

**The Problem with Harmony:  
Constructs of Proportionality, Music, and the Modulor in the 1950's**

by

Carl Ray Miller

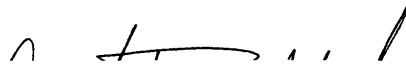
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Signature of the Author

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Carl Ray Miller

Department of Architecture, May 20, 1999



Certified by

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Mark Jarzombek

Associate Professor of the History of Architecture

Thesis Supervisor

Accepted by

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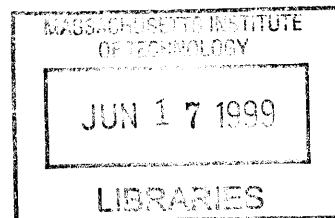


Roy Strickland

Associate Professor of Architecture

Chairman, Departmental Committee on Graduate Students

ROTCH



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Submitted to the Department of Architecture on May 20, 1999 in partial fulfillment of the requirements for the degree of Master of Science in Architecture Studies

## ABSTRACT

Throughout the late 1940's and early 1950's the re-popularization of the relationship between architecture and music took on several forms of expression. This relationship was to be verified through the notion of harmony that would in turn reflect not only a resurfacing of Humanist ideals and values as a cultural post-war response, but would also provoke a series of debates on proportion and proportion studies that would question these cultural demands against these systems based on preconceived notions of natural law. This study explores the particular contexts in which the idea of harmony was discussed and practiced through the 1950's relative to architecture and music as a reflection of natural law that, by the early 20<sup>th</sup> century, had been undermined by the practices of music.

The analysis examines two particular case studies, the publication of Rudolph Wittkower's *Architectural Principles in the Age of Humanism*, published in 1949, and the Phillips Pavilion, commissioned by Phillips Electronic Corporation, and designed by the office of Le Corbusier that was constructed at the World's Fair in Brussels in 1958.

Thesis Supervisor: Mark Jarzombek  
Title: Associate Professor of the History of Architecture

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The Problem with Harmony:

Architectural Constructs of Proportionality, Music, and the Modulor in the 1950's.

It is not uncommon to believe that there exists a fundamental relationship between architecture and music. This assumption has been cultivated throughout history and in turn has been developed in the context of other discourses. It is therefore of no surprise that there have been numerous attempts to translate music into a direct architectural expression. To directly equate architecture and music as formal translations of one another is not the goal of this inquiry. Instead, I wish to examine the relationship of architecture and music in contexts by which their emergence is figured through a network of relations to history and theory of architecture and its subsequent production. The form of approach and means of justification of the relationship of architecture and music has been guided by a multitude of discourses and ideologies. From analogies to metaphors and syntactical structuring to direct formal transposition, the forms of constructing architecture in the image of music are idiosyncratic, if not consciously disregarding a self-examination of what these organizing principles may suggest when employed. However, the topic of architecture and music remains perhaps necessarily open-ended in contemporary discourse. It has taken shape over the years, gathering interest in the form of proposals and theories from both students and practitioners of architecture. It is therefore not my concern to systematize these representations of architecture and music, but to form a critical point of entry into the cultural and social conditions of post-war architectural speculations.

Most often architectural productions that have constructed a relationship to music have used classical notions of music and aesthetics to validate their relationship. It may seem at first glance that music has in fact had some influence on these design strategies.

But in this case, unlike the Renaissance, the discipline of architecture has ignored contemporary trends in music composition and theory that continue to develop and are struggling to work out of their own forms of codified expression and production.

Architecture that has attempted to relate to music's more traditional or classical form, has inevitably supported a reified notion of music that has been cultivated by the discipline of architecture and is consequently based upon a classical model of aesthetics.

However, in order for the discipline of architecture to maintain its ties to music in this sense, it has had to perpetuate these classical models of music and composition rather than engage the contemporary practices of musicians and composers.<sup>1</sup>

It is necessary to focus upon one particular aspect that has been employed as a constant signifier in the production of these projects and papers through which the relation of architecture and music is constructed. It is essential to then expose the more deeply concealed formations that have been, in themselves, popularly constructed within the arena of architecture which would perpetuate the relationship of architecture and music. While there have been many optimistic speculations of both conceptual methods of creation and physical fabrications that could clearly be expressive of an architecture directly articulated as a formalized musical construct, few have succeeded in overcoming literal translations.

It is within the period of the 1950's in which the reception and the re-popularization of the relationship of music and architecture take an important turn. Proportionality and modular systems were extensively debated through the 1950's. They offered a direct link to historical models through which justification for particular design

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<sup>1</sup> One example is the 1994 publication of *Architecture as a Translation of Music*, this publication has done little to

practices of contemporary architecture could be verified and accepted. The single recurring concept that was employed to ground this debate was the idea of harmony.

My analysis examines the notion of architecture and music through two particular case studies, the publication of Rudolph Wittkower's *Architectural Principles in the Age of Humanism*, published in 1949,<sup>2</sup> and the Phillips Pavilion by the office of Le Corbusier that was constructed at the World's Fair in Brussels in 1958.<sup>3</sup> Both works contain the use of harmony and proportional systems. The Phillips Pavilion however, represents a more complex relationship that is signified through proportionality and harmony. It not only figures the conflation of architecture and music practices, but is also built within the context of Le Corbusier's Modulor system that represents a significant issue in the proportionality debates that occurred in the 1950's. The Modulor was a system of measurement and proportion, and in the words of Le Corbusier, "...the 'Modulor' is a measuring tool based on the human body and on mathematics."<sup>4</sup> The 1950's also marks a crucial moment in the development and propagation of "Neo-humanist" ideals, their acceptance in architectural discourse, indicate the general attitudes that surfaced within the context of post-war reconstruction.<sup>5</sup>

Both productions of Wittkower and Le Corbusier are intertwined through notions

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engage critical and contextual analysis and simply constructs the essential conditions to promote its own operations and practices. See Martin, E., *Architecture as a Translation of Music*, New York: Princeton Architectural Press, c1994.

<sup>2</sup> Wittkower, R. (1949). *Architectural principles in the age of humanism*, London, Warburg Institute, University of London, 1949. *Architectural Principles in the Age of Humanism* was first published as three articles in series in the *Journal of the Warburg and Courtauld institutes* as "Alberti's Approach to Antiquity in Architecture," IV [1940-1941], 1-18; "Principles of Palladio's Architecture," Part I, VII [1944], 102-122; Parts II and VIII [1945], 68-106. As cited by Henry A. Million, "Rudolf Wittkower, Architectural Principles in the Age of Humanism: Its Influence on the Development of Interpretation of Modern Architecture." *JSAH* 31 (1972), p. 84.

<sup>3</sup> The Phillips Electronics Company produces electronics for both consumer and professional markets had commissioned the pavilion. For a thorough history of the construction and correspondence, see Treib, M., C. Le, et al. (1996). *Space calculated in seconds: The Philips Pavilion, Le Corbusier, Edgard Varese*. Princeton, N.J., Princeton University Press.

<sup>4</sup> First published in 1948. The version I will cite will be Le, C. and M. E. Le Corbusier (1980). *Modulor I and II*. Cambridge, Mass., Harvard University Press. 1980. p. *Modulor I*, p. 55.

<sup>5</sup> The topic of humanism as well as post-war reconstruction in the 1950's is a vast subject and will not be covered here

that stem from the Pythagorean concept of harmony. Proportionality is therefore expressed through the particular terms of harmony, and is likewise sustained by the explicit connections made with mathematics that would justify its relationship to music. In the 1950's, as in the Renaissance, proportionality will similarly be employed as a means to unify the expression of society through the universal values found in harmony. Harmony is the reflection the universal relationships between mathematics, Nature, human kind and the divine. Wittkower convincingly expresses this relationship in numerous instances in his exposition of Renaissance architectural principles.

He sites Alberti, "With reference to Pythagoras, he [Alberti] stated that 'the numbers by means of which the agreement of sounds affects our ears with delight, are the very same which please our eyes and our minds,' and this doctrine remains fundamental to the whole Renaissance conception of proportion."<sup>6</sup> This forms the classical notion of beauty and also reflects the cosmological connections that were believed to exist between man and the cosmos; therefore the harmonic perfection of the geometric construct is "a visible echo of a celestial and universally valid harmony."<sup>7</sup> It as well introduces the necessary aesthetic connection of music and architecture as both to have the ability to express the same universal values through mathematics. Alberti's definition of harmony will figure predominantly as a guiding organizer of proportionality. This definition will principally facilitate a notion of cohesion in which the representation and composition of architecture will rely on the total parts that make up the explicit connections between the architectural construct, man, and the world. Le Corbusier will also ground architecture in harmony by connecting it with natural law and music, "...music rules all things, it

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as an in-depth study.



dominates; or, more precisely, harmony does that. Harmony, reigning over all things, regulating all the things of our lives, is the spontaneous, indefatigable and tenacious quest of man animated by a single force; the sense of the divine, and pursuing one aim: to make paradise on earth.”<sup>8</sup>

There are two considerations. First, to examine the conditions in which the popular reception of proportionality occurred. To tease out the circumstances relative to a post-war optimism in which the desires to promote unifying systems, both moral and design, could take place. These systems are to occur in the context of a resurfacing Positivism that, through an unquestioning belief in science and technology, would be able to accomplish this conjoining to proportionality of moral and design systems through “neo-humanist” ideals. The realignment in methods of analysis in the discipline of art history will throw into relief the prevalent methodological practices that will be taken up in the 1950’s; however these shifting attitudes will begin to surface much earlier.<sup>9</sup> The transformation of the methods of analysis used by art history will increasingly adopt a scientific approach over previous scholarship that had based its critique through connoisseurship or aesthetics. This tendency to accept technology and science, or to preference a scientifically verifiable mode of analysis, will predominately form the justifiable critiques upon architecture and music. This will also parallel and support, as an acceptable model of verification, the reception of Wittkower’s claims by art historians and architects. Second, to illustrate the inherent contradiction that lies within Le Corbusier’s “Modulor” and occurs in the Phillips Pavilion. It may be inferred through Le

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<sup>6</sup> Wittkower, R. (1971). *Architectural Principles in the Age of Humanism*, New York, Norton [c1971]. p. 110.

<sup>7</sup> Ibid., p. 8.

<sup>8</sup> Ibid., 74.

<sup>9</sup> McCorkel, Christine, “Sense and Sensibility: An Epistemological Approach to the Philosophy of Art History,” in *The*

Corbusier's continuing development of the Modulor system in the 1950's, the publication of the *Modulor I* in 1948 and *Modulor 2* published in 1958, that it forms an overall investment in a design methodology that would be integral to the Phillips Pavilion. What will be covered later in this paper will illustrate the involvement of composer Iannis Xenakis who had chiefly participated in the design of the pavilion and also contributed a musical composition. It is finely apparent in the media spectacle shown in the pavilion where by images of Le Corbusier's worldview, his slogans, architecture and Modulor man, are placed throughout the context of this eight minute spectacle and are compared as a harmonious alternative to the destruction of humanity.<sup>10</sup> The contradictions that will arise when examining this work against contemporary trends in music will demonstrate Le Corbusier's stake in the classical conception of harmony. Musical metaphors are of no scarcity in the *Modulor*. Le Corbusier is very conscious of the connections that he constructs. On the other hand, this use of history supports the possibility for the modern architect of the 50's using these notions of harmony and proportion, particularly Le Corbusier<sup>11</sup> to universalize proportionality through the use of his "Modulor" and thereby establish a concrete link to history. However there is an immanent problem contained within this model of history and practice. While reestablishing history through a pre-posed Vitruvian model of universal harmony, as was performed in a similar way by Renaissance theorists but located deeply in a cosmological view, it must be acknowledged that even though the Vitruvian model seems plausible in the context of the canons of architecture, a type of "natural history" that develops in the natural course of

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*Journal of Aesthetics and Art Criticism*, Vol. XXXIV, Number 1, Fall 1975. pp. 35-50.

<sup>10</sup> In particular the Modulor Man is depicted within the stream of images, as well as other self-promoting propaganda. See Treib, M., C. Le, et al. (1996). *Space calculated in seconds: The Phillips Pavilion, Le Corbusier, Edgard Varese*. Princeton, N.J., Princeton University Press.

architectural evolution, it is however a culturally constructed ideal. It is put into place as a revival of antiquity that would hope to exemplify and promote society in order to legitimate it as being located within a larger historical context. It as well legitimates a universal condition and relationship to harmony, that should be questioned as a culturally dependent model of aesthetics.

