The Waiting Room Condition

Fugal In-Betweens and the Composition of Coexisting Realities through Wave Field Synthesis

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Master Thesis in Sound Design
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Abstract

The Waiting Room Condition explores the sonic and phenomenological dimensions of in-between spaces through the concept of a sound installation using Wave Field Synthesis. Waiting is approached not only conceptually but as a subjective, embodied state oscillating between hope and anxiety, stillness and movement – and sound is chosen as the medium of inquiry because auditive perception, often overshadowed by the visual, operates at the boundary where self and space meet. Conceptually, the thesis develops around the waiting room as an archetypal threshold space and defines *The Waiting Room Condition* as a state of being in which multiple autonomous realities and fugal in-betweens coexist within the same space-time continuum. Within this framework, Wave Field Synthesis is approached as a perceptual and phenomenological medium rather than a representational tool: its spatialized sound rendering across the listening area enables listeners to physically experience these coexisting sonic realities. The compositional process itself unfolded as a continuous negotiation between artistic intention and the technical properties of Wave Field Synthesis, surfacing frictions – from sound material contradicting the intended condition to space-specific calibration challenges. The resulting insights, particularly around sound localization and the distinction between event-based and noise-based material, extend beyond technicalities of WFS-based sound design practice into the realm of sonic perception. Finally *The Waiting Room Condition* becomes bodily inhabitable as a fifteen-minute seamless sound installation for up to six listeners within a 5×5 metre room-in-a-room WFS array. As such it invites listeners into a space of lingering, listening and deeper attention – a condition in which spatial, temporal and personal boundaries dissolve, and the listener becomes an additional presence within an omnipresent now.

Keywords:

Wave Field Synthesis, Sound Design, In-Between Space, Relational Space, Quantum Listening, Deep Listening, Superposition, Omnipresent Now, Sound Installation, Spatial Composition, Acoustic Holography, Room Tones, Architectural Sound, Immersive Audio, Artistic Research, Sound Art, Sound Studies

Table of Content

Chapter 1: *The Waiting Room Condition* as Lived Experience and Philosophical Proposition **4**

1.1: Introduction and Research Question 4

1.2: Methodology – Artistic Research and Exploration 6

Chapter 2: From Waiting Room to *The Waiting Room Condition* – Space Becoming Condition **8**

2.1: The Relational In-Between: Encounter, Sound and Coexistence 8

2.2: The Fugal In-Between: Flight, Plurality and the Experience of Duration 11

2.3: The Waiting Room as Sonic Superposition: Coexisting Realities and the Omnipresent Now 13

2.4: Atmosphere, Dwelling and the Waiting Room Condition: Toward a Working Definition 15

Chapter 3: WFS as the Technology that Makes The Waiting Room's Coexisting Conditions Inhabitable **16**

3.1: The Physics of WFS and its Unique Spatial and Artistic Properties 16

3.2: The WFS Array System as Compositional Medium 18

Chapter 4: *The Waiting Room Condition* as Installation — From Concept to Sonic and Spatial Matter **19**

4.1: Translation from Concept to Space and Condition 19

4.2: Translation from Concept to Compositional Framework 20

4.3: Sound Design Process Documentation – Composing, Experiencing, Reflecting and Acting with the WFS Array System 20

4.4: The Waiting Room Condition as Compositional and Installative Room-in-a-Room Space 35

Chapter 5: Conclusion —*The Waiting Room Condition* and Its Narrative Around Sound, Time and Coexistence **42**

Appendix **45**

References **46**

Acknowledgements **48**

Chapter 1: The Waiting Room Condition as Lived Experience and Philosophical Proposition

1.1 Introduction and Research Question

Funny enough the topic of in-betweens as transcendent spaces and conditions have been present as such in my sphere of interest and sound-related practice not only for a fugal frame of time. I have figured that observing and listening to, as well as lingering within these in-betweens, can become both a practice of auditive experience and of empathic engagement with the inner self and with other human and non-human presences. This is because they seem, in my personal observation so far, to amplify fragile states of beings, that even though impermanent, can alter and further transcend the perception of space and time. As such and in relation to the self, these in-between spaces can become relational spaces wherein a subjective relationship with time and space can be experienced. In relation to others these in-between and relational spaces can enhance differences and similarities, enabling as such possibilities for different realities to co-exist.

The act of waiting – as experienced personally and through my research I found that resonating with others too –, can subjectively be perceived as an act of persistence and for that recall both positive and negative connotations. Waiting enacted within a waiting room as in-between space can be further linked to a feeling of uncertainty of what-is-to-come. To persist within this state of uncertainty can recall deep feelings that range from hope to fear, from anxiety to joy and this just to name four. Those feelings are experienced subjectively because they are linked to a very personal sphere of perception of those waiting. They all do though co-exist in the same space and time of those waiting physically together. The waiting room, seen from a spatial and philosophical perspective, influences these waiting room conditions through its own characteristics in sound, design, texture and agency.

