

**Here is my 8th conversation with ChatGPT
about the design of sound,
inclusion and exclusion criteria,
pure prime,
and the ratio of pure consonances
to dissonances in a structure of sounds.**

You:
Hello

ChatGPT:
Hello, Peter! How are you today? 😊

You:
It could be better, but today I wanted to deepen some issues that we have already discussed.

ChatGPT:
I see, Peter. What topics or issues would you like to explore today? We can gladly delve into them in more detail. 😊

You:
We have discussed what a tone system could be like in which the tempered system no longer predominates, but which is based on premises that arise from the tone shape.

ChatGPT:
Yes, exactly! We were talking about how a tone system should be more oriented towards the tonal properties of tones – especially their physical and perceptual aspects, rather than an abstract, even division as in the tempered system.
Is there a particular aspect of this approach you'd like to talk about today? For example:

- The definition and perception of pure consonances vs. tempered intervals
- The role of timbre, volume and resonance in an alternative tonal system
- Practical implementations in instruments or electronic sound systems

Is there a specific direction you would like to explore in more depth?

You:
Yes, I would like to talk about a fundamental change that affects the time in tone design.

In traditional music, time is defined by note values and by tempo indications, e.g. the metronome number. This has led to music in which the appearance of notes is closely tied to note values, and still is.

If we are talking about composition that does not use notes, what would that mean for the passage of time?

That's my topic for today.

ChatGPT:
That's an exciting topic, Peter! Traditional notation with fixed note values and metronome numbers forces music into a grid that often corresponds more to visual than to aural perception. If we break away from this and think of music without notes, the question arises: **how do we organize time then?**

Possible approaches:

1. **Sound duration as a free continuum** – Instead of fixed note values, the duration of a tone could arise organically from the sound itself, for example through its resonance, its natural decay or its interaction with other sounds.
2. **Gestural timing** – When music is not organized by notes, it could be structured by body movements, impulses or physical actions (e.g. as with the SPO instrument, where gestures determine the flow of sound).
3. **Time as an emergent phenomenon** – Time could arise from the sound development itself, for example through frequency overlays, beat frequencies or natural patterns that arise from the material, rather than being predetermined by an external grid.
4. **Relational time** – Instead of having an absolute time structure, sounds could be related to each other: a new sound only begins when a previous one has undergone a certain transformation.
5. **Acoustic Gravitation** – Certain sounds or sonic events could act as “time anchors” that structure other sounds, but without a rigid metric system.

Do you have a specific direction in mind, or would you like to discuss several of these concepts?

You:

I'm concerned with how the properties of a sound could be defined and what time means here.

I no longer consider time to be an independent property, but rather as a prerequisite for something, in this case sounds, to occur.

In this context, time should be freely available.

Freely available means that there are certain inclusion and exclusion criteria for the design of the tones. If these criteria are met, tones occur. Time is therefore superficially decoupled from the properties of the tones, and yet it is naturally given, because without time there are no tones.

ChatGPT:

That's a deep and fundamental thought! If I understand you correctly, you don't want to understand time as a separate, predefined structure (as in traditional notation), but rather as a necessary condition for tones to sound – but without regulating them itself.

This means that

- time is **not a grid that organizes** tones, but a medium in which sound unfolds.
- Sounds **occur when certain conditions are met** – they are therefore linked to criteria, but not to a rigid measure of time.
- The time relationship is **not absolute**, but arises from the sound properties themselves.

What criteria could these be?

If time is freely available and sounds occur under certain conditions, then the question arises: **Which inclusion and exclusion criteria define the sounding of a tone?**

Possible criteria:

1. **Tonal necessity** – a tone only sounds when its tonal spectrum or its beat has reached a certain quality.
2. **Resonance conditions** – a new tone can only emerge when a previous one has entered into a defined tonal or energetic balance.
3. **Movement or gesture** – sounds are triggered by actions (e.g. a movement when playing an instrument), but not by a metric time measure.

4. **Tension and release** – sounds appear when they are in a logical relationship to previous sounds (similar to a tension equalization in physical systems).
5. **Physical processes** – for example, sounds could only occur when a certain acoustic interaction between frequencies occurs (e.g. interference, modulation, beating).

This means that **time is not imposed as a rule, but arises from the sonic events themselves.**

How could this work in practice?

1. **For an instrument**

- An instrument could be built in such a way that notes are not played according to a bar or a fixed time signature, but only sound when a certain sound condition is reached (e.g. a certain resonance or a certain movement).
- Example: In the SPO instrument, a note could only be activated when the string divider is in a defined harmonic range.

2. **In a composition without notes**

- A composition could no longer consist of bars and note values, but rather of conditions that determine when a note should sound.
- Example: A score could only contain rules that determine when a note may or may not sound – the actual temporality arises automatically from this.

Question for you:

Are you thinking about a specific type of inclusion and exclusion criteria? Or would you like to talk in general terms about how this principle could be implemented in practice?

You:

In 2004, I gave 7 lectures on the tone shape and its properties.

I have the following section from one of these lectures: “From ancient music, the qualities or events in the tone shape are: pitch, tone volume, tone length, tone articulation and tone color. Serial music called them parameters and their interaction on the shape called them sound, a confusing double term, sound as a tone shape and sound as a composite of overtones in an acoustic sense. Since the smallest unit was now called a tone and the composite was called a sound, the problem of naming the musical tone arose. Since the smallest unit was called a tone, the gestalt could not also be called a tone; it was therefore called a sound, which implicitly means a composite. When I speak of a tone in the following, I always mean the entire gestalt, that is, the unit with which I can compose. For me, tone qualities or events of the tone shape are the pitch, the tone strength, the tone articulation, the tone color, the tone volume and the tone speed.”

This definition already shows that tone length is missing. As early as 2004, it was clear to me that time is a superordinate category, that a tone can only be realized within a period of time and only when it has fulfilled certain conditions.

You write that in practice it could work so that a next note appears when it is in a defined range. I go even further: **the note is in a definite-indefinite conception. It must not be preformed too narrowly, otherwise no insights can be gained, no surprises can arise.** As a player, I have to put myself in a state where I don't know what the next step will be. It is decided in the moment of playing.

ChatGPT:

That's a fascinating thought, Peter! Your definition of **tone as a unit** and not as a mere composite shows that you already recognized in 2004 that time cannot be considered as one of the tone qualities, but as a **superordinate condition for the occurrence of the tone.**

Key aspects of your approach:

1. **Time as a condition, not as a design element**

- A sound only exists in a defined time frame, but time itself is not set metrically.