Therefore, some of the tendencies of the post-war period can point to the immediate interest in Wittkower's study and to a desire to emulate the beliefs and justifications in harmony that would be connected to proportionality. These systems of rationalization will also play an important role in the modern architectural community as a newly defined Humanist enterprise. It is through the idea of harmony that we must examine the socialized ties to music and architecture that are to be developed through Wittkower's study and Le Corbusier's *Modular*. The notion of harmony will accordingly bring in line a system of values that are prevalent in the early portion of the decade and finally culminate in the Phillips Pavilion. It will not only signify that the conditions that followed the Second World War were to set right again humanity in order to reconcile the wound left by destruction and the atrocities witnessed. What must as well be examined is the dialectic nature of this notion of harmony when used in relation to these forms of rationalization. How will Wittkower's study figure into this to support the driving forces of a modern architectural aesthetics, the skepticism and acceptance of systems?

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<sup>11</sup> See Le, C. and M. E. Le Corbusier (1980). *Modulor I and II*. Cambridge, Mass., Harvard University Press. 1980.

*Proportionality and Wittkower*

The publishing of Wittkower's essays on Renaissance architecture foreshadows a radical change in the methods of art history, a precursor to the methods of critique that rely on social and ideological analysis to formulate the interaction of culture as an expression found in the objects created; the trajectory in which we find these concerns fully realized is in a social history of art. But the more prevalent methodology of art history, at least the concerns that were surfacing in the 1940's and early 1950's, were following a developmental criteria in which art history could gain a more specifically scientific positioned method of justification that would securely establish its methods to be verifiable outside of philosophy and definable as a science.

In his analysis, Wittkower exposes the connection to the Pythagorean rational that was prevalent in Renaissance thought in that it provided support necessary to unite through harmony, Nature, man and the divine.

"...it will be realized that the Renaissance analogy of audible and visual proportions was no mere theoretical speculation; it testifies to the solemn belief in the harmonic mathematical structure of all creation. But, in addition, music had a particular attraction for Renaissance artists because it had always been ranked as a 'science'."<sup>12</sup>

Wittkower would simultaneously connect these issues to current interests in proportional systems of 1950's architecture.<sup>13</sup> Wittkower's publication of *Architectural*

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<sup>12</sup> Wittkower, R. (1971). *Architectural Principles in the Age of Humanism*, New York, Norton [c1971]. p. 117.

<sup>13</sup> It is possible to speculate why was the effect that rendered the concept of proportionality so popular in a post-war era? Could the universalizing concept embodied in proportionality offer a constant that would unify the world again as a humanist project and surfacing post war responses that were receptive to these notions It may foreshadow exhibitions and trends such as "Globalizm." I will later establish a connection with a book and exhibition held at the MOMA, "*The Family of Man*," in book form, Steichen, E.c. and A. Museum of Modern, *The family of man*. 1955: [New York] Published for the Museum of Modern Art by Simon and Schuster, c1955 that used images to foster and create these

*Principles in the Age of Humanism* had become important to two audiences; art / architecture historians and practicing architects of the early 1950's.<sup>14</sup> The objective, therefore, is to examine some of the primary issues concerning methodological shifts and practical consequences that are present in *Architectural Principles in the Age of Humanism*.<sup>15</sup> It is however necessary to focus the discussion to a theme in architecture that was both re-conceptualized by Wittkower in the late 1940's, that would contend with traditional Renaissance scholarship, and as well, with the brief but current architectural debates of the 1950's that surrounded proportionality and proportional systems. By locating his thesis within the study of the relationship of aesthetics, science, philosophy, and music, Wittkower is able to inscribe a reading of architecture that was to be a reflection of contemporary Renaissance culture. It contends with a deeply rooted belief of a unifying principle of harmony that is embodied throughout as ordering worldview. All relations culminate in the notion of harmony that in turn reflects the cosmological views by which the production of architecture is ordered in the Renaissance. This belief system that pervaded Renaissance architectural production should not be considered idealist in the context of the Renaissance. It was a belief that was held to be universal in relation to natural law. However, as the debates on proportionality will reveal, this system in the context of the 1950's seems optimistic if not a questionable construct. The emphasis on mathematics and proportionality made it possible for Wittkower to operate outside of the current techniques of analysis that were used in traditional Renaissance scholarship. This

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very concepts. This will as well figure as a similar imagery that is used by Le Corbusier in the Phillips Pavilion, at the World's Fair 1958.

<sup>14</sup> As noted by Henry Million, the reception of the publication reached such an enormous popularity that those 600 copies of the first printing were sold within the first three months of its printing. Henry A. Million, "Rudolf Wittkower, *Architectural Principles in the Age of Humanism: Its Influence on the Development of Interpretation of Modern Architecture*." *JSAH* 31 (1972) : 89 n.43

<sup>15</sup> Wittkower, R. (1949). *Architectural Principles in the Age of Humanism*, London, Warburg Institute, University of

shift allowed for an analysis that suspends the purely figural or ornamental subject. The analytic method is then grounded in the syntactical relationships that were to be characterized through proportionality and would further suggest that there is an important social and intellectual component at work in the practice of Renaissance architectural production. Wittkower's analysis can be interpreted to foreground the beginning of a methodological shift in art history that will take into account the social conditions that will influence the production of architecture. This form of social critique furnishes the possibility to pinpoint the concerns and cultural beliefs that contributed to the conception of structure and form of the Renaissance architectural object

Between WWI and WWII there was a significant shift in the discipline of art history that may account for the wide reception of Wittkower's study. As noted by Christine McCorkel,

“The neo-Hegelian *Kunstwollen* of Riegl had become impossible to sustain as an historical “explanation” in the thirties. Indeed art history was in retreat from speculative theorizing and grand explanatory systems in favor of refinement of methods for defining and dealing with historical facts.”<sup>16</sup>

The discipline of art history was struggling to secure techniques of analysis that could be informed through other criteria in order to sustain critical assessments. Science, therefore, became a leading reaction to this uncertainty. But there are other conditions and consequences that reside in this belief that science has complete objectivity, or for that matter, “Truth.”

The interest in proportionality had provoked several conferences and debates

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London, 1949. First published in book form.

within the 1950's architectural and art community. There were two major discussions held within a span of six years. The first conference "*The First International Congress on Proportion in the Arts*"<sup>17</sup> was held in Milan, and the rebuttal to that conference, "Debate on the motion "*that systems of proportion make good design easier and bad design more difficult*" held at the Royal Institute of British Architecture held in June of 1957."<sup>18</sup>

### *Architectural Principles in the Age of Humanism*

Wittkower frames his endeavor in the introduction of *Architectural Principles in the Age of Humanism* by offering a context for his thesis,

"In order to avoid misunderstandings I should like to stress that this study is neither a history of Renaissance architecture nor does it contain monographic treatments of Alberti and Palladio. I am discussing the works of these architects only in so far as they are relevant to my main topic, the illumination of architectural principles at the time of the Renaissance..."<sup>19</sup>

Wittkower proceeds in the forth part of *Architectural Principles in the Age of Humanism* to outline the importance and the central meaning of how the notions of harmony and mathematics were to coincide with Renaissance architectural production, "...I am submitting this thesis that Renaissance architecture was conceived an image or

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<sup>16</sup> McCorkel, Christine, "Sense and Sensibility: An Epistemological Approach to the Philosophy of Art History," in *The Journal of Aesthetics and Art Criticism*, Vol. XXXIV, Number 1, Fall 1975. pp. 37.

<sup>17</sup> A report on this conference may be found in, *Neue Züricher Zeitung*, "De divina proportione." October 11 1951. As well as *Società degli ingegneri e degli architetti in Torino. Atti e rassegne tecnica*, v. 6 1952 PP: 119-135. Translation by Aleandra Massini.

<sup>18</sup> "Report of a debate on the motion "that systems of proportion make good design easier and bad design more difficult." *Journal: the Journal of the Royal Institute of British Architects*, Vol. 64 Number 10, August 1957.

<sup>19</sup> Wittkower, R. (1971). *Architectural Principles in the Age of Humanism*, New York, Norton [c1971]. Introduction.

mirror of a pre-ordained, mathematical harmony of the universe...<sup>20</sup>

The concerns here are twofold. First, as described in *Architectural Principles in the Age of Humanism*, Wittkower elaborates, and positions, the neo-Platonic and Pythagorean concepts used by Renaissance architects that would enable him to develop a method of analysis that was outside of current Renaissance scholarship. Wittkower's methodology operates within a model of historiography that assumes the interpretations that are proposed by history are not static. That the object of inquiry is constituted through the deposition of facts which accumulates and provides a description of the past. It is in this process by which his interpretation, and others to follow, pursues the continual unmasking of pre-posed notions of objectivity and rationality relative to historiography are rendered time and culturally specific. It is then of the utmost concern as to which form or theories of history that one may interpret when postulating the events and intellectual movements of history. Histories, within this model, or intervention as interpretation, will inevitably transform the reading of history through this process, much as Wittkower's study will prove.

The exchanges that occurred through *Architectural Principles in the Age of Humanism* with contemporary history and theory through symposia, journals and the practices of the architectural community make a unique case. Wittkower's own study would encapsulate both an agenda of objectivity that was, at that moment in history, influenced by the shifting determinates in scholarship and would also provided a new conception architectural analysis.

Wittkower was to reveal a Renaissance attitude toward proportionality that was to

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<sup>20</sup> Ibid., Introduction.



determine a relationship to nature that could be resolved through numerical and geometric consequence and employed to create an architecture that would be in turn relate to all things in the universe. Wittkower defined the differences between the Renaissance and medieval beliefs in geometry and mathematics. The medieval period strove to prove that there was an ultimate truth that lay in the *appearance* of things in the world that could be inscribed by geometry. While the medieval artist inscribed the things of the world with a predetermined geometry "...the renaissance artist tends to extract a metrical norm from the natural phenomena that surrounded him."<sup>21</sup> The parallel to modern architecture would be that there was in fact a possibility to achieve similar results, of both beauty and harmony, through proportional systems that could form the fundamental design strategies of their architectural productions.

Second, the exchanges with art history in the early 1950's are between historical scholarship and criticism and the practices of architecture. Even James Ackerman was surprised that it gained such popularity

"To Rudi's astonishment, the book exercised a phenomenal influence on practitioners and students of architecture. Although this was surely due to its insight into the thinking process of the architect, it was aided by an emerging interest in proportional composition (encouraged by Le Corbusier's *traces regulatoires* and his *Modulor*, and by the work of Mies) and in architectural typology, which related to what he had to say about Palladio's formulas for villa plans and church facades. And it effected scholarship..."<sup>22</sup>

Wittkower's departure from Renaissance scholarship posits that a deliberate

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<sup>21</sup> "The Changing Concept of Proportion" Rudolf Wittkower in *Daedalus*, Vol 89 1960 pp. 199-251. p. 202.

intellectual engagement is the determining factor as to how form is derived, and is aimed at the conveyance of meaning. It was directed rather to the mind instead of the senses contrary to the major publications on Renaissance architecture that Wittkower takes issue with.

“Architecture was regarded by them [Renaissance architects] as a mathematical science which worked with spatial units...For the men of the Renaissance, this architecture with its strict geometry, the equipoise of its harmonic order, its formal serenity and above all, with the sphere and the dome, echoed and at the same time revealed the perfection, omnipotence and goodness of God.”<sup>23</sup> “The conviction that architecture is a science and that each part of a building, inside as well as outside, has to be integrated into one and the same system of mathematical ratios, may be called the basic axiom of Renaissance architects.”<sup>24</sup>

A review of *Wittkower's Architectural Principles in the Age of Humanism* points out that Wittkower positions himself and overcomes other models of Renaissance architecture analysis. Both authors are used as foils that have different claims to assert about the Renaissance, one being a protagonist of taste and the other focusing on a style related to hedonism which were contrary to Wittkower's suppositions. Wittkower positioning against Ruskin's *Stones of Venice* and Scott's *The Architecture of Humanism*<sup>25</sup>, is verified through the notes in the opening chapter of his book.<sup>26</sup> In the final chapter of *Architectural Principles in the Age of Humanism*, Wittkower

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<sup>22</sup> James S. Ackerman, “Rudolf Wittkower's Influence on the History of Architecture” in *Source: Notes in the History of Art*, 1989 Summer-Fall, V. 8-9, no. 4-1, p. [87]-90. p. 89.

