert that both of them are true at the same time and in the same sense. That means these assertions are in apparent contradiction. Let us look closer and see if these two sides are indeed in an apparent contradiction.

First of all, we need to disburden ourselves of the pretence of knowledge, and at least for the moment assume without false pretence, that we truly do not know what the nature of the subject matter of Design is. Hence, I propose to re-formulate Galle's questions into these two propositions:

> (1) During the design process, artefacts that are being designed must refer to an entity that exists, for they are in the process of being designed, we can refer to them (even in space and time), and they are not purely imaginary. (I shall argue for the plausibility of this presently).
>
> (2) During the design process, artefacts that are designed must refer to an entity that does not exist, for if they did exist that would entail that they have already been designed.

These two propositions are apparently equally true, but opposed and mutually exclusive, therefore

seemingly contradictory. The propositions are also mutually exhaustive as there is no other conceivable option offered to a designer. There seems to be no middle ground left to settle, and an inquirer is under pressure, left without any easy and obvious way out. This is what constitutes an aporia by its definition. Now an inquirer is ready to engage with aporia and its zetetic (searching) function by, ideally I suggest, answering the question—what is required for both of these propositions to be true at the same time?

It might be objected that the first side of the aporia has no real attraction. Why, it may be said, not simply suppose that the object of design is purely imaginary, just like fictional objects? Unlike mere phantasies and purely imaginary objects, a key capacity of an architectural designer is to create not only meaningful, but accurate and reasonable predictions with respect to objects designed.[37] The main attraction of this side of aporia is in that a designer can provide accurate predictions about those objects. Consequently, we should not be satisfied with a general theory of imaginary or fictional objects as suitable for either articulating or gauging the attractiveness of this side of the aporia.

This example is explicated here in order to demonstrate that aporia is necessarily a part of inquiry into the consistency of a Design Theory. The way one reasons out of aporiai in design is, in part, a subject of this whole project, and it would take us a lot more space to attempt its resolution here. Therefore, unless curious readers engage themselves with this particular aporia on the subject matter of Design, they are asked to suspend their judgements and remain puzzled.

If it is indeed the case that a world view on design theory can be grown out of these "seed questions" as Galle proposes, then one must be first fully engaged with them by recognising the aporia.[38] I agree with Galle that these questions are "not to be shrugged off", as he says.[39] Furthermore, it seems to me that they are fundamental for any design theory. In other words, if one wishes to establish a consistent design theory, it is *necessary* for one to engage with this particular aporia in one way or the other. For how can we otherwise give an account for the subject matter of design itself? Any design theory must either reject at least one of the propositions and embrace the other, or find a way to embrace both. An informal thinker may indeed find more compelling evidence why one proposition is more acceptable to him or her than the other. But, as we have seen, unless one rejects the principle of non-contradiction, it is difficult to find a firm ground on which one can dismiss one and embrace the other proposition as they both seem to be plausible. One way forward

could be to find a way in which both propositions can be true, namely, explore the possibilities that are required in cases where both of these propositions are true at the same time. That means engaging in aporia. The only alternative to that is to find a justification to abandon reasoning on the subject matter of design altogether and conceive of design as a craft-like activity and accept that design is fully exhausted through practice alone like any other *techne*. However, if we indeed do that we will resemble people who are not engaged with aporia and as Aristotle says, *don't know where they need to be going* in their inquiry. In that case it is difficult to see how design can be understood as a form of inquiry, and a form of enquiry grounded in design theory.

For those willing to engage the aporias that present themselves, architectural design does indeed become a form of inquiry. This conception of architecture that is engaged with aporia opens up the possibility of removing the experiential limits sometimes imposed on design and to realign architectural design within the classical division of knowledge in such a way so that all cognitive capacities are engaged in design—from experiential to higher, intellectual capacities.[40]

> "APORIA IS INDEED ROOTED, NOT ONLY IN GENERAL PHILOSOPHICAL CONSIDERATIONS ABOUT DESIGN THEORY, BUT ALSO IN THE PROCESS OF DESIGN ITSELF."