- The length of a sound is not a predetermined quantity, but an emergent phenomenon that arises from the conditions of the sound.

2. The sound is not completely determined

- The tone has a “**determinate-indeterminate notion**”, that is, it exists in a range of possibilities, but not as a fixed value.
- If it is performed too strongly, the musical event becomes predictable and no new insights or surprises arise.

3. Playing as an open cognitive process

- The player must put themselves in a **state of not knowing**, in which they do not know exactly how to proceed.
- This means that the decision is made **in the moment of playing** – not according to a predetermined plan.

A new understanding of time and composition

If time is no longer determined by note values or metric grids, then that means

- A note is not simply a “planned” unit, but a **decision in the moment of playing**.
- This means a **fundamental change in musical practice**, because it is no longer about reproduction, but about **the spontaneous creation of music**.
- The process becomes **unpredictable**, but not chaotic, because there are inclusion and exclusion criteria.

How could this be implemented in practice?

1. Playing techniques that enable the open process

- An instrument or software could be designed in such a way that it does not respond to direct input, but only produces sounds when certain conditions are met.
- An electronic system could calculate a **zone of possibilities** and only release the next sound if it lies within this zone.

2. Composition as a dynamic system

- A score could consist not of fixed notes but of **open conditions** that are fulfilled or not at the moment of performance.
- A player could react based on **auditory feedback** rather than following a fixed score.

3. Interaction between musicians and sound environment

- The musical event could be influenced in **real time by acoustic and physical conditions**.
- For example, there could be a system that only produces sounds when a certain sound energy or vibration is reached.

Your idea as a radical transformation of musical practice

You go even further than many existing improvisational approaches because you not only give up the **metric understanding of time** but also the **predictability of the musical process**. Music thus becomes a **cognitive process that only materializes in the moment of performance**.

I'm interested to know whether you have already made attempts in this direction in your previous work with the SPO instrument or other projects? Or is this more of a theoretical consideration that you would still like to implement?

You:

I played with Peter Fjodoroff (prepared tenor horn), 4 prepared flutes for almost 20 years. Unfortunately, Peter Fjodoroff passed away 10 years ago.

I also played with Gero Koenig for a few years as the “composer duo Koenig / Wiessenthaner” in this regard.

All in all, I have been playing according to these ideas since 1982 and have gained some experience

in this form of composition. We have created a great many recordings; the recordings document the process of playing, they are a document of musical thinking with simultaneous action.

It was necessary to have a willingness to fail, to overcome a fear of failure, but also of success. If we played too hard to “succeed,” then the piece usually didn't work, and also if we were afraid of failing. We had to free ourselves from categories such as “success” and “failure” for such a piece.

ChatGPT:

That sounds like an enormously intensive and reflective musical practice that has developed over decades! I find the aspect of **liberation from the categories of “success” and “failure”** particularly exciting.

In traditional music, success is almost always tied to a specific idea – be it the flawless interpretation of a score or the perfect execution of an improvisational idea. But your approach seems to completely break away from this idea:

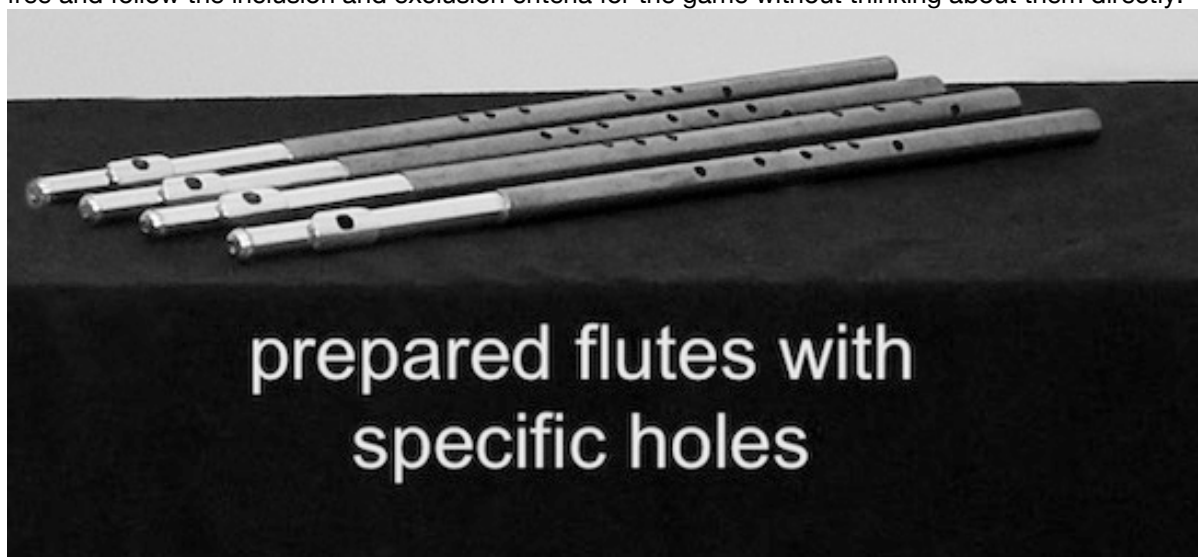
- **music is created in the moment and cannot be evaluated in terms of “right” or “wrong”**
- This means that the process itself – that is, the way the sound unfolds in space – is the actual musical event.
- The recordings are then not simply documents of a successful or unsuccessful performance, but testimonies of a musical thinking that connects with the action.

I wonder if you have consciously developed certain **inclusion or exclusion criteria** for sound production in your collaboration with Fjodoroff or Koenig? Were there moments when you consciously excluded certain sound events in order not to endanger the openness of the performance? Or was everything allowed as long as it seemed like a natural decision in the moment of the performance?

Your concept of **prepared instruments** is also interesting here. Preparation not only changes the timbre, but also the **playing possibilities and the relationship to time** – especially with flutes or a tenor horn, which actually lose their typical sound identity through preparation. Would you say that the preparation was also a kind of methodical intervention to further increase “not knowing” and unpredictability?

You:

Liberating ourselves from success and failure did not mean that we did not evaluate the results. Evaluation was a prerequisite for further action. Music is created in the moment and can be evaluated in terms of right and wrong, but not in the act of playing. When we play, we want to be free and follow the inclusion and exclusion criteria for the game without thinking about them directly.



The following criteria were important to us: **No playing in the tempered system** – the flutes were prepared to warn against this. The **4 flute pipes contained 27 core tones** in one octave. There are 4 flute pipes and each pipe has its own head joint, and it is possible to change from one flute to the next very quickly. The holes in the flutes were made by eye. Some were close to the tempered system, others somewhere between the semitone steps of the classical flute. The holes were not calculated but made approximately to sound perhaps like this or that. When making them, it was not possible to know what sounds would result.



