

# **Irrational Matrix:**

Using Daniel Libeskind to question the role  
of drawing in architectural representation

**Thomas Rowntree**



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drawing in architectural representation

MArch dissertation  
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January 2023





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Daniel Libeskind is an architect renowned for his conceptual and avant-garde approach to architecture. Libeskind's work is known for its dramatic and expressive forms, which often challenge traditional notions of architecture. Once a musician and grounded with a background in mathematics, Libeskind has gained international recognition by defying conventional categorisation of his drawings and built architecture.

Before becoming an architect, he was recognised as a talented accordion player and received prestigious awards such as the America-Israel Cultural Foundation (AICF) scholarship.<sup>1</sup> At the time, he had a strong affinity with the German composer Johann Sebastian Bach, for whom Libeskind admired his classical repertoire. With such confidence in his ability, he described himself as a child prodigy accordion player.<sup>2</sup> As a young adult, he felt he had exhausted the possibilities of the instrument and this limitation led to a commitment to his other hobby at the time, drawing.<sup>3</sup>

Libeskind was born in a homeless shelter in Łódź, Poland in May 1946, a year after the end of the Holocaust. From very early on in his drawings, Libeskind took influence from trauma and memory, inspired by his parents, who survived the Holocaust. This led to Libeskind creating meaningful connections between architecture and community. Libeskind drew from the void and emptiness created when a community is broken. Libeskind is now known for his attention to historical and cultural contexts, often incorporating them into his designs in subtle and thought-provoking ways.

His architecture journey commenced in 1960 when he studied architecture under Peter Eisenman and Richard Meier at the Cooper Union in New York. Since Libeskind's arrival in architecture, he gained his professional degree in 1970 and a postgraduate degree in the History and Theory of architecture in 1972.<sup>4</sup> Eisenman became an influential figure to Libeskind as there are many parallels between their explorations through drawing.

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1 Libeskind, D., 2004. *Daniel Libeskind Breaking ground*. New York: Penguin Group. pp.8-9

2 Ibid.

3 Ibid. pp.10

4 Libeskind. 2022. *Daniel Libeskind - Libeskind*. [online] Available at: <<https://libeskind.com/people/daniel-libeskind/>> [Accessed 4 October 2022].

Figure 1  
Image of: Daniel Libeskind  
as a child playing the  
accordion



To Eisenman, drawing is a way of thinking and is not representative of anything but instead gives life to a thing.<sup>5</sup> Similarly, Libeskind sought to avoid representing coherent architectural forms and instead develop architectural thinking that is neither a physical nor poetic of space.<sup>6</sup>

Research and exploration were important to Libeskind, and between 1978 to 1985, he shared his knowledge as the director and principal teacher at the Cranbrook Academy. During these years, he developed a reputation as a leading avant-garde figure in architecture. He produced some of his most highly recognised drawings, namely *Micromegas* in 1979 and *Chamber* works in 1983. Although qualified as an architect, Libeskind explored architecture through drawing and had never built any architecture until his fifties. From Libeskind's view, his drawings were architecture, their own entity detached from built work, while also avoiding representing anything objective and instead a projection of thinking. This method of drawing is not new to architecture as traditionally, drawings in architecture are more than objectifying the one-to-one correspondence of a drawing to a building.<sup>7</sup> By isolating them from structural essence, Libeskind overtly affirms that his drawings have neither two nor three dimensions. He often refers to his drawings as single artefacts representing an aesthetic experience of architecture, fluctuating between modes that could be described as a geometry of experience. *Chamber* works and *Micromegas* form part of that exploration.

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5 Ansari, I., 2013. *Interview: Peter Eisenman* - Architectural Review. [online] Architectural Review. Available at: <<https://www.architectural-review.com/essays/interview-peter-eisenman>> [Accessed 30 September 2022].

6 Libeskind, D. and Hejduk, J., 1981. *Between zero and infinity*. New York: Rizzoli International Publications.

7 Evans, R., 1997. *TRANSLATIONS FROM DRAWING TO BUILDING AND OTHER ESSAYS*. London: ARCHITECTURAL ASSOCIATION.

Figure 2  
Chamber Works example Horizontal #5  
Not to scale

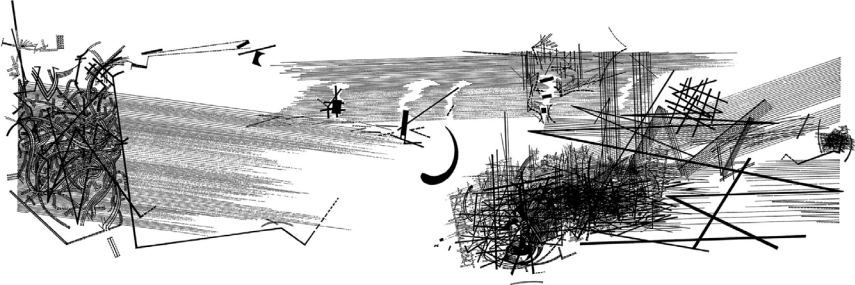
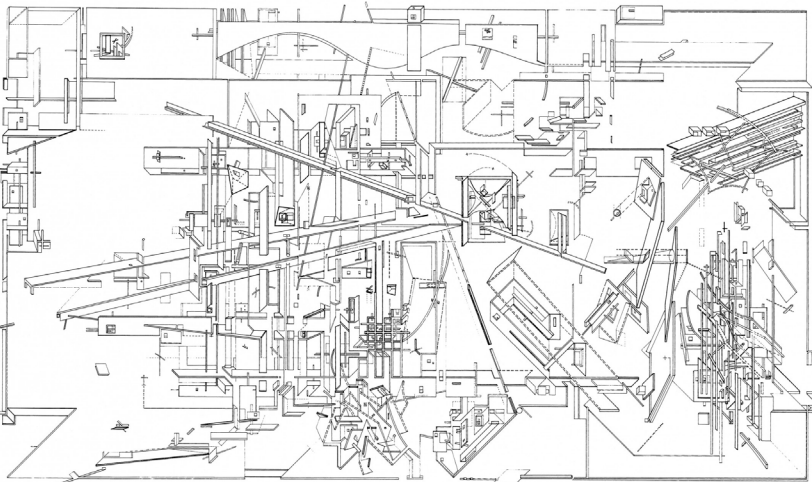


Figure 3  
Micromegas drawing: *Dance Sounds*  
Not to scale




Coming to architecture with a background in music, Libeskind promotes the idea that architecture and music are closely related and makes for an interesting starting point for this discussion. This is suggested through statements such as, "Drawing is a score just like a piece of music"<sup>8</sup> made at the *Architecture is a Language: Daniel Libeskind at TEDxDUBLIN* event and "You can see the musical instruments but you can't see the music... you can see the materials, walls, windows textures, etc but you can't see the architecture"<sup>9</sup> made in the *Daniel Libeskind Interview: The Voices of a Site* found on the Louisiana channel. Libeskind has repeated such comparisons to suggest a connection between architecture and music which subtly anchors some of his works.

In my dissertation, I aim to study both Chamber works and Micromegas as drawings that push the role of representation in architectural drawing. These drawings have sparked intriguing discussions amongst commentators due to how they oppose the conventions of an architectural drawing of the time. While Chamber Works provides an overarching narrative regarding the connection between architecture and music, Micromegas explore fluctuating form and space. By referring to the descriptions and analogies made by Libeskind and by making an account of some of the more significant critics to have commented on his work, I aim to dissect the drawing works that made him a leading avant-garde figure in architecture.

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8 *Architecture is a Language: Daniel Libeskind at TEDxDUBLIN*. 2012. [video] Directed by D. Libeskind. Dublin; TEDx Talks.

9 *Daniel Libeskind Interview: The Voices of a Site*. 2018. [video] Directed by M. Wagner. New York City: Louisiana Channel.



02.  
Architectural drawing  
as music



## Architecture and music

Chamber Works is a set of twenty-eight drawings, first displayed at his AA exhibition in London in 1983. The drawing set is equally subdivided into two orientations, fourteen vertical drawings and fourteen horizontal. On display at the AA, the drawings were hung in numerical order from #1-14, allowing each drawing to decrease in width. In this order, the drawing sub-groups became two distinctive lines, horizontal and vertical. While there is a lack of visual evidence of the drawings series being exhibited, it was later documented that they should have been displayed in pairs that add up to fifteen (i.e., #2 + #13 = #15) which suggests that the axis rotates from horizontal to vertical. Despite the arrangement of the drawings displayed at the exhibition, one would describe Chamber Works as a piece of abstract art comprised of black ink on white paper. A series of lines and hatches intersect and interact with one another, lacking architectural qualities. With the knowledge that Libeskind is an architect, coupled with being displayed at an architecture exhibition, one would assume these drawings must relate to architectural features in a not-immediately obvious way.

As introduced, Libeskind had a previous career as a musician and makes his affinity to music clear, Bach and his classical repertoire in particular. With the numerous comparisons between architecture and music when describing his work, one can begin to question the validity of his descriptions. Libeskind describes Chamber Works as his initial exploration of the connection between architecture and music through drawing. He states:

*"[...] my first rigorous attempts to connect music and architecture. . . Architecture is based on drawings. A drawing is a score it's a code, a language that has to be communicated to performers who then have a certain amount of leeway in interpreting that."<sup>10</sup>*

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<sup>10</sup> Libeskind, D., 2022. *Chamber Works: Architectural Meditations on Themes from Heraclitus 1983*. [online] MoMA. Available at: <<https://www.moma.org/collection/works/164668>> [Accessed 11 October 2022].

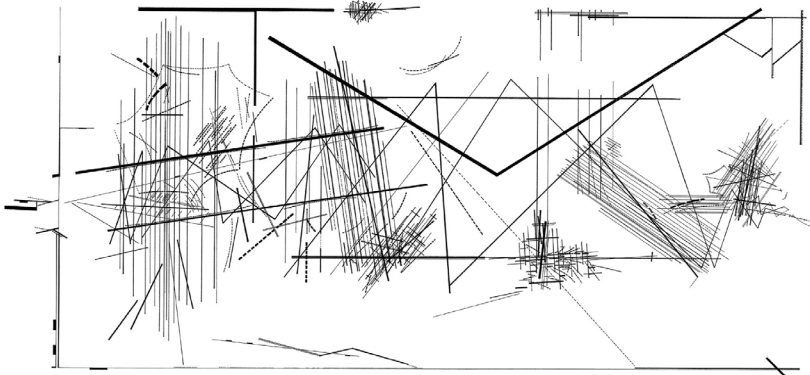


Figure 4  
Chamber Works example Horizontal #1  
Not to scale

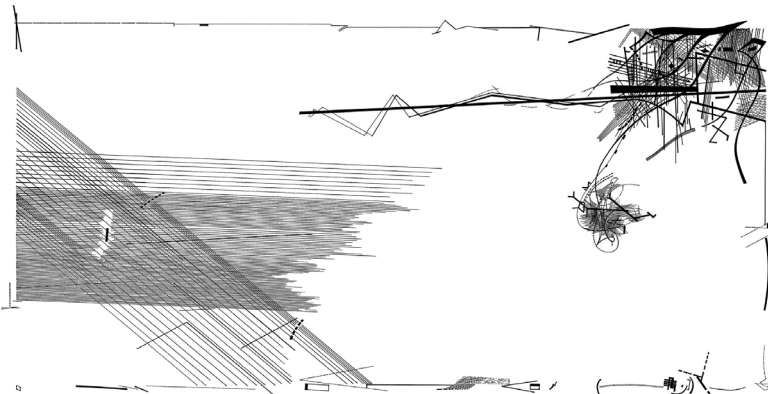


Figure 5  
Chamber Works example Horizontal #2  
Not to scale

Such statements oppose the logic of an architectural drawing at the time. However, these views are supported by Kurt Forster, who makes an account that Chamber Works is an example of spatialised scores and musical translations. The discussion concerning this specific work has circulated among some of his critics. Aldo Rossi places Chamber Works as an instance of hieroglyphs by explaining that Libeskind may be the only person who knew what they meant.<sup>11</sup> Rossi uses this analogy by referring to the fact that hieroglyphics are still undeciphered and may lack accurate translation. In this opinion, it may mean that the viewer will always remain ignorant of the true meaning beyond the drawing. This is a statement echoed by John Hedjuk by describing Chamber Works as illustrations of a thought process, something that only Libeskind may have accurate knowledge of.<sup>12</sup> Peter Eisenman suggests that Chamber Works is a kind of writing and should be read<sup>13</sup>, implying that the viewer must look beyond the graphics and analyse the drawings as a piece of text. These critics offer fascinating takes on Chamber Works, but Kurt Forster's and Peter Eisenman's accounts become very relevant in understanding the works. Both suggest a kind of writing must be read, whether a text or musical score. This echoes the analogies made by Libeskind as he further suggests the viewer read the Chamber works drawings in the way you read a musical score and experience the drawings in the way you experience music.

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11  
pp.89-96.

Evans, R., 1984. AA Files. *IN FRONT OF LINES THAT LEAVE NOTHING BEHIND*, (No. 6),

12  
ibid.

13  
ibid.



Figure 6  
Chamber Works example Vertical #11  
Not to scale



Figure 7  
Chamber Works example Vertical #12  
Not to scale

## Chamber music

One could interpret 'Chamber Works' to evoke a 'chamber architecture' in the same way we might say 'chamber music' that refers to music composed for small ensembles of elements. This immediately creates the link between this drawing and music. Chamber music requires a small group of instruments in a chamber or small room where ladies and gentlemen would attend all-purpose events. A chamber music performance requires one person to play each part which contrasts with orchestral music that requires each piece to be played by several performers. This may help one to interpret Chamber Works as a set of drawings that contains a small group of elements placed on large pieces of paper. It could also be understood that Libeskind requires these drawings to be displayed in a small chamber-like space. Therefore, it may be no coincidence that these drawings were first viewed at the AA exhibition and were intentionally arranged to create a composition. Although the material plane sets the drawing as an individual thing in the realm of its surroundings due to the four boundaries of the material, the arrangement of the individual drawings tells a larger story. The detail of orientation and position of the drawings alongside one another could resemble how a chamber music performance requires a group of people to perform as one.