<sup>23</sup> *ibid.*, p. 29.

<sup>24</sup> Wittkower, R. (1971). *Architectural Principles in the Age of Humanism*, New York, Norton [c1971]. p. 100.

<sup>25</sup> Sir Kenneth Clark, “Humanism and Architecture,” in *Architectural Review*, Vol. 109 (1951) pp. 65-69. Scott's research is more or less notion of the “disinterested enthusiasm” which is preferences taste rather than any political or social agenda. Wittkower sees an intellectual operation that operates against Scott's model.

demonstrates the central role of mathematics, proportion and music for the Renaissance theory.

He states, “We have already seen that the architect is by no means free to apply to a building a system of ratios of his own choosing, that the ratios have to comply with the conceptions of a higher order...”<sup>27</sup> Through this notion of proportion, and the integral relation of the building parts as to express a harmony, Alberti was to establish music intervals and the correspondence to architectural proportion. His belief that the same experiences had through music could equivalently be experienced by the eyes and the mind. This became the fundamental link that was to provide a means to construct the relationship of music and architecture, “...this doctrine remains fundamental to the whole Renaissance conception of proportion. Alberti continues: We shall therefore borrow all of our rules for harmonic relations (‘finitio’) from the musicians to whom this kind of numbers is extremely well known, and from those particular things wherein Nature shows herself most excellent and complete.”<sup>28</sup>

Wittkower couples the systems of architecture, harmony, and music that will figure as the guiding force behind aesthetic judgements as an objective rational and scientific guarantor for perfection. He consequently identifies a desire in Renaissance mentality that manifests itself as a necessity to order through an intellectual scientific and philosophically based system of proportion and composition. His focus is supported by a fundamental relationship to syntactical operations; he will dissect the architecture as a structural kit of parts, looking at the significance of the structural relations rather than the meaning of stylistic forms and ornamentation. As noted by Payne, “Wittkower looks

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<sup>26</sup> Wittkower, R. (1971). *Architectural Principles in the Age of Humanism*, New York, Norton [c1971]. p. 1.

beyond its immediate physical presence to a primary structure and subordinates all other “principles” to that of an essential and willed, rather than intuitive, order that rests upon scientific matrix. ...the explicit link between syntax and science via mathematics allows Wittkower to situate Renaissance formal practices within the objective and rational rather than the subjective realm.<sup>29</sup> His analysis will further emphasize the relationship to ideal numbers that will define architecture to the other arts within a larger philosophical context. The sheltering of architecture within Neo-Platonic ideals will consequently reinforce the status architecture as a discipline of intellectual dimension that earlier interpretations in Renaissance scholarship had not considered.<sup>30</sup> By equating architecture as a “mathematical science” Wittkower is able to securely establish its connections to intellectual as well as an aesthetic operation that “should mirror the proportions of the human body; a demand which became universally accepted on Vitruvius’ authority. As man is the image of God and the proportions of his body are produced by divine will, so the proportions in architecture have to embrace and express the cosmic order.”<sup>31</sup>

“ Interpreted thus, architecture takes a leading role amongst the arts in materialization a Weltanschauung rooted in a mathematical conception of the universe: science (cosmography), simultaneously absorbed and transcended, receives visible expression in architectural form.”<sup>32</sup>

The focus on science and proportions in the Renaissance parallel similar beliefs in the post-war period and may be seen as a hopeful reflection in solving problems in the

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<sup>27</sup> Ibid., p. 101.

<sup>28</sup> Ibid., p. 110.

<sup>29</sup> Alina A. Payne “Wittkower and Architectural Principles in the Age of Modernism” in *JSAH* 53: 322-342, September 1994. p. 328

<sup>30</sup> See Scott, G., *The Architecture of Humanism: a Study in the History of Taste*. London, Constable and company. (1914).

<sup>31</sup> Ibid., p. 101.

1950's. Considerable attempts to produce justifiable designs by which designers could efficiently cope with emerging production were sought in proportional system; standardization became the object in which proportionality would salvage through beautiful design. Le Corbusier's Modulor is shot through with dictums of a unified world through his proportional system that would provide a beautiful environment achieved through mass production and proportionality<sup>33</sup> It also with these terms that one may look to Siegfried Giedion's analysis. Production methods and mechanization foreshadow other studies on proportionality whereby the expression of science and technology have a direct influence on physical production; the relationship that is outlined in Giedion's *Mechanization Takes Command* published in 1948 assesses a similar attitude that shifts toward a scientifically justified analysis. His bases of justification optimistically stem from scientific studies in biology, psychology, and physiology. But one may clearly see that in the closing chapter Giedion notes that the "man in equipoise" must contend as well as collectively balance world. "We must establish a balance between the human body and cosmic forces."<sup>34</sup> While Giedion criticizes science and technological "advancement" of the world, he still holds an optimistic view for the "man who can restore the lost equilibrium between the inner and outer reality."<sup>35</sup> A "better world" in which one may see as a form of optimism of the post-war period supported through the belief that science will aid in that recovery. He promotes this claim by connecting through history the contemporary practices of architecture in the Renaissance and

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<sup>32</sup> *ibid.*, p. 327.

<sup>33</sup> See Ehrenkrantz, Ezra D., *The Modular Number Pattern: Flexibility Through Standardization*, Lecture essays on art. 4. London, A. Tiranti, 1956. Press ltd.

<sup>34</sup> Giedion, S. (1948). *Mechanization Takes Command: a contribution to anonymous history*. New York, Oxford University Press. My edition is the 1971 by New York, Norton [c1971]. p. 22.

<sup>35</sup> *Ibid.*, 22.

“legitimizes modernism by embedding it into history and represents the renaissance as an origin that validates its aspirations.”<sup>36</sup>

“Indeed one rarely sees so complete a unity of thinking and feeling as is to be found in the early 15<sup>th</sup> century. There was not only the important identity in method in those two spheres, but a complete union of artist and scientists in the same person.”<sup>37</sup>

Wittkower will use similar tactics to emphasize the spiritual kinship that modernism and the renaissance aesthetics will have. For Wittkower “Humanism is an intellectual configuration based on an appropriation of ancient thought, that is, on Platonic philosophy, Pythagorean mathematics, and Euclidean geometry, at the hands of the humanists, that is absorbed by an act of cultural osmosis into architectural theory.”<sup>38</sup>

### *Proportionality conference and debate*

The debates around proportionality can be divided into two distinct moments. While the issue of proportion was significantly a “lively topic of discussion” in the early part of the 1950’s, changing currents slowly transformed proportionality and the systems that had accompanied it from its initial enthusiasm into an uncertain disaffection. The initial popularity that proportionality acquired as a guaranty to beauty had become questionable in light of whether artistic choice and the belief in systems predicated on natural law could adequately perform as a design tool. The interest in universalizing

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<sup>36</sup> Alina A. Payne “Wittkower and Architectural Principles in the Age of Modernism” in *JSAH* 53: 322-342, September 1994. p. 331.

<sup>37</sup> Giedion, S. (1941). *Space, time and architecture; the growth of a new tradition*, Cambridge, The Harvard University Press; London, H. Milford, Oxford University Press, 1941. Cited in Alina A. Payne “Wittkower and Architectural Principles in the Age of Modernism” in *JSAH* 53: 322-342, September 1994. p. 331.

<sup>38</sup> Alina A. Payne “Wittkower and Architectural Principles in the Age of Modernism” in *JSAH* 53: 322-342, September 1994. p. 333

systems in the late 1940's and early 1950's may be indicated by a conference on proportion held in Milan, 27 to 29 September 1951 and entitled "De Divina Proportione." The Milan conference was organized within a larger exhibition of the applied arts. The name and thematic justification of the conference was inspired by a conjoined bibliographic exhibition that concentrated on proportions in the arts. The exhibition organizer, Carla Marsoli, had seen an opportunity to schedule an impromptu conference on proportion in the arts and was able to schedule the current supporters of this topic of interest to attend for the delivery of papers and discussion to the topic of divine proportion and proportions in art, science and architecture. The topics covered were "...from Pythagoras up to nuclear physics or Le Corbusier..."<sup>39</sup> Participants were Rudolf Wittkower, Le Corbusier, Matila Ghyka, Hans Kayser, James Ackerman, Bruno Zevi, E. N. Rogers, Siegfried Giedion, Luigi Nervi, to name but a few.<sup>40</sup> There was an optimistic atmosphere, and support was given in positive forms of discussion, which were devoted to each day of the conference in the form of daily topics. The topics on the first day surrounded in a general sense, "The Studies on proportions in the history of thought and history of art." The key speaker and conference discussant was Rudolf Wittkower whose paper was divided into two parts: "Purpose of the Conference" and "Some Aspects of the proportions in the Middle ages and Renaissance." Other conference discussants were Matila Ghyka "Symetric pentagonal et Section Doree..." and James Ackerman "Gothic Architectural Proportions, Milan 1400." On the second day the topics were "Mathematical foundations in the studies on proportion, Proportions in Music, Proportions in

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<sup>39</sup> *Societa degli ingegneri e degli architetti in Torino. Atti e rassegna tecnica*, "First International Congress on Proportion in the Arts," v. 6, 1952 pp. 119. A complete list of conference speakers and topics will be listed in the appendix. Translation by Aleandra Massini.

<sup>40</sup> *Ibid.*, p. 121-122

Technology, and Proportions in Architecture.” The key figures that would deliver papers on this day were Sigfreid Giedion “The Part and the Whole in Contemporary Architecture,” Luigi Nervi “The Proportions in Technology,” Bruno Zevi “The Fourth Dimension and the Problem of Proportions in Modern Architecture,” E. N. Rogers “Measurement and Space,” and Le Corbusier “Le Modulor.” On the final day the topic was introduced as “On Proportion and Intuition in Arts.” Both exhibition and conference strove to define the working and endeavors of “human kind” in broad universalizing terms. The exhibition compared cultures of various countries and historical periods that bring to bare much of the proposal of this historical synthesis of proportional systems, and was devoted to the current climate that surrounded the interests of design practitioners.

“The exhibition was a historical synthesis of the questions pertaining to proportion and harmony that governs every invention and creation of man. The juxtapositions of ancient and modern texts as well as the presence of Renaissance artifacts together with avant-garde works of art, testified to the renewed interest and revival of the studies on proportions in our time.”<sup>41</sup>

Confirmation of the optimistic atmosphere was reported by the *Neue Züricher Zeitung*<sup>42</sup> and was in support of the current climate that surrounded the mathematicians, engineers, design practitioners, and historians that participated in the conference. The *Neue Züricher Zeitung* had indicated that there was a relationship between contemporary society and the Renaissance that was formed through prominent attitudes of the present

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<sup>41</sup>Ibid., pp.119.

<sup>42</sup> *Neue Züricher Zeitung*, “De divina proportione,” October 11 1951. Translation by Tomas Rammin and author.



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“With the Renaissance, which not only reinvented concepts from early times, there were new investigations and explorations of newly formed ideas of proportion. The Renaissance has something in common to our most recent times. Because of the past, there has been a consolidation of knowledge. There have been huge steps forward in respect to new knowledge, and that people of today, as in the Renaissance, live in a liberty that seems to be almost frightening. In the fear of this vast knowledge that we have acquired, people are looking for order and relationships so that they can relate themselves within the larger context of the world. In this sense the congress’s specific topic is not only to proportion, but is actually a topic of humanity.”<sup>44</sup>

This conference foreshadows trends that were to occur decades later, such as a higher reliance on mathematics to replace decision making, to mediate social relations, the concept of globalism, and the rise of a further technification of music and architecture. The overall willingness to accept instruments of rational is certainly a possibility, but one would imagine that this would be impossible after the Second World War. The likelihood that subjectivity or free choice could be replaced by rules that organize the very act of creativity is perhaps unacceptable. This is perhaps acknowledged by the second conference that was in response to the issue of proportional systems.<sup>45</sup> Caution should be taken, however, for when the desire to formulate overarching system of rationality in order to tame or organize events, actions, and ideas, of both past and

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<sup>43</sup> This assumption could have been gathered from the conference proceedings and re-presented through the report. This would obviously lead one to believe that the opinion was acceptable with current ideas and attitudes at least with the readers of this newspaper.