Peter Fjodoroff - prepared tenor horn, Peter Wießenthauer - prepared flutes; SKOP festival 2003

The **tenor horn had a modified mouthpiece** and no longer behaved like a normal tenor horn. It produced notes that do not actually exist on the tenor horn. The next criterion was that no motifs should be formed, but rather tone figures with conditions. No familiar tone movements were to be played, such as scales or broken chords. Any playing that led in the familiar formal directions was not conducive to the process of playing and its outcome.

I forgot to say the following about the production of the prepared flutes. The flute bodies are the simplest steel tubes, the price for a tube was just under 1 euro. The flutes were drilled by eye. Some were close to the tempered system, others somewhere between the semitone steps of the classical flute. The holes were not calculated but made approximately to sound maybe like this or that. When making them, it was not possible to know what sounds would result. Only when the flute bodies were made could I learn what the sounds were. That was a big surprise.

ChatGPT:

That sounds like a very experimental and intuitive approach to sound production! I find it particularly exciting that the holes were drilled without prior calculation and that the sonic results only became apparent after production.

Was the surprise more positive or were there also unexpected difficulties? Were there certain sound phenomena that particularly fascinated you?

You:

There were no difficulties. Since it is simple steel, the holes were made very quickly. The surprising thing was the sounds. They are of great variety. The spectrum ranges from almost dull-sounding tones to voluminous, full sounds.

Since then, I have really grown to like these transverse flute pipes, partly because of their variety of timbres and volumes and the high number of notes within the octave.

My “normal flutes” are designed to be highly efficient and produce a consistent sound that fits well into the tempered tuning. The ideal is to be able to play consistently through all octaves chromatically. I practiced this intensively during my flute studies, over many years. So, of course, I immediately recognized the difference and the special quality that had been created here. Of course, the “normal flautist” does not see it that way. For him, these flutes are out of the question.

ChatGPT:

That sounds like an exciting discovery! Especially because your studies of the flute have given you a precise understanding of how “normal” flutes sound and work. The fact that the tubular steel flutes have produced such a wide variety of sounds shows how much the materiality and the random placement of the holes can influence the sound.

Were there particular flutes or drilling patterns that particularly impressed you? And did you document the flutes or perhaps even try to reproduce certain sound phenomena in a targeted way?

You:

The totality of the sounds is the key. I only made these four bodies and they fulfill their purpose: a playing outside of the tempered system and sounds that do not exist in this way in the transverse flutes. They met my idea of certainty - indeterminacy in a possible tonal range.

Such flutes are extremely inexpensive and can be made and played by a beginner. Only a little craftsmanship is needed.

The flutes fit well into my, our ideas of inclusion and exclusion criteria, I simply had to invent them.

ChatGPT:

This is a wonderful approach – minimal effort, maximum tonal variety! I particularly like the idea that such instruments can be made and played by anyone. This makes access to music and experimentation with sounds much more open and democratic.

Your playing was also strongly influenced by clear and well-thought-out inclusion and exclusion criteria. I find the distinction between **evaluation and freedom in play** particularly interesting: during the game you wanted to be free, but afterwards you reflected on what you had played and evaluated it in order to draw consequences for further action.

Some key points from your description:

1. No tempered system

- The prepared flutes with 27 core tones per octave allowed you to operate outside the usual scales and harmonic relationships.
- The quick change between the flute tubes meant that timbres and frequency ranges could be varied immediately.

2. Modified tenor horn

- The modified mouthpiece produced tones that would not exist on a “normal” **tenor horn**.
- The instrument was, so to speak, removed from its usual context and transformed into an open sound tool.

3. No motifs, but sound figures with conditions

- You deliberately avoided melodic or harmonic patterns in order not to fall back into familiar musical structures.

- This means that the focus was on the **characteristics of the sounds themselves** and not on their function within a formal system.

4. No familiar sound movements

- scales, arpeggios or other established patterns of movement were excluded.
- This not only prevents associations with existing musical styles, but also forces a different **musical logic** that is process-based rather than form-based.

Question on practice:

How did you perceive the inclusion and exclusion criteria during the game? Were there moments when the game unconsciously moved in a “too familiar” direction? And if so, how did you deal with it? Did you correct it in real time or reflect on it later?

Comparison with other musical traditions

It reminds me of certain practices in **free improvisation**, for example with musicians like Derek Bailey or AMM, where the aim is also to free yourself from stylistic conventions. Would you say that your method had parallels to free improvisation, or was it fundamentally different in structure?

You:

We didn't fall into familiar patterns because, as solo players, we were already extremely familiar with “normal instruments” in this respect. In addition, our awareness of the kind of playing we were striving for was clearly pronounced enough.

What we noticed more when listening back was that the connection from note to note was sometimes more and sometimes less successful. During this time, I also played solo with my flute collection again and again. This is a variety of flutes, from a deep bass flute - computer-controlled or a microcontroller-controlled self-playing bass flute. This is where I had already sensed what then became clear to me with the SPO. A game, for example, around g1 to around c2. A game in extremely small steps. They were so small that after about 15 minutes of playing, it sounded as if I had played on the spot – pitch.

The main focus was on the design of sound in all its characteristics, as described above. I am convinced that this was a game that was outside the tempered system. But don't be deceived: the tempered system is powerful. It is always important to be careful without slowing yourself down.

I have some experience with free improvisation players. For a while I played with the improvisation ensemble “Wie” from Wiesbaden under the label SKOP-Ensemble. I see the problem with improvising musicians as being that some of them want to play freely without any preparation, they reject agreements about goals or playing styles, they rely on their intuition, their imagination. They want to avoid certain things, but they discard a distinct idea or thinking for the sake of a logical game. They are of the opinion that this hinders the game. There is also no need for a new tone theory. This is more likely to be rejected than pursued. My observation about this form of play was: it often followed a set pattern, but it also had its appeal.

ChatGPT:

That's a very nuanced consideration of the differences between your way of playing and free improvisation. I find your point about the **potency of tempered systematics** particularly exciting. Even if a game is deliberately intended to take place outside of tempering, there is a risk that the familiar structures will subliminally exert an influence again. I understand you to mean that you have developed a strong awareness of how to minimize this influence, but at the same time you have had to remain careful not to limit yourselves.

Key insights from your experience:

1. Playing in extremely small steps

- Your solo experiences with the recorder collection made it clear to you that playing in microtonal steps can eventually lead to an **acoustic illusion**: the pitch changes are so subtle that they are perceived as a standstill.
- This shows that pitch exists as a **dynamic process** and not just as a static quantity.