The shifting between the horizontal and vertical axis (figures 8 & 9) in Chamber Works could represent how a musical score is read by pairing up horizontal and vertical-orientated drawings. Typically music is written on a staff that contains five parallel lines and gives structure to notes that works on two axes. The vertical axis tells the performer the pitch of the note and what to play, and the horizontal axis, working from left to right, telling the performer the rhythm of the note or when to play it. Moreover, similarly, in the way that a bar line divides the staff into small sections called bars, the twenty-eight Chamber Works drawings are divided individually. When arranged together, they complete the composition. This interpretation may be supported by Kurt W. Forster's statement in

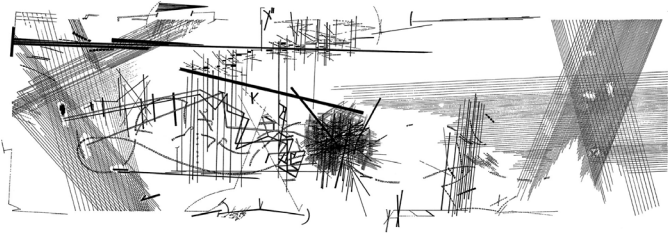


Figure 8  
Chamber Works example Horizontal #4  
Not to scale



Figure 9  
Chamber Works example Vertical #11  
Not to scale

his short essay 'Chamber Works from the Work Chamber of Daniel Libeskind:

"[...] together with Libeskind's folio reproduction of Chamber Works, the two series of these drawings, the horizontal and the vertical, form a continuum of graphic interventions that he defines as spatial music: they are spatialized scores, musical translations."<sup>14</sup>

A musical score is a tool for the composer and performer, and a drawing is a tool for the architect. Both a musical score and drawing rely on a medium to communicate, and the content of either can drastically change the outcome of the performance or building. In the case of architecture, drawings have different functions. The most obvious is to specify and instruct their subject matter. This understands drawings as a one-to-one translation between the defined idea and the building.<sup>15</sup> However, some can function as works of architecture in their own right. The latter type of function is one that Libeskind used throughout his career and often emphasises his will for his drawings to be free of architectural structure. Libeskind claims Chamber Works follow this function. One contender for understanding Chamber Works is notation.

## Notation

Notation is a concept described by Nelson Goodman in *Languages of Art* in which he sought to be able to describe all representational devices such as pictures, descriptive texts, scientific theories, and musical scores.<sup>16</sup> The *Languages of Art* book aims to give a general theory of symbolism by treating representational works as instances of particular systems. Using scores and scripts as the focus of Goodman's discussion, he identified how to decipher particular work from its near copies unambiguously.<sup>17</sup> In explaining the idea of notation, he lays down the following five requirements.

14 Forster, Kurt W., 1983, *Chamber Works from the Work Chamber of Daniel Libeskind*, Architectural Association, E.G. Bond Ltd and G&B Arts Ltd (box cover), London, pp. 9-11.

15 Pérez Gómez, A. and Pelletier, L., 2000. *Architectural representation and the perspective hinge*. Cambridge, Mass.: MIT Press. pp.3

16 Bafna, S., 2008. *How architectural drawings work – and what that implies for the role of representation in architecture*, *The Journal of Architecture*, 13:5, pp535-564.

17 *ibid*

First, a score primarily identifies work from performance to performance and must accurately define the work.<sup>18</sup> Secondly, each character must be indifferent to each instance of characters to differentiate.<sup>19</sup> Thirdly, the characters should be able to combine and compose to make for other inscriptions.<sup>20</sup> Fourthly, the symbol system must correlate with the field of reference, and finally, the characters must relate to a language or logic, and any ambiguous character must be excluded.<sup>21</sup> The requirements placed by Goodman aim to eliminate ambiguity towards his idea of notation and emphasise the systematic validating process.

Orthographic drawings are an example of architectural drawings that typically seek to define various levels of detail and scales that, when added up, represent an idea of a final building. Construction drawings such as plans, elevations, sections, and details are examples of architectural drawings that describe and define the projection of built architecture. Goodman refers to an architectural plan as a drawing only used to refer to the location of elements and often just a sketch. The addition of numerical characters and measurements makes for a notational system.<sup>22</sup> Sonit Bafna comments on the theory of symbolism in his essay *How architectural drawings work – and what that implies for the role of representation in architecture* by supporting that “this is exactly what architectural drawings... - roles such as specifying constructional details, preparing estimates of quantities, or ensuring that the projected building meets construction code requirements – have been designed to do.”<sup>23</sup> However, Bafna later refers to the idea that Goodman’s theory looks at architectural drawings only to specify the building they project and that the notation does not require visually representing the building. Therefore, Goodman only defines architectural drawings as notational after adding text, measurements, and numerical characters. Goodman only sees notation as a convention to be able to accept standards and legitimise works. In the procedure, it eliminates the visual cues in the construction process and relies only on the description of built architecture.

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18 Goodman, N., 1976. *Languages of Art: An Approach to a Theory of Symbols*. 2nd ed. Indianapolis: Hackett Publishing Company, Inc. pp130-140

19 Ibid.

20 Ibid.

21 Ibid. pp141-142

22 Ibid. pp219

23 Bafna, S., 2008. *How architectural drawings work – and what that implies for the role of representation in architecture*, *The Journal of Architecture*, 13:5, pp535-564.



Suppose the qualification of an architectural drawing as notation merely depends on adding measurements and numerical characters; then architectural drawings are a poor example of a notational system, explicitly when a drawing has no intention of specifying or codifying the construction of built architecture. Chamber works fail to fall into the specification process as it is a more expressive example of works that fail to refer to anything specific. Robin Evans affirms this thinking by stating that: “they are certainly not a system of conventionalized notation or representation.”<sup>24</sup>

## Musical score

Interestingly, Goodman introduces musical scores after his discussions of architectural drawings. He refers to musical scores being similar to architectural drawings in the way that they sometimes define works broader than expected.<sup>25</sup> Similar to how an architectural drawing is a tool for the architect, the musical score is a fundamental tool for a composer or performer. Each musician would use a score differently depending on the type of performance instructed, similar to how an architect uses a drawing for different purposes. Goodman describes musical scores as a “truly notational system”.<sup>26</sup> He believes each character of a musical score is syntactic and semantic and accurately composed to instruct a performance while ensuring the work of the musical score cannot be copied.<sup>27</sup> Historically, a musical score only became a true notation from the development of the early medieval musical manuscripts. In manuscripts, “marks were placed higher or lower over syllables or words of a song to indicate pitch.”<sup>28</sup> They later introduced horizontal lines as guides to judge the position of characters.<sup>29</sup>

By Goodman’s logic, only when the horizontal lines became a structural feature for the placement of syllables and characters did

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24 Evans, R., 1984. AA Files. *IN FRONT OF LINES THAT LEAVE NOTHING BEHIND*, (No. 6), pp.90

25 Goodman, N., 1976. *Languages of Art: An Approach to a Theory of Symbols*. 2nd ed. Indianapolis: Hackett Publishing Company, Inc. pp219

26 *Ibid.* pp180-181

27 *Ibid.* pp180

28 *Ibid.* pp180

29 *Ibid.* pp180

Figure 10  
Scan of Cecilia Arditto's page in  
*Notations 21*

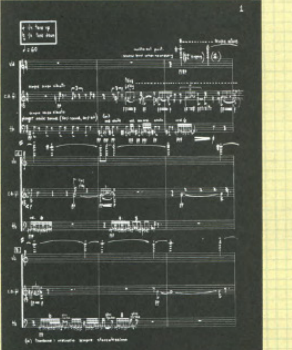


Figure 10 shows a scan of Cecilia Arditto's page in *Notations 21*. The page features three musical scores on a yellow grid background. The top score is for 'Música invisible—Libro tercero, #1, 2 and 3. For B♭ trumpet / flugelhorn'. The middle score is for 'Música invisible—Libro tercero, #4'. The bottom score is for 'Música invisible—Libro tercero, #5'. The scores are arranged in a grid-like fashion, with the top score on the left, the middle score on the left, and the bottom score on the right. The page is titled 'CECILIA ARDITTO' in the top right corner. There are two dark, torn-edge rectangular shapes on the page, one above the text and one below it.

**CECILIA ARDITTO**

I like to think about music (I am talking about written music) as an object that regenerates itself every time it is evoked. Different from other arts where the physical object previously exists, in music the work of art "pops up" every single time music is performed, following the recipes of a score.

Music chooses a foreign language to express itself that is not sound waves but rather graphical signs. This synesthesia—that is when one type of stimulation evokes the sensation of another—prints to musical thought an ambiguous feature, ambiguity understood as fragility and strength at the same time.

We know that the history of Western music was always dancing together with the history of musical notation: one generating the other in an indivisible dialectical relationship. Musical notation is not only a tool to preserve the right: sound waves in the correct order but a way of thinking and creating music from a different perspective, being both a registration and generation machine at the same time. Notation is in this way a kind of "arena" that allows music to be thought constantly in diverse and flexible ways, being this imperfect-perfect, defined-undefined, precise-imprecise double-sided coin, the right scenario for the abstract condition of music.

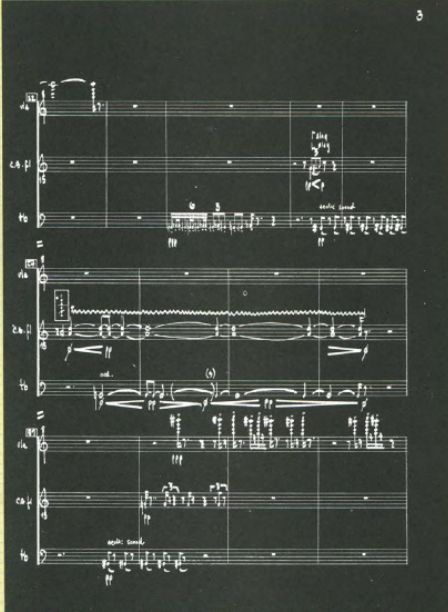


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musical scores become a notational system. Musical scores are now structured to define pitch, rhythm, timing, and beat. Although a musical score's primary function is to instruct, the relationship between the written music and performance is vital.

Goodman qualifies the musical score as a perfect example of a notational system because of its ability to definitively describe the work of the music performance. It is possible to interpret the music score as a codified instruction that does not visually represent the sound of the music but, instead, states the notes to be played at the correct pitch and time. This differs from architecture as the architectural drawing generally represents what it instructs. Contemporary composer Cecilia Arditto offers a contrasting opinion that written music uses notation to show music as a flexible and fluctuating tool between imperfect and perfect.<sup>30</sup> She expresses that:

*"Written music chooses a foreign language to express itself that is not sound waves but rather graphical signs. This synaesthesia that is when one type of simulation evokes the sensation of another... Musical notation is not only a tool to preserve the right sound waves in the correct order but a way of thinking and creating music from a different perspective, being both a registration and generation machine at the same time".<sup>31</sup>*

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30  
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Sauer, T., 2009. *Notations 21*. 1st ed. Mark Batty Publisher. pp17  
ibid



Figure 11  
Chamber Works example Vertical #3  
Not to scale

## Chamber Works

Within the contents of Chamber Works, there are no references to architectural elements, measurements, or a site. They are entirely comprised of line work at different line weights. In Goodman's theory of symbolism, Chamber Works would not qualify as an example of notation. This set of drawings does not refer to anything specific; rather, it could be an example of Libeskind's work that aims to explore certain forms to be granted the right to be free of any objective order.<sup>32</sup> Libeskind's interpretation of architectural form "seeks to explore the deeper order rooted not only in visible forms, but in the invisible and hidden sources which nourish culture itself,"<sup>33</sup> suggesting that drawings such as Chamber Works investigate form in terms of "art, literature, song, and movement".<sup>34</sup> These figurative forms are without physical features of architectural structure as they are not tied to symbols of meaning. This "approach does not wish to reduce the visible to a thought, and architecture to a mere construction".<sup>35</sup>

Chamber Works is full of these 'figurative forms' made visible through the overlapping and clashing of line work. In the eyes of Robin Evans, the lines never close, they never make bodies, and so they fail to represent figure or space.<sup>36</sup> Though it may be clear that the role of these drawings is not to represent figures, they are certainly spatial. I feel there is an intention behind the choice of line weight and particular arrangement of straight and curved lines that give a spatial quality to the drawings. This relationship of lines offers an inner dynamic or non-objective quality that has been a topic of investigation by Wassily Kandinsky. In the book *Point and Line to Plane*, Kandinsky describes the translation of various phenomena into forms of linear expression. He deploys a 'science of art' to understand the point, the line, and the plane as graphic elements that can be viewed abstractly. Ultimately, Kandinsky describes the line as a continuous and endless movement. To describe each type of line, he refers to sounds and temperature to understand the simplicity of an individual line and the complexity of a combination of

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32 Libeskind, D. and Hejduk, J., 1981. *Between zero and infinity*. New York: Rizzoli International Publications.

33 *Ibid.* pp29

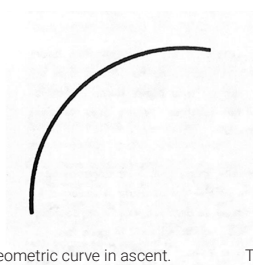
34 *Ibid.* pp29

35 *Ibid.* pp29

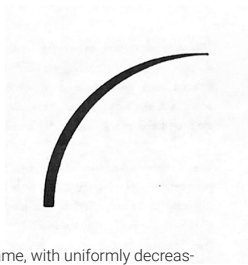
36 Evans, R., 1984. AA Files. *IN FRONT OF LINES THAT LEAVE NOTHING BEHIND*, (No. 6), pp.90.

Figure 12

Scans of illustrations taken from *Point and Line to Plane* by Wassily Kandinsky



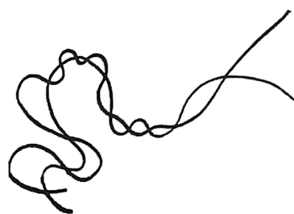
Geometric curve in ascent.



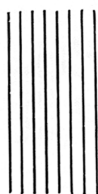
The same, with uniformly decreasing emphasis whereby heightened tension of ascent is attained.



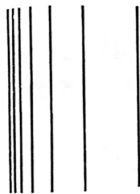
Contrasting combination of a curved line with an angular line. The characteristics of both acquire a strengthened sound.



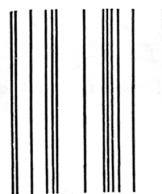
Curved lines running along with each other.



The simplest case is the exact repetition of a straight line at equal intervals—the primitive rhythm.



