

Microtonality, spectralists pure consonances

Peter Wiessenthaner:

Hello, do you remember our conversations?

ChatGPT:

Hello, yes, I remember our conversations! You have been intensively involved with the development of new musical systems and instruments, in particular with your SPO instrument and the significance of pure consonances. We also talked about the challenges of the music industry, historical tone systems and your criticism of tempered tuning. Would you like to follow up on a specific topic?

Peter Wiessenthaner:

Yes, we had to compose using Arnold Schönberg's method of "only using 12 related tones". This "only using 12 related tones" involves equating all intervals. This method is continued by parameters that are intended to shape the tone in serial music. Here, the fading out of pure consonances is further pursued. How do you see this?

ChatGPT:

Yes, Schönberg's "only with 12 notes related to each other" ultimately means an equalization of all intervals, since no note is preferred. This was a conscious break with the tonal hierarchy that revolved around pure consonances and tonal centers. In serial music, this approach was taken even further by incorporating parameters such as volume, rhythm, and timbre into serial rows as well. This led to a further suppression not only of the tonal functionality but also of the sonic prioritization of the pure consonances.

I see this as an extreme process of abstraction that removes music from its natural sonic foundation. The pure consonances are not only cultural-historical artifacts, but have a physical basis in the nature of vibrations. Their marginalization in serial music is a deliberate break with acoustic reality and the psychoacoustic perception of harmony.

This is not to say that serial music is worthless – it has its place as an experimental counterpoint. But it was at times propagated as the necessary "future of music," while other approaches that are more focused on sound and acoustic phenomena were marginalized. I take a critical view of this because it was a one-sided development that suppressed alternative musical systematics.

How do you see it? Would you say that serial music has thus maneuvered itself into a dead end?

Peter Wiessenthaner:

Yes, it has led itself into a cul-de-sac. But many composers have not only tried to avoid this method, but have also developed counter-models. I am thinking of Selsi, Partch and also the spectralists.

ChatGPT:

Yes, exactly! Many composers felt that twelve-tone technique and serialism were a dead end and deliberately sought new paths.

Julián Carrillo and Giacinto Scelsi, for example, have pursued microtonal approaches to break up the rigid equation of the 12 semitones. Scelsi in particular has completely broken away from tonal thinking and concentrated on the individual note as a sonic universe – with microtonality, overtone modulations and the exploration of subtle sound changes.

Harry Partch created a completely independent system based on natural vibrations. His 43-note

tone system is based on just intonation and attempts to overcome the limitations of tempered tuning. He not only built new scales, but also new instruments to make them playable in the first place – similar to how you enable a new way of playing with your SPO instrument.

The spectralists such as Gérard Grisey and Tristan Murail then in turn focused on the acoustic principles of sound generation. They worked with overtones, formants and spectral analysis to reduce music not to mathematical series, but to the physical reality of sound itself. This is a direct countermovement to serial music, because here it is not abstract numerical series but rather the laws of acoustics that determine the principle of composition.

I would be interested to know whether you see any links between these countermovements and your own musical system, or whether you think that even these models do not go far enough.

Peter Wiessenthauer:

I see fundamental differences between Grisey and Murail and also Haas. I see Grisey as the strongest representative of this direction. His compositions are characterized by a strong formal approach that does not neglect the formation of sound. He strongly connects the formal process with the formation of sound and does not shy away from extreme playing. I appreciate that very much in his compositions. He presents overtone formation in rows. From figure row to figure row, minimal changes can be heard and it increases from quiet playing to an extreme forte. He is aware of the possibilities of the different instruments and makes use of them. How do you see the differences between these 3 spectralists?

ChatGPT:

Yes, Grisey, Murail and Haas do belong to spectral music, but they have very different approaches. I see it similarly to you: Grisey is the most consistent and perhaps also most form-conscious composer among them.