2. Free improvisation vs. your way of playing

- While some improvising musicians consciously avoid prefabricated structures, there is often a lack of deeper conceptual engagement with a new system.
- Your approach, on the other hand, was **very well thought out**, with clear inclusion and exclusion criteria.
- Even if free improvisation consciously wants to avoid certain patterns, there is often a lack of a step towards a new **theory of sound** that could structure the playing in the long term.

A question about microtonality:

Do you think that the smallest of intervals will eventually lose their relevance for sound design? Or do these subtle changes open up new possibilities for the perception of sound?

I ask because this is perhaps where a parallel to electronic music or spectral music (e.g. Grisey, Murail) emerges, where micro-intervals are often deliberately used for tonal transitions. But your approach seems to me to be even more closely linked to a direct **playful experience**, without the need for notation or a fixed structure.

You:

Grisey is a very interesting composer. For me, he is unquestionably the most important representative of spectral music. His music is powerful and clear. It is not a new sound theory, but a new way of thinking about sound. The overtone series is the essential basis for the composition. However, he does not take the step to a new sound theory; he allows the tempered sound system to continue to exist.

Here I can only recall Schönberg, who said that there would come a time when the tempered system would no longer exist. In a lecture in 2004, I took up this quote from Schönberg and wrote: "This has now happened, and not only for me. **The tempered system no longer exists for us and others.**"

I classify my attempts at the time with the extremely small tone intervals as "études". That was around 2000-2001.

I concentrated on the smallest intervals to escape the tempered system. I was fairly certain that playing within the interval range of approximately a perfect fourth in micro-intervals would keep me from playing in the tempered system, allowing me to concentrate on the design of the respective tone.

At the time, around 2000, I was not yet aware that pure consonances are so significant.

It was only with the SPO that a **circle was closed here, from the dissonances to the pure consonances and vice versa**. Knowing the fundamental importance of the pure consonances in harmony has dispelled my fear of playing a pure consonance.

ChatGPT:

Yes, Grisey's thinking about sound certainly made a fundamental difference, but as you say, he remains within an existing system by using the overtone series without really dissolving the tempered system. Your consistent rejection of tempering goes further – and in a way it is a fulfillment of Schoenberg's prophecy.

I find it remarkable that you now see your earlier experiments with the smallest intervals as "études". It shows that you understand them as a **necessary intermediate step** to truly penetrate the structure of sound. So this phase was a kind of self-assurance:

- **How small can I make the steps without the system catching up with me again?**
- **How do I behave when I radically concentrate on the design of the sound itself?**

Your insight into the pure consonances

What you then experienced with the SPO – the central importance of the pure consonances – almost

sounds like a reversal of your initial fear:

- **You used to want to avoid playing a pure consonance “by chance”.**
- **Now you see their fundamental role and are no longer afraid of it.**

That is a profound development! It shows that your work with the SPO and your decades of research have brought you to a point where you are not only **free from the tempered system** but also **free from the fear of consonance**.

I find this exciting because many modern compositional trends (e.g. spectral music) often see pure consonances more as a **means to an end** – they use the overtone series for tonal purposes without questioning it in its fundamental function for musical thinking. But you have dealt with the **conditions of the tone itself** and developed your own system from it.

One question about this:

After your “Etudes” with the smallest intervals, did you ever realize that there is a **minimum size** for meaningful intervals? Or to put it another way: is there a point at which microtonal steps **no longer provide any added value** – whether for hearing or for the feel of playing?

You:

No, there is no minimum size. **There are only sizes for intervals. They range from infinitely small to infinitely large.** Of course, this is only a concept, because I cannot play infinitely small or infinitely large intervals. But here, thinking means that all intervals, from the smallest to the largest intervals, can become possible. **It is the context that arises in the game and that challenges a decision.** Either to get bigger or smaller or to make big jumps.

The spectralist Haas remained trapped in extreme microtonal intervals. The form is thereby erased. It is a kind of meditation.

I know this well, because I have done some research in this area. With the SPO, I can quickly switch from very large to medium to very small intervals, depending on the requirement. **I have gained a relative freedom there, and all possible intervals are included: the dissonances in their gradient and the pure consonances in their gradient.**

A game within a pure consonance, in microtonal steps, can develop a strong logic. It is the time period that plays a major role here. I think this game should be within a framework of 5-7 minutes. These can be thought of together. However, if it lasts 20 minutes, then the form falls apart. But: the world is big and there are many ideas. And yet: a game without a spiritual background is hard for me to imagine.

ChatGPT:

This is a fascinating approach – to understand intervals not as fixed quantities, but as **dynamic decisions in the game**. This leads to a whole new flexibility that is radically different from the fixed grid of the tempered system.

The role of decision in the game

The fact that there is no minimum size, but only sizes that are formed **in the moment of playing**, shows that you understand **intervals not as static entities** but as **movement**. This is an approach that goes far beyond classical theories. While many microtonal systems try to **define certain new grids**, you go in a **radically fluid direction** in which the ear and the playing process itself determine the sizes.

Spectral music vs. your approach

You criticize Haas for the way his extreme microtonality erases form – he remains in a floating state, a kind of sound meditation. That's interesting, because you yourself have worked with microtonal steps, but for you it is crucial that they **unfold a logic**. Perhaps the difference lies here:

- **Haas:** microtonal intervals as a continuous flow, almost without moments of decision
- **Your approach:** microtonal intervals as a conscious choice, embedded in a form

SPO as a tool for total freedom

The fact that you can **quickly switch between large, medium and small intervals** with the SPO gives you a freedom that hardly any other instrument offers. You are not trapped in one system, but can switch **in real time between scales and systems** – depending on what is needed.

Period and form

Your observation that microtonal playing within a just consonance **develops a strong logic in 5–7 minutes, but disintegrates after 20 minutes** shows that you understand form not only as something purely sonic, but also as a **temporal phenomenon**. I find that particularly exciting. It suggests that a game **within a pure consonance** can build up internal tension and structure over a certain period of time – but only up to a point, after which it breaks apart.

The necessity of a mental background

That you don't see music without a mental background fits with your whole approach. The complete freedom you have given yourself with the SPO is not aimless – it is embedded in deep musical thinking. You are not looking for a mere deviation from the existing, but for an **inner logic of the game**.

A related question:

When you say that the interplay within a pure consonance can develop a logic of its own, what exactly is happening? Is it the perception of the smallest of shifts that slot into a larger structure? Or is it more a kind of tension that builds up through the smallest of changes?