At the same time and while performing the action of waiting, the bodily state can assume multiple positions varying from stillness to movement. Also waiting as such invites and can be experienced simultaneously with other conscious or subconscious actions such as listening and mindtravelling. When experienced together in multiplicity, those actions could become tools to access a deeper perception of self and “other” while inhabiting the same space at the same time. The waiting room then becomes a vessel wherein the perceived conditions can be experienced and altered through the performance of waiting.

Talking about space, every room is defined not only by its visually graspable characteristics, but also by the other sensory means as for the sonic components resounding within a room. In the words of Pallasmaa, “our contact with the world takes place at the boundary line of the self through specialised parts of our enveloping membrane” (Pallasmaa, 2005, pp.10-11). As such a room can be experienced in multiple ways and through multiple sensory spheres of perception. In relation to my personal sphere of interest and practice the medium used to research belongs to the auditive sphere. To cite Pallasmaa observing the ongoing “bias towards vision, and the suppression of other senses” (Pallasmaa, 2005, p.10) sound as medium and form of art combined with the sonic possibilities of Wave Field Synthesis are intended within this thesis to unfold new ways to experience, inhabit, perceive and become space.

This intention takes shape within the following research question:

> How can I use Wave Field Synthesis to compose a space in which multiple non-hierarchical architectural sonic realities coexist as a waiting room condition — connected and separated by active in-betweens — and how can the act of deeper listening within this field enable the transcendence of boundaries between spatial, temporal and personal realities, rendering the listener an additional presence within an omnipresent now?

The explorative journey towards answering the research question of this thesis is subdivided in chapters: starting from the conceptual translation of space becoming condition, through a phenomenological approach in the use of Wave Field Synthesis and its technical characteristics, to the *composition* of a sound installation. Throughout the thesis and reflecting my personal sphere of interest, the research combines aspects of the philosophical, the architectural, the physical and the sonic realm. The attempt to draft a conclusion at the end of the writing process reflects a snapshot in the design process, as the testing phase described in chapter 4 represents only one part of the process to be continued during the setup and further calibration of the installation within the actual exhibition space. And even then, it will be hopefully and potentially ongoing – further evolving through multiple modes of perception and every other space and listener in time.

1.2 Methodology – Artistic Research and Exploration

The methodology applied consists in artistic exploration with main focus in approaching the terms “fugal in-betweens" and "co-existence" sonically through Wave Field Synthesis. The main interest hereby lies in its possibility to create acoustically delineated presences within a room, the possibility of WFS for listeners to “step into a sound source” and the potentiality of co-existence of a multitude of sonic realities to be composed and experienced without having to focus on one singular “sweet spot” of listening.

The research approach is to dive into the above named terms and sounding realities from a sonic, textural, psychological, sociological, compositional and architectural point of view. All these aspects combined and present within the research question mentioned in the previous chapters, are subdivided into three subquestions to thematically structure the phase of exploration as follows:

1) Can a physical space be sonically composed for the listener to experience both, single sounds and multiple coexisting sounding realities at the same time in the same space?
2) Is it possible to recreate a physically perceivable sense of “in-between” through Wave Field Synthesis?
3) How can a narrative space be composed sonically so as to become architecturally perceivable — without relying on sonic material whose associative potential would impose a specific narrative onto the listener?

Ultimately through this research the aim is to compose a sounding space, wherein the audience becomes both listener and composer of multiple sonic realities in the same space at the same time.

The main part of the exploratory sphere consists in a testing phase with WFS array system of the Institute for Computer Music and Sound Technology (ICST) [1]. During two weeks in early June 2026 and after having dived into the more theoretical and conceptual framework, I was able to physically dive into my research questions through the use of the WFS array system in the Labor of the ICST.

[1] For further information on the ICST WFS array system see:
https://www.zhdk.ch/en/researchproject/wave-field-synthesis-system-604123

During this time I kept journaling in detail about my sonic experiments as well as perceptions of the sonic material projected through the WFS array into space. The phases of testing were subdivided and repeated in loop as follows:

- Selection, recording and shaping of sonic material;
- Distribution of the selected sounds to match the virtual sound sources of the WFS;
- Selection and perception of the single sounds sounds as projected through the WFS array in space;
- Composition of the single sounds intertwined to an overall sonic field;
- Reflection on the perceived sonic feel within space in relation to the theoretical and conceptual framework.

