

Architecture and the Problem of Space and Time

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Abstract

Architecture is about creating a place through physical design of buildings situated in space and in time. There is a dominant trend in the literature focusing on the relational aspects of space as well as of time. In that sense, Space and time are only relational attributes and not ontological categories in themselves. This essay argues, in line with Kant, that space and time are *a priori* notions, fundamental to a holistic understanding of situating buildings in spatio-temporal fields. The notion of place, as conceptualized by Aristotle, becomes an encompassing and meaningful totality.

Introduction

Space appeared in Greek philosophy. The Pythagoreans asserted the existence of a void and that it extended into the heavens out of the limitless breath, since it is this void that delimits the separation between things next to each other. Its prime seat being in numbers, since it is this void that delimits their nature. Spatial vacancies were necessary to guarantee the directness of individual numbers in the Pythagorean geometrization of number. Space here has not yet any physical implications apart from serving as the limiting agent between different bodies. The concept of space is still confounded with that of matter. The Pythagoreans identified air with void. Lucretius reveals that if space were not infinite, all matter would have sunk in the course of past eternity in a mass to the bottom of space and nothing would exist anymore.

Plato identifies the world of physical bodies with the world of geometric forms. A physical body is merely a part of space limited by geometric surfaces containing nothing but empty space. With Plato, physics becomes geometry as with the Pythagoreans it became arithmetic, stereo-metric similarity becomes the ordering principle in the formation of macroscopic bodies.

The parts of space, which are occupied by the parts of the solid, have the same common boundary as the parts of the solid. Thus, not only time but space, also, is a continuous quantity, for its parts have a common boundary. Space here is conceived as the sum total of all places occupied by bodies; and place, conversely is conceived as that part of space whose limits coincide with the limits of the occupying body.

The dilemma of time as past, present, and future has been explored by many philosophers. The momentous present presents the most difficulty as part of it recedes in the past and part advances from the future (see annex for a more lengthy argument on this

dilemma). Measuring time of motion of a moving person also presents a similar dilemma and a brief argument is presented in the annex.

Time is duration set out by measures, the next thing natural for the mind to do is, to get some measure of this common duration, whereby it might judge of its different lengths, and consider the distinct order wherein several things exist; without which a great part of our knowledge would be confused, and a great part of history be rendered very useless. This consideration of duration, as set out by certain periods, and marked by certain measures or epochs, is that which most properly call time.

What then, are space and time? Are they real existence? Are they only determination or relations of things, yet such as would belong to things even if they were not intuited? Or are space and time such that they belong only to the form of intuition, and therefore to the subjective constitution of our mind, apart from which they could not be ascribed to anything whatsoever? In order to obtain light upon these questions, let us first give an exposition of the concept of space. By exposition I mean the clear, though not necessarily exhaustive, representation of that which belongs to a concept. The exposition is metaphysical when it contains that which exhibits the concept as given a priori.

Space & Architecture

The nature of a building, considered in general, does not consist in its being a thing that has hardness or weight or color, but simply in its being a thing that has extension in length, breadth and depth, and we should say that there is space there. All that happens here is change of shape that has many gaps between their masses. Whatever they maybe that fills the gaps, that some new body that comes and fills them up, although we do not perceive this body by any of our senses. We may consider the entire nature of the building as a new body comes to occupy the space and determines the space and without color, heaviness, coldness and heat and all other such qualities except its extension in length, breadth; and depth. Now this is just what is implied in the idea of space; not merely of a space occupied by bodies, but even of a so-called vacuum.

There is, however a conceptual difference. When a block is removed from the space or place where it is, we think of its extension as being likewise removed, for we are then regarding the extension as something individual and inseparable from the block. But if the building is still, it has the same shape and size and keeps the same position relatively to the external bodies that determines the space.

The terms place and space do not signify something different from the building that it is said to be in a place. They merely mean its size, shape and position relative to other buildings. The term 'empty' means not a place or space where there is no object at all, but simply a place where there is no object such as we think there ought to be. Since a

cup is made to hold water. It is called empty when it is only full of air; for we ordinary consider only such things as our senses attain to.

Space denotes an order of things which exist at the same time, considered as existing together. Space is something absolutely uniform, and without the things placed in it; one point of space does not absolutely differ in respects whatever from another point of space. But space without things, has nothing whereby it may be distinguished; and indeed not anything actual.

Place is nothing else but a relative position of anything. We can have no idea of the place of the universe though we can know all the parts of it. The idea therefore of place we have is formed by the same means that we get the idea of space. The parts of pure space are inseparable one from the other, so that the continuity cannot be separated. According to Aristotle, Place is an accident, having real existence and that the place of a thing is no part of or factor of the thing itself, but that which embraces it.