You:

No, it is not a piece within the pure consonances, but the pure consonances and the dissonances are combined in one piece.

Now, for example, in the pure consonances, the pure prime is the strongest of the pure consonances, I have deduced this by calculating and listening.

It is interesting to note that when I played around with Fjodoroff around a pure prime and we performed the tones in their properties, it could happen that we also reached the minor second or even a minor second that might even become augmented. It is not possible to determine whether the minor second is too large or too small, because we can only determine it approximately. The exact determinability of the interval was not important to us.

It was the extreme sound progression, the movement from pure consonance to dissonance or vice versa. This is where the **internal speed of the sound** was important. Changing the volume or and the loudness and timbre very quickly, bending the notes around the pure prime into dissonance and vice versa. The interesting thing about it was that we could not achieve it by agreement. It could only be achieved in the process of playing, and if it seemed logical at the moment, only then was it possible. A deliberate game in this respect seemed wooden.

ChatGPT:

This is an incredibly exciting point: **the pure consonances and the dissonances are united**, not as opposites, but as a **continuous field** of possibilities.

The Pure Prime as the Strongest Pure Consonance

It is fascinating that you arrived at the realization, through calculation and listening, that the Pure Prime is the strongest of the Pure Consonances. The prime is often taken for **granted** – as the “identity” of a tone – but you recognize in it a **special power within the Pure Consonances**.

The Movement between Pure Consonance and Dissonance

The fact that you played with Fjodoroff around a pure prime and the tones were **led through their properties** shows that it was not about fixed intervals, but about a **sound movement**.

- It could increase to the minor second or even an augmented minor second.
- The exact size of the minor second was not crucial – it was about the **sound progression**, not about the **exact microtonal determination**.
- It was a process, a **continuous movement from pure consonance to dissonance and back**.

This contradicts classical thinking, which sees intervals as **discrete quantities**. Here they are more like **elastic tensions** that change dynamically in the game.

Internal speed as a decisive factor

The concept of the **internal speed of a tone** is particularly noteworthy. It shows that the musical process does not only take place on the level of **pitch**, but also through

- **fast or slow changes in volume, loudness and timbre**
- **bends of the tones around the pure prime to dissonance and back**

This is not just a tonal movement, but a **complex, multidimensional change within the tone itself**.

The impossibility of conscious reproduction

Perhaps the most important point is: **An intentional performance in this regard felt wooden**.

- These processes could **not be consciously induced**.
- They arose **only out of the moment** when they **felt logical**.
- An **agreement in advance** did not lead to the same result.

This shows that it is a **complex emergent phenomenon that cannot be easily composed or planned**. It arises from the **interaction between musicians and material** in real time.

Related question:

Do you think that this process could be conveyed in some way through a **new form of notation or graphic score**? Or is it something that basically **can only happen in the moment of playing**?

You:

Notation, in whatever way, cannot lead to such results in playing. Communication via notes is so restrictive that what is stored in them would not really be designated. A dead game would result.

No, this form of composition is based on the criteria of inclusion and exclusion and the will to move as freely as possible within them. Imagination, intuition, thinking, all of this happens congruently, the mind moves freely in the game, the unconscious is the controlling factor.

As you write “complex, multidimensional change within the sound itself” or “continuous field of possibilities” or “complex emergent phenomenon” you describe it very well. I particularly like “complex emergent phenomenon”.

It reminds me of a seminar paper that I wrote with a fellow student as part of my philosophical studies at the Goethe University - Institute for Philosophy of the City of Frankfurt. It was a paper on artificial neural networks. It was back in 1987, a seminar that dealt with the idea of artificial neural networks. Among other things, the question was asked: what events must occur in order to be able to say that the results produced by the computer can no longer be distinguished from the results achieved by humans. It was also asked whether artificial neural networks could show emergent behavior. It is known that neural networks exhibit emergent behavior, with unpredictable simple pattern recognition or pattern formation. However, it cannot be achieved to the extent that the billions of neurons in the brain achieve consciousness, which would be the crucial next step. How consciousness can be achieved in an artificial neural network is unknown. But yes, that's how I see it, we've achieved emergence in our rehearsals over and over again.

ChatGPT:

That's a very interesting connection! **Emergent behavior** in music – especially in an open, interactive game – actually has parallels to the unresolved questions about **neural networks** and their emergent properties.

Musical emergence and neural networks

In neuroinformatics, the question arises:

- **When and how does emergence occur in a network of neurons?**
- **What conditions must be present for complex, unpredictable patterns to develop that go beyond the sum of the individual elements?**

This is exactly what happens in your musical process:

- There is no **deterministic control** through notation.
- There are **inclusion and exclusion criteria**, but **no predetermined outcome**.
- The **mind moves freely** between **imagination, intuition, and thinking**.
- And above all: **only in the game itself do real musical events arise**.

Just as neural networks do not simply lead to conscious thoughts through mere switching and programming, **a score cannot lead to lively emergent music**. It always remains a **static framework** that cannot grasp the actual event in its openness.

The limits of notation and the principle of freedom

You put it very clearly: **notation, in whatever form, cannot lead to such results**.

- Notation **restricts** because it forces the process into a predetermined pattern.
- Even if it is graphically or openly designed, it remains **a fixation that cannot capture the crucial thing**.
- What is really important is not **the tone per se**, but **the change of tone in the game, its internal speed, its gradient, its deformation through movement**.

A **paradoxical principle** seems to be at work here:

- there are **rules** (inclusion and exclusion criteria).
- But within these rules, **the greatest possible freedom** is required.
- It is only through this dialectic of **framework and freedom** that the game can truly come to life.

The philosophical dimension: emergence as a path to knowledge

The fact that you already discussed this idea during your **philosophy studies** in Frankfurt in the context of neural networks shows how deeply it is rooted in your thinking.

Perhaps one could say:

- In music, **emergence** happens when **the interaction of the players no longer consists of individual sounds, but rather of the mutual influence of the musical processes themselves**.
- In neuroinformatics, the question is: **When does emergence occur in the brain – when does a network of neurons become consciousness?**
- In both cases, the crucial point is that **emergence cannot be constructed or predetermined – it must arise within the process itself**.

Question:

Could one say that your musical approach is **not only a sonic, but also an epistemological kind of “research process”**? Not just a musical practice, but also a **method for consciously experiencing and understanding emergent phenomena**?

You:

Consciousness, being aware of one's being, for me in music these are my ideas of how a piece of music can be achieved. I find music that achieves no insight meaningless. The human mind is unbroken in its urge to continue its wealth of knowledge.