This looping structure of doing, perceiving and readjusting can be linked to the dual movement of reflective practice – reflection-in-action and reflection-on-action – described by Donald Schön. While reflection-in-action represents the thinking and adjusting that happens within the act of composing, reflection-on-action describes the reflective examination of what occurred and why (Schön, 1983). The two modes of practice were active throughout the testing phase: the reflection-in-action while shaping sounds, listening to them and moving within the array, the reflection-on-action during the act of daily journaling. As such thinking, doing and reflecting are to be seen equally as integral components shaping this thesis, for "when someone reflects-in-action, he becomes a researcher in the practice context" (Schön, 1983, p. 68).

The form chosen to describe this exploratory process spans through various subchapters throughout Chapter 4 and specifically from Subchapter 4.3 as a Sound Design Documentation. The documentation summarizes the daily testing journal and is reorganized thematically following the testing and compositional discoveries as well as creative decisions taken to shape the final piece. During the testing phase I received studio visits by mentors, other students and collaborators, who listened and exchanged their points of perception and thoughts on the topic with me. These insights and conversations were precious to the research, as they allowed me to include and reflect already multiple ways of perception, listening and movement within the installation and through the sonic field by others.
Formally the documentation contains *Personal Notes* written in cursive and accentuated in light grey. Within these personal notes I describe the testing from two perspectives: the technical approach and the perceptual realm. This method was chosen because in resonance with the conceptual framework of the thesis on one hand, and on the other hand as personal way of approaching research through exploration, as I find reflected by Schön: "Our knowing is ordinarily tacit, implicit in our patterns of action and in our feel for the stuff with which we are dealing. It seems right to say that our knowing is in our action." (Schön, 1983, p. 49).

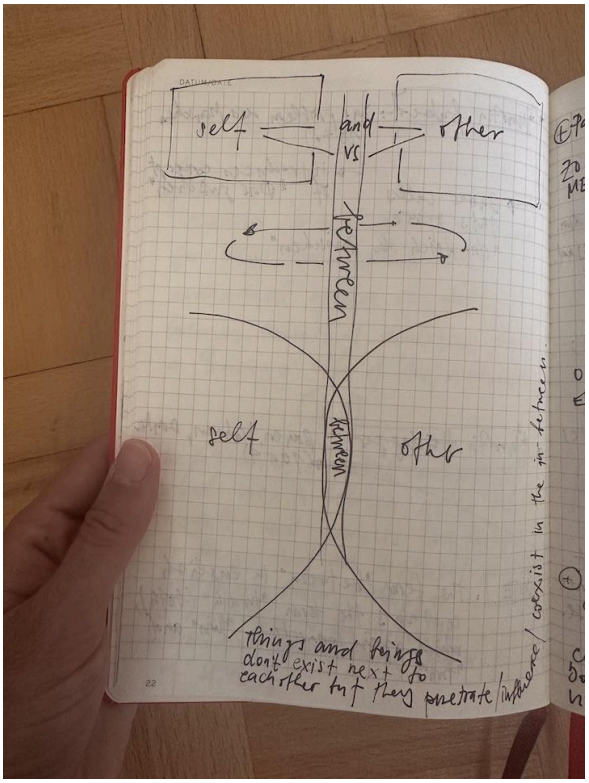
Chapter 2: From Waiting Room to Waiting Room Condition – Space Becoming Condition

2.1: The Relational In-Between: Encounter, Sound and Coexistence

Based on the various nuances that the concept of "in-between" can imply, the one chosen as framework for this thesis is the relational one. As Gianpaola Spirito describes it from a philosophical and architectural point of view, the in-between represents a "relational field between distinct and autonomous entities, within which these entities engage in dialogue, come together, and enrich one another" (Spirito, 2015, p. 8).

In the early 1920s, the philosopher Martin Buber, within his writings on relational philosophy, connects "being" to being human as an entity able to comprehend the being of entities entering into relation with it, as well as to question its own being (Spirito, 2015, p. 18).

Later in 1943 he introduced the concept of "Das Dazwischen" (in-between), assuming its social and anthropological worthiness as a space of encounter, interaction and acceptance of the "other". This sphere in-between according to Buber is deep-rooted in the fact that humans consider the other as other, as a distinct body and for that able to communicate through a common sphere (Spirito, 2015, p. 21).



Hand drawing of in-between spaces with distinct function regarding the relation between self and other. (Image Source: MM June 2026)

Going further and applying the concept of "in-between" to an architectural context, the Dutch architect Aldo Van Eyck stated that architecture should be thought of as a configuration of in-between spaces clearly defined and able to enhance the connection between inner and outer spaces (Spirito, 2015, p. 22). Architectural spaces are defined by physical characteristics such as textural and tactile ones, which make the space perceivable on sensorial levels. These relational spaces with their characteristics are active and pre-exist a body entering them. Through entering, body and space get in relation with and alter each other's condition – coexist.