<sup>44</sup> *Neue Züricher Zeitung*, “De divina proportione,” October 11, 1951. Pp.1.

<sup>45</sup> See “Report of a debate on the motion ‘that systems of proportion make good design easier and bad design more difficult.’” the *Journal of the Royal Institute of British Architects*, Vol. 64 Number 10, August 1957. pp. 456- 463.

present, which are reasoned out through statements such as a “fear of this vast knowledge.” On the one hand this statement may represent the fallibility of knowledge and humanities belief that its survival is in a delicate balance, a sign of caution in the light of its great achievements. On the other hand, systems of social control oftentimes propose quantifiable answers that may reconcile atrocities in order to realign the dominance of the popular culture. Just as the most common claim that will be employed by the champions of proportional systems that the utilization of production methods will place proportional systems in the service of technological rational in order to “increase living standards”<sup>46</sup> and are used to procure acceptance for good cause; “it is claimed that standards were based in the first place on consumers’ needs, and for that reason were accepted with so little resistance. The result is the circle of manipulation and retroactive need in which the unity of the system grows even stronger.”<sup>47</sup>

The interest in proportionality were seen as a fresh expression in relation to modernist enterprises by which there was a unifying activity that could encompass all endeavors of man through science and art. The discussion that occurred at the Milan conference specifically looked to the unification of science and art through a course of action that was to take form through mathematics. This model prevailed throughout the 1950’s as a form of justification through which mankind was to resolve all the difficulties faced in the modern world.

There was an overall tendency to emulate the Renaissance paradigm and to further establish a verifiable reciprocity through harmony between science and art. It was

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<sup>46</sup> See Ehrenkrantz, Ezra D., *The Modular Number Pattern: Flexibility Through Standardization*, Lecture essays on art. 4. London, A. Tiranti, 1956. Press ltd., p. 3.

<sup>47</sup> See Horkheimer, M. and T. W. Adorno (1997). "The Culture Industry: Enlightenment as Mass Deception, " *Dialectic of Enlightenment*. London; New York, Verso. p. 121.

thought that this reciprocation would "...open up far greater horizons in the calibrations between artists and (scientist) scholars, independently of their specialization."<sup>48</sup> In the descriptions of the conference presented by all sources it becomes explicitly clear that the concepts and means are positioned to justify proportionality in a larger historical context. As reported by the *Societa degli ingegneri e degli architetti in Torino. Atti e rassegna tecnica*, "The vast problems and difficulties of modern architecture, as well as the new concepts, tendencies, and current expressions in the plastic arts, have been the topic of passionate lectures, yet with a critical orientation towards the universal side of the problem, even when analyzed within the individual expression of an artist."<sup>49</sup>

One of the primary conference discussants had been Le Corbusier who had delivered a version of his "Modulor" in order to justify his use of proportion, but there were other interests. As reported by the daily *Neue Züricher Zeitung*, "A very similar desire and connection to rules and laws were seen in the lecture of Le Corbusier, this... architect has been searching many years for proportions that could express the human being and his way of living."<sup>50</sup> Obviously there is some bias here, this attraction to Le Corbusier can be attributed to the fact that there was promoted throughout his "Modulor" the suggestion that he developed this system not only in the legacy of the humanist architects but he was as well able to unite human proportions and building systems into one unified expression. One cannot slight Le Corbusier for this optimistic social project, but there should be some skepticism of what he proposes when placed against the figure of world fabrications and systems of mass production.

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<sup>48</sup> *Societa degli ingegneri e degli architetti in Torino. Atti e rassegna tecnica*, "First International Congress on Proportion in the Arts," v. 6, 1952 pp. 119. Translation by Aleandra Massini.

<sup>49</sup> *Ibid.*, 121.

<sup>50</sup> *Neue Züricher Zeitung*, "De divina proportione," October 11, 1951. pp.2.

“He [Le Corbusier] developed a system of proportion that derived from a human scale which is today the desire of the large portion of the world, it is developed from “the man with the out stretched arm” to a serious attempt to find a human scale which is a desire that confirms theories throughout history.”<sup>51</sup> The extreme popularity in Le Corbusier’s activities dealing with proportionality should not go unnoticed. In all source material encountered, it is Le Corbusier who is the proponent of a system and an architecture that will restore a cohesive and unified system of beliefs, a way of living and a method for creating.<sup>52</sup> Likewise he receives the most criticism at the conference held by the Royal Institute of British Architects.<sup>53</sup> The title should indicate precisely the fact that Le Corbusier will be under some scrutiny, for it is somewhat of a parody on a statement that is taken from his *Modulor 1* and that he presents at the Milan conference.

### *Critique*

The overall interest in proportionality that would be practiced by the design community received a critical blow at a R.I.B.A. conference held on the 18<sup>th</sup> of June 1957. The focus and title of the debate, as noted by Architect Peter Smithson, was “that systems of proportion make good design easier and bad design more difficult.” The title references a fragment of a conversation reported by Le Corbusier at the Milan conference and published in the *Modulor 2*, made by Professor Albert Einstein. This statement is one among many confirmations that Le Corbusier uses to substantiate the Modulor. One can

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<sup>51</sup> *Neue Züricher Zeitung*, “De divina proportione,” October 11, 1951. pp.2.

<sup>52</sup> The source material that had placed Le Corbusier center to the Milan conference, but he likewise finds a central position in the critical debate at the R.I.B.A. debate.

<sup>53</sup> see “Report of a debate on the motion ‘that systems of proportion make good design easier and bad design more difficult.’ the *Journal of the Royal Institute of British Architects*, Vol. 64 Number 10, August 1957. pp. 456- 463. This conference was held on at the R.I.B.A. on the 18<sup>th</sup> of June 1957.

never truly discern the amount of fabrication of any statements that are published in the *Modulor*, but to be sure, there are not as transparent as Le Corbusier would have wished them to remain. The fragment reads, “Einstein had the kindness to say this of the ‘Modulor’: ‘It is a scale of proportions which makes the bad difficult and the good easy.’<sup>54</sup> Throughout the debate the majority of criticism, which was predominately skeptic, was directed to Le Corbusier. There are, for the most part, in the recordings of this conference many subtle understandings of what is arguably the reason for the proceeding at all. While on a stronger line of questioning, most seem to be centered on aspects of rationality and how that is in opposition to creativity and subjectivity. Without delving too far into the ideological forces at work for each individual delivering their version of critique against or support of proportionality, it may be a more productive endeavor to simply list some of the main points of the primary figures recorded. The list of participants reads Nikolaus Pevsner, Maxwell Fry, Misha Black, W.E. Tatton Brown, Peter Smithson, W. A. Allen, Alan White, L. N. Fraser, R. Wittkower, James C. Kennedy, Alexander Flinder, John Summerson, and Athol W. Brentall. While these speakers seem to be the main body of representatives for both sides that had been recorded. There was a vote cast at the end of the proceedings to determine the fate of systems of proportions that tallied 48 people voting for and 60 people voting against.

Nikolaus Pevsner who would outline in a seven-section survey the history of proportional systems introduced the discussion. In paragraph seven his argument closes on Le Corbusier’s *Modulor* by dismissing it as “quack panacea,”<sup>55</sup> which was

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<sup>54</sup> First published in 1948. The version I will cite will be, Le, C. and M. E. Le Corbusier (1980). *Modulor I and II*. Cambridge, Mass., Harvard University Press. 1980. p. 58.

<sup>55</sup> “Report of a debate on the motion ‘that systems of proportion make good design easier and bad design more difficult.’ the *Journal of the Royal Institute of British Architects*, Vol. 64 Number 10, August 1957. p. 457.

undoubtedly for the insistent repetition of every justification imaginable. His final comment rests on his compiled evidence that proportional systems are basically a “mystique of numbers and figures.” With this comment, he places a question of doubt as to the validity of any proportional system and its justifiable relationship as to whether it can be a means of a guarantee to beauty or harmony. His criticism of the Modulor focuses on the fact that there will be numerous possibilities of combinations as with other system that attempt to work out a standardized system of design with variability. Once the Modulor is exposed as *the* system for mass production, as Le Corbusier intends, it becomes quite limited. On the most pragmatic level, the methods of production of mass marked goods at that time in history were operating on models of production stemming from automobile manufacturing and production forms that had to inevitably set standards which could not be altered once they had been put into place. Tooling cost was often prohibitive in terms of alteration after the fact, and therefore, the amount of design flexibility that had to initially be built into the notion of Le Corbusier’s manufacturing process vanishes. While this “flexibility” indeed offered an amount of variation, controlling it is simply a task of delineating all of the combinations once they have been set to figure the system and this, to be sure was a necessary activity of mass production. The dialectic of the Modulor; while on the one hand it claims variability and flexibility of and for any harmonious combination possible, but on the other hand this flexibility stems out of absolute control and when in the service of mass production this only will exhibit an appearance of choice. This seems to be the main contradiction in Pevsner’s argument, he argues that the Modulor is not a system in which one can determine a set standard of “good design” because there are so many possibilities. While he undermines the

Modulor's ability to construct a rationalized beauty through a system that will guarantee harmonious realizations through its own flexibility, stating that the "Modular sanctions an infinity of length and would make it possible for anything to be justified,"<sup>56</sup> but when the Modulor is applied to mass production is not as flexible as it may seem. Mass production was certainly not a foreign concept to the world at this time, but for the moment, perhaps Le Corbusier should be examined in a slightly more neutral light. While Le Corbusier's desire may be based upon good intentions that were focused on a possibility to create beauty through his system; a "heaven on Earth."<sup>57</sup> Le Corbusier may unconsciously illustrate the problem in the following quote from the Milan conference. The notion of a system that will provide ease and is unified through measures based on nature.

"It gives a security to designers and provides the manufacturers that have to sell their product with a means to do so. It also gives the products that travel throughout the world the utility and necessity of a dimensioning system of the same kind and nature. And in our modern times, that take us toward abundance by means of industrialisation and the process of production, the Modulor simply makes things easier."<sup>58</sup> The question is what would this make easier?

Pevsner neglects to see that when the Modulor remains as a representation or abstraction in the design process, it appears to behave as a flexible system, although this behavior is ultimately predictable due to the fact that it is still a systemization derived from mathematics and proportions that underlie universal beliefs as a foundation. Pevsner hits his mark when questioning the revision of the human figure to reflect the

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<sup>56</sup> Ibid., p. 457.

<sup>57</sup> Le Corbusier sees in his system as a way to populate through constructions that would engage the similar ideas as the Renaissance architects but through means of mass production., see....

<sup>58</sup> Le Corbusier, "Le 'Modulor' et la 'Loi des 7 V : Conference de Milan 1951,'" *Societa degli ingegneri e degli*

manufacturing process, a standardized human figure that would allow the Modulor to be implemented in the world market of mass production for the selling of building materials and commercial items.

Pevsner asks whether one can derive “a guarantee to produce beauty by sticking to certain fixed proportions?” His introduction for the following speaker can hardly be said to have ended on an unbiased note. It is also questionable as to Pevsner’s own “neutrality,” whereby in his statement he tries to indicate that he has been objective and has no part in the real discussion, stating, “...the neutrality of history can leave the platform to good honest partisan warfare.” Pevsner has already set the tone for the debate. Through his criticism and attempts to align his commentary with facts and unbiased history, he has tried to create an image of objectivity and a lack of partisanship in his actions. As one may see there is nothing neutral about his exposition of the historical data culminating against Le Corbusier.