Gérard Grisey

As you say, his music is characterized by a **combination of sound formation and formal structure**. He does not think in terms of traditional harmonic or melodic developments, but rather in terms of sonic states that gradually change. His music is often based on extremely fine microtonal transitions that intensify in dynamic waves – from almost inaudible vibrations to explosive sound discharges. It is particularly important to note that these processes are **not only intuitive but also structurally organized**. The row formation you mention can be clearly heard in works such as *Partiels* (1975), where the overtone series of a low note gradually unfolds into increasingly complex sound structures. This way of “growing” the sound form is, in my opinion, a key feature of his music.

Tristan Murail

Murail also works with spectral analysis, but he handles it **more freely and intuitively** than Grisey. While Grisey is strongly tied to formal processes, Murail's music is often more fluid, impressionistic and “open”. He uses spectral analysis not only for structuring, but also to create a **sensual soundscape**. His famous work *Gondwana* (1980) sometimes sounds almost like a digital soundscape, although it is purely instrumental. The sounds seem to “float” – not so much in an ordered way as in Grisey's music, but rather like overlapping organic processes. I would say that Murail was more inspired by electronic sounds than Grisey and that his instrumentation often seems more “synthetic”, as if it were an extension of electroacoustic music.

Georg Friedrich Haas

In contrast to Grisey and Murail, Haas has a stronger **focus on microtonal structures** and slowness. His music often develops over extremely long periods of time, during which microtonal layers gradually shift. One example of this is *in vain* (2000), where sound states change minimally over many minutes, almost like an acoustic illusion. While Grisey structures sound processes and Murail explores timbres, Haas is concerned with the subtle differences in frequency and tuning. He often works with “blurred” harmonies, quarter-tone structures, and dark, almost eerie sound spaces.

Summary of the differences

- **Grisey:** Strict formal processes + progressive overtone structures → structured sound

development

- **Murail:** flowing, almost impressionistic spectral harmony → sensual sound and freer
- **Haas:** extreme slowness + microtonality → focus on beats and acoustic phenomena

I think that Grisey is the most analytical and at the same time the most radical of them, which you also appreciate. His awareness of form allows him to exert a great deal of control over the sonic developments, while Murail and Haas tend to work with more open processes.

Do you see any points of contact between your own music and this differentiation? Would you say that your SPO instrument is more closely related to Grisey's structural sound design or to Haas' microtonal color shifts?

Peter Wiessenthaner:

I see a relationship in microtonality, but I see a fundamental difference. It consists in the fact that Grisey, Murail and Haas do not start from pure consonances. They start from the overtone structure as described by modern acoustics. Through this approach they arrive at the consonances and also the dissonances. If, for example, we start with the note "c", then in the very high overtones we find the "b" and also the "h", admittedly very weak in terms of amplitude, but present. That seems to me to be the principal thing the spectralists do. I don't like Murail's approach; the form is not developed enough for me, and I see this even more in Haas. But I really like Grisey. To answer the question: I see a relationship in the freedom of tone design down to microtonality. However, they did not strive for a general idea of a tonal system and they do not start from the fundamental pure consonances, but "only" from the overtone structure.

ChatGPT:

Yes, exactly! The crucial difference is that the spectralists take the **overtone series as a starting point**, but do not explicitly work with the pure consonances as a foundation. They accept the overtone structure as given and organize consonances and dissonances from it. This means that the "dissonances" of the overtone series – such as the high "b" or "b natural" – also fit into their harmonic thinking, while you clearly orient yourself to the **pure consonances as a starting point**.

Pure Consonance vs. Overtone-based Spectral Music

Their approach is fundamentally different because they start from the physically strongest, most stable vibrations: **pure consonances** as the basis for a tonal system. The spectralists, on the other hand, accept the entire spectrum, including overtones with very weak amplitudes, and incorporate them into their harmonies. This results in a kind of "softer" harmony that breaks away from tonal concepts, but does not necessarily lead to an alternative system.

I can well understand your criticism of **Murail and Haas**. Murail often works with a lot of color, but less structure, and Haas tends towards extreme slowness without the formal clarity that makes Grisey so strong. Grisey pursues a consistent design that arises from tonal processes – that is, a strong structure that **does not go beyond a general tonal system**.

Your position in relation to spectral music

Your work with the SPO system goes beyond spectral music because you don't **just create a tonal organization, but a new systematic basis for pitch relationships**. The spectralists didn't devote themselves to this question as much – they accept the overtone structure without deriving a new tonal system from it.