Space: an *a priori* intuition

Space is not an empirical concept which has been derived from outer experiences. For in order that certain sensations be referred to something outside us, and similarly in order that we may be able to represent them as outside and alongside one another, and accordingly as not only different but as in different places, the representation of space must be presupposed. The representation of space cannot, therefore, be empirically obtained from the relations of outer appearance. On the contrary, this outer experience is itself possible at all only through that representation.

Space is a necessary *a priori* representation, which underlies all outer intuitions. We can never represent to ourselves the absence of space, though we can quite well think of it as empty of objects. It must be regarded as the condition of the possibility of appearance, and not as a determination dependent upon them. It is an *a priori* representation which necessarily underlies outer experiences.

Space is not a discursive or, as we say, general concept of relations of things in general, but a pure intuition. For, in the first place, we can represent to ourselves only one space, and if we speak of diverse spaces, we mean thereby only parts of one and the same unique space.

Space is represented as an infinite given of magnitudes. Now every concept must be thought of as a representation which is contained in an infinite number of different possible representations, and which therefore contains these under itself, but no concept, as such, can be thought as containing an infinite number of representations within itself. It is in this latter way, however that space is thought, for all the parts of space coexist as infinitum. Consequently, the original representation of space is *a priori* intuition, not a concept.

Time: an *a priori* intuition

Time is a necessary representation that underlies all intuitions. We cannot, in respect of appearances in general, remove time itself, though we can quite well think of time as void of appearances. Time is therefore given a priori. In it alone is actuality of appearances possible at all. Appearances may, one and all, vanish; but time cannot itself be removed.

Time has only one dimension; different times are not simultaneous but successive. These principles cannot be derived from experience, for experience would give neither strict universality nor apodictic certainty. These principles are valid as rules under which alone experiences are possible, and they instruct us in regard to the experiences, not by means of them.

Time is not something which exists of itself, or which inheres in things as an objective determination, and it does not, therefore, remain when abstraction is made of all subjective conditions of its intuition. Were it self-subsistent, it would be something which would be actual and yet not an actual object. Were it a determination or order inhering in things themselves, it could not precede the objects as their condition, and be known and intuited a priori by means of synthetic propositions. But this last is quite possible if time is nothing but the subjective condition under which alone intuition can take place in us. For that being so, this form of inner intuition can be represented prior to the objects, and therefore a priori.

Time is nothing but the form of inner sense, that is, of the intuition of ourselves and of our inner state. It cannot be a determination of outer appearances; it has to do neither with shape nor position, but with the relation of representations in our inner state. And just because this inner intuition yields no shape, we endeavor to make up for this want by analogies.

Time is an a priori condition of all appearances whatsoever. It is the immediate condition of inner appearances of our souls, and thereby the mediate condition of outer appearances. All objects of the senses, are in time, and necessarily stand in time relations.

Time is a purely subjective condition of our human intuition which is always sensible, that is, so far as we are affected by objects, and in itself, apart from the subject, is nothing. Nevertheless, in respect of all appearances, and therefore of all things which can enter into our experience, it is necessarily objective. We cannot say that all things are in time, because in this concept of things in general, we are abstracting from every other of their intuitions and therefore from that condition under which alone objects can be represented as being in time. If however, the condition be added to the concept, and we say that all things are appearances, that is, as objects of sensible intuition are in time, then the proposition has legitimate objective validity and universality a priori.

Time and space, taken together, are the pure forms of all sensible intuition, and so are what make a priori synthetic propositions possible. But these a priori sources of knowledge, being merely conditions of our sensibility, just by this very fact determine their own limits, namely, that they apply to objects only in so far as objects are viewed as appearances, and do not present things as they are themselves. This is the sole field of their validity; should we pass beyond it, no objective use can be made of them. This ideality of space and time leaves, however, the certainty of empirical knowledge unaffected, for we are equally sure of it whether this forms necessarily inherent in things in themselves or only in our intuition of them. Those, on the other hand, who maintain the absolute reality of space and time whether as subsistent or only as inherent, must come into conflict with the principles of experience itself.

Time itself does not change, but only something which is in time. The concept of time thus presupposes the perception of something existing and of the succession of its determinations; that is to say, it presupposes experience.

Conclusion

Time is not something which exists of itself, or which inheres in things as an objective determination, and it does not, remain when abstraction is made of all subjective conditions of its intuition. Were self-subsistent, it would be something which would be actual and yet not an actual object. Were it a determination or order inhering in things themselves, it could not precede the object as their condition, and be known and intuited a priori by means of synthetic propositions. But this last is quite possible if time is nothing but the subjective condition under which alone intuition can take place in us. For that being so, this form of inner intuition can be represented prior to the objects, and therefore a priori.

