

# Heisenberg and Music

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The place where some people turn to religion is where Heisenberg turns to music. This remark, made by a friend of mine, is so vague and yet so fitting that I have never been able to put it out of my mind. Now it will serve as a point of departure for my reflections on the significance of music in Heisenberg's life.

The author of the remark, a Greek man, hardly knew Heisenberg, had probably only heard about him through some mutual friends and then read the newly published autobiography *Physics and Beyond*. Perhaps he had only chosen the phrasing of this remark because he happened to be in a circle of religious skeptics and lovers of music. I, however, immediately saw in my mind's eye the very concentrated, yet never tense gaze of my father whenever he was playing music, or the inward, luminous face when he was gripped by some piece and unable to find the words for it. Undoubtedly, there was some music that would touch aspects of his being that were beyond communication, but were a true source of strength for him — the very aspects that lead others to religion?

In my reflections, I will make use of my personal recollections and of statements he himself has made. From among the many publications, his autobiography and the text written in 1942, and published posthumously under the title *Ordnung der Wirklichkeit*

(*Reality and its Order*) are the most revealing ones. In addition, there are many as yet unpublished letters of the young Heisenberg to his parents and also from his circle of friends, all of which allow a glimpse into the very lively “musical part” of his life.

## **1 Music at Home**

In my memory, our parental home was always filled with music: piano playing of my father, joint music making of my parents, simultaneous practicing of the children in their various rooms, playing music together with friends of my parents and with our own friends, and small and large house concerts on the occasion of small and large festive events. My mother loved to sing and sang well, and my father would accompany her singing Löwe Ballads and Schubert Lieder. When we were little, we were lulled to sleep by my father’s nightly practice of scales and finger exercises. Later on, this nightly practice would often lead to playing music with the older children.

It is probably foremost my mother’s merit, that each of us was able to learn to play an instrument. She invested her entire pedagogical and creative energy in our musical education: from the very first beginning, we would sing together, then, at about age four, there was reading of music and playing the recorder, and, a little later, the practice sessions with our chosen instruments.

Motivation for these efforts (on her part and ours) came from making them into a present for our father for Christmas, for his birthday, or other special occasions. My mother’s diary notes at the beginning of 1946 that in happy anticipation of his return from the internment at Farm Hall, she was preparing a little concert. The children of ages eight, six and five and younger—and some friends were performing canons by Praetorius, Purcell,

and Schubert, old traditional songs, and short pieces for piano and/or recorder by Bach and Corelli.

The choice of instruments for my older siblings was definitely determined by my father's special preference for piano trios. So it is that the oldest, Wolfgang, learned to play the violin, and the next brother, Jochen, the cello. How much the children's own wishes may have played a role there, is not on record. But the choice was a sound one, with respect to joint music making: in most of the Haydn Trios, for instance, the cello part is so simple that even a beginner can enjoy ensemble playing, while the violin part demands a little more technical proficiency, but it is up to the piano to render the fullness and virtuosity of sound.

He took my two oldest brothers under his wings and trained them in regular, patient musical sessions to become his accomplished musical partners. In this way, he passed on all his love for music and forged a close bond with these sons. By the time they finished high school, he had initiated them into a whole repertoire, ranging from the Bach Trio Sonatas, and the Piano Trios of Haydn, Mozart, and Beethoven, to Dvorak, Brahms, and the most beautiful trio on earth (Schubert's B-Major), (as he once termed it in a letter to his parents, when he was still a young man).<sup>1</sup>

We younger siblings learned music through page turning. Here, however, it could happen that my father became impatient: if we turned too early, too late, or two (!) pages at once.

This was mostly true for the fast movements, for instance in Beethoven, when the two half-grown sons had chosen a more aggressive tempo to prove their prowess.

During this time, friends had quite often also joined in so that the piano quartets and quintets from Mozart to Schumann could be studied as well. Eventually, the boys started their own ensembles

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<sup>1</sup>2-14-1930

independently: for some time the London Trios by Haydn with the flutist brother, Martin, became a Sunday musical staple, later there were Mozart flute quartets or string quartets with friends. Much later still, even the little sisters were summoned to play in the larger ensembles, such as the Brandenburg Concertos by Bach. Then you could quite often see my father in the audience with a happy expression on his face.