Uniformly increasing intervals



Unequal intervals

lines. Kandinsky's descriptions offer a compelling read of Chamber Works as drawings that express sounds. Sounds of different tones, pitches, and complexities.

Kandinsky begins by suggesting that a horizontal line describes a plane on which a human stands, a coldness or a flatness of a basic sound. Horizontal lines may also depict a boundary for which works lie within. Vertical lines may indicate height or warmth, while the diagonal line is an equal position between coldness and warmth.<sup>37</sup> In Kandinsky's terms, free straight lines, which may be the most prominent in Chamber Works, can be divided into centric and acentric. Centric lines lie upon a common centre, yet acentric lines lie outside a centre. These operate differently from horizontal, vertical, and diagonal lines as their tensions are on the plane. Kandinsky states that:

*" [...] in the case of the free straight lines and, above all, the acentric ones, we observe a loose relationship to the plane: they are less completely fused with the plane and seem to pierce it occasionally."<sup>38</sup>*

This suggests that free straight lines can extend beyond the plane and explore the third dimension. The penultimate individual type of line is the angular line which is a result of two forces that causes a discontinued action and contain a plane-like quality.<sup>39</sup> These angular lines may be at an acute, right, obtuse or free angle. Finally, the curved line directly contrasts the straight line (figure 12). These individual lines can be grouped and combined to make for more complex work.

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38  
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Kandinsky, W., 1947. *Point and line to plane*. New York: Dover Publications  
ibid. pp.62  
ibid

Figure 13  
 Authors illustration - Thickest angular line - Chamber Works horizontal #1

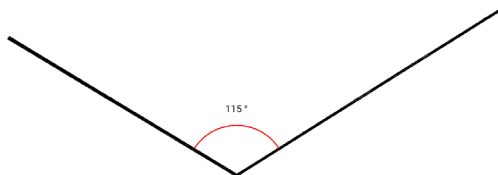
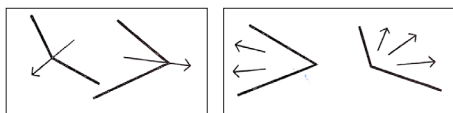


Figure 13.1  
 Scan of illustrations taken from *Point and Line to Plane* by Wassily Kandinsky



Sound of inclination to a more or less acute tension

Sound of inclination to a smaller or greater conquest of the plane

Figure 14  
 Authors illustration - Thickest angular line and example of free many-angled lines - Chamber Works horizontal #1

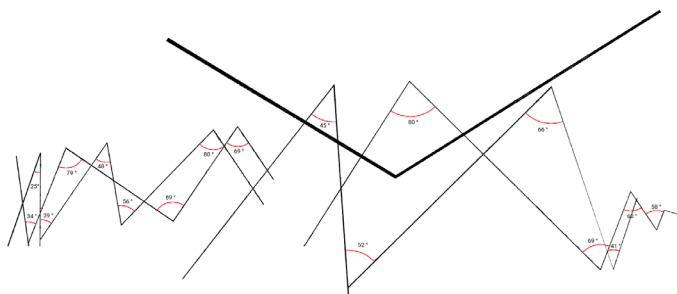


Figure 14.1  
 Scan of illustrations taken from *Point and Line to Plane* by Wassily Kandinsky

Free many-angled lines



Taking horizontal #1 as an example, there is a complex combination of lines that shift in orientation and alter in line weights. Some lines are drawn parallel, some are clustered, and there is heavy white space. Often there is a mixture of line weights that intersect and cluster, which have hierarchical qualities. When dissecting Horizontal #1, angular lines dominate the drawing and become the main feature.

Firstly, I have highlighted the thickest angular line (figure 13), which has an obtuse angle of one hundred and fifteen degrees which Kandinsky would describe as a "clumsy, weak and passive" sound.<sup>40</sup> Kandinsky believes any angle to extend beyond the right angle is weakening and "loses its aggression, its piercing quality, its warmth."<sup>41</sup> With this logic, it is interesting that Libeskind would draw his thickest line to have a weakening strength. Due to the thickness of this angular line, it seems to be in the very foreground of the drawing, and the thinner lines lie beyond. Directly behind are many-angled lines with unequal segments of acute angles (figure 14). This creates a contrast between the many-angled acute lines and the thicker obtuse-angular line and places even more emphasis on the hierarchy of line weights and drawing depth. Kandinsky suggests that line weights can be a precise graphical form of musical tone, and "it can be asserted that in music the line supplies the greatest means of expression. It manifests itself here in time and space just as it does in painting".<sup>42</sup>

A very fine line could represent the sound produced by the violin or flute, and the broadest line could represent the deepest tones by the tuba. Kandinsky asserts that musical notation is "nothing other than various combinations of point and line,"<sup>43</sup> but the

*"[...] unqualified brevity and the simplicity of the means of translation, which in clear language convey the most complex sound phenomena to the experienced eye (indirectly to the ear) are instructive."*<sup>44</sup>

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40 Kandinsky, W., 1947. *Point and line to plane*. New York: Dover Publications. pp72  
41 *Ibid.* pp.73  
42 *Ibid.* pp.99  
43 *Ibid.* pp.99  
44 *Ibid.* pp.99

Figure 15

Line repetitions - Snippet taken from  
Chamber Works horizontal #1

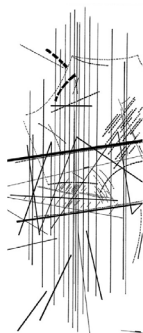
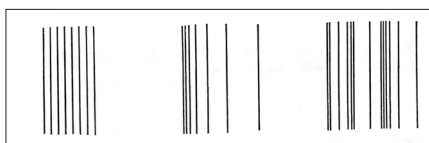


Figure 15.1

Scan of illustrations taken from *Point and  
Line to Plane* by Wassily Kandinsky



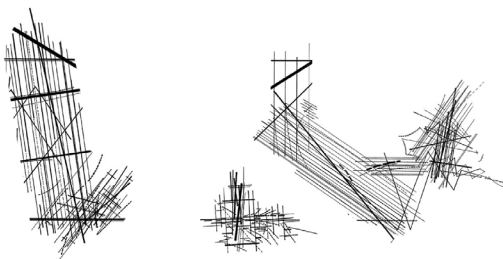
Equal inter-  
vals-the primi-  
tive rhythm.

Uniformly in-  
creasing intervals

Unequal  
intervals

Figure 16

Line repetitions - Snippet taken from  
Chamber Works horizontal #1



Pitch is described by lines on which the staff's five horizontals form the basis. Just as time and space manifest themselves in musical notation, it also does in a painting by how the pitch of various instruments could correspond to the width of the line. Alternatively, in architectural terms, different thicknesses of lines could describe the weight or thickness of a material. A thicker line could describe a heavy material such as concrete and outline a general space boundary. Thinner lines could describe more lightweight or more delicate materials such as glass, timber, cloth or other materials that could define general space arrangements. Although however, I feel these architectural explanations aren't as compelling as those of Kandinsky's graphical musical expression.

Figure 15 indicates a repetition of vertical lines at unequal intervals, which to Kandinsky's logic, is a rhythm. If the lines were to run in equal intervals, this would be an example of quantitative reinforcement. Kandinsky explains this by referring to music and how many violins reinforce the sound of one violin. However, in this instance of Chamber Works (figure 15), these lines repeat in unequal intervals, which could be seen as a more complex rhythm or intricate sound. Furthermore, as shown in figure 16, there are examples of diagonal repetitions at equal and unequal intervals throughout the drawing, which may describe a strengthened warmer or colder temperature and inner sounds. Although looking at these features individually is helpful, they come together to make up a total drawing. In the Chamber works horizontal 1, there are repetitions, angular, curved, and straight lines that overlap, making for a more complex rhythm and acquiring a strengthened sound.<sup>45</sup>

Figure 17  
Chamber Works horizontal #2

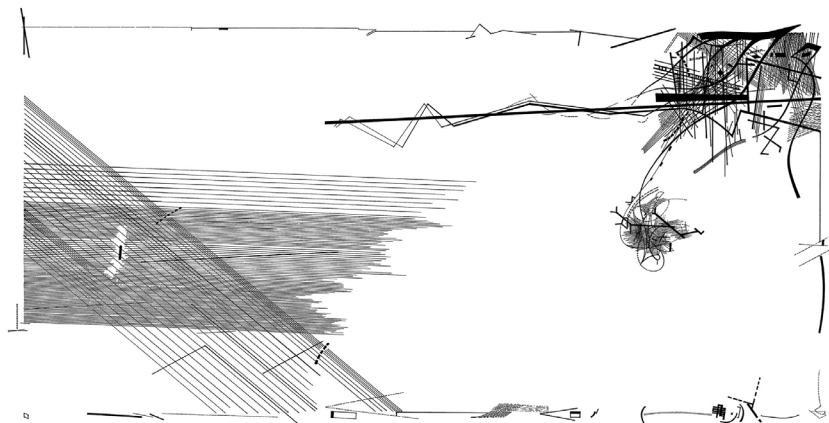
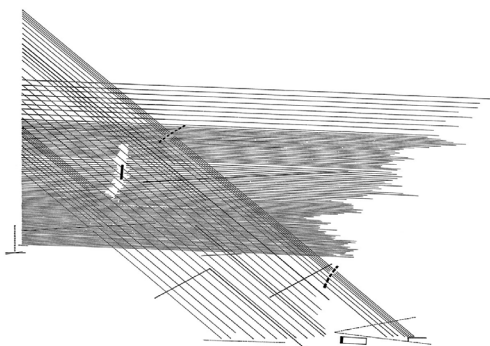


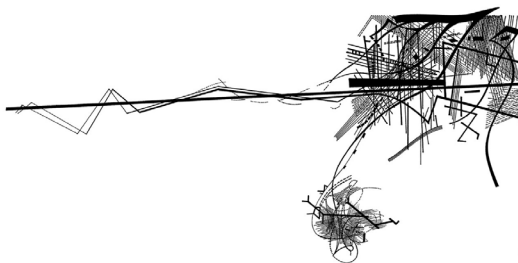
Figure 18  
Line repetitions - Snippet taken from  
Chamber Works horizontal #2



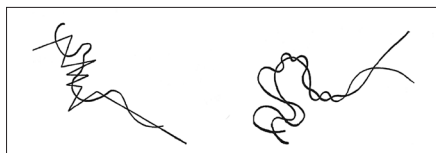
Horizontal #2 also contains a repetition of lines, some in equal and some unequal intervals (figure 18). I feel that the repeated use of repetitions is emphasising a representation of rhythm but also some relationship with how music is read. As they are a continuous feature throughout the entire drawing series, these parallel lines could also be some graphical representation of a musical staff. By placing them to run diagonally, they could be spatialised staves that either extend into the distance or towards the plane. This would support the beliefs of Kurt Forster. They could also be some hatch to describe a texture or material.

The top right corner of the drawing, shown in figure 19, contains curved lines that overlap with straight and angular lines. Once again, Kandinsky would describe this to be a complex rhythm. This is the first instance where wave-like curves appear and examples where line weights uniformly decrease. The degrees of intensity can be expressed in an increasing or decreasing sharpness of the line in the way that the pressure of the hand on the bow of a violin corresponds to the pressure of the hand on the pencil. This change in line weight could also describe something either moving into the distance or towards the surface of the medium plane. Furthermore, these examples of lines could be an expression of a change in speed and direction.

**Figure 19**  
Complex rhythm - Snippet taken from  
Chamber Works horizontal #2



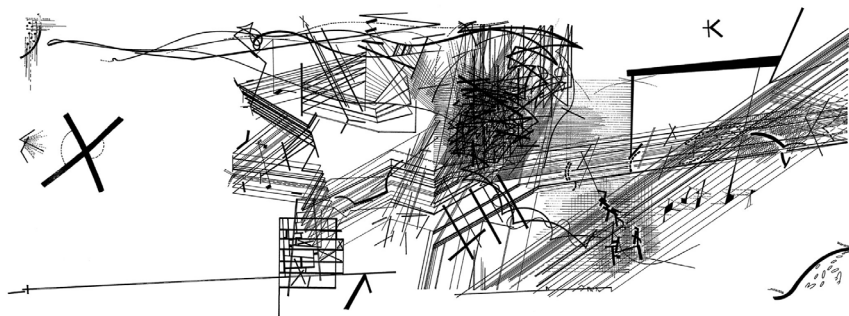
**Figure 19.1**  
Scan of illustrations taken from *Point and  
Line to Plane* by Wassily Kandinsky



Contrasting combination of a curved line  
with an angular line. The characteristics of  
both acquire a strengthened sound.



**Figure 20**  
Chamber Works horizontal #3



Horizontal #3 is arguably the most prominent example of musical expression. In this particular drawing, there are many instances of repetitions that, in my opinion, are clearly representative of a musical staff. Figure 21 takes a slice through the drawing where a zig-zag of parallel lines seems to explore the third dimension. A surface that seems to be sitting on different rotating planes is created using parallel lines that continue in this zig-zag fashion. This is where the parallel lines become a type of hatch and describe a wall or partition. Furthermore, in figure 22, there are four shapes that could represent musical notes placed on a staff. These are prominent examples of how Libeskind explores the cross-over between architecture and music.

Throughout all twenty-eight drawings, there are regular clusters of repetitions of lines, straight, curved, and angular lines that, in Kandinsky's words, would acquire the strongest sound. In figures 23, 24, 25, 26, 27, 28, you can see that these clusters become a focus for each drawing as they are the darkest. They are sometimes just blobs and sometimes they consume the drawing. Although the lines become the focus of the drawing, the white space could be viewed as the secondary quality to the line weights that gives depth to the drawing. The white space allows the viewer to question the direction and orientation of the lines, which may be in the foreground or background of the drawing. Similarly, as the scale of the drawings adjusts, the white space seems to reduce, and the line weights become less clear. In the instance that Chamber Works is to be read in numerical order #1 to #14, the orientation of the drawing is continuous. As the drawings decrease in width per pair, the clusters of lines at different line weights create the illusion that the drawing is infinite and slowly disappears into the distance.