Le Corbusier seems to set up a guarantee that the Modulor is not always going to produce a beautiful design, and that there still must be the artistic act. This will be a primary criticism of the Modulor. Le Corbusier leaves this possibility open by confirming that it is simply “a working tool” but he is always ready to embellish statements seemingly so pragmatic, connecting the Modulor once again, with music; the Modulor is “a working tool in the service of musical thought.”<sup>59</sup> Le Corbusier is well aware that he must cast a word of doubt as to the guaranty of the modulor and simultaneously open the possibility for the harmonious construct. Throughout the *Modulor 1* and *Modulor 2*, musical metaphor and analogy will be employed repeatedly, it is integral to his entire

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*architetti in Torino. Atti e rassegna tecnica*, v. 6 1952 p. 127. Translation by Aleandra Massini.



argument that there is a connection between his system of proportion, music, and mass production. One telling example relating the Modulor to musical notation, "...if a tool of linear or optical measure, similar to musical script, were placed within our reach, would it help in the process of construction?"<sup>60</sup>

Throughout the debate each participant would make the case as to whether there is some usefulness in the use of these systems of proportion, Maxwell Fry commented that "the search for systems of proportion has some idea of universality as its object." But he believes that there is an amount of practicality in the use of these systems. Fry states that it is a struggle between the "scientific side of our nature and science itself" and that it is through our analysis that we are placing a system that may measure in some way the world around us. We recognize beauty in nature and through our analysis have found mathematical and geometric relations that are occurring in them. But in Fry's case he points out that these systems are simply applied, and that the systems have an inherent relativity in regard as to whom is employing them and that though these systems of proportions we are able to refine our feelings and intuitions. But with in his statement there is still the underling belief that a system of rational is a refinement to subjectivity. The next discussant, Peter Smithson proves to be a bit more succinct on determining his stance on proportional systems. According to him these types of systems support more of an ideological standpoint rather than practical.

He points out that his attack is not outright on Le Corbusier and further justifies Le Corbusier's stance in terms of his own belief that this proportional system (when in place) must be overridden by the 'art decision.' He also echoes a similar justification that

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<sup>59</sup> Ibid., p.16.

was reported by the *Neue Züricher Zeitung* on the *First International Congress on Proportion in the Arts* that Le Corbusier's Modulor is but "a tool to be seen or used as a mechanical guarantee, but to be used as a supportive tool."<sup>61</sup> It seems that in response to the R.I.B.A. debate, Smithson, among others, is still holding onto the notion that there is the "genius" that produces 'good design' and not simply the application of a system that will guarantee beauty. His conclusion is that "Systems of proportion only touch the fringe of the problem of values in architecture and, if anything, confuse the issue both of the creative process and the environment received."<sup>62</sup> It the contextulizing of the relevance of Wittkower and *Architecture Principles in the Age of Humanism*, Smithson believes that the issues of proportion were much more important in 1948-1949, and that there were many enthusiasts concerned with the topic then. Smithson as well attributes this enthusiasm as "our European post-war impulse, as also is this debate at the R.I.B.A."<sup>63</sup> He also equates the interest in proportion had been a Palladian revival, and that then "it was necessary at that time to get back to something simple and comprehensible, and then from the classical control move forward to a new sort of control."<sup>64</sup> Smithson states that he is "against systems of proportion that claim universal validity, rather than a validity at a particular time in a particular place."<sup>65</sup> It seems that the prevalent issue to all of the attendees at this conference was a concern of subjectivity. That the design process cannot inherently relay on universal systems that order the form of the work as an ultimate

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<sup>60</sup> Ibid., p. 17.

<sup>61</sup> *Neue Züricher Zeitung*, "De divina proportione," October 11, 1951. pp.2.

<sup>62</sup> "Report of a debate on the motion 'that systems of proportion make good design easier and bad design more difficult.' the *Journal of the Royal Institute of British Architects*, Vol. 64 Number 10, August 1957. pp. 461.

<sup>63</sup> Ibid., p. 461. There are other dimensions to this statement, relative to a Palladian revival that the Europeans had already gone through and that America was suffering from the same symptoms several years later.

<sup>64</sup> Ibid., p. 461.

<sup>65</sup> Ibid., p. 461. One must also consider Smithson own interests. At this time he is looking for other values and what he see in Le Corbusier is something clearly different than mere proportionality. See Banham, R. (1966). *The New*

controlling force. There is always the necessity to mediate in this case between the system and free will.

Lastly Wittkower will speak on his own behalf. The conference will not undermine or diminish the work of Wittkower, but may illustrate a more complex relation that must be teased out within the discourse on proportionality. The systems of rational that are deliberately rejected represent a changing perception of proportional systems. Wittkower concurs with the general attitude of the debate with respect to universalizing systems of control, “One idea has been repeated constantly and that is the concept of the search for a universal system of proportion. That, of course, is a fallacy.”<sup>66</sup> This meeting and after will also mark a slight change in Wittkower positions. He will tend to support more openly Le Corbusier and likewise develop proportionally relations more toward sensation and optics.<sup>67</sup> Precisely three years later, in 1960, Wittkower publishes an article that will provide indications for his slightly modified beliefs in proportional systems. While he recants the history of proportionality, he will also contextualize it within the debate and conferences. After the R.I.B.A. debate, a debate in which Wittkower labels “historic” marks the turning point in the beliefs of proportionality. Wittkower puts forth the question, “can one blame skeptics if they brush aside the whole question of proportion as a silly pastime?”<sup>68</sup> In his address to the R.I.B.A. he had felt that an indication of the time was figured by Smithson’s pragmatic approach to the problem of proportionality, Wittkower states,

“I think that is typical of the situation today. We cannot find a position of belief as

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*Brutalism: ethic or aesthetic?*, New York, Reinhold Pub. Corp. [1966].

<sup>66</sup> Ibid., p. 462.

<sup>67</sup> See Rudolf Arnheim A review of Proportion in Kepes, G. e. (1966). *Module, proportion, symmetry, rhythm*, New York, G. Braziller [1966]. Page 218.

individuals because a broad foundation is lacking, and I suppose that as long as such a position cannot be won back again on a broader level, a level of universal belief, it is no good the individual architect fighting for a system of general values. That has been made clear in the discussion.”<sup>69</sup>

### *Post-R.I.B.A.*

Wittkower will attempt to recover from the criticism of proportionality being a “silly pastime,” his aim will continue to search for a unifying principle through which verification may be found. Wittkower proposes,

“On the other hand, the very fact that so many able and highly intelligent men of the past and present devoted and still devote years of their lives to the investigation of this problem should make us careful, and should lead us at least to concede that we are after all facing a serious concern of *Homo sapiens*.”<sup>70</sup> His lament is not at all unheard, it is relevant to focus on the later developments of proportionality through Le Corbusier, for he will publish *Modulor 2* in 1958 which will be one of the last optimistic as well as instrumental works put forth by such a popular figure in architecture. Wittkower will encapsulate in one of the last articles directly dealing with proportionality, the entire trajectory that we have just traced, that the Milan conference was the meeting of in the early post-war period bring together “...philosophers, painters, architects, musical

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<sup>68</sup> Wittkower, Rudolf , “The Changing Concept of Proportion” in *Daedalus*, Vol. 89 1960 pp. 209.

<sup>69</sup>“Report of a debate on the motion ‘that systems of proportion make good design easier and bad design more difficult.’ the *Journal of the Royal Institute of British Architects*, Vol. 64 Number 10, August 1957. pp. 462.

<sup>70</sup> Wittkower, Rudolf , “The Changing Concept of Proportion” in *Daedalus*, Vol. 89 1960 p. 209.

historians, art historians engineers, and critics from many countries.”<sup>71</sup> His brief but salient point is that they had gathered there because “they agreed on one point: that some kind of controlling or regulatory system of proportion was desirable” and that the “bankruptcy” of that conference was publicly sealed at the R.I.B.A. conference. He continues, “as long as a broad foundation for a resurrection of universal values is lacking, one cannot easily predict how the present dilemma can be resolved. The very formulation of the motion put before the R.I.B.A. meeting shows that we have left far behind the realm of the absolute, and are submitting to pragmatic and opportunistic motivations.”<sup>72</sup> In the last two pages of the article, Wittkower seems to gain belief again, announcing the heroic architect, “our man”<sup>73</sup> Le Corbusier and that his “answer is quite different.” Le Corbusier is able to recover the possibility for a different conception of a universalized system that is not predicated upon one system of proportion. It is however derived from Pythagorean-Platonic thought, but vacillates between the absolute commensurable conditions that that system engendered, and a non-commensurable number sets derived from the Golden Section. Wittkower believes that this fluctuation is as well representative of “our non-Euclidean age.”<sup>74</sup> Le Corbusier has also been able to shift the value system from, in contrast to the Renaissance model, universal standards to relative standards that would begin by taking “man in his environment” as the point of relative “universal” value. The argument in which Wittkower takes up, in his attempt to recover a “value system” determined through proportion, positions parallel with Le Corbusier’s Modulor and its place within the context of technology and mass production.

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<sup>71</sup> Ibid., p. 210.

<sup>72</sup> Ibid., p. 210.

<sup>73</sup> One of Le Corbusier’s pet names for himself.

<sup>74</sup> Wittkower, Rudolf, “The Changing Concept of Proportion” in *Daedalus*, Vol. 89 1960 p. 213.

By the late 50's their achievements and conditioning had furthered the beliefs in science and its inherent relationship to technology through which Le Corbusier's system would advocate.

Wittkower will now have the ability to substantiate or verify one of the last optimistic statements on proportionality put forth in *Architectural Principles in the Age of Humanism*. When stating that "...the subject is again very much alive in the minds of young architects to-day, and they may well evolve new and unexpected solutions to this ancient problem."<sup>75</sup> Whether or not that this is a solution, it is far from the renaissance model of values. Although it could be speculated that at this time the overall belief system had simply transferred to something quite different.

This renewal of life for the systems of proportion, and this is inclusive of Le Corbusier's Modulor, has now found verification predicated through production and mass building practices. With the assumption that these practices are to give a higher standard of living, to increase industrial potentials and allow for a more economic fabrication processes.<sup>76</sup> "In the construction of objects of domestic, industrial or commercial use, such as manufactured, transported and bought in all parts of the world, modern society lacks a common measure capable of ordering the dimensions of that which contains and that which is contained: capable, in other words, of offering a solid pledge of satisfaction to supply and demand. To offer such a measure is the purpose of our enterprise. That is its *raison d'être*: to bring order.

And if, over and above that, our efforts were to be crowned with harmony?

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<sup>75</sup> Wittkower, R. (1971). *Architectural Principles in the Age of Humanism*, New York, Norton [c1971]. p. 154.

<sup>76</sup> Wittkower, Rudolf, "The Changing Concept of Proportion" in *Daedalus*, Vol. 89 1960 p. 212.

...Who knows..."<sup>77</sup>

In this instance what one may find is that the outcome of such an optimistic forecast will arrive somewhere between. On the one hand, it is a system that will predict with ease the abilities and outcomes with which goods and products will be available to every corner of the globe. On the other, this could be also cast in a light of negativity that renders this a system of false choice and subjectivity.

Wittkower's justification is slightly different than Le Corbusier's at this moment, Wittkower relies upon a connection to biological models that will inevitably escape value judgment and criticism because they attempt to define ordering as biological process inherent in the human condition (natural history). This may reflect a means to qualify some universal link to man and the systems of verification that are created, but this may indicate other forces that are to manipulate, or in a more neutral term, process thoughts and the world. Wittkower in some way recovers from one universal only to find another, "Nobody will deny that our psycho-physical make-up requires the concept of order, and in particular, of mathematical order...Modern psychology supports the contention that the quest for a basic order and harmony lies deep in human nature."<sup>78</sup>

We must not forget that the overall recognition of proportionality strives to define itself through a perception of harmonious constructs in which post-war activities of reconstruction may take place. However, and more important to our construct, is that the concepts used and promoted by Wittkower reflect conditions that are present when considering classical beauty.

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<sup>77</sup> Ibid., Modulor 1, 21.