Time is nothing but the form of inner sense, that is, of the intuition of ourselves and of our inner state. It cannot be a determination of outer appearances it has to do neither with shape nor position, but with the relation of representations of our inner state. And just because this inner intuition, yields no shape, we endeavor to make up for this want by analogies. We represent the time-sequence by a line progressing to infinity, in which the manifold constitutes a series of one dimension only, and we reason from the properties of this line to all the properties of time, with this one exception, that while the parts of the line are simultaneous the parts of time are always successive. From this fact also, that all the relations of time allow of being expressed in an outer intuition, it is evident that the representation is itself intuition.

Time is the formal a priori condition of all appearances whatsoever. Space as the pure form of all outer intuition, is so far limited; it serves as the a priori condition only of outer appearances. But since all representations, whether they have for their objects outer things or not, belong, in themselves, as determination of the mind, to our inner state; and

since this inner state stands under the formal condition of inner intuition, and so belong to time, time is an a priori condition of all appearances whatsoever. It is the immediate condition of inner experiences of our souls, and thereby the mediate condition of outer experiences. Just as we can say a priori that all outer appearances are in space, and are determined a priori in conformity with the relation of space, we can also say from the principle of inner sense that all appearances, whatsoever, that is all objects of the senses, are in time, and necessarily stand in time relations.

What we are maintaining is therefore, the empirical reality of time, that is, its objective validity in respect of all objects which allow the ever being given to our senses. And since our intuition is always sensible, no object can ever be given to us in experience which does not conform to the condition of time. On the other hand, we deny to time all claim to absolute reality, that is to say, we deny that it belongs to things absolutely, as their condition; or property, independently of any preference to the form of our sensible intuition; properties that belong to things in themselves can never be given to us through the senses. This then, is what constitutes the transcendental ideality of time. What we mean by this phrase is that if we abstract from the subject conditions of sensible intuition, time is nothing and cannot be ascribed to the objects in themselves in the way either of subsistence or of inherence. This ideality, like that of space, must not however, be illustrated by false analogies with sensation, because it is then assumed that the appearance, in which the sensible predicates inhere, itself has objective reality. In the case of time, such objective realities falls entirely away, save in so far as it is merely empirical, that is, save in so far as we regard the object itself merely as appearance.

Annex

The problem of time

If nothing passed away there would be no past time, and if nothing were still coming, there would be no future time; and if there were nothing at all, there would be no present time. But then how is it that there are two times: past and future, when even the past is now no longer and the future is now not yet. But if the present were always present, and did pass into past time, it obviously would not be time but eternity. If, then, time present, if it be time, comes to existence only because it passes into time past, how can we say that even this is, since the cause of its being is that it will cease to be? Thus can we not truly say that time is only as it tends toward nonbeing? And yet we speak of a long time and a short time; but never speak this way except of time past and future. We call a hundred years ago, for example, a long time past. In like manner, we should call a hundred years hence a long time to come. But we call ten days ago, a short time past; and ten days hence a short time to come. But in what sense is something long or short that is nonexistent? For the past, is not now, and the future is not yet. Therefore, let us not say, "it is long"; instead, let us say of the past, "it was long" and of the future, "it will

be long". And yet for that long time past; was it long when it was already past, or when it was still present? For it might have been long when there was a period that could be long, but when it was past, it no longer was. In that case, that which was not at all could not be long. Let us not say "time past was long" for we shall not discover what it was that was long because, since it is past, it no longer exists. Rather, let us say that "time present was long because when it was present it was long". For then it had not yet passed on so as not to be, and therefore, it still in a state that could be called long. But after it passed, it ceased to be long simply because it ceased to be.

Let us see whether present time can be long, for it has been given you to feel and measure the periods of time. Is a hundred years when present a long time? But, first, see whether a hundred years can be present at once? For if the first year in the century, is current. Then it is present time, and the other ninety and nine, are still future. Therefore, they are not yet. But, then if the second year is current, one year is already past, the second present, and all rest are futures. And thus, if we fix on any middle year of this century as present, those before it are past, those after it are futures. Therefore a hundred years cannot be present all at once.

Let us see then, whether the year that is now current can be present. For if its first month is current then the rest are futures; if the second, the first is already past, and the remainders are not yet. Therefore the current year is not present all at once. And if it is not present as a whole, then the year is not present. For it takes twelve months to make the year, from which each individual month which is current is itself present one at a time, but the rest either past or future.

Thus it comes out that time present, which we found was the only time that could be called "long" has been cut down to the space of scarcely a single day. But let us examine even that, for one day is never present as a whole. For it is made up of twenty four hours, divided between night and day. The first of these hours has the rest of them as future, and the last of them has the rest as past; but any of those between has those that preceded it as past and those that succeed it as future. And that one hour itself passes away in fleeting fractions. The part of it that has fled is past, what remains is still future. If any fraction of time be conceived that cannot be now divided even into the most minute momentary point, this alone is what we may call time present. But this flies so rapidly from future to past that it cannot be extended by any delay. For, if it is extended, it is the divided into past and future. But the present has no extension whatever.