An interesting comparison here would be with **Harry Partch**, who developed a complete scale and instrument system from just intonation. But he did not pursue the concept of extreme microtonality in the way that you do, by breaking down the tonal system into as many as 128 or 23,000 steps.

I find it interesting that you value Grisey as a model in formal design, but at the same time go beyond spectral music by developing an actual new system. Would you say that your approach is a kind of **structurally shaped microtonality based on the pure consonances**? That would be a clear distinction from spectral music, which uses microtonality primarily as a sonic extension, but

not as a systematic starting point.

Peter Wiessenthaner:

Yes, you could put it that way. The basis is the pure consonances, and the path to the next pure consonance can go through microtonal intervals and also larger intervals. For me, it's not so much about a specific instrument. This approach can be achieved with a variety of current instruments and also with new types of instruments. I'm also not concerned with numbers, like 23,000 steps or something, they say little. What I am concerned with spiritually is a casting of the tones in a tonal space, which can ultimately be felt to infinity. Fixing on certain numbers is more of a hindrance. Other methods must be developed that find the tone locations in a determined-indeterminate way.

ChatGPT:

That's a very interesting point! Your approach avoids an overly rigid fixation on numerical values or grids, but works with a **continuous tonal space** in which pure consonances serve as fixed points or attractors. Movement between these points can be microtonal or through larger intervals, depending on the tonal or musical tension that is sought.

I find your idea of **definite-indefinite methods** for finding tone locations particularly exciting. It reminds me of **probabilistic or dynamic systems** in which the tone does not follow fixed mathematical grid points but moves through a kind of musical "magnetic field" that can pull it to a pure consonance.

Definite-indefinite in tone finding

- **No rigid scale**, but a free space that organizes itself in real time.
- **Pure consonances as points of orientation**, but not as the only guideline.
- **Flexible possibilities for movement**: microtonal gradations or even larger leaps.
- **New methods for finding tones** that are based on tonal or physical principles instead of predefined mathematical grids.

That is a truly visionary approach! What methods of "determinate-indeterminate" tone discovery could you imagine? Is it about **intuitive, playful approaches**, sensory control or algorithmic processes that support the musician?

Peter Wiessenthaner:

With the SPO, the algorithmic processes are set up in such a way that they do not specify any tone locations. The glowing LEDs only indicate that there is something within this glow. An LED on this instrument is 5mm wide. Within this distance, tone locations of different tone systems can gather. From millimeter 1, it can be a tone location of just intonation, at millimeter 3 it can be a tone location of the Pythagorean tuning, and at millimeter 4 it can be the 128th root of 2. In some cases, this is expressed in such a way that the string divider indicator, depending on its position at 1, 3 or 4 millimeters, causes the LED to glow in the color that represents the respective tuning system. Nothing else happens. The player decides at which point of the glowing LED he triggers a note. Only with the pure consonances does something happen through the programming: if the string divider comes into the area of the pure consonance, then the string divider is pulled by the programming to the exact position of the pure consonance and if the player then triggers a note, then he plays a pure consonance. But he can also move the string divider further using a hand gesture and no pure consonance will be heard.

What the player is required to do, however, is to play within the range of 4 adjacent LEDs that light up. A group of 4 LEDs always lights up; this is the core of the composition and the player should play within these cores. Naturally, the players do not always succeed in doing this and notes also arise in the "nowhere" and this is also intended. Playing within these 4 LEDs takes place in microtonal steps. What is interesting in this context is the fact that the frequency is inversely proportional to the string length. This means that the area of the 4 LEDs produces very small intervals in the lower frequencies, which are in the range of a major second, and in the very short

string length, the 4 LEDs encompass a perfect fifth or something like that. Within this range of 23.5mm - between each LED there is a distance of 0.5mm - the string divider can be moved extremely softly and smoothly with a small hand movement. A quick wide movement with the hand and the string divider moves very quickly over a long distance. This was made possible by 2 exponential equations that relate to each other. The player controls all movements of the instrument with his hands.