Figure 21

Slice through Chamber Works horizontal #3

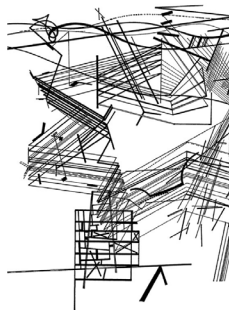


Figure 22

Sample of something that looks to be musical notation - snippet taken from Chamber Works horizontal #3

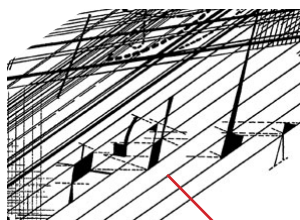


Figure 22.1

Example of historical medieval musical notation

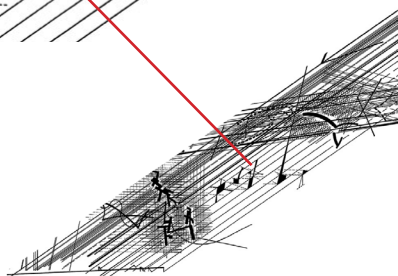
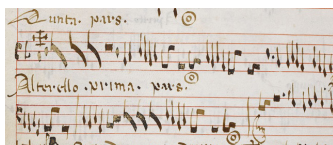




Figure 23  
Chamber Works horizontal #5

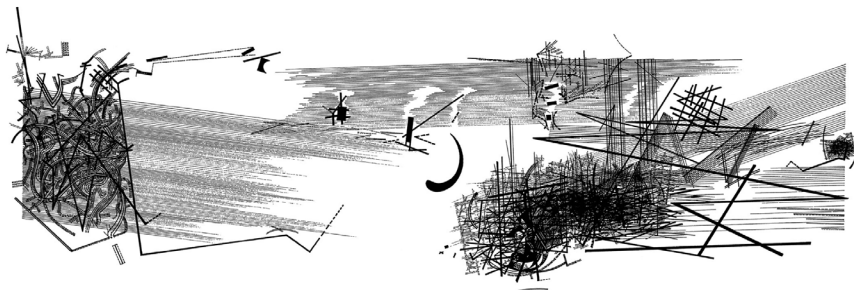


Figure 24  
Chamber Works horizontal #6

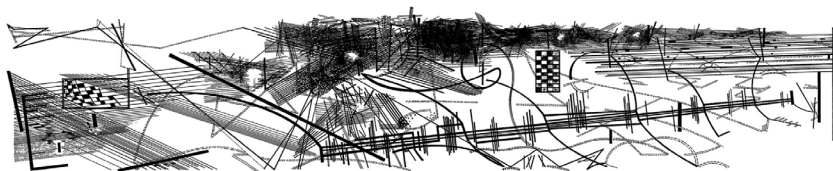


Figure 25  
Chamber Works horizontal #9



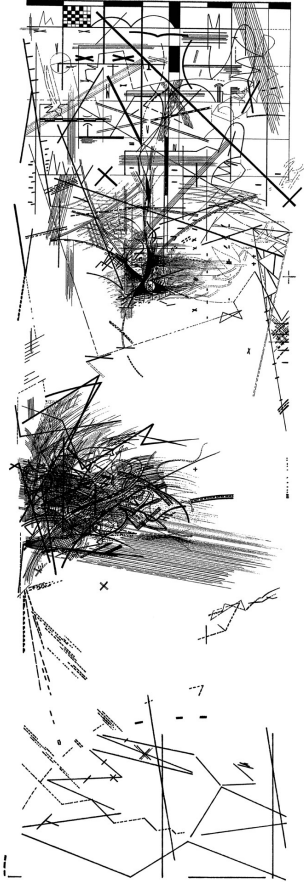


Figure 26  
Chamber Works vertical #5

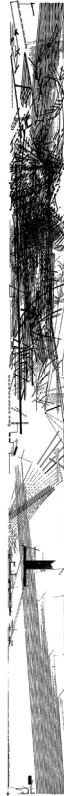
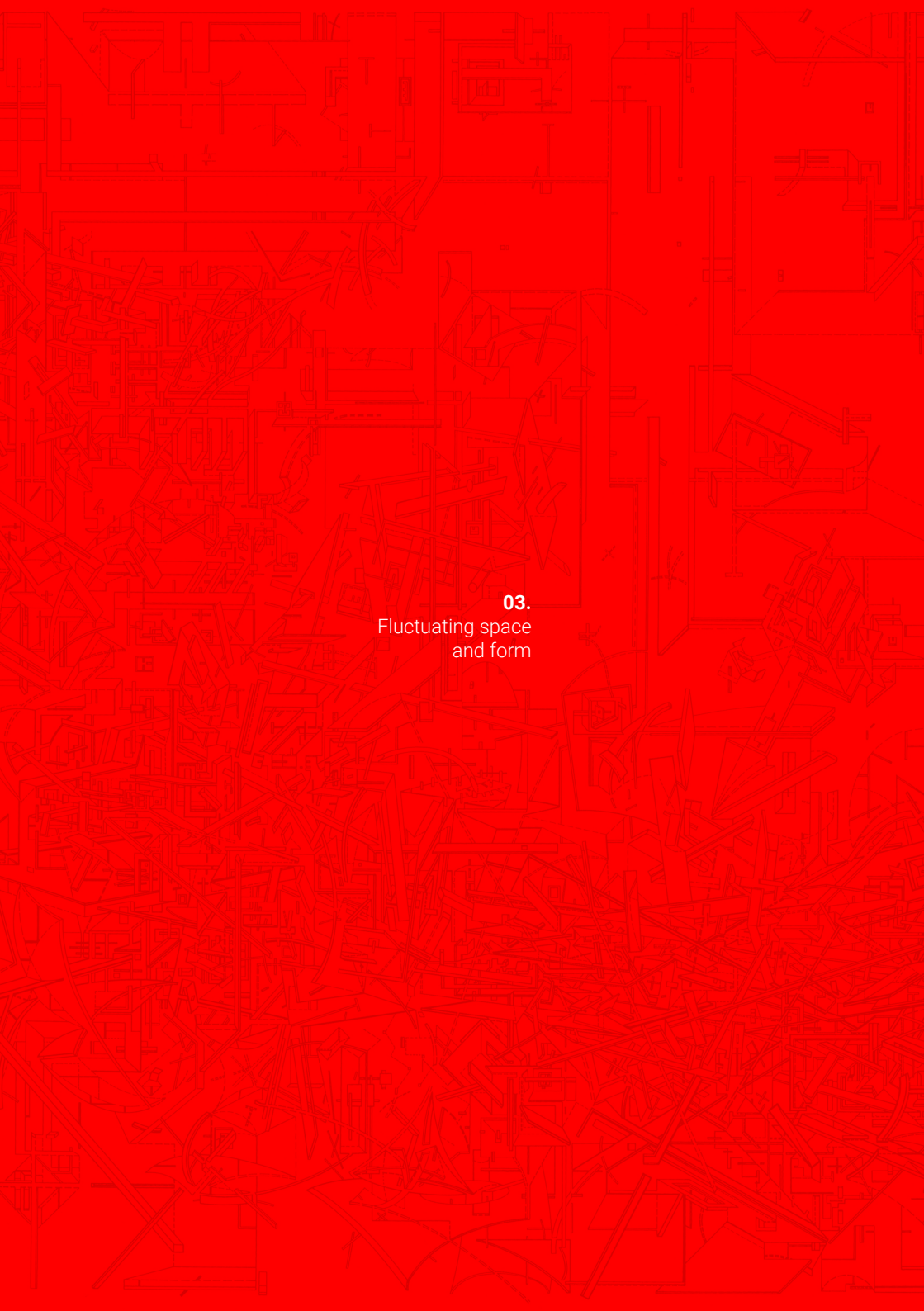


Figure 27  
Chamber Works vertical #12



Figure 28  
Chamber Works vertical #13

Consequently, Kandinsky's graphical language provides a valuable analysis of Chamber Works. It seems likely that Libeskind is interpreting Kandinsky's work to create an expressive connection between architecture and music. Similar to how Kurt Forster describes Chamber Works as spatialised scores and musical translation. Interestingly, Libeskind has identified the role of the drawing and the musical score but explores them to neither specify a building projection nor instruct a musical performance. Instead, he is merging the principles of music and architecture through line work and line weight, although cryptically. The linear expression investigated amplifies Libeskind's artistic approach in pushing the boundary of architectural representation. Such linear expression creates an ambiguity that forces the viewer to read the drawings and find forms that may not be visible. Libeskind is encouraging the viewer to imagine what could be form or space.



### **03.**

Fluctuating space  
and form

During the late 1970s and 1980s, Libeskind continues to explore the nature of architectural space through his drawings. Despite the expressive qualities of Chamber Works, the drawings contain no recognisable formal figures related to architecture. Instead, through Chamber Works, Libeskind is overtly challenging architectural drawing conventions through his passion for music. To maintain an exploration into the works of Libeskind, Micromegas emerges as a portfolio of works that preceded Chamber Works in 1979 but presented more recognisable formal figures of space.

Micromegas is a set of ten radiograph drafting pen drawings that I would depict to be made up of fragments of architecture, furniture, and machines composed of a remarkable complexity of geometry. With such geometry complexity, they seem to be an explosion of form and space. Shapes overlap, extend, rotate, and clash and could be described as a three-dimensional map or city. Due to the recognisable features within the drawing, it may be easier to categorise these works as representational. Although this is lacking in Chamber Works, which is distinctly non-representational, they play a similar game of ambiguity by never referring to anything specific. However, the Micromegas drawings are more readily understandable than Chamber Works as they can more easily be read as axonometric drawings. The viewer can then more clearly categorise these drawings as three-dimensional, yet, in typical Libeskind fashion, he disrupts the continuous space of axonometry and isometry by conflicting and fluctuating space and surface.

The ten drawings were each individually named, *The Garden*, *Time Sections*, *Leakage*, *Little Universe*, *Arctic Flowers*, *The Burrow Laws*, *Dance Sounds*, *Maldoror's Equation*, *Vertical Horizon*, and *Dream Calculus*. Unlike Chamber Works, they were drawn to be seen in a portfolio, which may suggest that each drawing is individual to one other and isn't required to be read as a total composition.

Figure 29  
Micromegas front image -  
Including the quote from Voltaire



## Satirical story by Voltaire

The name Micromegas comes from a satirical story by Voltaire and provides an overarching narrative to the drawings. In this science-fiction story, Micromegas is a character who stands thirty-seven kilometres tall and comes from a planet almost twenty-two million times greater in circumference than that of Earth. Micromegas begins to travel the universe and eventually lands on Earth, where all beings are minuscule to the thirty-seven kilometres tall character. The giant converses with many philosophers, from Aristotle to Locke, including hearing Aquinas' theory that the universe was made solely for mankind, which Micromegas questions the human's centric view of space and scale. A portion of this story was included on the front page of the Micromegas drawing series and went by:

*"About the four hundred and fiftieth year of his age, or latter end of his childhood, he dissected a great number of small insects not more than one hundred feet in diameter, which are not perceivable by ordinary microscopes, of which he composed a very curious treatise, which involved him in some trouble."*<sup>46</sup>

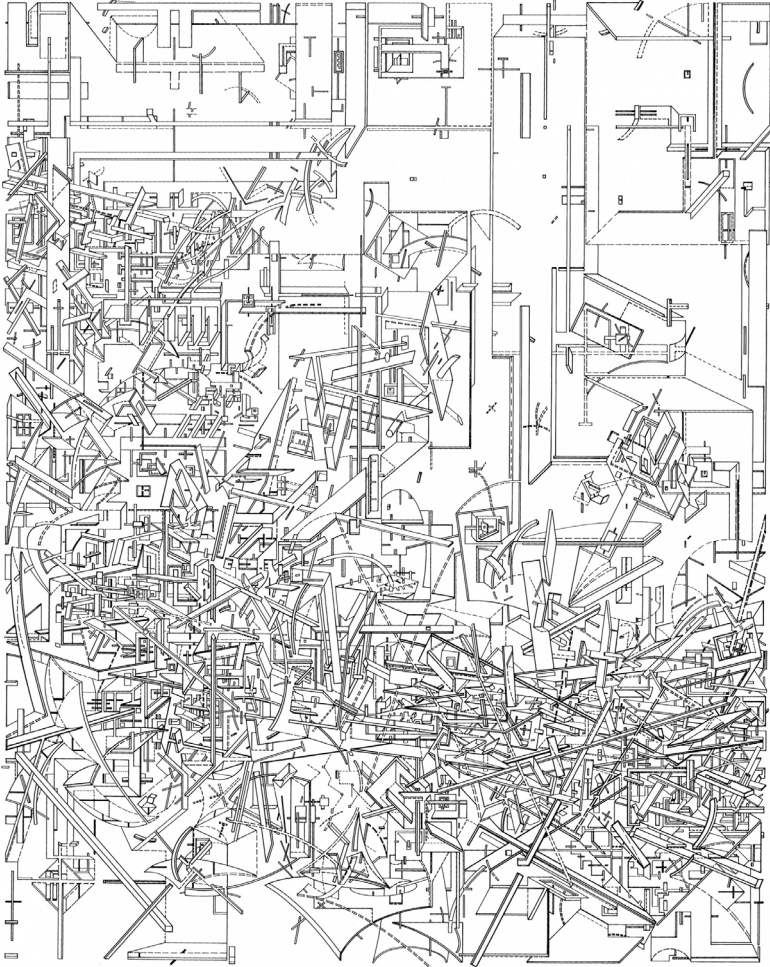
One could interpret Libeskind as referring to Voltaire to make a point of scale or human-centred knowledge of the universe. Micro-megas, 'small-big' would undoubtedly imply a story of scale. Due to the level of minute intricacy in the drawings, Libeskind may be placing the viewer as the character Micromegas, looking down on earth. At thirty-seven kilometres above the ground, one is looking down on a city that must be dissected at a microscopic distance. By this interpretation, the viewer may be at a 'big' scale while the drawing is at a 'small' scale. Furthermore, from the giants' perspective, humans are insects placed in the city and are minuscule in relation to the planet. As described in Voltaire's story, humans believe that the universe is made solely for mankind which Micromegas sees as an ignorance of the accurate scale of the universe.

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<sup>46</sup> Libeskind, D., 2022. *Micromegas*. [online] Studio Libeskind. Available at: < <https://libeskind.com/work/micromegas/#~:text=The%20Micromegas%20series%20of%2010,whose%20limits%20it%20always%20challenges.> > [Accessed 1 November 2022].