## *Modulor*

Le Corbusier and Wittkower had similarly initiated their studies on the development of concepts centered on the idea of proportionality. But it would be Le Corbusier who would endeavor to construct out of proportionality an instrument for design purposes. The Modulor, at first glance, is just that; a “tool” that will allow for proportional ordering. But the Modulor it is not as neutral as it may appear to be. It too, as most of the proportional studies at this time, is explicitly developed in the context of post-war optimism and has its own set of ideological extensions. Since the initial conference on proportion, Le Corbusier has been promoting his system of proportion, verifying it through the coupling of both mathematics and music to achieve a system of unquestionable validity. In the attempts to verify his claims he will connect from ancient to contemporary sources, placing it within historical contexts, leaving little that is not related to the Modulor. On the one hand, Le Corbusier hopes to create a flexible system that would unite mankind through its implicit relationship to harmony, and on the other, a possible problematic side, he opens the possibility for a system of rationalizing to be developed and through it will potentially pervade and control the world through its standardization. “Let us not lose sight of our aim: to harmonize the flow of the world’s products. These products are going to be fabricated on a worldwide scale: a great event now taking place in the history of humanity.”<sup>79</sup>

The Modulor is saturated with musical metaphor and analogy, it continually attempts to verify itself as an instrument, for creativity, a tool for the more pragmatic side, and a universal object for the salvation of human kind, but all is reduced to simply

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<sup>78</sup> Wittkower, Rudolf, “The Changing Concept of Proportion” in *Daedalus*, Vol. 89 1960.



be a tool for mass production, “the Modulor is a working tool, a scale to be used in composition...for the mass-production of manufactured articles, and also for the creation, through unity, of great symphonic works of architecture.”<sup>80</sup> His metaphor and repetitive attempt to reinforce these relations of music architecture are expressed throughout his publications, conferences and architecture. One may see, as an elaboration of Le Corbusier’s *les tracés régulateurs*, the Modulor as a reaction to the destructive forces witnessed through the consequences of war, as Le Corbusier states at the Milan conference on proportion, “After the Great War in 1942, I had the desire to react and to think about my desires. I thought about the great building sites of France and of the other countries that had been destroyed. I cherished illusions about future realities. I thought that people from great cities would all go to the destroyed villages to rebuild them together. I hoped that they would not wait for the money of war compensation but would start immediately, without a day’s delay, to rebuild the houses with their own hands. I asked myself: ‘How will they do it? What measures will they adopt, what dimensions?’ Everything was uncertain: whether to consider a double decimetre or a double metre, were the ever-revolving questions. What dimension? I hesitated about 5 millimetres, half a metre or two centimetres...I felt there lacked the attainment that permitted to play the music of lines and dimensions. The people of the destroyed cities needed a ‘grid of proportions’.”<sup>81</sup> The “grid of proportions” as one might have guessed is the Modulor. Le Corbusier continues, “We’ll call it ‘rule of proportions’. We created an amazing tool...It

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<sup>79</sup> Ibid., Modulor 2, 107.

<sup>80</sup> Ibid., 185.

<sup>81</sup> Reported in *Società degli ingegneri e degli architetti in Torino. Atti e rassegna tecnica*, v. 6 1952 p. 128. Translation by Aleandra Massini.

contains a whole truth, that has been verified and confirmed in every respect.”<sup>82</sup> The insistent comparison of music and architecture are throughout both publications of the *Modulor 1* and *Modulor 2*. Music performs as the fundamental grounding component for this architecture that would be solely dependent upon harmony. Le Corbusier quoting Leibnitz, “Music is a secret mathematical excursive, and he who engages in it is unaware that he is manipulating numbers.”<sup>83</sup> and “...music rules all things, it dominates; or, more precisely, harmony does that. Harmony, reigning over all things, regulating all the things of our lives, is the spontaneous, indefatigable and tenacious quest of man animated by a single force; the sense of the divine, and pursuing one aim: to make paradise on earth.”<sup>84</sup> Le Corbusier is very conscious of the connections that he is maintaining through the use of constructing relationships between the Modulor and music. Like Alberti, Le Corbusier had believed that music is geometry translated into sound and that there is a direct correlation between them that could express the very same conditions of harmony in architecture. Alberti, with reference to Pythagoras, states that, “the numbers by means of which the agreement of sounds affects our ears with delight, are the very same which please our eyes and minds.” He continues, “we shall therefore borrow all our rules for harmonic relations (‘finitio’) from the musicians to whom those kind of numbers is extremely well known, and from those particular things wherein Nature shows herself most excellent and complete.”<sup>85</sup>

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<sup>82</sup> Ibid., 128.

<sup>83</sup> Le, C. and M. E. Le Corbusier (1980). *Modulor I and II*. Cambridge, Mass., Harvard University Press. 1980. 73.

<sup>84</sup> Ibid., 74.

<sup>85</sup> Ibid., p. 110.

*“A scale for harmonic measurement of space...”<sup>86</sup>*

Much of Le Corbusier’s opening criticism is precisely directed to the deliberations of the Milan conference that seemed to him to concentrate too much on mathematics, and consequently were moving in a direction of scientific concerns rather than remaining situated in the concerns of art. While his concerns for harmony are on target, as he sees it as “the problem facing modern society,” his view is romantic and classical, especially in the context of music, which renders his views problematic if not naive. While he would, as it has been indicated, wish to create harmonious relationships in the world through the use of the Modulor, he faces a contradiction in the relationship of harmony and the practices of contemporary music that is already understood in the current practices of music. This is conceivably the major flaw within his understanding of music and harmony and will consequently lead him into a dangerous territory if not a complete contradiction in how the relationship of architecture to music is to be conceived. Perhaps Le Corbusier’s use of the term “harmony” and his constant associations with music should be considered differently and these that notions enacting on the world at this time are attempting to reestablish a socially conscious architecture and as well as to create a social project that, in light of the catastrophes of the Second World War, will ultimately refigure the world as a “better place” through humanist values grafted on to a technological productions scheme; placing a heroic promise that only the architect can strike a balance between man and his environment.

Thus far the course of proportional systems has been examined from the initial

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<sup>86</sup> Ibid., 100.

interest and popularization and finally to the transformation from optimistic engagement, on the part of a large community of architect and architectural historians, to new focuses that would seemingly question the fundamental issues of proportionality that were present in the initial stages.

### *A World's fair*

The Brussels's World Exhibition of 1958 was the first world's exhibition to take place after the Second World War. It was not only defined in the context of a new optimism but its very title, "Scientific Civilization and Humanism," can be assumed to reflect the culminated interests of the 1950's. "Two ideologies, two world views were set before the visitors to the exhibition, centering not only on scientific achievements but also bringing in ethical, moral, social, and cultural issues."<sup>87</sup> The two ideologies represented were socialism and capitalism, both displaying their own achievements, in order to suggest a "better world" through their systems of practice. We as well see at this time the rise of new dominant ordering systems and world powers that will be at conflict for years to come. Notions of globalism, nuclear power, and space exploration were widely popular topics at the exhibition.

For the last forty years the Phillips Pavilion has remained an exemplary conflation of music and architecture. It has been through the aid of recent studies and historical distance that we have been able to understand this object in terms of its creation and design problems but little attention has been directed toward the surrounding context of

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<sup>87</sup> Friebe, W. (1985). *Buildings of the World Exhibitions*. [Leipzig], Edition Leipzig.

music composition. This distance has stripped away the notions of the Phillips Pavilion as being an idiosyncratic creation of Le Corbusier-his involvement or lack there of-and has made it possible to be rationalized by current practices of historiography.<sup>88</sup> In the pavilion both composer and architect participated in the design of the construction as well as the media event contained within. The Pavilion in this case represents other issues that are outside of the complications and problems regarding authorship that had ensued throughout its construction with collaborator Iannis Xenakis.

The pavilion was to be organized around Le Corbusier's *Poème électronique*, which would utilize the current technologies developed by the Phillips Electronic Corporation to produce a spectacle of sound, light, and images housed in an architectural structure that would be made specifically for this function. Le Corbusier would compose the images and visual spectacle to be projected upon the walls of the pavilion and the pavilion itself, while Edgar Varèse would construct a musical composition. This collaboration would take the form of "...a film presenting images illustrating the course of human civilization and the threats of its prolongation; colored lighting... within the pavilion to manipulate atmosphere and mood; simple shapes superimposed upon the film by projectors; three-dimensional forms to be illuminated with ultra violet light for maximum effect."<sup>89</sup> This formed the extent of the visual presentations that would be projected upon the interior surfaces of the pavilion. Two independent sound compositions were to be made by both Xenakis and Varèse. Xenakis had been involved with Le Corbusier's studio practicing architecture musical endeavors.

The building's formal resolution depended highly upon geometrical and

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<sup>88</sup> See Treib, M., C. Le, et al. (1996). *Space calculated in seconds: The Philips Pavilion, Le Corbusier, Edgard Varèse*.

mathematical calculations, and would reflect Le Corbusier's underlying interest to rationalize architecture through mathematics. In the design of the pavilion Xenakis will establish the necessary connection that reflect the Modulor as an integral component in the conception of the pavilion's form. These compositional practices were derived from Xenakis's interests in mathematics however there exists a much more complex relationship to traditional harmony that must be further examined. The pavilion would operate on 10 minutes intervals of which 8 minutes were programmed for Le Corbusier's visuals and Varèse's organized sounds, both entitled the *Poème électronique*. The interval between performances, which was the ushering of people in and out of the pavilion, was dedicated to Xenakis's piece *Concret PH*.

*Xenakis-Le Corbusier-: stochastic vs. organized sounds image*

Throughout this study, the relationship of architecture and music has been illustrated through the ties that harmony shares with proportionality. This is architecture's only link to music that is justifiable through scientific models, a verifiable connection to past aesthetics beliefs that are inevitably inseparable from architecture if we are to maintain both Le Corbusier's and the popular understanding of this premise in the context of the 1950's. In this circumstance architecture was ultimately obliged to maintain the classical notion of harmony for it offered the only legitimate connection to music through proportionality which had been reinforced and accepted by popular opinions. It will then be important to draw out the role that harmony has to music in order to understand the

general practices of composers in the 1950's. This will also illustrate the conflicts that will be figured in the relationships made between harmony, classical beauty, and the organization of music material.

But in order to gain insight as to how the notion of harmony was considered in the practices of the avant-garde composers, one must examine the early period of the 20th century to witness the break with classical composition practices that undermined the position of harmony. The transformation that harmony had undergone in the early 20th century had reflected the break with the traditional tonal system in music. The "New Music" was described as "A musical language that renounces the elements of the triad (once viewed as a matter of second nature), the major and minor scales, and the distinction between consonance and dissonance..."<sup>90</sup> Arnold Schoenberg as one of the primary (if not only) composers to have transformed tonal music in the early part of the century. Harmony took on a different status through his techniques of composition. Atonality, a term invented to categorize this music, may be described as the "shock that is exerted by 'New Music.'"<sup>91</sup> The concept of harmony is reified through its relationship to an already perceived second nature of music material that is central in the mislabeling of atonal music. Atonal music reflects the radical opposition to bourgeois conceptions of harmonic music; an undermining of classical beauty and harmony.<sup>92</sup> The definition of "Atonal" music finds itself as a response to Schoenberg's early works in that it was the inability to recognize the necessary structural and musical components of the

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<sup>89</sup> Ibid., p. 98.

<sup>90</sup> See Adorno, W. "Music and the New Music: In Memory of Peter Suhrkamp(1960) *Telos* 13 (1): Spring 1980 number 43, p. 126.

<sup>91</sup> Ibid., p. 127.

<sup>92</sup> See Arnold Schoenberg, "Composition With Twelve Tones (1)" (1941), in *Style and idea; selected writing of Arnold Schoenberg*. Edited by Leonard Stein, Translations by Leo Black, Published :London, Faber & Faber, c1975, p. 223. Also in *Quasi una fantasia : Essays on Modern Music*, translated by Rodney Livingston. Published :London ; New

composition that had been understood by the dominate culture of music listeners. The definition was, therefore, a response by critics and listeners imposed upon Schoenberg's compositions in order to codify the compositional and tonal form as a means in which it could be regarded as music by the popular culture. Schoenberg considered the definition "atonal music" a defamation, as he once states, "I regard the expression of atonal as meaningless... atonal can only signify something that does not correspond to the nature of tone,"<sup>93</sup> And "to understand it literally would translate to music without tone."<sup>94</sup> The literal definition would be of no consequence, however, it would express the shock that it caused through the traditional listening-culture. Atonal music would later transform into further systematized musical forms; twelve-tone music and then to serialised music.

A definition of this early stage of modern music for our purposes could be that in relation to harmony the musical composition would not have a leading tone.<sup>95</sup> In other words, the musical form that had prevailed, up until Schoenberg, had an unchanging identity established through tonal sequences, cadences and melodic figures that are associated with harmony; especially in the sense of tonality. In atonal music, however, the leading tone is replaced with a universally distributed dissonance and it is within these compositions that dissonance prevails.<sup>96</sup>

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York : Verso, 1992. pp. 249-268.