Highlights of this house music were the performances of the Bach motet *Jesu meine Freude* and the cantata *Weichet nur betrübte Schatten*, or on the occasion of my father's 60th birthday the *Sinfonia Concertante* in E-flat Major and the Piano Concerto in D-minor by Mozart, played with a full orchestra of friends. Every one of the participants practiced and prepared and my mother would contribute a festive house and great meals.

## **2 Heisenberg's Musical Development**

### **2.1 Family Context**

Through this musically demanding playing within the family, my father was continuing a tradition that connected him closely to his own family of origin.

Hanging in his study was the portrait of an ancestor, August Zeising, his mother's great grandfather that she had treasured ostensibly by keeping it safe throughout the war in order to pass it on to her heirs, together with a brief record of his life. In his day Zeising had been a very renowned violinist; his daughter, Lina, describes him in the following account: he was an artist in the full sense of the word, living only for the senses; he played the violin with passionate enthusiasm and fire, as well as deepest interpretive powers, and his playing was not only distinguished by the greatest technical skill, but his soulful presentation was

saturated with deep emotion which would enthrall his audience. This ancestor was not only an artist but also an adventurer. After he had made a name for himself in his concert tours through Europe, he set sail to the West Indies, where he lived for eleven years in the most agreeable circumstances, partly giving concerts, partly teaching in the most illustrious families, always with distinction and honor until he returned home and started his family. My father always regarded this ancestor with a certain pride, although he hardly would mention anything about him to us children, aside from his name.

Parsimonious he was anyhow, when it came to “stories from the olden times,” about his childhood in Würzburg or about his father who died in 1930 from typhoid fever at age 61, long before we could have gotten to know him. August Heisenberg must have possessed a good and strong voice and sung even the most difficult arias with fervor. Soon young Werner was trained to accompany him on the piano, and in this way he grew up with the repertoire of German opera and Lieder.

That this music making was a shared joy, can be seen in a letter the 20 year old wrote to his father from Göttingen.

"Dear Papa! This is the first time that I have to write a letter to you for your birthday and that I cannot be there myself. And, unfortunately, it may well be that in the future this will not be an exception, but probably the rule. So you and I will have to get used to it, gradually, that we will send congratulations only from afar, and thus some special things are lost forever, for instance the chess games that Mama detested so much and the singing that I am missing here above all.<sup>2</sup> And, after a few sentences in defense of his new enthusiasm for the “youth movement,” he closes by comforting both his father and himself. But for now I

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<sup>2</sup>11-11-1922

am still able to come home, briefly, from time to time, and we can still continue our playing music together, and playing chess, and celebrating birthdays together, and so I am wishing you the best for your birthday, with all my heart! Your grateful Werner.”

This gratitude, uttered so unexpectedly in the closing, has its basis in the serene attitude towards life his father was able to transmit to him through music making or their talks. Reflecting on the father, taken so prematurely by death, he tells his mother of a luminescence that must have also brightened his own life: “When I think of Papa, then this remains foremost in my memory: that at times, all of a sudden, something would appear to be glowing about him, be it a happy little thing of no consequence, or be it the drawing of a connection in his science, or something quintessential in music. This sudden brightness was so important for our life in Munich of course it was also very important that your calmness and your even temper provided the necessary balance. But I could relate to this sudden glow particularly well and it meant a lot to me. Today I want to remember it with gratitude.”<sup>3</sup>

### **3 His Development as a Pianist**

At what age Heisenberg started to study the piano, is not on record. That he was a gifted musician can be concluded from the repertoire he built rather quickly in his younger years, as we can see in his letters to the family from 1918 to 1936: When he was 16 years old, and was working for several months on a farm in Miesbach in the context of the auxiliary war effort, (cutting trees, sawing lumber, and making hay), he had yet enough energy left to practice the Liszt Rhapsodies on the piano of the neighboring grange hall. He also studied a violin sonata by Grieg with the