I have not attempted to resolve this aporia—this is for another occasion. What I have done is argue that, if we want to take seriously the idea of design as a form of inquiry, and a form of inquiry grounded in design theory, then we must engage with and try to resolve this (and similar) aporiai.

I want to end by drawing attention to one condition for a successful resolution of this aporia—which is, I believe, a core aporia in design theory. For, as we saw in our response to Galle, there is a danger here that grand philosophical views—be it this, that, or the other philosophical position—be hauled in ready-made to do the job of resolving an aporia that, if it is at all genuine and worth taking seriously, is specific to and rooted in

design and design theory. This, I believe, has to be resisted. For if this is what we do to engage with and try to resolve the aporia, then we are in effect admitting that the aporia is not specific to or rooted in design and design theory: since its resolution will not make use of any tools or idea that are specific to design or design theory. In that case, however, one would be forgiven for wondering why design theory should worry about this aporia and not simply leave it to the philosophers.

Nonetheless, we have shown that aporia is indeed rooted, not only in general philosophical considerations about design theory, but also—and, for us designers and design theorists, primarily—in the process of design itself.

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ENDNOTES

[1] Aristotle, *The Basic Works of Aristotle* (New York: Random House Incorporated, 2001), *Metaphysics*, III. 1, 995a34-b1.

[2] See Plato, *Protagoras*, 321c. Extract from Protagoras's speech:

Prometheus arrived to examine his [Epimetheus] distribution, and saw that whereas the other creatures were fully and suitably provided, man was naked, unshod, unbedded, unarmed; and already the destined day was come, whereon man like the rest should emerge from earth to light. Then Prometheus, in his perplexity [ἀπορία] as to what preservation he could devise for man, stole from Hephaestus and Athena wisdom in the arts together with fire—since by no means without fire could it be acquired or helpfully used by any—and he handed it there and then as a gift to man.

[3] The meaning of the word Prometheus can be translated as "Forethought."

[4] The meaning of the word Epimetheus can be translated as "Afterthought."

[5] Plato actually uses the word aporia to depict Titan's mental state. See Plato, *Protagoras*, 321c2.

[6] ἀπορία = aporia—the state of being perplexed, puzzled, lacking resources, or being at a loss.

[7] Aristotle, *The Basic Works, Metaphysics*, III. 1, 995a34-b1.

[8] Aristotle, *Posterior Analytics Topica*, ed. Loeb Classical Library (London and New York: Harvard University Press, 1960), 145b17.

[9] If not stated otherwise, in this paper I have generally relied on Cooper's edition of Plato's Complete Works. See Plato, *Complete Works*, ed. John M. Cooper, (Indianapolis and Cambridge: Hackett Publishing Company, 1997).

[10] Plato, *Republic*, 514a-519a.

[11] Ibid., 509d-511e.

[12] See Plato, *Republic*, VII, 509d-511e. Illustration by Aleksandar Kostić.

[13] Vasilis Politis, "Aporia and Searching in the Early Plato," in *Remembering Socrates: Philosophical Essays*, eds. Lindsay Judson and Vassilis Karasmanēs (New York: Oxford University Press, 2006), 101. For the place of aporia in Plato's philosophy, see especially Politis, *The Structure of Enquiry in Plato's Early Dialogues* (Cambridge: Cambridge University Press, 2015), Part II.

[14] Ibid., 88-110.

[15] Plato, *Laches*, 194a-b.

[16] Plato, *Meno*, 80a-c.

[17] Politis proposes that besides being a mental state, "aporia is [also] zetetic: [its aim is] to generate particular searches, defined and directed by the puzzle and problem at hand." See Politis, "Aporia," 108.

[18] Plato, *Apology*, 21b3–7.

[19] Politis, "Aporia," 88–110.

[20] Ibid.

[21] Ibid., 98.

[22] Aristotle, *The Basic Works*, *Metaphysics,* IV, 1005b24.

[23] Ibid., 1011b13–14.

[24] Graham Priest, *An Introduction to Non-Classical Logic* (Cambridge: Cambridge University Press, 2001), 119.

[25] Susan Haack, *Deviant Logic, Fuzzy Logic: Beyond the Formalism* (Chicago: University of Chicago Press, 1996).