Where therefore, is that time which we may call "long"? Is it future? Actually we do not say of the future "It is long", for it has not yet come to be, so as to be long. Instead we say, "It will be long". When will it be? For since it is future it will not be long, for what may be long is not yet. It will be long only when it passes from the future which is not as

yet, and will have begun to be present, so there can be something that may be long. But in that case, time present cries that it cannot be “long”.

We do perceive intervals of time and we compare them with each other and we say that some are longer and others are shorter. We even measure how longer or shorter this time maybe than that time. And we say that this time is twice as long, or three times as long, while this other time is only just as long as that other. But we measure the passage of time when we measure the intervals of perception. But who can measure times past which now are no longer, or times future which are not yet, unless someone will dare to say that what does not exist can be measured! Therefore, while time is passing, it can be perceived and measured, but when it is past it cannot, since it is not.

The motion of a person

Nobody is moved but in time, for when a person is moving we measure by time how long he was moving from the time when he began to be moving until he stopped. And if we do not see when he began to move, and if he continued to move so that we could not see when he stopped, we could not measure the movement, except from the time when we began to see him until we stopped. But if we look at him for a long time, we could affirm only that the time is long but not how long it maybe. This is because when we say how long we are speaking comparatively as: This is long as that or this is twice as long as that; or other similar ratios. But if we were able to observe the point in space where and from which the person who moved, comes and the point to which he moved, or if we can observe his body moving, we can say how long the movement of his body took or the movement of his body from this place to that. Since the motion of a body is one thing, and the norm by which we measure how long it takes is another thing, we cannot see which of these two is to be called time. For, although his body sometimes moves and sometimes stands still, we measure not only his motion but also his rest as well; and both by time. Thus, we say he stood still as long as he is moving or any other ratio which our measuring has either determined or imagined, either roughly or precisely, according to our custom. Therefore, time is not the motion of a body, and that very long is not long except when measured by the duration of time. How then do we know this, when we do not know what time is? Or, is it possible that we do not know how can we express what we do know?

We measure the motion of a body by time, but the time itself we do not measure. But, could we measure the motion of a body and how long it takes, and how long it is in motion from this place to that unless we could measure the time in which it is moving.

How then, do we measure this time itself? Do we measure a longer time by a shorter time as we measure a length? Thus, we can say that the length of a long syllable is measured by the length of a short syllable and thus say the long syllable is double. In that way we would measure space rather than time.

But no certain measure of time is obtained this way, since it is possible that if a shorter verse is pronounced slowly, it may take up more time than a longer one if it is pronounced hurriedly. From this it appears that the time is nothing other than extendedness, but extendedness of what we do not know. The extendedness may be of the mind itself. For what is it we measure when we say this time is longer than that or this twice as long as that. We know that we measure time but not measuring the future, for it is not yet; and we are not measuring the present because it is extended by no length, and we are not measuring the past because it is no longer is. What is it therefore, that we are measuring? We measure times, and those which are not yet, nor those which no longer are, nor those which are stretched out by some delay, nor those which have no limit. Therefore, we measure neither times future nor times past, nor times present, nor times passing by; and yet we do measure times. In fact we measure something in our memory which remains fixed. We measure the periods of time. We measure as time present the impression that things make on us as they pass by and what remains after they have passed by. We do not measure the things themselves which have passed by and left impression on us. This is what we measure. When, we measure periods of time. Either, then, these are the periods of time or else we do not measure time at all.

What are we doing when we measure silence, and say that this silence has lasted as long as that voice lasts? Do we not project our thoughts to the measure of a sound, as if it were then sounding, so that we can say something concerning the intervals of silence in a given span of time? For, even when both the voice and the tongue are still, we review in thought, poems and verses of various kinds of various measures of motions, and we specify their time spans, how long this is in relation to that, just as we were speaking them loud. What is already finished has already sounded and will go on sounding. Thus it passes on until the present intention carries the future over into the past. But how is the future diminished when it is not yet exists? Or how does the past, which exists no longer, increase, unless it is that in the mind in which all this happens there are three functions? For the mind expects, it attends, and it remembers so that what it expects passes into what it remembers by way what it attends to. Who denies that future things do not exist as yet? But still there is already in the mind the expectation of things still futures. And who denies that past things now exist no longer? Still there is in the mind the memory of things past. Who denies that time present has no length, since it passes away in a moment? Yet our attention has continuity and it is through this that what is present may proceed to become absent. Therefore, future time, which is nonexistent, is not long; but a long future is a long expectation of the future. Nor is time past, which is now no longer, long; a long past is a long memory of the past.