<sup>93</sup> Schoenberg, "The Objectivity of Music" in *Musical aesthetics : a historical reader, Aesthetics in music; no. 4, Vol. 3*, edited by Edward A. Lippman. Published :New York : Pendragon Press, c1986, p. 148.

<sup>94</sup> See Arnold Schoenberg, "Composition With Twelve Tones (1)" (1941), in *Style and idea; selected writing of Arnold Schoenberg*. Edited by Leonard Stein, Translations by Leo Black, Published :London, Faber & Faber, c1975, p. 223. (In many of Schoenberg's writings reviewed for this study the use of the word "atonal" is a definition of "New Music" is an institutional and popular construct.)

<sup>95</sup> This is a much more complex situation than is described above. This representation is only one dimension of the early "atonal" compositional strategies. To gain some insight to this and the later systematized work stemming from "atonal" composition, See Arnold Schoenberg, "Composition With Twelve Tones (1)" (1941), in *Style and idea; selected writing of Arnold Schoenberg*. Edited by Leonard Stein, Translations by Leo Black, Published :London, Faber & Faber, c1975.

<sup>96</sup> Adorno, T. W. (1973). *Philosophy of Modern Music*, translation by Anne G. Mitchell and Wesley V. Blomster, New York, Seabury Press.



“The idea that the tonal system is exclusively on natural origin is an illusion rooted in history. This “second nature” owes the dignity to its closed and exclusive system to mercantile society, whose own dynamics stress totality and demand that the elements of tonality correspond to these dynamics on the most basic functional level.”<sup>97</sup>

Architecture has similarly had the same fate in regarding its relationship to music as being not only “Natural,” but also reflecting those natural laws through its connection to harmony and proportionality.

The moderation of atonality in “New Music” succumbed to a transformation into “twelve-tone music” that already registered the consumption and institution of this musical technique into the dogmatic assumption of rows that developed through continual and subsequent elaboration. In the 1950’s many avant-garde musicians were practicing serialised music as a compositional strategy and likewise attempting to develop a method of total technification or control over musical material.<sup>98</sup> Therefore there are similar practices that parallel both architecture and music, but only on the levels of mathematization, systemization, and control; not harmony.

“The total rationality of music is its total organization. By means of organization, liberated music seeks to reconstitute the lost totality- the lost power and the responsibility ... Music succeeds in so doing only at the price of its freedom...”<sup>99</sup> It would be a logical comparison to see the parallels that may be drawn from the following statement by Theodore Adorno, when one considers the issues raised at the R.I.B.A. conference

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<sup>97</sup> Ibid., p. 11.

<sup>98</sup> I have collapsed a great deal of music history and composers starting after Schoenberg, but for the scope of this paper the interest will be directed toward a few musicians who will be in the same circles that Xenakis was involved with and deal primarily with the problems that he will attempt to transform. Likewise, the general usage of serial music and the criticism that it must contend with will be directed primarily towards Boulez

<sup>99</sup> Adorno, T. W. (1973). *Philosophy of Modern Music*, translation by Anne G. Mitchell and Wesley V. Blomster, New York, Seabury Press. P. 69

regarding systems of proportions.

“... The integral organization of the musical score through the twelve-tone method has increasingly limited the scope of interpretation and - according to the convictions of the method itself- would like to get its hands upon interpretation as well. In contrast to notation which every note, every structural feature, has a tendentially unequivocal designation, the desire to interpret here becomes obsolete....”<sup>100</sup>

The first contradiction between the practices of music and architecture may be obvious, while modern architecture had interests in maintaining its relationship to the practices of music through harmony; it however disregarded the practices of music from the early 20th century to the 1950's. It is equally hard not to believe (although it must be assumed) that Le Corbusier was well aware of modern music, even by proposing that both Varèse and Xenakis compose musical pieces for the Phillips Pavilion would infer that he would have some idea about the avant-garde practices. It is possible that the statement made in the last pages of the *Modulor 2*, after Xenakis has explained his interest in the Modulor, would verify Le Corbusier's lack of comprehension?

Le Corbusier states, “The confession of insatiable curiosity with which I ended the main text of this book is hereby confirmed. But this time I am surrounded by the unknown and faced with the unknown: I am a musician at heart but not at all by profession.”<sup>101</sup>

The process by which the technification of music occurs in “total serial music” is in the form of compositional methods that attempt to have total control over all sound

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<sup>100</sup> Adorno, “Music and Technology”, *Telos* 10 (2): 79-94. Summer 1977 number 32. “Musik und Technik” first appeared in (1958), *Gravesaner Blätter*, 4: 11-12. This essay was translated from German by Wes Blomster from a version that appeared in *Klangfiguren* (Frankfurt am Main, 1959).

<sup>101</sup> Le, C. and M. E. Le Corbusier (1980). *Modulor I and II*. Cambridge, Mass., Harvard University Press. 1980. p. 330,

material. This form of rational wishes to manipulate and control every possible outcome of the musical event, and to be sure, will “degenerate into a deluded system;”<sup>102</sup> it is the mastery over musical material through which mathematical devices of organization would in turn replace compositional. The force of this movement would be primarily European, as the American composers, in particular Milton Babbitt, had developed a critical view once they had discovered the prevalent difference in attitudes, Babbitt states that “...Mathematics – or, more correctly, arithmetic – is used, not as a means of characterizing or discovering general systematic, pre-compositional relationships, but as a compositional device...the alleged “total organization” is achieved by applying dissimilar, essentially unrelated criteria of organization to each of the components, criteria often derived from outside the system...”<sup>103</sup>

As mentioned previously, Le Corbusier relates the Modulor to mathematical operations similar to the writing of music. It is his belief that it will be through the act of dividing space and material into sections that will produce a similar construction method as in his description of a rule that would be acceptable to all in the dividing of sound.

He states, “How to cut up sound in accordance with a rule acceptable to all, but above all efficient, that is, flexible, adaptable, allowing for a wealth of nuances and yet simple, manageable and easy to understand.”<sup>104</sup> Therefore, there is parallel to be drawn between the operations of serial composition and the Modulor.

Once realized, Le Corbusier is able to impose upon material a system of

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*Modulor 2.*

<sup>102</sup> Adorno, Theodor W. “The Aging of the New Music,” (1973) *Telos* 21 (3): 95-116. Fall 1988 number 77, p. 100.

<sup>103</sup> See Griffiths, P. N. (1981). *Modern Music: the Avant Garde Since 1945*. New York, G. Braziller. Op.cit., p. 93, Milton Babbitt.

<sup>104</sup> Le, C. and M. E. Le Corbusier (1980). *Modulor I and II*. Cambridge, Mass., Harvard University Press. 1980. p. 15, *Modulor 1*.

manipulation that could allow flexibility and control of that material to be brought out through the techniques of geometrical and mathematical systems. However, when this manipulation of geometry and mathematics is brought out of the abstract designing process, where on paper the system will operate ideally, and it is confronted through the techniques mass production, the construction flexibility, or one should say, the design freedom must be considered in quite a different light. Upon mass industrialization, the flexibility of the Modulor becomes a system of domination and prediction; it will have no hope of flexibility and will consequently be controlled by the forces that control mass production.<sup>105</sup> Therefor the Modulor will be in the services of other forces once outside the abstract operations of design where notation will allow for a multiplicity of choice and geometric solution. In the services of production, where standards are based on consumers, this prearranged harmony gives not only the illusions of choice but is domination itself.<sup>106</sup> An insight direct toward serial composers that is comparable to the commentary expressed at the R.I.B.A. conference, All were “More or less treading on ice, and as long as this is the case, the organizational systems being put forward represent guidelines to prevent the composer from faltering. And one has to face that there are as many systems as there are grains of sand...”<sup>107</sup>

The unrelenting control of material through systems limits the subjective mediation of the material itself. By the latter part of the decade, the rigidity of serialised compositional techniques gave way to newly defined techniques of indeterminacy and

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<sup>105</sup> There is the possibility that market sensitivity and response could determine a different type of flexibility that was not foreseen by Le Corbusier.

<sup>106</sup> See Horkheimer, M. and T. W. Adorno (1997). "The Culture Industry: Enlightenment as Mass Deception, " *Dialectic of Enlightenment*. London; New York, Verso. p. 120-168.

<sup>107</sup> Karlheinz Stockhausen, *Texte*, i, p 47. cited in Griffiths, P. N. (1981). *Modern Music: the Avant Garde Since 1945*. New York, G. Braziller. Op.cit., p. 87.

stochastic methods of composition.<sup>108</sup> Pierre Boulez speculates that there may be a possibility to organize musical material at every instance through “rigorous global organizations” and simultaneously have the possibility within serial transformation a structure that would allow for the momentary subjectivity or free choice. This will be realizable by Xenakis in the Phillips Pavilion.<sup>109</sup>

In the *Modulor I*, Le Corbusier relates music to architecture, but it should be noted that his assumption or correlation of “joy” and “oppression” to harmony and cacophony are reversed in terms of contemporary avant-garde music practices. This is especially odd, for by the late 1940’s since the practices of Schoenberg, and unmistakably the rest of modern music, had already unmasked the myth of harmony. In equating architecture and music, Le Corbusier states, “A kind of harmony is created, exact like a mathematical exercise, a true manifestation of the acoustics of plastic matter. It is not out of place, in this context, to bring in music, one of the subtlest phenomena of all, bringer of joy (harmony) or of oppression (cacophony).”<sup>110</sup> What is important here is that his belief in mathematics is figured and still pertinent to the production of both architecture and music. What provides a second order of relations to both architecture and music in Le Corbusier’s description is harmony. However this understanding is either naïve or consciously subversive. Is it not apparent that the sonic and structural qualities of the “New Music” are radically different from that of classical or popular music? If Le Corbusier were to acknowledge the conditions in which harmony in music had been

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<sup>108</sup> Adorno, Theodor W., *Quasi una Fantasia: Essays on Modern Music*, 1903-1969. Published: London; New York : Verso, 1992.p. 266.

<sup>109</sup> *Relevés d'apprenti* (Paris, 1966), pp. 27-32.,*op. cite.*, Griffiths, P. N. (1981). *Modern Music: the Avant Garde Since 1945*. New York, G. Braziller. p. 88. Boulez had made some investigation upon systems that allowed more subjective activities and some aleatory structures that were encapsulated within the overall structure of his serialization.

<sup>110</sup> Le, C. and M. E. Le and the New Music: In Memory of Peter Suhrkamp(1960) *Telos* 13 (1): 124-138. Spring 1980 number 43. Corbusier (1980). *Modulor I and II*. Cambridge, Mass., Harvard University Press. 1980. p. 31. *Modulor I*.

criticized and transform, he would then be unable to perpetuate the verifiable ties to proportionality or to continue to uphold the relationship of architecture and music expressed through the Modulor in the traditional sense.<sup>111</sup>

### *Music in the pavilion*

Varèse's *Poème électronique* represents a transitional stage of composition and music technique that comes out of an older generation and tradition of composing. Varèse had leaned more toward *Musique Concrète* than the compositions realized by "total serialised music."<sup>112</sup> His earlier electronic composition, such as *Déserts*, would reflect more upon the integration of the new medium into the old, such as taped sounds into traditional orchestral instrumentation. The overall struggle for Varèse was the incorporation and production of this new medium in opposition to the fragmentation of thematic melodious constructs. For example, the *Poème électronique* contains sounds such as bells, door creaks and pure electronic waveforms that are intermingled throughout the composition, manipulated through pitch transpositions, reversals, and superimposition that basically formed the some techniques of electronic transformations.<sup>113</sup> Varèse's music represents a use of technology and science that expresses the tensions between the traditional orchestral instrumentation and the electronic. He makes "...room for the expression of just those kind of tensions that the aged New Music forfeits. He uses technology for effects of panic that go far beyond run

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<sup>111</sup> This is again a reiteration of my main point.

<sup>112</sup> *Musique Concrète*.... Footnote a description...to come.