Figure 30  
Micromegas: *The Garden*





Libeskind may be using such a small scale, level of complexity, and intricacy of geometry to make a point that we, as humans, know very little about the city, planet, and universe. He may be suggesting that we are of minor significance compared to the universe, yet humans believe we are much more. Each drawing may be framing a different city that Micromegas visits. Through naming specific drawings (*Vertical Horizon*, *Arctic Flowers*, and *Little Universe*), Libeskind continues an oxymoron theme suggested by micro-megas. While he may be constructing a narrative of contradiction, he also refers to literature in the drawing titled *Maldoror's Equation* which this time relates to *Songs of Maldoror* by Comte de Latremount, whose hero, by the power of his imagination, enlivens the richness of language, without admiration of mathematics.<sup>47</sup>

Libeskind's affinity for literature is apparent and continues to place subtle clues for explanations. When the drawing series was first presented at an exposition at the London Architectural Association, an expository essay was presented with it. A catalogue named *En Space* accompanied the drawing works, beginning with a quotation from August de Villiers de L'Isle Adam's novel, *The Torture by Hope*. Cezary Wąs quoted the tale in his essay *Practising Theory. Concepts of early works of Daniel Libeskind as references for real architecture*: "it was the Inquisitor's eyes reflex, still preserved in his pupils and refracted in two spots on the wall".<sup>48</sup>

At first, the quote seems irrelevant; however, Cezary Wąs explains it through the description:

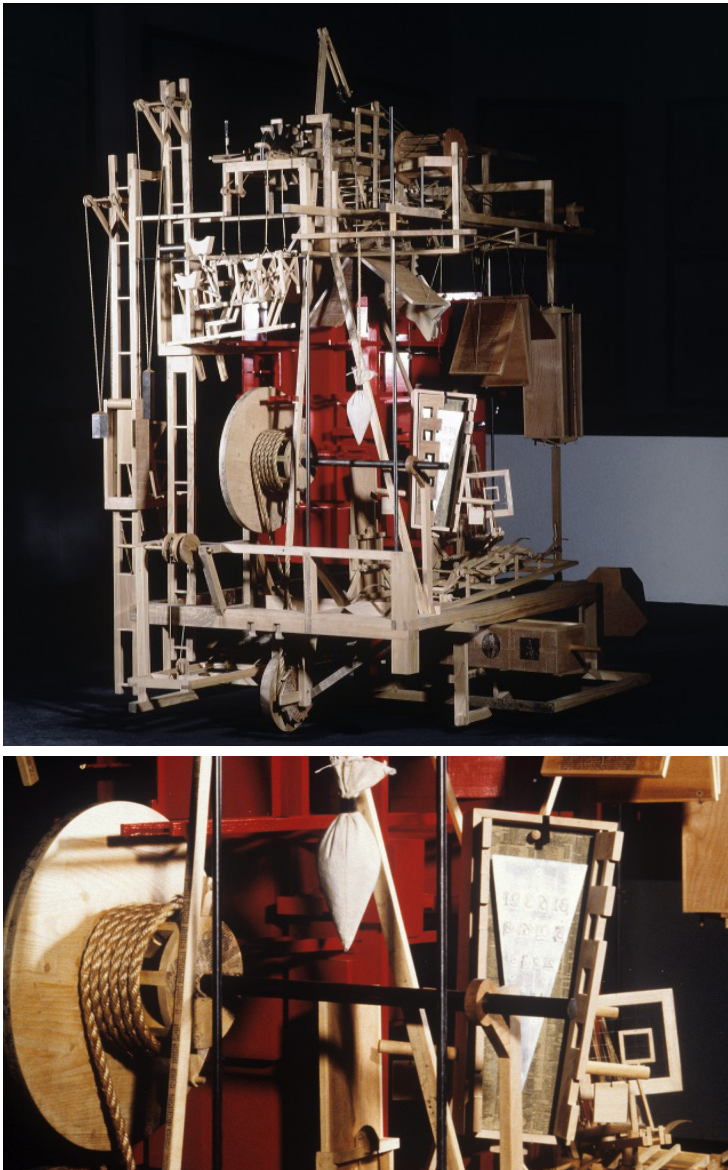
*"This half sentence aptly sums up a reflection on complex relations between various systems of signs and reality, which spread in those years, and was inspired, inter alia, by philosopher of Jacques Derrida, this making a literary source again a starting point of reflections on the nature of architectural drawing shows the assumption of various sources of architecture which certainly do not focus on meeting the needs of utility, strengthening sustainability, and exposing aesthetic."<sup>49</sup>*

47 Cezary, W., 2015. *Practicing Theory. Concepts of early works of Daniel Libeskind as references for real architecture*. [online] ResearchGate. Available at: [https://www.researchgate.net/publication/278685172\\_Practicing\\_Theory\\_Concepts\\_of\\_early\\_works\\_of\\_Daniel\\_Libeskind\\_as\\_references\\_for\\_real\\_architecture](https://www.researchgate.net/publication/278685172_Practicing_Theory_Concepts_of_early_works_of_Daniel_Libeskind_as_references_for_real_architecture)

48 *ibid.*

49 *ibid.*

Figure 31  
Image of: Daniel Libeskind: *Memory machine*



Micromegas has posed a difficult task for commentators, leading to various interpretations. Juhani Pallasmaa claims Micromegas to have “associations of music and the audibility of the forms and their configurations and collisions are equally strong. Here I felt the presence of the musician in Daniel’s personality.”<sup>50</sup> Although such complexity of form could suggest a kind of audibility, following one’s understanding of Chamber Works, this is not a clear example of works that explore the relationship between music and architecture. Line weights and hierarchy is not so clear, so here, there is much more of an emphasis on form and space that plays with the nature of perspective. Robin Evans makes his account by placing Micromegas in the context of modern art, if not modern architecture.<sup>51</sup> Evans describes them in the same class as synthetic cubist paintings, though they are three-dimensional and belong to an established convention of pictural fragmentation.<sup>52</sup> However, to Dalibor Vesely, Micromegas is situated:

*“[...] very far beyond the reality of cubism, constructivism or collage, close to the horizon where most of the non-figurative movements of this century fought their last battles and where our imagination is permanently challenged by the inner possibilities of abstraction”.*<sup>53</sup>

Vesely’s position is that they explore the limits of the representative power of our imagination concerning current architecture and visual arts.<sup>54</sup> Finally, Lebbeus Woods documents Micromegas as visual texts produced by machines from the *Three Lessons in Architecture* installation. Namely the *Memory Machine* (figure 31), *Reading Machine*, and *Writing Machine* constructed in 1985. Although completed six years after Micromegas, Lebbeus proposes that “they depict a new and ambiguous spatial world emerging from an older, familiar one of architectural form and representation”<sup>55</sup>. All suggest that Micromegas contests the limits of what was represented in the built and drawn architecture of the time.

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50 Boyarsky, A., 1980. *Daniel Libeskind End Space*. London: The Architectural Association. pp4

51 Evans, R., 1984. AA Files. *IN FRONT OF LINES THAT LEAVE NOTHING BEHIND*, (No. 6), pp.89-96.

52 Ibid. pp.89-96.

53 Boyarsky, A., 1980. *Daniel Libeskind End Space*. London: The Architectural Association. pp.10

54 Ibid. pp.12

55 Woods, L., 2009. *LIBESKIND’S MACHINES*. [online] LEBBEUS WOODS. Available at: <<https://lebbeuswoods.wordpress.com/2009/11/24/libeskinds-machines/>> [Accessed 17 March 2022].

Figure 32  
Image of: AI Held: *White Cube*

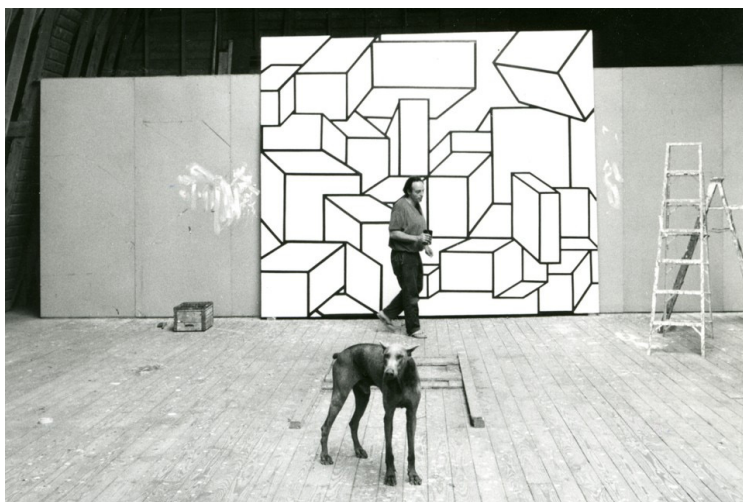
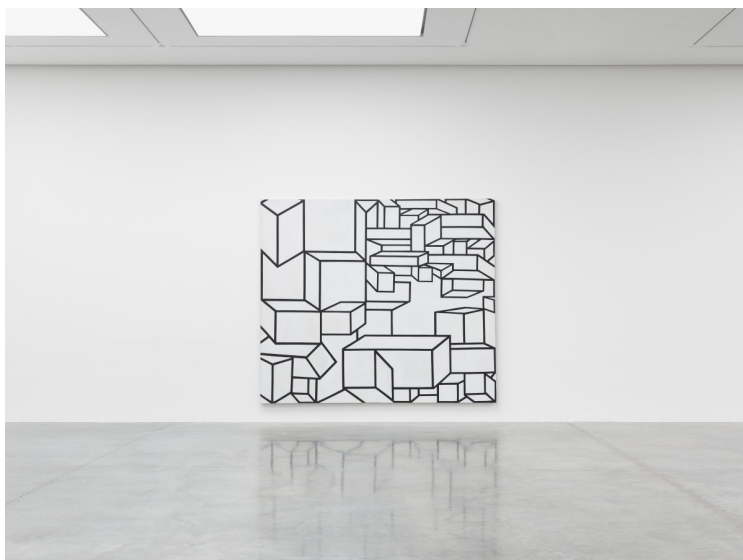


Figure 33  
Image of: AI Held: *White Cube*



## Cubism

As noted by Robin Evans, this apparent similarity between these drawings and cubism may suggest an explanation more clearly situated in avant-garde representational practice. Micromegas is an exploration that Libeskind values to be indefinite and developed “in an area of architectural thinking which is neither a physical nor a poetics of space.”<sup>56</sup> By way of Robin Evan’s placing Micromegas in the context of modern art, if not modern architecture<sup>57</sup>, cubism becomes a key topic and contender for understanding Libeskind’s thinking. Evans interprets the Micromegas drawings as cubism by comparing them to the works of Al Held. This American artist focussed on abstract, geometric forms existing in a non-Euclidean space.<sup>58</sup> Al held is an example of an artist that practices visual ambiguity and explores the ability of abstraction beyond the viewer’s primary senses. The most notably similar example of Al Held’s work to Micromegas is *White Cube* (figure 32), a black-and-white hard-edge geometric abstraction. The *White Cube* series pushes the boundaries of abstract art in the 1960s by studying the structure, space, and hierarchy in a painting. For the *White Cube*, he worked fully in black and white to simplify the painting and fully explore form and space without the distraction of colour, a tactic that Libeskind seems to have adopted.

Dating back to the rise of cubist painting, cubism sought to test the illusion of three-dimensional space on a flat, two-dimensional surface. E. H. Gombrich introduces his account of cubism and ambiguities of the third dimension in the book *Art and Illusion* and affirms, “If illusion is due to the interaction of clues and the absence of contradictory evidence, the only way to fight its transforming influence is to make the clues contradict each other and to prevent a coherent image of reality from destroying the pattern in the plane.”<sup>59</sup> These types of effects have been exploited for thousands of years. Patterns of mosaics spanning back two thousand years in Antioch and Rome explored the opposition of purely spatial reading.

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56 Libeskind, D. and Hejduk, J., 1981. *Between zero and infinity*. New York: Rizzoli International Publications. pp.80

57 Evans, R., 1984. AA Files. *IN FRONT OF LINES THAT LEAVE NOTHING BEHIND*, (No. 6), pp.89-96.

58 *Ibid.* pp.90

59 Gombrich, E., 1977. *Art and illusion: A Study in the Psychology of Pictorial Representation*. 5th ed. London: Phaidon Press.pp238

Figure 34

Scan of *Art and Illusion* by E.H. Gombrich  
- Mosaics



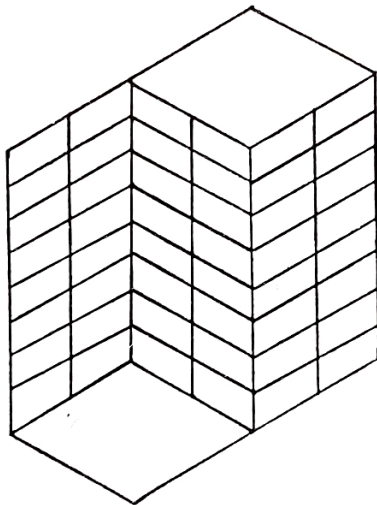
Mosaic from Antioch



Mosaic from Rome

Figure 35

Scan of *Art and Illusion* by E.H. Gombrich  
- Thiéry's figure



The pattern of the Antioch mosaic never concludes any consistency and forces us on a continuing quest. Similarly, the whirling pattern of the Rome mosaic causes the viewer to search for a point of reference to interpret geometries that may lie above or beneath one another (figure 34). A successful example of such a game is *Thiéry's figure* which presents an axonometric figure with contradictory visual clues (figure 35). In this case, the axonometry of the drawing becomes the tool for which it is impossible to distinguish the front from back, left from right, and neither up from down.

Many examples of works by Georges Braque and Pablo Picasso challenged conventional and realistic art forms by transforming the effects of illusionist reading. Gombrich refers to the example of *Still Life: The Table* by Georges Braque in 1928 (figure 36) as an exercise in painting, not an illusion, that forces perspectives, textures, and shading to collide and not work in harmony.<sup>60</sup> Between 1907 and 1917, Picasso wanted to evolve the way painting expresses reality and to emphasise that we see objects from not just one perspective but multiple as we move. This cubist approach was to move away from a single point of reference and to understand the inner compositions of form by dissecting objects from multiple viewpoints. The effect of the composition of various viewpoints is one of contradiction and creates resistance to consistency. Libeskind is using a similar tactic of halting consistency in *Micromegas*, but rather than expressing reality, he is exploiting form and space. However, intriguingly, Gombrich describes the impulse behind cubism as artistic and fails as a device for increasing our awareness of space.<sup>61</sup> Therefore, Libeskind may be using cubism as simply an explorative tool for questioning perception and conventions of architectural representation.