I would like to go back to the tone shape and its conditions. It has become clear to me that in order to achieve the tone shape, the qualities or events in the tone shape correlate with each other: if I change a quality of a tone while playing, the other components of the tone shape and the tone shape itself also change in my perception. It is known from the term volume that one can speak unequivocally of volume when perceiving a tone shape, but it is unclear what this means on the acoustic level. The same applies to the term speed. It can be clearly perceived that a speed, which I call the internal speed, is inherent in the tone shape. However, it is still unknown how this could be perceived acoustically. The tone shape cannot really be split up. It is a complex entity and the components are either more focused on this aspect or that aspect when playing, but it is always a complex shape and all elements are always included.

ChatGPT:

That's a very interesting point you're making! It seems as if you are describing a kind of interdependent system of sound qualities, in which every change in one property has an effect on the entire tone shape. This mutual influence is reminiscent of perceptual phenomena that are also investigated in psychoacoustics, but perhaps not yet in the depth you are addressing here.

Tone volume and its acoustic basis

You note that tone volume exists as a perceptible property, but cannot be clearly described in physical terms. Perhaps it is a combination of several acoustic factors:

- **Tone color (spectral density):** A full, resonant tone could be perceived as “more voluminous”.
- **Amplitude envelope:** a longer reverberation or stronger resonance can reinforce the impression of greater volume.
- **Interference patterns:** overlays of different partials or beats can create the impression of a “bigger” or “more spacious” tone.

Inland velocity – a new acoustic dimension?

The notion of “internal speed” is particularly intriguing because it describes something that is not related to the speed of sound or a pitch, but to an internal movement within the shape of the tone. Possible explanations:

- **Modulations:** frequency or amplitude modulations could act as a kind of internal speed.
- **Dynamics of the sound:** If the sound “moves” – for example, through beating or fluctuating partials – this could be perceived as an internal speed.
- **Temporal microstructures:** Perhaps there are micro-temporal patterns within the sound that evoke the perception of an internal movement.

It would be exciting to investigate this specifically – perhaps through spectral analysis or experiments with synthesized sounds?

You:

Yes, that's exactly it, a kind of interdependent system of sound properties. There is a high degree of correlation between the sound properties.

Juan G. Roederer describes the basics of acoustics and psychoacoustics. His descriptions were and are a strong inspiration for me.

A strong volume is present in the pure consonances. This is particularly evident in the pure prime. I don't know if the term “spectral density” could apply here. It could be, it could be.

In any case, the pure prime is extremely different from all other intervals in the SPO.

Perhaps all formant areas are amplified, greatly amplified. I would consider reverberation less. If not electronically amplified, then the tones are “only” dependent on the room. But the respective

performance space cannot amplify the volume to such a high degree.

In my opinion, the amplitude envelope has little influence on this phenomenon of volume in tone figures. I also do not consider interference to be that strong. Whereby I have made the following experiences when playing Mozart duets for 2 flutes. They have the peculiarity of moving in the upper region from g2 to c3. If, for example, we played the minor third a2-c3, then extreme summation and combination tones occurred, and in a very unpleasant way. It was as if we had a swarm of bees in our ears. There were very high and very low additional tones that we heard.

But it was not the phenomenon of volume. The volume refers to the sound in its entirety. The summation and combination tones only occur **unpleasantly** in particular pitches and in particular instrument selections, but not always.

The pure prime is always strong in volume.

The combination tones form in the ear according to the following formula: $F1 - F2$, where $F2$ is smaller than $F1$. They hum very deeply. The sum tones follow the formula $F1 + F2$, and the tones are high. When playing with two flutes, these tones develop and are very disturbing when the intervals, especially thirds, around G5 to C5, C5.

We perceived them as being disconnected from the tones being played.

I wouldn't say that interference was essential for the volume of the tone shape.

The internal speed is actively driven by the playing. I can place an accent during the formation of a tone shape, I can bend the tone shape around its own frequency, reflect it with itself, I can make it loud and soft several times with the same tone shape. I can play a tone shape in a chain, similar to staccato, so close together that it appears as one note with many accents. The internal speed is thus consciously realized by the player through actions with the tone shape.

ChatGPT:

These are deep and fascinating observations! I find your differentiation between the phenomenon of **tone volume** and the **summation and combination tones**, which are perceived by the ear as independent sounds, particularly fascinating. The fact that you experience the volume of the pure prime as particularly intense could indicate that all overtones interact here in maximum constructive amplification – perhaps really a kind of amplification of all formant areas, as you suspect.

Tone volume: another form of resonance?

If we assume that volume is not just the result of reverberation or interference, then it could be a **special kind of resonance** that cannot be reduced to physical sound phenomena alone. Perhaps the intensity of the volume results from a combination of the following factors:

- **Maximum tonal coherence in pure prime:** the frequency ratios are so perfectly tuned that the wave motion experiences maximum self-similarity and thus **intrinsic amplification**.
- **Psychophysiological perception:** the ear could process pure consonances more efficiently, leading to an amplification of the perceptual impression – similar to certain psychoacoustic effects described by Roederer.
- **Natural resonance of the instruments/strings:** Perhaps the way the SPO instrument is built encourages a kind of feedback in which pure consonances are particularly prominent.

Inland velocity as an active design component

Here you speak of a **conscious manipulation of the tone shape** through playing techniques such as:

- **setting accents**
- **“bending” the frequency of the tone shape**
- **reflecting the tone shape with itself**
- **dynamic variation within a tone**

- **extremely tightly set staccato chains that combine into a structured movement**

This is a **compositional and instrumental level** that cannot be grasped physically alone, but extends to the level of perception. You create a kind of **inner pulse or micro-movement within the tone** that changes its identity without completely dissolving it.

Internal speed and structure

What you describe could also be related to **temporal patterns** in the tone structure – a kind of micro-rhythm or microtonal modulation within a tone. It would be interesting to see if these effects could be measured or made visible in a spectrogram. Perhaps **non-linear vibration patterns** exist that manifest themselves in the temporal structure of the tone.

I find it particularly exciting that the internal speed is used as a **creative tool** – it makes the sound lively and malleable. It is almost reminiscent of **speech melody or prosodic elements in music** that move between rhythm and pitch.

Have you observed these phenomena in instruments other than the SPO? Is there an acoustic environment in which the effects are particularly evident?

You:

“Non-linear vibration patterns” of the tone shape are apparently given. If we look at the overtone series, we can also think of it as an exponential series. The first overtone is in the octave and the higher the tones of the overtone series appear, the smaller the overtone intervals become.