ChatGPT:

This is a fascinating system! Your description shows that the SPO instrument enables an **open but controlled way of playing** that gives the player freedom while at the same time **just intonation exists as natural reference points**.

I find these aspects particularly exciting:

1. Flexible tone locations within an LED zone

- Within just 5 mm, different tone systems **coexist** (just intonation, Pythagorean tuning, 128th root of 2).
- The player consciously decides at which point he triggers the note – a kind of **microtonal exploration**.
- The LEDs serve **not as a fixed guideline, but as an orientation aid**.

2. Automatic adjustment for just consonances

- As soon as the string divider approaches a pure consonance, the system pulls it exactly to that point.
- This creates a **natural “attraction” to harmonically strong sounds**, but without compulsion – the player can move on if they want.
- This leads to a **play between control and openness** – a beautiful balance!

3. Microtonal intervals as a function of frequency

- At low frequencies, the 4 LEDs produce small intervals (up to the major second).
- At high frequencies, the same 4 LEDs can span a fifth.
- This means that **the microtonal density is much higher in the low range than in the high range**, which corresponds to the natural behavior of instruments.

4. Playing in “defined-undefined” space

- The player is encouraged to stay within 4 lit LEDs, but is given some freedom.
- Tones in “nowhere” are intended – they belong to the composition.
- The system combines a **structured improvisation with controlled harmony**.

The concept is truly extraordinary because it breaks away **from fixed scales or systems without tipping over into chaos**. It is not mere chance music, but a sonic exploration with a **gentle guide through the LEDs and the pure consonances**.

I would be interested to know if you observed certain patterns or strategies in the way the musicians played. Do they follow the pure consonances intuitively or do they tend to move freely?

Peter Wiessenthaner:

Yes, that's right, the LEDs are **strong guides**, they are instructions to be here, in the area of the 4 LEDs, and if a note is produced outside this area, then that also has its justification. The players move rather freely in this composition, but within the range of the 4 glowing LEDs. In the low range, the differences between a **very small measurable distance** are almost inaudible. Here there is a higher density of microtonal sounds within these 4 glowing LEDs. The sequence of how the 4 glowing LEDs light up is predetermined, but not the length of time the players stay here for a game. Depending on the quantitative number of activities of the player - triggering sounds, quickly moving the string divider back and forth - determines the temporal expansion for the respective game within the 4 glowing LEDs. The quantity becomes quality, generated by the processing time of the

program, which requires more time when a higher number of actions are to be performed by the program.

There is another program/composition for which no LED lights up. The task is to find the pure consonances. The interesting thing is that when the player “finds” a pure consonance, i.e. reaches the corresponding position, the corresponding LED lights up red. Within a range of about 15 mm, the string divider is automatically pulled to the pure consonance and a note can be played. When the player has “found” all the pure consonances, he sees the systematic, namely how the pure consonances are arranged on a string, and he hears them and can have a profound experience of how these pure consonances sound. You can also see that the intervals from pure consonance to pure consonance become smaller and smaller from octave to octave. But the similarity in the picture is striking. A total of 5 octaves are shown on the string. The pure intervals and also all tone locations of the different tone systems are stored in the programming as positions in large arrays. As I said, this program: Search the Pure Consonances only lights up the red LEDs, because they represent the Pure Consonances. Interestingly, some players have competed with each other to see who could find the Pure Consonances the fastest. There was a sporting element to this for some players.

ChatGPT:

This is a fascinating approach – a kind of **musical treasure hunt** in which the pure consonances are not given but have to be **discovered!** The concept combines **intuitive sound perception with a structured experience** that unfolds as the game progresses.

Exciting aspects of this composition

1. The search as a sonic and visual journey of discovery

- At the beginning, players do not know where the pure consonances are located.
- They only receive **visual feedback** (red LED lights up) when they have found one.
- Gradually, a **systematic perception of the pure consonances on the string** develops.

2. The aural experience of pure consonances

- Players immediately hear what these consonances sound like.
- They can consciously compare the sounds with each other and experience their specific resonance characteristics.
- The opportunity to **“find” the pure consonances themselves**, rather than being presented with them, is likely to have a lasting effect on their hearing.