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<sup>3</sup>11-20-1932

intent of performing it eventually for his father, together with his older brother, Erwin. On his 21st birthday he writes from Göttingen to his brother that he had played Chopin all evening there are some fabulous Preludes among them) and that he played for the first time with Max Born: “We played a Mozart and a Beethoven Piano Concerto on two pianos, that is, one piano took on the orchestra part. Especially the Beethoven Concerto — which was new to me — was incredibly beautiful.”<sup>4</sup> The last sentence indicates that he was able to sight-read these things. A letter from the following year states that the Mozart and Beethoven Trios are pieces long since familiar to him. In they ears 1932 to 1936 he studied several Beethoven Piano Concertos and learned them by heart as well. This was probably done under the tutorship of a piano teacher, since in 1927, after his appointment to the Faculty of Theoretical Physics in Leipzig, he had immediately acquired a piano and taken lessons again.

His teacher, Hans Beltz, was not unknown: he gave concerts in various places in Germany and seems to have had critical acclaim.<sup>5</sup> Beltz taught him a basic routine for practicing his technique and above all the theoretical foundation for a methodical access to music: cadenzas, bass line, counter point, sonata form, thematic development, analysis of a fugue, etc. This analytical work, in particular, aroused his greatest interest, since he now could detect in music mathematically structured principles not unlike those in science. Even representations of reality that are quite far removed from the exact sciences, such as music or the fine arts, reveal upon closer analysis manifestations of inner organizations that are intimately related to mathematical laws. These principles of organization can manifest themselves as distinctly as, say, in a Bach fugue or a symmetrical ribbon or-

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<sup>4</sup>12-6-1922

<sup>5</sup>See letter from 1-31-1936 to his mother: ... Hans Beltz is indeed my teacher, I am happy that he got such favorable reviews...

nament. Or they may initially simply arouse attention by a particular balance, an immediately accessible beauty of melodic line — always a closer analysis will reveal simple mathematical symmetries, similar to those that mathematicians are dealing with in group theory.<sup>6</sup> As an example of a melodic line full of immediately accessible beauty, he cites the famous secondary theme in the first movement of Beethoven's D-Major Violin Concerto, whose symmetry is easily recognized by looking at the notation in a piano score:



Fascinated by these mathematically structured principles, he must have given a talk about it to his colleagues. Unfortunately, however, it is not preserved.<sup>7</sup> He even made the attempt around this time to write a fugue of his own.<sup>8</sup> For these discoveries he remained indebted to his teacher throughout his life. That they were not merely a clever artistic game for him is revealed in his text: *Reality and its Order*. Here he talks of the act of making conscious the other, higher world which presents a challenge to us: This is also, particularly now in our own time, relevant to many people who do not belong to any religious community, and for whom there is an encounter with the other world for the first time in the sounds of a Bach fugue, perhaps, or in a flash of

<sup>6</sup>*Ordnung der Wirklichkeit* (Reality and its Order) in: Werner Heisenberg, *Gesammelte Werke* Bd.I, Piper Vlg., S. 227f.

<sup>7</sup>"On Monday I gave a talk to the eight gentlemen of our professor's corona, — part mathematical, part musical in content — and I had the impression that the others were also quite involved." (Letter to his mother)

scientific illumination.<sup>9</sup>

Ever since his studies with Hans Beltz, the finger exercises by C.L.Hanon<sup>10</sup> became the backbone of Heisenberg's regular, almost daily practice, either during the mid-day dinner break or at night. Here he displayed definitely a touch of stubbornness or as he might have termed it *Prussian discipline*. To him these finger exercises were more akin to meditation. The repetition of very familiar, mechanical sequences, coupled with a concentration on the tensing of the few necessary muscles in the back, arm, and fingers enabled him to leave behind the unrest and tension of daily problems and to return to something that he termed the connection to a central order.