<sup>113</sup> Griffiths, P. N. (1981). *Modern Music: the Avant Garde Since 1945*. New York, G. Braziller. p. 31.

of the mill musical resources.”<sup>114</sup>

Le Corbusier initially proposed the composition of the *Poème électronique* as a collaborative effort that would integrate both image and light spectacle as an analogous formation. It was, however, not accomplished by close collaboration but was a matter of event timing.<sup>115</sup> In one of the first electronic compositions that Varèse had accomplished in 1952, *Déserts*, he had further intentions for this realized composition to be accompanied with the experience of film. This perhaps foreshadows, if not confirms Le Corbusier interest to involve Varèse in the production of the Phillips Pavilion and as well reflects a general attitude about the synthesis of the arts.<sup>116</sup> Varèse’s had opposed the combination of visuals with synchronized sound, or in this case, as “film music” which would paraphrase the narrative or image construct. He would however propose that the score would be constructed as a dialectical relationship to the imagery. In order to accomplish this he proposed that the film should be “in opposition to the score. Only through opposition can one avoid paraphrasing... There will be no action. There will be no story. There will be images. Phenomena of light, purely... successions, oppositions of visual planes, as there are successions and oppositions of sound planes.”<sup>117</sup>

The composition by Xenakis, *Concret PH*, expresses a transition using mathematical operations to formalize the composition that would signal new outlooks of musical expression that would augment the traditional domination musical material seen

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<sup>114</sup> Adorno, Theodor W. “The Aging of the New Music,” (1973) *Telos* 21 (3): 95-116. Fall 1988 number 77, p. 109.

<sup>115</sup> Treib, M., C. Le, et al. (1996). *Space calculated in seconds: The Philips Pavilion, Le Corbusier, Edgard Varèse*. Princeton, N.J., Princeton University Press. p. 174. From this it may be assessed that the systems of control are brought together as independent works and through their lack of orchestrated timing, chance is allowed to enter into the equation.

<sup>116</sup> The Phillips Pavilion may certainly fulfil the requirements as *Gesamtkunstwerk*, and this, in itself, will indicate once again that there was to be a system in which the sound light, images, and architecture would be subjected to an over arching ideological organization.

<sup>117</sup> Quoted in Georges Charbonnier, *Entretiens avec Edgard Varèse* (Paris, 1970), 156. *op. cite.*, Griffiths, P. N. and P.

in earlier serial compositions. Xenakis's turning away from "total serialised music" was a reflection of his belief that the fundamental conflicts that existed as his beliefs that the deterministic complexity was "an auditory and ideological nonsense."<sup>118</sup> Xenakis defines music outside of the current practices, yet maintaining a mathematical basis for his compositional method. He introduces, instead of a deterministic causality model, a model predicated upon "...a probabilistic logic which would contain strict serial causality as a particular case. This is the function of stochastic science."<sup>119</sup>

Xenakis's composition is positioned as a chaser, or the intermediate musical composition that ushers the 500 spectators in and out of the pavilion. *Concret PH* occupies an interstitial point in the larger compositional matrix of the *Poème électronique*. While the sound-image-construct of Le Corbusier and Varèse is sequenced in relative darkness, *Concret PH* is without visual accompaniment except for the environment of the pavilion itself. The austerity, along with the visual impact of the interior of the building has a relation to the actual compositional structure. *Concret PH* is unlike the piece made by Varèse as it exhibits a mathematical sophistication that is conceptually different in regard to the sound material organized. It is also radically different than other serial compositions, as there is an ambiguous condition that arises within the mathematical procedure that in some ways contradicts the aspects of total control over the musical material. A physical description of stochastic music, which we may regard to be at the foundation of both *Metastasis* and *Concret PH* would be, as Xenakis states, "These sonic events are made out of thousands of isolated sounds; this

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N. M. m. Griffiths (1995). *Modern Music and After*. Oxford [England]; New York, Oxford University Press. p. 129.

<sup>118</sup> Ibid., p. 8.

<sup>119</sup> Xenakis, Iannis, *Formalized Music: Thought and Mathematics in Composition* edited by Sharon Kanach, Published: Pendragon Press, Stuyvesent, NY, 1992. p. 8.



multitude of sounds, seen as a totality, is a new sonic event. This mass event is articulated and forms a plastic model of time, which itself follows aleatory and stochastic laws.”<sup>120</sup> A crowd would be a physical model that could express this phenomenon. So in a sense, this musical composition which was witnessed by the spectators upon entering and leaving the pavilion not only reflected the geometric surface of the pavilion, but their movement as well. It may as well be speculated that the experience of the “chaser” in raw contrast to the building offered a vastly different sensation than did the *Poème électronique*.<sup>121</sup> Xenakis also saw this organizational method as means to interact with both local and global events relating to sound characteristics through continuous and discontinuous elements.

The first indication of these organizational activities was in the composition *Metastasis*, which was primarily the generative formal impulse for the Phillips Pavilion. *Metastasis* as well forms the basic formal principles of the parabolic shape of the pavilion’s surface.<sup>122</sup> Xenakis states, “If glissandi are long and sufficiently interlaced, we obtain sonic spaces of continues evolution. It is possible to produce ruled surfaces by drawing the glissandi as straight lines. I performed this experiment with *Metastasis* (this work had its premiere in 1955 at Donaueschingen). Several years later, when the architect Le Corbusier, whose collaborator I was, asked me to suggest a design for the architecture of the Philips Pavilion in Brussels, my inspiration was pin-pointed by the experiment with *Metastasis*. Thus I believe that on this occasion music and architecture found an intimate

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<sup>120</sup> Ibid., p. 9.

<sup>121</sup> A chaser is a device used in vaudeville, usually a film, to indicate that the performance has concluded and to clear the performance hall to make way for new patrons.

<sup>122</sup> See Xenakis, Iannis, *Formalized Music: Thought and Mathematics in Composition* edited by Sharon Kanach, Published: Pendragon Press, Stuyvesent, NY, 1992. p. 10.

connection.”<sup>123</sup> When asked, “is the line of the Phillips pavilion not a glissando in space?” Xenakis replies, “of course it is.”<sup>124</sup> Xenakis had initially used the Modulor as part of the compositional strategy of *Metastasis*, his concerns were not at all with harmony as such described in the Renaissance and by Le Corbusier but in the relationship of pitch and time exclusively. His belief is that pitch and time in music are alien by nature and are only connected by “their ordering structure.”<sup>125</sup> Through this interest he was able to employ the Modulor in a way that would contradict its intended harmonizing function. He had used Modulor to compute the permutations of intervals that could produce dodecaphonic music. Dodecaphonic music, which had consequently defined Schoenberg’s twelve-tone system, had obliterated the notion of harmony as we have discussed earlier. While there are some problems with this definition in regard to the systemization of atonal music, dodecaphonic music expresses similarly atonality.<sup>126</sup> Is it then possible for the Modulor to have had some part in the creation of contemporary music and an architecture that would reflect this union? If so it is not through harmony as Le Corbusier nor does it express harmony would have had it; it is its opposite. Xenakis speaking on *Metastasis*, “I was interested in two things in those years. One: I wanted to write a kind of dodecaphonic music with the help of computations – a music macroform emerges from a few basic principles. In *Metastasis* I made computations based on the permutations of intervals...”<sup>127</sup> Suffice it to say that this focus upon sound characteristics represents yet another level of control of even the most aleatory. “In the composition “*Les Metastasis*”...the role of the architect is direct and fundamental by virtue of the

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<sup>123</sup> Ibid., p. 10.

<sup>124</sup> Varga, Balint Andras, *Conversations with Iannis Xenakis*, Faber and Faber Limited, London, 1996. P. 70.

<sup>125</sup> Ibid., p. 70.

<sup>126</sup> See Adorno, Theodor W. “The Aging of the New Music,” (1973) *Telos* 21 (3): 95-116. Fall 1988 number 77.

Modulor. The Modulor has found an application in the very essence of the musical development.”<sup>128</sup>

### *Conclusion*

Finally, it would be productive to briefly examine the Modulor from another musician’s point of view. John Cage had contributed an article in the book *Module, Proportion, Symmetry, Rhythm* published in 1966, while this is outside of the time constraints that were proposed, this should be informative as to the early conditions of skepticism on systems of proportions in the late 1950’s. Cage states ““What am I dealing with when I deal with proportion? Going to the store to buy something? Standardization and mass production and containers (this was his most striking evidence) for packing comestibles for distribution anywhere on the globe?”<sup>129</sup> This can be compared with Le Corbusier’s statement about distribution, “In the construction of objects of domestic, industrial or commercial use, such as manufactured, transported and bought in all parts of the world...” and coupled with, ““the Modulor is a working tool, a scale to be used in composition...for the mass-production of manufactured articles, and also for the creation, through unity, of great symphonic works of architecture.”<sup>130</sup> Cage’s rejection of all systems, and in this case the Modulor’s proportional system, reflects not only the changing practices of avant-garde musicians, but the changing perceptions of proportions

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<sup>127</sup> Ibid., p. 72.

<sup>128</sup> Le, C. and M. E. Le Corbusier (1980). *Modulor I and II*. Cambridge, Mass., Harvard University Press. 1980. p. 326-330.

<sup>129</sup> John Cage, “Rhythm Etc.,” in Kepes, G. e. (1966). *Module, Proportion, Symmetry, Rhythm*, New York, G. Braziller [1966]. p. 202.

<sup>130</sup> Le, C. and M. E. Le Corbusier (1980). *Modulor I and II*. Cambridge, Mass., Harvard University Press. 1980. p. 185.

and ultimately the relationship of architecture and music. Cage's critique, however, did not see beyond the evident problems the Modulor must contend with when used for commercial production. He refused to see that there was a social project at work in the Modulor emerging out of the context of post-war optimism.

Cage is however correct to assume that when the Modulor is an implement of mass production, and that this rational will control it as the "...ideal tool, fit to do service for everything, wherever it can be applied."<sup>131</sup> Its flexibility would only be an illusion. Yet, let us not forget that Le Corbusier's commitment is to reconstruct the world as a "harmonious place," and that the proportional system developed from the Modulor is predicated on values deeply rooted in the concerns for humankind. The point of contention was where to locate "humanism" within or without these systems of proportion.

It is important to recount a criticism made by architect Peter Smithson at the R.I.B.A. debate, where he states that "We are against systems of proportion that claim universal validity, rather than validity at a particular time in a particular place."<sup>132</sup> Smithson's criticism represents the overall changing reception of proportional systems that reject the universal values that had been the leading figure in the Renaissance as well as the overarching construct that Le Corbusier had employed in the Modulor. Smithson as others, who had questioned the acceptance of natural laws, rejected the rules regulated by tradition and that had been supported by a popular belief. It should also be reiterated that the acceptance of these universal conditions in the initial period of interests in proportion,

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<sup>131</sup> Horkheimer, M. and T. W. Adorno (1997). "The Concept of the Enlightenment," *Dialectic of Enlightenment*. London; New York, Verso. p. 39.

<sup>132</sup> "Report of a debate on the motion "that systems of proportion make good design easier and bad design more difficult." *Journal: the Journal of the Royal Institute of British Architects*, Vol. 64 Number 10, August 1957. p. 461.

in some way marks its own reintroduction into history and reflects a desire for stability and unity in the world after the Second World War.

If architects are to accept the advice that Alberti provides in regarding architecture and music, namely that “We shall therefore borrow all of our rules for harmonic relations from the musicians to whom this kind of numbers is extremely well known...,” should architects not borrow from the rules of contemporary musicians? If not, then is music related to architecture in any other way than it is related to other disciplines that are connected through the practices of exchanging and borrowing? Perhaps this is an unanswerable question. To be sure, the Modulor had something that was not only about the connection to music, harmony and mass production, but also the relationship to seeing outmoded expressions of harmony, and had thus supported the very system that musicians had tried to transform since the early 20<sup>th</sup> century. Clearly Xenakis was able to achieve something outside of traditional harmony with the Modulor, but his activity reflects more the contemporary trends in the practice of music than what Le Corbusier had understood them to be. Harmony as considered by Le Corbusier was just that, a natural law, and to Xenakis “As far as harmony is concerned, nobody composes in triads today...”<sup>133</sup>

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<sup>133</sup> Varga, Balint Andras, *Conversations with Iannis Xenakis*, Faber and Faber Limited, London, 1996. P. 124.

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