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60 Gombrich, E., 1977. *Art and illusion: A Study in the Psychology of Pictorial Representation*. 5th ed. London: Phaidon Press. pp.239

61 *Ibid.* pp.239



Figure 36  
Braque: *Still Life: The Table*. 1928

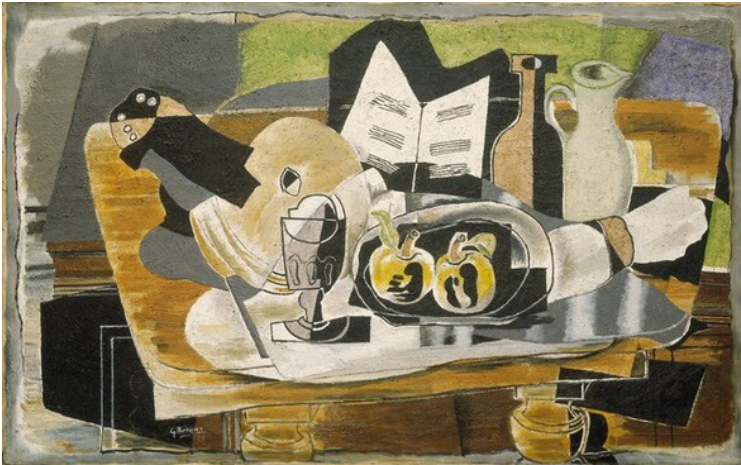
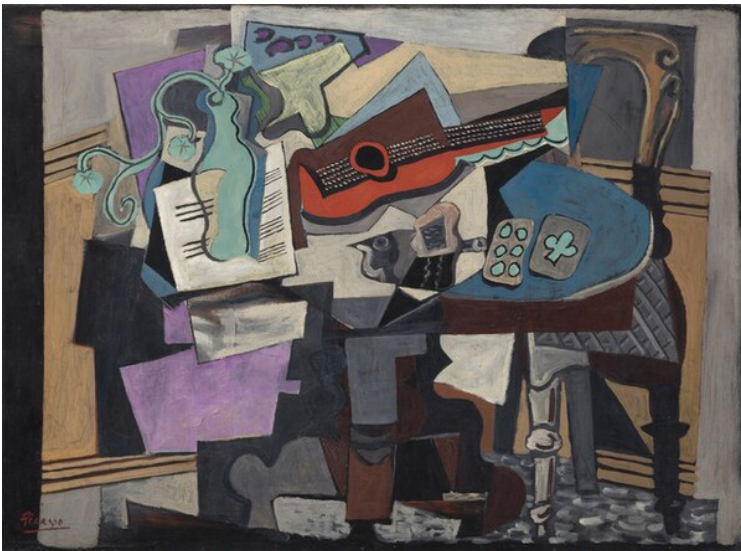


Figure 37  
Picasso: *Still Life*. 1918





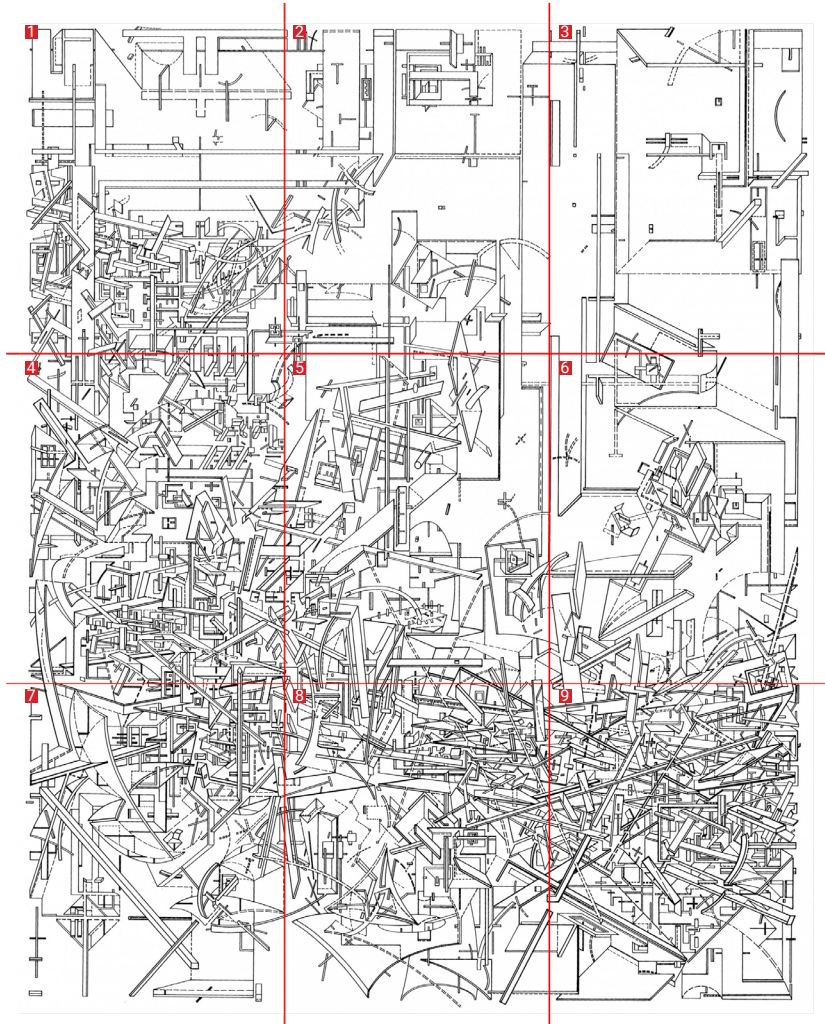
Robin Evans positions *Micromegas* as a class of synthetic cubism, one of two cubism divisions. Analytical cubism is the other, but it came before synthetic cubism. Picasso initially explored an analytical cubism style that dissects an object viewpoint-by-viewpoint resulting in a fragmented image of multiple viewpoints to describe the entirety of an object. *Still Life* by Pablo Picasso in 1918 (figure 37) is a prominent example of such a technique and used a simplified colour palette to avoid distracting the viewer from the structure of the form and abstraction. Synthetic cubism is a later phase of cubist painting that explored the collage by adding textures and patterns to their paintings. Synthetic cubist paintings have been referred to as “architectonic” and “abstract” by Henry-Russel Hitchcock as he views them to be concerned with the subtle complexity of spatial relations.<sup>62</sup>

One may say that *Micromegas* finds itself somewhere between the two classes as there are techniques that Libeskind has adopted from both. This continues a narrative of contradiction that begins with the title and feeds through to the drawing contents. The black radiograph drafting ink on the white paper exposes the geometry and removes the distraction of textures and colour, a technique more often used in analytical cubism. However, it may be clear that Libeskind isn't trying to describe a total object by dissecting it viewpoint-by-viewpoint. Instead, he is stitching together fragments that could be seen as architecture, furniture, and machines. This stitching and overlapping of objects and planes could represent some city or network. Visually, it reminds me of the makeshift structures and arrangement of favelas or a machine that has exploded into thousands of smaller pieces.

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62 Blau, E., Troy, N. and Cottingham, D., 1997. *Architecture and cubism*. Montreal: Canadian Centre for architecture. Pp.2

Figure 38  
Micromegas: *The Garden*



## Micromegas

It is hard to define what can be seen when looking at the Micromegas drawings as total drawings; instead, zooming into smaller segments might unveil more recognisable characteristics. To begin with *The Garden* (figure 38), the composition of the drawing could be more easily understood when broken down into nine segments. Here you can see segments of the drawings that have different types of two and three-dimensional qualities. As shown in figure 39 some areas are more straight or curved and dashed lines, which could be seen to have more qualities of maps or diagrams describing boundaries, arrangements, and pathways. Dashed lines could indicate movement ranges, partial or transparent boundaries such as glass, or edges that are not directly visible in the drawing plane. While solid lines may indicate a more definitive boundary or separation between spaces. Unlike Chamber Works, these lines close making bodies, enclosing areas, and marking paths. Larger patches of white space often accompany this more simple line work to give the line work some breathing space. Typically, these examples are to the outer edges of each drawing and give focus to the more chaotic and detailed clusters of line work towards the centre. These areas could be interpreted as the suburbs of the city.

Figure 39

Micromegas: *The Garden* (top right corner) - straight, curved and dashed lines, which could be seen to have more qualities of maps or diagrams describing boundaries, arrangements, and pathways.

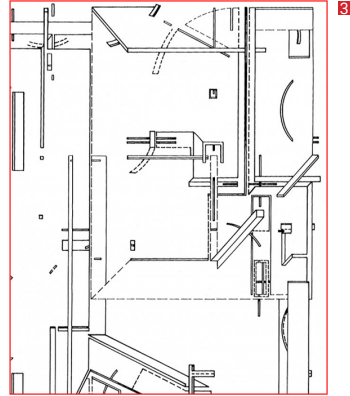


Figure 39.1

Authors edit of: Micromegas: *The Garden* - zoomed and coloured - line work develops into three-dimensional forms such as cubes and cuboids

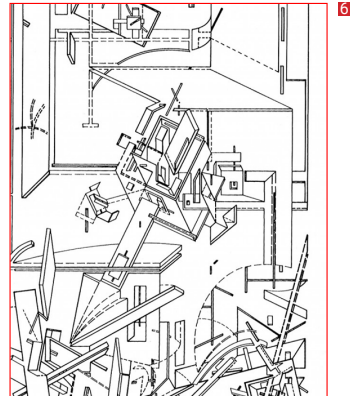
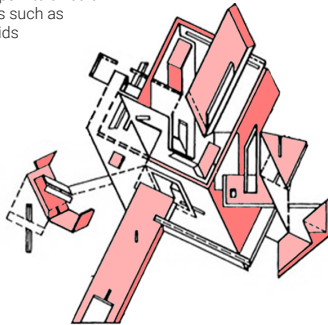


Figure 39.2

Authors edit of: Micromegas: *The Garden* zoomed and coloured - overlapping and layering of planes become highly complex and look as if there is some explosion

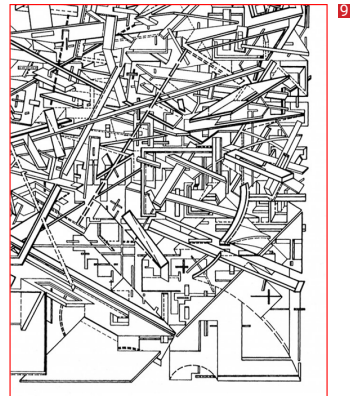
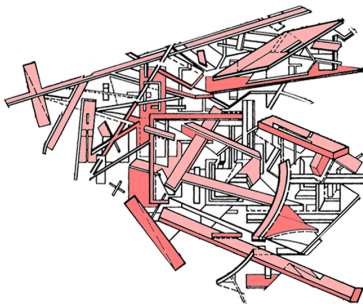


Figure 39.1 takes a segment where you can see how the line work develops into three-dimensional forms such as cubes and cuboids. One would associate these shapes with architectural features such as walls, floors, windows, and furniture. Here you can see how Libeskind explores the qualities of cubism to make the viewer question the orientation and direction of shapes and forms. He makes it impossible to distinguish the front from back, left from right, and up from down. However, it is clear that closed geometries are defining planes and solid objects that are rotating, extending, folding, floating, and exploding. These surfaces and planes are indicated with different shades of red in figure 39.1. The simpler line work gradually becomes more three-dimensional and more cubist as it moves across the page. The bottom right corner of *The Garden* (figure 39.2) shows moments where the overlapping and layering of planes become highly complex and look as if there is some explosion.

It visually reminds me of the work of Cornelia Parker and, more specifically her project *In the Cold Dark Matter: An Exploded View* (figure 40). This project suspended household objects and burnt wooden shards from an exploded garden shed. A single light bulb in the centre cast shadows across the surrounding walls and created a dramatic layering of shapes. While Libeskind doesn't use shadows, there are similarities in his composition and suspension of fragments. These more intense areas of geometry could be interpreted as the inner city. *Time Sections* (figure 41) has very similar characteristics and recognisable fragments as indicated in figure 41.1. Here there are cylinders that look like more recognisable pieces of machines. This could be seen as a kind of piping or wiring network. This, however, is an example that has shifted to horizontal and has a slightly different scale. This subtle change in scale happens throughout all ten drawings and could represent the other size cities that Voltaire's Micromegas visits. Cities of different densities, arrangements and infrastructures.

Figure 40  
Image of: *In the Cold Dark Matter: An Exploded View* by Cornelia Parker



Figure 41.1  
Authors edit of: *Micromegas: Time Sections* - zoomed and coloured - three-dimensional forms such as cubes, cuboids and cylinders - looks machinic

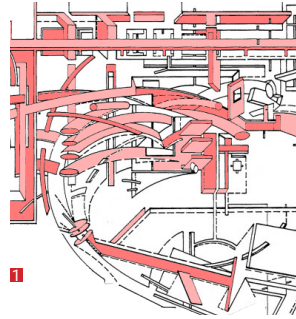
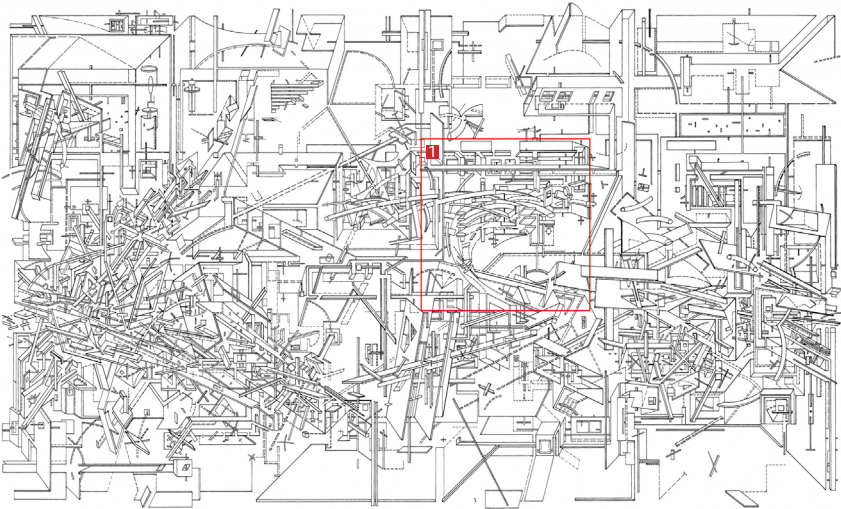


Figure 41  
*Micromegas: Time Sections*



*Leakage* (figure 42) is an example that stands out to me as it contains a quality that is slightly different from the rest. As shown in figures 42.1, and 42.2, Libeskind uses a hatch to define a surface. Often this hatch has a shadow-like quality that describes how a surface may have a bend or a change in direction. Figure 42.1 contains examples of hatches made from a repetition of lines in either equal or uniformly increasing intervals. These are not examples previously described by Wassily Kandinsky as this is not an example of rhythm; alternatively, it could define a bending surface. *Leakage* is where most of the drawing is consumed by the explosive geometries as previously described, and has only small pockets of white space towards the edges of the drawing. This could represent a more dense city or network. *Little Universe* (figure 43) is less crowded and dense, which could reflect the name 'Little' Universe, while *Maldoror's Equation* (Figure 44) is arguably the densest and most chaotic of the drawings.