From the sound of his scales, one could tell that Heisenberg was no virtuoso. Fluency was not his forte, but had to be worked at assiduously, and in his chord technique he reached certain limits which then spoiled his enjoyment of the trios of Brahms, Mendelssohn, and Schumann. Consequently, he never had a desire to acquire a Steinway grand piano with its brilliant sound, but he loved the mellow sound of the Bluethner grand that he had bought for himself from the Nobel prize money: this model came from the production series which had won Bluethner the first prize in the 1910 world exhibition in Brussels.

Heisenberg's great skill was his soft, sensitive touch, very suited to chamber music ensemble playing and to the unadorned emotional depth of slow movements. He was able to bring out the songlike quality in a theme, making it resonate, and also to chisel out the underlying structures to their full clarity. His heart belonged to the slow movements, and here he could open up. There is half a sentence in his autobiography that describes his first

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<sup>9</sup>Reality and its Order op. cit. p.296

<sup>10</sup>The Piano Virtuoso 60 Exercises for Fluency, Independence, Strength, and Totally Even Training of the Fingers, as well as Suppleness of the Wrist.

and for him so decisive meeting with his future wife. In its reticent brevity it expresses perfectly what music meant to him. He writes: "...and the slow movement of the Trio (Beethoven, G-Major) was on my part already becoming a continuation of the conversation with this listener."

## 4 Playing music with others

Music was communication to him a means of understanding that is closer to his heart than science and technology.<sup>11</sup> He makes the following statement in a letter to his parents from Copenhagen, a place he did not easily grow accustomed to: "tonight I am going to play Beethoven Cello and Piano Sonatas with a young physicist. That will be great. It is really impossible to live without music. But when one listens to music, one sometimes arrives at the absurd idea that life might have meaning."<sup>12</sup> Music became Heisenberg's medium for the numerous and diverse friendships that unfolded in his life.

Wherever he went, he would seek out and find opportunities to play with others, friends and colleagues alike. In his letters to his parents he gives accounts of music making in Leipzig and Berlin, with Max Born in Göttingen, and with the Bohrs in Copenhagen, or on his trip to America in 1929 with colleagues in Boston and Montreal. Because his love of playing was coupled with experience and a reliable technique, he found his musical partners even among professionals: In Berlin, he played with the violinist Karl Klingler, the founder of the Klingler Quartet, renowned for its brilliance of sound and its virtuosity.<sup>13</sup> During the Göttingen

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<sup>11</sup>cf. Werner Heisenberg *Physics and Beyond, Encounters and Conversations*, Harper and Row, 1971 p.18

<sup>12</sup>3-27-1924.

<sup>13</sup>Verbal communication from Helmut Rechenberg.

years, after the war, he played with young musicians from the local Symphony Orchestra. In Munich, he became friends with the violinist Denes Zsigmondy.

As a kind of final glory to this long musical life, the Bavarian Radio Orchestra fulfilled his 70th birthday wish to let him play a Mozart piano concerto for once in its original orchestration and with professional musicians. It was not about succeeding in a new career as soloist, but rather he was tempted by the opportunity to participate in, what he termed in the autobiography the work of reinterpreting and conscientious attention to detail,<sup>14</sup> so that the thoughts and thematic content of the kings of music such as Bach or Mozart could be captured and rendered. When he was told that the concerto he would be playing was then also to be broadcast on the radio, he was shocked and tried to prevent it. He had no illusions about his limited abilities as a pianist. And I can remember him confessing, somewhat embarrassed, after the first rehearsal with the conductor, that, well, he would have to go back to practicing quite a bit, since he had had no idea that two hands could be playing quite so simultaneously. And yet his playing was a joy even to these accomplished musicians because Heisenberg's art of the subtle tones moved them.

It must be said that such high musical expectations came about only towards the end of his long and rich musical life. In his early years, when he had turned to the youth movement, he and his new friends participated with unselfconscious enthusiasm in the rediscovery of traditional music and in the preparation of classical literature for the untrained and uninitiated, all within the framework of the newly started movement for adult education. Later, in his autobiography, he would call these activities amateurish in the extreme,<sup>15</sup> but his early letters do reveal how much

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<sup>14</sup>*Physics and Beyond*, op. cit. p.23.