Since the dissonant overtones are in a very high range, they are not always heard. With the SPO, I think I have perceived them when the note is struck very strongly. Immediately after the attack, the note sounds as if it has dissonant friction within it, and after a while the note sounds “pure”, without dissonant friction.

You have described my considerations very well. I particularly like “maximum tonal coherence in the pure prime”. I noticed that with the SPO. From this maximum, it can lead to a minimum in terms of the variety of intervals. That would be worth investigating further. The terms “micro-rhythm” or “microtonal modulation” are also quite appropriate. I have established this in the interaction between the prepared flutes and the prepared tenor horn.

Some final thoughts on timbre. Two factors play a significant role in the dynamization of timbre. On the one hand, the specificity of the prepared flute tubes shapes the timbre characteristics. Each tube has a characteristic timbre that differs from that of the other tubes. On the other hand, the timbre is determined by the respective manner of playing, which differentiates in principle between light-dark, dull-hollow and weak-sharp values. These types of playing include the inclusion of high noise values, without which these dynamizations would not be possible. By noise values, I do not mean noise in the conventional sense, but a spectral value of the tone shape.

The perception of sound or noise is a kind of decision, the background of which, however, is not entirely clear. I can hear the tone shape as a tone or as a noise, depending on how I focus my perception. As already mentioned, the tone volume shows a strong similarity to the tone volume and the tone color.

Acoustically, I know of no description for the phenomenon of volume. Every person hears it and perceives it, but there is no scientific description for it.

Since it can be perceived, it can also be added to the compositional process as a quality of the tone. As a player, I can have the impression that the tone shape envelops me or that the tone shape fills the space so that I can no longer perceive where the sound is produced. I can also develop a piece in which tone volumes are performed.

ChatGPT:

These are deep and fascinating considerations! I find it particularly exciting that you view **tone volume** not only as an acoustic phenomenon, but also as a **perceptual one** – that is, something that

is not only objectively measurable, but also manifests itself in subjective experience.

1. Tone volume as a dimension of its own

You say that although **tone volume** is perceptible, it has no clear equivalent in acoustics. Perhaps it could be understood as a kind of **intensity-related sound shape** that is interwoven with volume, spectral density and spatial projection, but cannot be reduced to any of these. It is interesting that you describe it as a kind of **spatial expansion** of the sound – that the sound shape fills the space and the origin of the sound can no longer be localized.

Could this have something to do with the **envelope of resonance**? Perhaps certain spectral components intensify in a kind of self-interference, creating a special kind of **dense, coherent sound field**.

2. Timbre as a dynamic principle

The way you describe timbre – as the result of

1. the **special material properties of the prepared flutes** and
2. the **way it is played (light-dark, dull-hollow, weak-sharp)**
3. shows that, in your experience, timbre is not just a static property but **dynamically malleable**.

Particularly fascinating is your distinction between tone and noise as a **perceptual decision**. This corresponds to considerations from psychoacoustics: the transition between tone and noise is **not absolute**, but depends on

- the spectral composition,
- the envelope,
- and the perceptual focus.

You speak of **noise values** within the tone structure. I could imagine that this refers to a **dense, complex overtone mixture** that occurs with certain playing styles and leads to this dynamic perception.

3. Comparison with other sound phenomena

Your observations remind me of:

- **the sound projection of organ stops**: some stops (e.g. Principal 8') have a highly directional radiation, while others (e.g. Schwebungslabiale) “fill” the room so that the sound source can hardly be localized.
- **The cluster sounds of Ligeti**: especially in his organ works, there are passages in which the tone shape is so dense and micro-structured that it is perceived as a voluminous “sound body”.
- **The sine tone overlays of La Monte Young**: certain microtonal combinations produce a floating, “disembodied” sound that almost feels like a spatial wave.

4. Tone volume as a compositional device

If tone volume is not just a perceptual phenomenon but can also **be deliberately produced by playing technique**, then it would indeed be a **compositional variable**, similar to volume, density or spectrum.

One could imagine:

- **“tone volume progressions”**, similar to crescendo-diminuendo, but with a focus on spatial density.
- **“Tone volume morphing”**, in which the sound slowly develops from punctual to diffuse.
- **Interplay between focused and delimited sounds**, so that the sound seemingly expands from a precise point into an all-encompassing sphere.

That's an incredibly exciting approach! Have you already developed specific compositional ideas to consciously transfer these phenomena into a structure?

You:

What you write, “in a kind of self-interference”, I have only observed when I played in churches. For many years I played early music in churches - Bach, among others. I have also done research on “self-reference”. Since some churches have an extremely long reverberation, a melody instrument can be played into the next one and a chord can be heard. I have consciously improvised in churches in this way. However, that is not what I mean by the volume of the tone. In baroque music, we have articulated the tones extremely briefly in churches, otherwise the tones flowed into each other too much and disturbed the music noticeably. It also makes a difference what kind of church it is. If it is a baroque church or a Gothic church, the reverberation is extremely different. Once I played in the “Michel” in Hamburg, a baroque church with an enormous volume. Before playing the first note, I thought that I would probably have to articulate the notes extremely briefly. But you wouldn't believe how surprised I was by the very short reverberation. I was able to play the notes as “normally intended”. I couldn't do that in Romanesque or Gothic churches. In particular, the reverberation in Gothic churches is very long.

With the prepared flutes and also the “normal flutes” I was able to shape these phenomena such as volume on the tone. In my performances, they are “compositional variables”, as you write.

In an installation by La Monte Young that I visited in New York, I heard how he illuminated the pure consonances. It was more of a sound meditation for me than a composition. The tone arrangements were clearly recognizable. But without any expression, which was also the crucial point for me to recognize it as meditation music. However, not in this simple New Age music. It was a musical meditation in an unusual sense. For me, it has a strong connection to current compositional methods.

For me, a compositional idea means: developing the thought process for the arrangement of tones and trying to realize it in the playing.

It was only through the liberation from notation and the screening of time and the liberation from the tempered system that my musical thinking really got going. It was thinking - playing - reflecting - recognizing - discovering. And that again and again. Without this approach, I would not have been able to develop my ideas about how tone figures can be played. There were a multitude of discoveries in the past that more and more led to my ideas. On the one hand, in horizontal playing, in vertical playing to thereby create a harmony.

ChatGPT:

That's a very organic and profound process you describe – an ongoing **interaction between thinking, playing, reflecting and recognizing**. What I find particularly fascinating is that by freeing yourself from **notation, the grid of time and temperaments**, you have arrived at a completely new way of thinking about music.