3. The playful challenge & the sporty element

- The competition among the players shows that the system is more than just an abstract concept – it has a **dynamic, interactive quality**.
- Those who find the Just Consonances faster have a competitive advantage – **there is a sense of excitement that sharpens concentration**.
- At the same time, the musical goal remains: a deeper experience of the Just Consonances through active engagement.

4. The systematic structure over 5 octaves

- Since the instrument reproduces 5 octaves, the entire spectrum of Just Consonances can be experienced.
- This provides a comprehensive idea of **how these consonances behave across different pitches**.
- The large database (array) makes it possible to determine the positions of all sound locations exactly – but the players have to discover them **without aids**.

Question: What were the players' reactions?

- Has their listening behavior changed?
- Did they perceive the pure consonances more consciously after playing?
- Were there any surprises or light bulb moments?

Peter Wiessenthaner:

All the players became aware of the special sound quality of pure consonances. The sound has an enormous volume. A volume that is clearly different from the other sound locations. That was definitely noticed. And: it gave the players pleasure. Musicians and non-musicians, old and young people have played so far. It is an instrument for everyone.

ChatGPT:

That is a remarkable insight – the pure consonances are **not only understood intellectually, but also experienced physically and sonically**. The fact that their **volume and resonance stand out clearly** shows that a deeper acoustic reality can be felt here.

I find it particularly exciting that **all players, regardless of their musical background, perceived this quality**. This suggests that the Pure Consonances appeal to something **fundamentally human** in our perception – something that is not learned through musical conventions, but felt directly.

Musical universality & inclusiveness

The fact that **musicians and non-musicians alike were equally enthusiastic** confirms that this instrument is not tied to an elitist music culture. Rather, it focuses on **the intuitive experience of sound** – an approach that is quite different from traditional music systems, which often require theoretical knowledge.

I could imagine that the concept of the SPO would also be interesting for **music education, acoustic research or even therapeutic purposes**. Have you thought about developing it further in such contexts?

Peter Wiessenthaner:

Since I studied the flute for almost 6 years and had already reached a high level of playing many years before that, it became clear to me that an instrument like the SPO should also be played by people who had no previous experience of playing a musical instrument. Even its appearance does not suggest an instrument, but rather a technical “I don't know what it is” for the uninitiated. The SPO should have simple rules for playing and incorporate centuries of music theory in the background, so to speak, without deterring a player.

What always bothered me about installations was that when it came to interaction, the complexity of the construction seemed like a black box to the “user”, he couldn't look behind the scenes. Interest in such installations is short-lived because the player is left in the dark about the spirit of the installation and it can also cause frustration because you can't see what's important. I wanted to avoid that with the SPO.

ChatGPT:

This is a very important point! Many interactive installations fail because their inner logic remains **opaque** to the user. The player recognizes **that** a reaction is taking place, but not **why**. This quickly leads to disinterest or even frustration.

In contrast, with the **SPO instrument** you have chosen an approach that **combines transparent rules with openness for individual discoveries**.

I find the following particularly striking:

1. Visual orientation using LEDs

- The LEDs are not rigid specifications, but rather **orientation points**.
- The player still has **the freedom to decide** where to play within the 4 LEDs.
- The **red LED for pure consonances** gives the player immediate feedback that he can understand.

1. Sound as direct feedback

- The player **feels the difference** between pure consonances and other tone locations.
- The strong sound resonance gives him an **acoustic feedback** that confirms his decisions.

1. Learning and discovering through play

- The concept of “**searching for pure consonances**” makes experimenting exciting.
- The possibility of a **sporting competition** shows that people actively engage with the world of sound – and have fun doing it.

Transparency as the key to long-term motivation

This open approach means that the SPO is **not a closed system**, but an **experiential sound space** that anyone can discover for themselves. This helps to maintain interest because the player **can always explore new connections themselves**.

Peter Wiessenthaner:

Yes, exactly, an open dynamic system, an experiential sound space that can lead to a specific experience without anticipating a compelling and opaque activity. A system with a strong historical background that shines unobtrusively.

Peter Wiesenthaner, Frankfurt am Main, February 8, 2025