<sup>15</sup>*Physics and Beyond*, op. cit. p.54.

fun he had with this unencumbered music making:

On Saturday an incredible evening came my way: “My landlord had asked me to play music with him in the ‘Tannenkrug’ (where good food would be available too).” This Tannenkrug is a remote hunting cabin, forty five minutes outside of Göttingen. Upstairs was a strange assembly of people, musicians, doctors, merchants, high school professors, railroad civil servants, craftsmen etc. between the ages of 25 and 70. In line with this strange company was their weird program. One time this person would play, the next time someone else. If someone got bored, he left to go out into the lovely winter night. Inside, everything imaginable would be played, starting with the foxtrot to the Larghetto from Beethoven’s 2nd Symphony. The latter was really beautiful, however. Violin, cello, harmonium, and piano playing together, everyone a good musician.<sup>16</sup>

Another letter describes a meeting of the scouts in Berlin:

In the evening the scouts from Berlin whom I knew were invited, and because us four Bavarians were present, we proceeded to have a “rather Bavarian” evening with the most incredible impromptu verses of nonsensical singing (Schnaderhuüpfel), with yodeling, etc. and had the greatest lark. The next morning it rained cats and dogs. In the afternoon we played some music, sang and were otherwise very lazy. To compensate for this laziness, however, I have been underway since very early yesterday morning, without any break or sleep. We were traveling with two other Berliners in the direction of Zossen and made it a real “trip.” One played the violin, Heini the flute, I the guitar, and we sounded terrific together.<sup>17</sup>

It is likely that he needed the impetus for such musical jokes from others. Vis-à-vis us children he would claim that he could not sing, and when we would sing Advent songs together, he maintained his silent delight in listening, making requests for his fa-

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<sup>16</sup>11-29-1923.

<sup>17</sup>11-20-1922.

favorite carols. But when the right mood would strike him, he was known to whistle even complicated melodies, and once in a while he would actually offer a yodel.

I have already mentioned the degree to which music was the common bond between him and his wife, Elisabeth. During her student years in Freiburg, she had been part of an international circle of friends founded on the idea of a community through the creative strength of music.<sup>18</sup> It had gathered around Olga Westphal who taught music at the private school "Birklehof." Here one organized music weeks, Bachfestivals, and joint Advent singing, and very quickly Heisenberg was most sincerely invited to join in. Olga Westphal told Elisabeth Heisenberg:

Today, as we laughed sic! our way through the plans for the duck and garden music week from 8- 21st to 8- 27th or 28th, we decided to ask if you and your husband wouldn't like to join us "as either doers or listeners"! We will be about 11 or 12 people so that there is a decent orchestra; 2 Brandenburg Concertos are on the program, also lots of vocal music, string quartets too, and finally the Musical Offering which we plan to do in its entirety. Meals will be eaten outside; lounges are waiting for the tired folks; some of the music will be played outside too; there will be hikes in between; one can move about as one pleases!<sup>19</sup>

In this circle, one could trust one another and exchange non-conformist political opinions during the difficult years of the national socialist dictatorship. The letters of Olga Westphal, this motherly friend, written to Elisabeth Heisenberg and her husband are of a worrisome directness despite all their noticeable caution. They give an impression of the fundamental insecurity and search for direction which only in the rarest of cases people articulated in as straightforward and unequivocal a voice as those who know the horrible outcome are demanding these days.

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<sup>18</sup>cf. Letter from Olga Westphal, 11-15-1939.