Finally, *Vertical Horizon* (figure 45) is the easiest to critique due to the reduced geometry density and their being more obviously vertical or horizontal-orientated planes and surfaces. Generally, I associate vertical-orientated planes with walls and structures that extend above the ground and into the sky. This reminds me of vertical architecture, such as skyscrapers, office buildings, and residential complexes. At the same time, horizontal-orientated planes would be associated with floors and platforms to stand on. These horizontal planes seem floating, hung or supported above ground level. An example is highlighted in figure 45.1; when the drawing is rotated ninety degrees, there seem to be parallel planes that could be seen as floor levels in a building. Between these parallel elements seem to be column-like or structural-like fragments and cuboids.



Figure 42  
Micromegas: *Leakage*

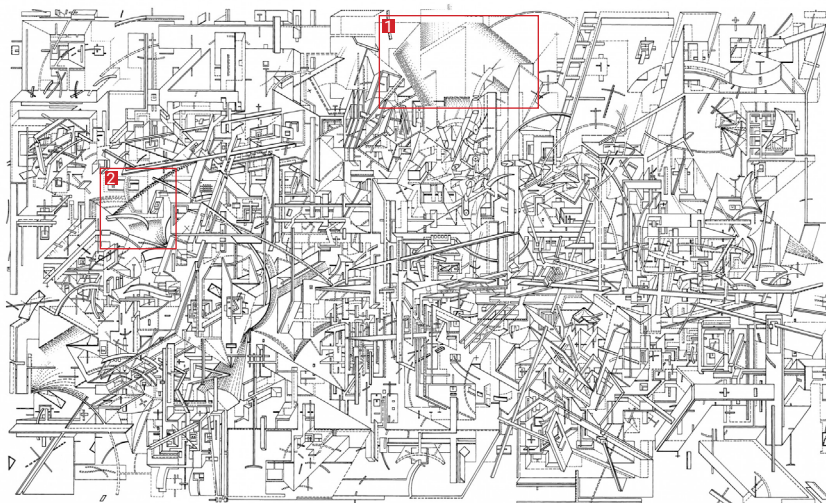


Figure 42.1  
Micromegas: *Leakage* - zoomed  
- example of hatch that has a shadow-like  
quality which could describe how a surface  
may have a bend or a change in direction.

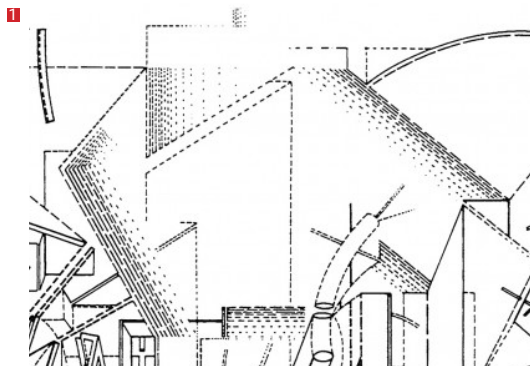


Figure 42.2  
Micromegas: *Leakage* - zoomed  
- example of hatch that has a shadow-like  
quality which could describe how a surface  
may have a bend or a change in direction.

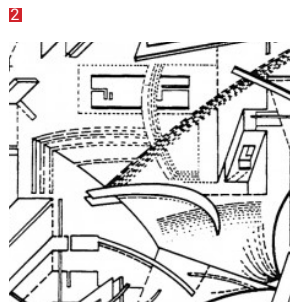




Figure 43  
Micromegas: *Little Universe*

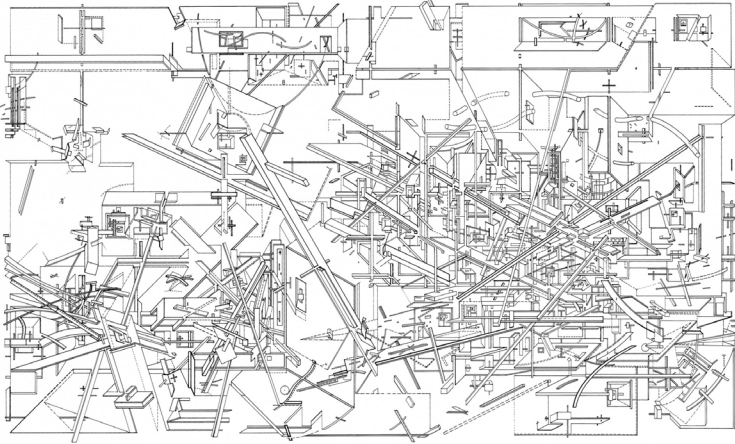


Figure 44  
Micromegas:  
*Maldoror's Equation*

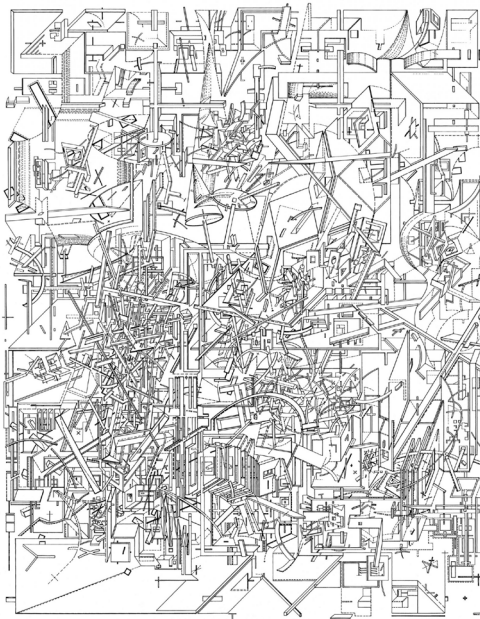


Figure 45  
Micromegas: Vertical Horizon

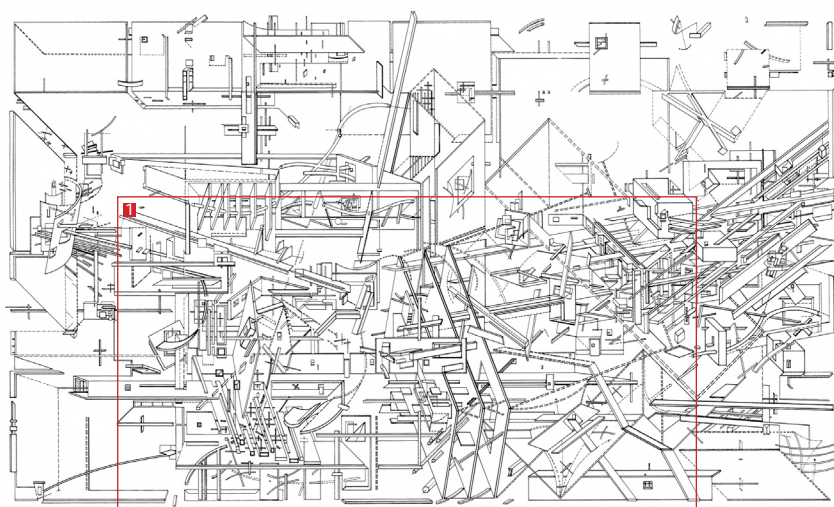
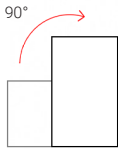


Figure 45.1  
Micromegas: Vertical Horizon  
Rotated and coloured



Parallel Horizontal  
planes that look  
like floor levels of  
a building. Vertical  
fragments could be  
seen as columns or  
supports

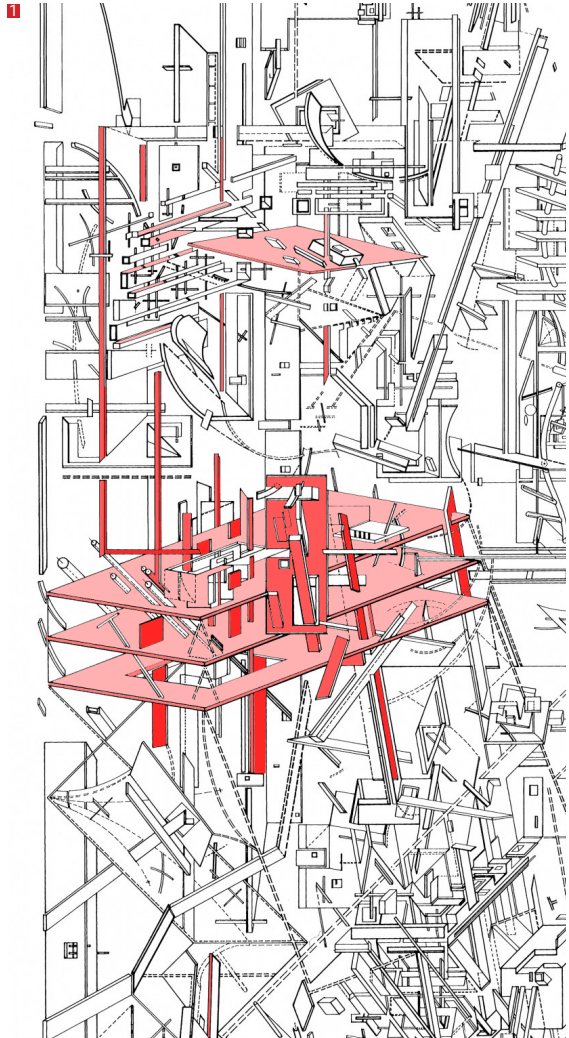
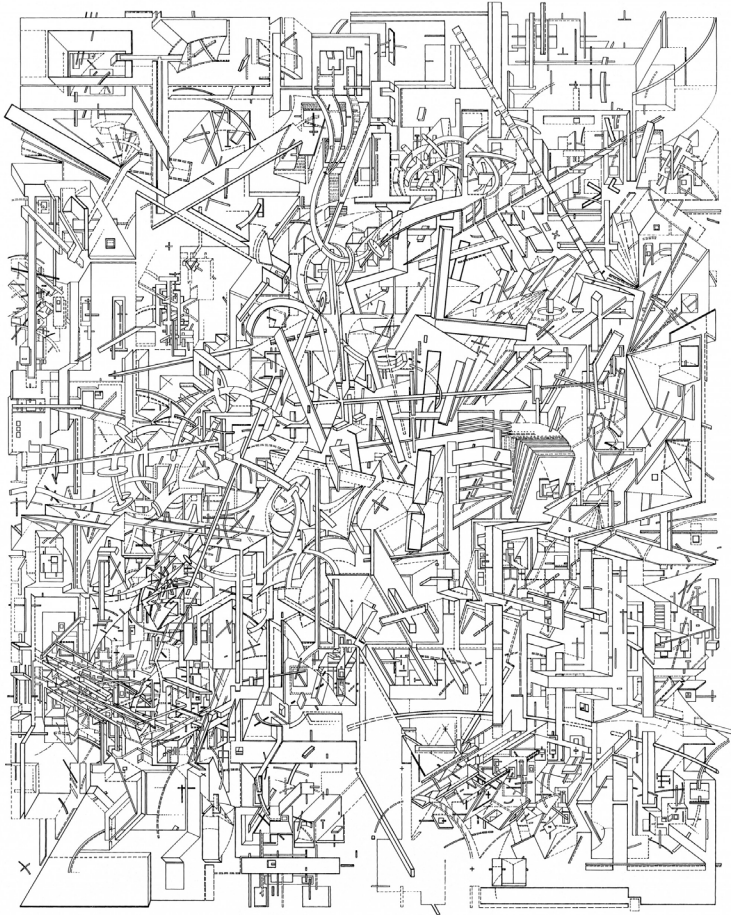


Figure 46  
Micromegas: *Dream Calculus*



Inevitably, Libeskind is heavily leaning into the qualities of the axonometric and isometric types of drawing. This helps Libeskind to explore a science-fiction interpretation of architecture and cities. In *Micromegas*, Libeskind utilises cubism to explore the intense relationship between geometric structures and the possibility of formalisation. Libeskind describes his use of axonometry as an expression of inadequacy at the heart of perception and isolates the structural essence whose manifestation is in two dimensions that illuminates the subsystems of projection.<sup>63</sup> By pushing the boundaries of perception and exploring fictional architecture, Libeskind creates an experience for the viewer to imagine space without organisation or structure. An experience that Libeskind describes as a spontaneous appeal.<sup>64</sup> It may be clear that Libeskind utilises cubism to explore such visual experience through drawing. Axonometry allows Libeskind to examine an "inner life of geometrical order"<sup>65</sup> because of the axonometric ability to fluctuate between two and three dimensions. This is a similar experience explained by John Hejduk, who adds that:

*"[...] there is no exit; no escape; from the time... the time it takes to penetrate. Our minds are shattered by the involvement. There is no protection for our eyes... we are simply drawing into... to a mysterious; a phenomenological; ... a profound new vision."<sup>66</sup>*

*Micromegas* is a cognitive adventure, the adventure of Voltaire's *Micromega* character in the story.

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63 Libeskind, D. and Hejduk, J., 1981. *Between zero and infinity*. New York: Rizzoli International Publications. pp.81

64 *Ibid.* pp.81

65 *Ibid.* pp.81

66 Boyarsky, A., 1980. *Daniel Libeskind End Space*. London: The Architectural Association. Pp.6



Daniel Libeskind is a valuable case study in questioning the role of drawing in architectural representation due to his challenges to the conventions of representation. This study presents just two examples of Libeskind's works but gives an insight into the methods deployed in pushing the boundaries of architectural representation. During the years between 1978 to 1985, in a post-modern world, Libeskind may have looked to early modernism for inspiration. Libeskind is deploying a similar evolutionary architecture approach by exploring tactics previously investigated by Le Corbusier. Exploring pre-modern tactics was a trend amongst architects of the time as Zaha Hadid emerged through her explorations of constructivist geometry. She developed an architectural aesthetic that took elements of the anti-gravitational space of Russian avant-garde. Through the investigation of linear expression and ploys of cubism, maybe Libeskind is reappropriating the revolutionary tactics of the twentieth century.