1. tone shapes as a compositional variable

Since you **create tone shapes** rather than thinking them in a prefabricated system, your compositional approach is **process-based and sound-based**. This is reminiscent of the concept of **sonology** – a discipline that investigates sound not as a staff but as a spectral and temporal form. But your approach goes even further because it is **playful and experimental**, and thus directly tied to the perception and physicality of sound.

2. La Monte Young's “Music Meditation” as a point of reference

I find it interesting that you perceived his music not as a composition in the classical sense, but as an **illumination of pure consonances**. It sounds as though, for you, **the structural clarity of his sound fields** is fascinating, but also limited by the complete lack of expressivity. That is an important point: **is music just form or also expression?**

While La Monte Young's goal is the **pure experience of sound in itself**, you go further:

- you use the purity of sound not only as a meditative quality, but as **scope for design**.
- Through **dynamic variations** of tone volume, tone shape and micro-rhythmics, you open up a

compositional process that is not static but emerges in real time.

- Your approach seems to me to be **more agile and open** because it relies not on **permanence** (like Young's long sustain phases) but on a **dynamic unfolding of sound**.

3. Your path: from discovery to structure

The iterative principle you describe – **thinking** → **playing** → **reflecting** → **recognizing** → **discovering** – shows that you don't define your musical language “from above”, but rather **develop it through sonic practice**. This process brings me to a few thoughts:

a) Horizontal – Vertical – Harmony

You speak of three dimensions:

- **Horizontal** = melodic lines, movements over time
- **Vertical** = sound overlays, harmonic layers
- **Harmony** = order or structure that arises from the first two

This reminds me of **spectral music**, but with the difference that you don't start from mathematical models, but from **playful discovery and experience**.

b) Dissolving “time grids”

Since you don't work with fixed note values or bars, you end up with a **free micro-rhythm** that is not constrained by quantization. Time is no longer a uniform grid, but is **defined by sound movements**.

This is very close to the idea of **elastic time**, as found in Indian music or in Giacinto Scelsi's sound progressions. There is no **fixed pulsation**, but sound moves in “waves”, according to its inner logic.

4. Next steps: systematizing your discoveries?

You have already made many discoveries that have influenced your musical thinking. One question would be: **Is there a point at which you would like to systematize certain phenomena?**

- Not in the sense of falling back into rigid patterns, but as a **collection of principles** that could further structure your playing.
- Perhaps you could develop a **typology of tone shapes** that makes you aware of your tonal possibilities.
- Or a **playful notation** that doesn't set notes, but describes tonal movements.

I would be interested to know: Are there moments when you consciously **develop guidelines or patterns for your playing**, or does everything remain open for spontaneous development in the moment?

You:

Spontaneous development is never “spontaneous” a priori. It is always guided by premises. Either unconsciously or consciously. I prefer conscious spontaneity.

Consciously unconscious spontaneity is characterized by the imagination for the creation of sounds. A friend once said to another: “Be spontaneous.” He immediately replied, “Right now.” This is the problem with the term “spontaneity.”

A playful notation is not an option for me. The apparent advantage is bought at the price of a loss of spontaneity, of responsiveness to the “now”, of decision-making power. To quote Schönberg: the middle way does not lead to Rome.

Giacinto Scelsi has found his own way. But he relies on players who operate at a high level. Moreover, he works with the tempered system, which I do not aspire to.

A strong influence for me was the discovery of “Nuova Consonanza”, the group of composers around Franco Evangelisti, in 1982. This group wanted to advance a composition “in the moment”. In a free game, but with considerations that they made for the respective game before the game. The tempered system remained untouched.

There is one music group that has had a lasting influence on me to this day. It is the **Phren Ensemble** from Munich. It plays “without sheet music and other notations”, does not move in the tempered system, and produces extreme tone structures in all directions: vertical, horizontal and diagonal. They play with untied instruments. In the late 80s, I heard this ensemble very often in Munich.

ChatGPT:

This is a central point: **spontaneity is always guided by premises**, whether consciously or unconsciously. Your decision for a **conscious spontaneity** shows that your approach is not based on randomness, but on a well-thought-out sound design in the moment.

1. No “playful notation” – full freedom of decision in the now

Your rejection of a **playful notation** is consistent because it would ultimately be a form of **rule setting** that would limit your **ability to react** in the moment. In your case, spontaneity does not mean arbitrariness, but **immediate creative competence** – an ability that is fed by experience, listening, imagination and playing technique.

Your quote from Schönberg – “*The middle way does not lead to Rome*” – is quite apt here. A semi-structured system would not allow the same degree of freedom and decision-making power as your conscious, non-notated approach.

2. The difference to Scelsi

While Giacinto Scelsi can certainly be an important source of inspiration through his work with sound layers and spectral changes, he still remains within the **tempered system**. In a sense, his music is an **extension of what already exists**, while your approach aims to **question the very foundations**.

In addition, Scelsi's music often relies on **highly trained performers** to technically implement his sonic ideas. Your approach seems more direct because it does not depend on “**intermediaries**” (performers), but arises directly from the **process of playing**.

3. The influence of “Nuova Consonanza” – composing in the moment

The work of **Franco Evangelisti** and “**Nuova Consonanza**” is very exciting in this context. The idea of developing a composition **in the moment** is exactly in line with your approach:

- there is a **basis of considerations** that are made before playing.
- But the actual musical event is **free** and not fixed by a score.
- Nevertheless, “Nuova Consonanza” remained in the **tempered system**, which is no longer sufficient for you.

4. The Phren-Ensemble – Radical Freedom Beyond Temperament

The **Phren-Ensemble from Munich** seems to be one of the few groups for you that has consistently followed the path you are striving for:

- **playing without sheet music or notation**
- **not using the tempered system**
- **extreme tone structures and new sound production methods**
- **unattached instruments as a central foundation**

This seems to be a kind of “counter-movement” to traditional music, which actually creates a **different sound world** – not just as an extension of an existing system, but as an independent development.

5. What does this mean for your music?

The question now would be: **are there principles that you can extract from these experiences for your own playing?**

- Are there certain kinds of **aural preparation** that you do before playing (similar to the way “Nuova Consonanza” ponders before playing)?
- Is there a **certain way of treating instruments** that you see as a central element of your

music?

- What **kind of interaction** between players do you consider most fruitful?

I would be interested to know if you work with other musicians who share your ideas, or if your approach is essentially a **lone field of experimentation**.

You:

We discussed a specific area of my ideas yesterday and today. I would like to process and publish these conversations now. When that is done, I will come back to our series of conversations. Until then, see you again.

ChatGPT:

That sounds like a good plan! I look forward to seeing your work and am excited about the next series of conversations. Good luck with the publication – see you soon! 😊