<sup>19</sup>8-9-1938

Dear Elisabeth! Today I received a lengthy letter from Mieke about her birthday in which she tells me, she's off to see you for a weekend invitation, and that Wolf Jaeger is quite excited too, and that you were preparing a Bach festival! How much this delights me! Simply enviable!... Yes, in the meantime all of us have probably been through a lot of difficulties, right? Today I had the first ray of hope; someone had returned, some acquaintance, and from other sources too I am hearing of a family's father who had returned home!<sup>20</sup>

And four weeks later:

Dear Mr. Heisenberg! You have written me so very kindly, and I want to reply to you that your visit made clear to me the ardent need of young people to have manly advice, and some untainted guidance! How are they expected to cope in this chaotic time; how to stay clean, when they are surrounded by lies and cowardice! All of them would have had so many more questions — unfortunately your visit was much too short! Please come back, when and if your time ever allows our woods and our music are always there for you!<sup>21</sup>

It is obvious that these amateur music retreats in peoples homes were nothing like a hiding out in an ivory tower, but provided the participants orientation and support and then during the horrors of war some vital comfort. Of a concert in Hechingen in late February of 1945 at which Heisenberg was the accompanist for every piece on the program, we have a newspaper account.<sup>22</sup> It shows distinctly how the effect of such music making cannot be over-estimated:

In reverential silence, deeply gladdened to the core, the listeners were receiving these lovely gifts. In a time filled with fighting and sorrow, we were allowed a glimpse of a better world, one that is an inalienable and indestructible possession that nobody can take

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<sup>20</sup> 11-24-1938.

<sup>21</sup> 12-22-1938.

<sup>22</sup> Newspaper clipping presumably from the daily paper in Hechingen, hand dated as 2-23-1945

from us. This shall be a comfort to us in these times when so many values are perishing.

A similar effect may have been felt from Heisenberg's regular piano recitals during the internment at Farm Hall.

## 5 The Significance of Music to Heisenberg

To Heisenberg music was a basis for living his life: it gave purpose and was indispensable. The greatest imposition he could have imagined in his young life would have been, if his mother had demanded he sell his music and piano in order to have more to eat.<sup>23</sup>

So it is natural to ask, why he did not become a musician. In *Physics and Beyond*, his reflections on his life, he assigns the posing of this question to the mother of a musician friend of his and gives his own answer:

In music, I find, that the compositions of recent years are no longer as compelling as those of earlier times. During the 17th century music was still largely orienting itself on the religious core of life at the time, in the 18th century there was a transition into the emotional realm of the individual, and the romantic music of the 19th century has penetrated the innermost depths of the human soul. But in recent years music seems to be caught in a noticeably restless and rather feeble stage of experimentation, in which theoretical notions play a more important role than the secure awareness of progressing along a predetermined course.<sup>24</sup>

Of course, there also were other reasons that he mentions in this same conversation: He was only too aware of the limitations of his pianist abilities. He loved music as a source of beauty and

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<sup>23</sup>Letter to his mother dated 10-27-1932.

<sup>24</sup>*Physics and Beyond*, op. cit. pp.18

harmony. Playing the piano was one of the ways in which he could vicariously think the thoughts of the great musicians if he worked carefully at it, and thus bring back to life the content of their ideas.<sup>25</sup> However, as far as he was concerned, he did not see an opportunity to develop his creative potential in that arena. He observed that in the music of the late 19th century, with Wagner and the French impressionists, Debussy and Ravel, the structure of classical harmonies had collapsed, but he had no use for the resulting free reign over rules and laws: “If the limitations of the means of expression were taken away, if in music, for instance, we could produce any sounds we liked- then the artists effort would reach into a void.”<sup>26</sup>

This is why Heisenberg could not relate to modern music. It is quite astonishing, indeed, when we consider that as a young man he had not been closed off at all. We know that at age sixteen he was studying a violin sonata by Grieg, a contemporary then. And in a letter he tells his parents about a theater play with music by a modern composer, all very beautiful.<sup>27</sup> After the war, in Göttingen, and later in Munich, he continued to expose himself to modern music by attending concerts regularly. But it remained alien to him and he did not enjoy it. The newly devised rules of twelve-tone music seemed random to him, not borne out of knowledge of the natural harmonies. And so he talks in his autobiography of the sadness as he and his young musician friends were thinking of the great epoch of European music as gone forever.<sup>28</sup>

With this thought, he compresses into one sentence what Thomas Mann made into the central theme in his novel, *Doctor Faustus*, begun in 1943. Thomas Mann, however, admits that music was still capable of expressing deepest despair, even if after the pervers-

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<sup>25</sup>ibid. p. 23.