[26] The belief that it is possible for a single proposition to be at the same time both true and false, without inferring that this leads to any and every proposition being true is called Dialetheism. However, this view fails to define a negation, as it is difficult to grasp what a concept of disagreement would be in the world where a proposition can be both true and false at the same time. Another important and undesired consequence of Dialetheism is the principle of explosion. Namely, if we hold both propositions p and ¬p to be true, then it follows that for any statement q both p∨q and ¬p∨q to be also true, which means any and every proposition q is true.

[27] A passionate read on many-valued logic can be found in Graham Priest's *An Introduction on Non-Classical Logic*, cited above.

[28] Robert M. Johnson, *A Logic Book: Fundamentals of Reasoning* (Belmont: Thomson Wadsworth, 2007), 63.

[29] The Law of excluded middle (LEM) is the third law of thinking in traditional logic and it simply means that besides true or false there is no other available option for truth-value.

[30] Intuitionistic logic invalidates the Law of excluded middle. This rejection has "far-reaching consequences." (See Joan Moschovakis, "Intuitionistic Logic," *The Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta, Spring 2015 edition, https://plato.stanford.edu/entries/logic-intuitionistic/.) One of those consequences being that the principle of elimination of double negation also becomes invalid and, perhaps more importantly, intuitionistic logic becomes "axiomatically incomplete." For our purposes, it is important to note that rejection of the LEM practically disables the condition of the principle of mutual exhaustion (i.e., there is a middle ground available, hence aporia is not possible).

[31] Vincenzo Scamozzi, *The Idea of a Universal Architecture*, Volume VI (Amsterdam: Architectura & Natura Press, 2008).

[32] Ibid.

[33] Horst W. J. Rittel and Melvin M. Webber, "Dilemmas in a General Theory of Planning," *Policy Sciences* 4 (1973): 155-169.

[34] Per Galle, "Candidate worldviews for design theory," *Design Studies* 29, 3 (May 2008): 279.

[35] Ibid., 280.

[36] Some philosophers consider a notion of dilemma that is closely related

to aporia. For example, Karamanolis uses the term "dilemmatic structure" to describe weighing various possibilities or ways out of the aporia. (See George Karamanolis, "The Aporetic Character of Plotinus' Philosophy," in *The Aporetic Tradition in Ancient Philosophy*, eds. George Karamanolis and Vasilis Politis (Cambridge: Cambridge University Press, 2017), 250.) Others hold that the reasoning leading to an aporia need not take the form of dilemma. (For example, see John Palmer, "Contradiction and Aporia in Early Greek Philosophy," in *The Aporetic Tradition in Ancient Philosophy*, eds. George Karamanolis and Vasilis Politis (Cambridge: Cambridge University Press, 2017), 9.) Gelber maintains that a particular type of aporia, in cases where we are presented with equally impossible options (i.e., 'negative aporias'), can present itself in a form of dilemma, but also that some aporiai do not have "the appearance of dilemma at all" and so on. (See Jessica Gelber, "Uses of Aporiai in Aristotle's Generation of Animals," in *The Aporetic Tradition in Ancient Philosophy*, eds. George Karamanolis and Vasilis Politis (Cambridge: Cambridge University Press, 2017), 164-165.) I am considering the notion of dilemma here in the context of Galle's proposition (seed questions) to distinguish between problems of choice and aporiai.

[37] To describe the predictions architects make, Galle gives an example of an architect designing an opera who points "to one of his drawings, saying 'every seat on this balcony has an unobstructed view of the stage.'" Galle rightly emphasizes that "if we could not rely on such design predictions as largely true, we should hardly be able to make artefacts at all." See Galle, "Candidate Worldviews for Design Theory," 278.

[38] Galle, "Candidate Worldviews for Design Theory," 267-303.

[39] Ibid.

[40] For Plato, architecture is indeed a form inquiry leading to true knowledge. In the *Statesman*, when Plato makes a distinction concerning the highest kinds of knowledge, he specifically uses the example of an architect to depict the highest level of knowing (γνωστικὴ ἐπιτακτικὴν), which is removed from practical experience and belongs to higher cognitive capacities. See Plato, *Statesman*, 260d.