The discussion introduces Goodman's theory of symbolism, which became a valuable account for identifying Chamber Works and Micromegas as not following the requirements of a system of notations. Goodman refers to a musical score as a perfect example of a notational system as it is more of a codified instruction that doesn't visually represent the sound of the music and instead states the notes to be played at the correct pitch and time<sup>67</sup>. This differs from architecture as, generally, the architectural drawing represents what it describes. In the case of Chamber Works, Libeskind is doing neither. Instead, it seems that Libeskind is interpreting the works of Kandinsky by exploring the expressive nature of art and building a visual relationship between architecture and music. While Micromegas has a kind of audibility in its chaotic complexion, it draws on the tactics of cubist art by conflicting two-dimensional and three-dimensional space. During my analysis, Micromegas became more structured and carefully composed than how they first appeared as there are recognisable features of architecture, machines and furniture. To Libeskind, Chamber Works and Micromegas may be instruments capable of revealing new areas of reality.

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67 Goodman, N., 1976. *Languages of Art: An Approach to a Theory of Symbols*. 2nd ed. Indianapolis: Hackett Publishing Company, Inc. pp180-181



Arguably these drawings serve no purpose except playing a cognitive experience of creating spaces that are neither physical nor poetic. They are examples of Libeskind's work that seek a realisation while also tapping into the impure side of imagination.<sup>68</sup>

Both drawing sets, never refer to anything specific or indicate a full-built form, these types of drawings are described by Sonit Bafna as imaginative. Bafna feels that the imaginative mode allows observers to make judgments without the presence of a building, and "their relationship to the built work is more like the relationship of a preparatory sketch of a painting to that of the actual painting, rather than that of a musical score to its performance."<sup>69</sup> By Goodman's logic of notation, the imaginative type of drawings would be neither scores nor scripts but instead a sketch, that of depiction. The distinction between drawings that specify and depict has had a continued conversation between writers. In describing depictive seeing, Richard Wollheim used the term 'seeing-in', which defines the experience of seeing figures within a picture despite knowing that they are just marks on a surface. The reading of pictures differs from readings architectural workings, as the viewer of pictures has a 'natural perceptual capacity' rather than when reading architectural drawings; they rely heavily on pre-specified conventions.<sup>70</sup> This kind of definition is echoed by Kendall Walton, who deems "depictive representations as graphical entities that can be used as 'props in perceptual games of make-believe.'"<sup>71</sup> One could argue that both Chamber works and Micromegas are examples of imaginative modes of representation as they encourage the experience termed by Wollheim as 'seeing-in'. By openly challenging the object-like nature of architectural drawing, Libeskind is creating an experience that is beyond the surface of the drawing. This may explain why Libeskind, Forster and Eisenman suggest reading the drawings.

Previously, it became clear that Libeskind was drawing on the methods of Picasso and Braque, which placed Micromegas in the class of modern art. However, in these particular works, one can identify

68 Cezary, W., 2015. *Practicing Theory. Concepts of early works of Daniel Libeskind as references for real architecture*. [online] ResearchGate. Available at: [https://www.researchgate.net/publication/278685172\\_Practicing\\_Theory\\_Concepts\\_of\\_early\\_works\\_of\\_Daniel\\_Libeskind\\_as\\_references\\_for\\_real\\_architecture](https://www.researchgate.net/publication/278685172_Practicing_Theory_Concepts_of_early_works_of_Daniel_Libeskind_as_references_for_real_architecture)

69 Bafna, S., 2008. *How architectural drawings work – and what that implies for the role of representation in architecture*, *The Journal of Architecture*, 13:5, pp539

70 *Ibid.* pp540

71 *Ibid.* pp540



recognisable fragments of architecture. Therefore, Libeskind may also be referring to methods deployed in the relations between cubism and architecture, which was revolutionary in the early twentieth century by contradicting what architecture should look like at the time. Cubism has a history of relations with architecture that stems back to the early 1920s. Later in 1941, Sigfried Giedion was the first to posit explorations of cubism and architecture in his book *Space, Time and Architecture*. The idea shared by artists and architects was that cubism forged a vital link between avant-garde practices in early twentieth-century painting and architecture. Giedion documented that:

*"[...] embodying in their non-perspectival spatial compositions a new perception of space in terms of time, or 'space-time' marked by planarity transparency, and multiple viewpoints".*<sup>72</sup>

He believed the spatial innovations of the Bauhaus building that explored "hovering vertical grouping of planes and extensive transparency that permits interior and exterior to be seen simultaneously" were conscious decisions made by Walter Gropius to find cubist space in architecture.<sup>73</sup> However, for Giedion, cubist painters exercised a "device of simultaneity"<sup>74</sup> and "transparency of overlapping planes,"<sup>75</sup> which he felt was the core of the architectural project of the modern movement in Europe in the 1920s.

During the early twentieth century, Le Corbusier exercised both modes of expression and explored relations between pictorial experiment and architecture. In the article '*Le Purisme*', Ozenfant and Le Corbusier wrote:

*"Space is needed for architectural composition; space means three dimensions. Therefore we think of the painting not as a surface but as a space."*<sup>76</sup>

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72 Blau, E., Troy, N. and Cottington, D., 1997. *Architecture and cubism*. Montreal: Canadian Centre for architecture. Pp.1

73 *Ibid.* Pp.1

74 *Ibid.* Pp.2

75 *Ibid.* Pp.2

76 *Ibid.* Pp.196

Figure 47  
Scan taken from *Architecture  
and Cubism* - Le Corbusier,  
Villa Besnus

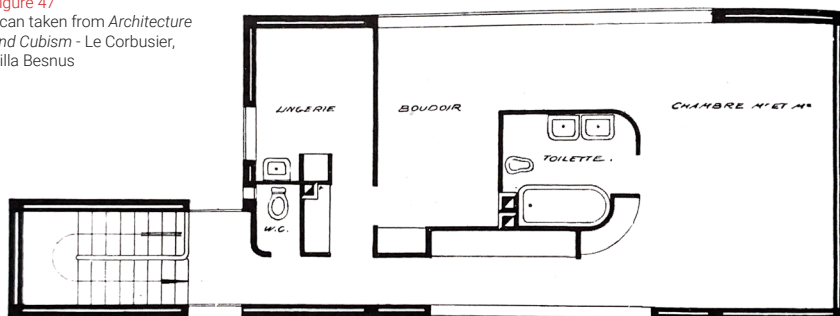


Figure 48  
Image of: Le Corbusier, Villa Besnus



Purist painting explored the concept of space through studies that aimed to no longer refer to objects but to only their forms. Typically, the arrangement of objects in these paintings does not conform to the natural features of perspective and opposes compositional strategy. In Le Corbusier's studies for *Still Life with Stack of Plates and Book 1920*, he plays with an axonometric projection where objects seem to float and reach out to the viewer. In this case, axonometry is a feature of cubism, as discussed earlier in detail, creating an illusion that opposes our habits of perception by exploring more than one viewpoint. To draw parallels between Le Corbusier's paintings and the architecture of this period, his purist paintings were not constructed to satisfy a single viewpoint, which continues in his architecture<sup>77</sup>. One of Le Corbusier's first architectural projects, Villa Besnus at Vaucresson, was designed for no single viewpoint. Through rounded corners, a centred toilet, a lack of doors, and horizontal and strip windows, one must discover the interior through partial, restricted views.<sup>78</sup> There is no single viewpoint, and it is anti-perspectival. An architectural promenade is an example that permits one to view the architecture over time, bit by bit, and the perspectives evolve. Le Corbusier was at the forefront of this cubist approach that contradicted what architecture was supposed to look like at the time. He wanted to create his style of cubism following the creation of his paintings that paid attention to the evolution of various spatial and compositional devices.<sup>79</sup>

When discussing the relationship between painting or drawing and architecture, there are apparent differences in the use of the medium. A painting's space is virtual and defined by the flat surface of the medium; in contrast, architecture requires multiple views from categorically different viewpoints in real time to understand. The disadvantage for architects is that they work through an intervening medium, unlike painters and sculptors who use sketches and maquettes closely related to the final product; drawing a building isn't.<sup>80</sup> It is obvious that while an architect works through drawing, they are hugely detached from the physical built work that is a consequence of their drawings. For many years of Libeskind's career,

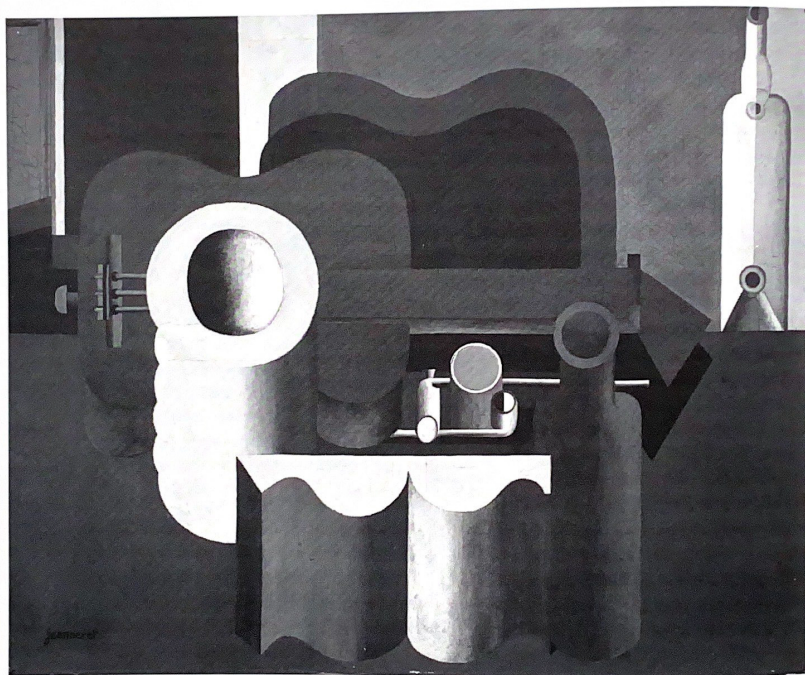
77 Blau, E., Troy, N. and Cottingham, D., 1997. *Architecture and cubism*. Montreal: Canadian Centre for architecture. Pp.202-203

78 Ibid. Pp.203

79 Ibid. Pp.202

80 Evans, R., 1997. *TRANSLATIONS FROM DRAWING TO BUILDING AND OTHER ESSAYS*. London: ARCHITECTURAL ASSOCIATION.

Figure 49  
Scan taken from *Architecture  
and Cubism* - Le Corbusier,  
*Still Life with Stack of Plates  
and Book*, 1920



this wasn't an issue as he purely explored architecture through drawing. This may have given Libeskind the license to exploit the physical confinement of the medium to push the boundary of architectural representation.

I believe he was aware of the fundamental issue of the drawing medium, which reduces three dimensions to a two-dimensional physical sheet of paper. The drawing is physically two dimensions and requires an extensive compromise for both the architect and viewer as paper immediately needs more ability to communicate a sense of dimensional complexity.<sup>81</sup> Paper or screen are mediums that require dimensions compression, so drawings with multidimensional qualities are automatically restrained by the medium that it lives on. So, for the viewer, it requires more work to grasp the three-dimensional qualities of a drawing. To communicate a set of drawings representing a projection of a building, layering, separation of data, multiplying images, colour, and narratives of space and time are methods of improving data communication. Through micro and macro representation, there can be an organisation of complexity and detail to deliver the simplicity of an idea. However, as concluded, Libeskind is exploring drawing as a detachment from built architecture and does not need to specify the communication of the drawings. It may therefore be evident that Libeskind is using the medium to his advantage to create ambiguity and to make for a much deeper reading into his drawings. He doesn't want his drawings to be understood; he wants the viewer to question and interpret them while providing clues. This is a strategy John Hedjuk appreciates by stating that "although on a two-dimensional sheet of paper, the implied vacuum is understood to be a spherical ground; a semi-sphere. As in film, the space is three-quarter depth".<sup>82</sup> A simple black-and-white colour tactic simplifies the information so that there is a complete focus on the line work. It almost draws the viewer into the drawing's line work, which one can begin to imagine as space. Coming full circle, this tactic deployed by Libeskind lends to the thinking of Richard Wollheim and Kendall Walton about depictive seeing and imaginative representation.

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81  
82  
Pp.6

Tufte, E., 1998. *Envisioning information*. Cheshire, Conn.: Graphics Press. pp.15  
Boyarsky, A., 1980. *Daniel Libeskind End Space*. London: The Architectural Association.

Figure 50  
Image of: Jewish Museum by  
Daniel Libeskind



Figure 51  
Image of: Jewish Museum by  
Daniel Libeskind



Ultimately, Libeskind's drawing explorations offer a profound alternative to how architects use drawing in architectural representation. I believe that in exploring forms detached from function and void of visual architecture, Libeskind introduced an experience of imagining architectural space rather than defining it. This type of exploration led to Libeskind producing drawings that held multiple meanings that the readers could interpret themselves through various references. This was a radical move from Libeskind, as previous drawings were produced for client-programmed spaces and to represent the project based on the client's intentions. Libeskind achieved success because of his detachment from built architecture and his pure pursuit of architecture through drawing. This begs the question of whether Libeskind's drawing process would alter the production of drawings for built architecture.

During the many years of drawing, he seemed to have developed an understanding of architecture's psychology and emotional experience, which is now a prominent feature of his built work. Namely the Berlin Jewish Museum, which exhibits the social, political and cultural history of the Jews. It explicitly presents the impact of the Holocaust through the design of the building as an experiential piece of memory and acknowledgement. The building is designed based on zig-zags and voids, which are prominent features of the drawings analysed in this dissertation. Libeskind has since explained that the building is based on an unwritten piece of music and includes musical ideas related to opera.<sup>83</sup> The Berlin Jewish Museum is an example of built work with many qualities seen in Libeskind's drawings explored many years before the Jewish Museum was commissioned. Libeskind investigates intertwining geometries, complex line work and figurative forms throughout his built work, almost as if his avant-garde approach to architectural drawing inspires his built architecture.

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83

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