<sup>26</sup>ibid. p. 19

<sup>27</sup>9-23-1921.

<sup>28</sup>*Physics and Beyond* op. cit. p.24.

sion of every bourgeois value through the “contract with the devil” and after the horrors of war, it no longer provided “comfort, reconciliation, transfiguration.” In the music of Adrian Leverkühn, here Thomas Mann is referring to the twelve-tone and serial technique of Arnold Schoenberg, he is describing a work filled with immense sorrow and capable quietly, of surpassing the rational mind and to touch emotion with a pleading vagueness which only music possesses. And he is hoping that it might be a corollary to the religious paradox that from the total lack of redemption — even if only as a barely posed question — hope could stir.<sup>29</sup>

Heisenberg did not manage this step towards an understanding of 20th century music. He had never viewed music as a means to become fully emotionally expressive in order to then return to life — after a somewhat Aristotelian catharsis — full of new strength and cleansed. Rather, it meant to him, much like mathematics, a passageway to gain knowledge of what he termed the central order. In this central order he saw the workings of the <one>, to whom we relate through the language of religion,<sup>30</sup> and that he, devoid of further doubts, perceived as the good, in contrast to everything confused and chaotic. Throughout his life, he saw himself confronted with the task of gaining access to the knowledge of reality, which understands the various connections as components of a single, meaningfully ordered world.<sup>31</sup> A first attempt at gathering these thoughts is made in the text *Reality and its Order* from the year 1942. Here he is fully mindful throughout that language is ultimately inadequate: “The ability of man to understand is limitless. Of the ultimate things one cannot speak.”<sup>32</sup>

During the early forties, in a strange coincidence, the thoughts

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<sup>29</sup>Thomas Mann, *Doktor Faustus*, Fischer Pocket Books 9428 , pp. 647.

<sup>30</sup>*Physics and Beyond*, op. cit. p. 214.

<sup>31</sup>*Ordnung der Wirklichkeit*, op. cit. p.221.

<sup>32</sup>ibid. p. 226.

of both Heisenberg and Thomas Mann are circling around the last composition of Beethoven, his Piano Sonata op. 111 with its simple, slow movement with variations. Packaged in a scenario of cabaret style distortion, its interpretation is given a whole chapter by Thomas Mann. Here he describes it — half ironically, half seriously — as surmounting a tradition that had already reached its pinnacle and talks of passages of melodic delight by which the turbulent stormy sky of the piece is periodically lit as if by tender rays of light.<sup>(33)</sup>

Most likely, these rays of light are the reason Heisenberg incorporated the score of such a passage into his text on reality and its order. It denotes the first bars of the variations movement, the Arietta theme *Adagio molto, semplice e cantabile*. Thomas Mann has the teacher Kretzschmar say that the theme is destined for *adventures and a fate for which it does not seem prepared at all in its idyllic innocence*.<sup>33</sup> He creates with this sensitive phrasing a parallel to the human fates of his time.

Heisenberg's language does not have at its disposal irony or the sprightly game of associative linkage. He is attempting in his writing from 1942 to decipher reality and its order through a systematic approach and a critical accuracy of language. The Arietta-theme serves him here as an example for those totally pure entities of the mind that are detached from everything earthly<sup>34</sup> which could only be created by those blessed humans who have access to the creative forces of the soul.

In contrast to Thomas Mann, he does not use a lot of words on this musical theme, because he is unable to speak about the final things. In their stead music itself has to speak, even if only through the image of a score. If this were a conversation with my father, now would be the moment he would probably walk over

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<sup>33</sup>ibid. p. 72.

<sup>34</sup>*Ordnung der Wirklichkeit* op. cit p.301.



to the piano, sit down and, gazing thoughtfully across the music stand, express through the sounds of the music what he meant.