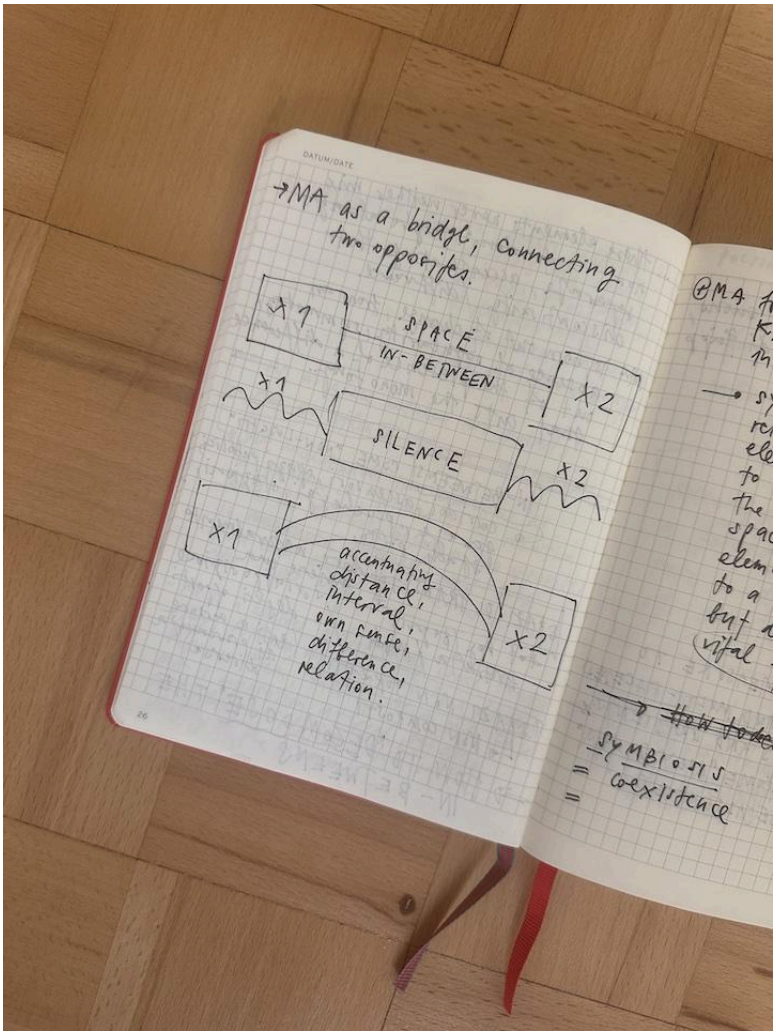
Talking of relations between the things equals talking of composition, as Spirito poetically and functionally describes (Spirito, 2015, p. 9). Applied to the sonic realm and as Brandon LaBelle identifies beautifully:

> "sound as an itinerant movement that immediately brings two together; it suggests the intensity and grace with which sound may create a relational space, a meeting point, diffuse and yet pointed; a private space that requires something between, an outside, a gap." (LaBelle, 2019, p. xiv)

Sound, even though ephemeral in its being, does have a surface and can be grasped – not by hand, but perceived by skin and fully anticipated by inner means of perception. Its ephemerality is fluid and able to transcend the materiality of things, of course being altered by the material properties. Texture and reflection alter the way sound is perceived within and through a specific room. As such it enters in relation with the room, becoming multiple within itself and with the room's sonic characteristic; a multidimensional and multilayered field that can be heard and perceived, as overall field of sound or within its nuances when actively listened to. While to hear, as Pauline Oliveros notes about deep listening, is the physical means that enables perception, to listen is to give attention to what is perceived acoustically and psychologically (Oliveros, 2005, p. 22). In that to listen and to hear are actions that one body can perform simultaneously, through the conscious and the subconscious. Moreover through listening the body can become conscious of the multitude and diversity of the sonic presences being and moving within one space simultaneously.

The sounds belonging to a space are the ones defining the space from a sonic perspective – In the concept of "Ma" belonging to the eastern hemisphere and describing the "being in-between" within a space-time dimension. This interval enables them to stay opposite but in symbiosis. The term symbiosis here is applied to the concept of "Ma" by the Japanese architect Kisho Kurokawa and reformulated as a dynamic relationship between opposite elements. The in-between space or "Ma" as such consists in its ambiguity and multivalence and doesn't force the opposite elements to a compromise or harmony, but provides the key to enter in relation with each other and coexist (Kurokawa, as cited in Spirito, 2015, p. 23).

In relation to sound this in-between in “Ma” is understood as “silence in-between two sounds”. It is found in moments of stillness, in the voids in between. This silence in-between is a neutral space, an interval, but active. According to Japanese architect Arata Isozaki “Ma is a place where life is lived (…) and it only becomes attractive to us when it bears traces of the life it shelters.” (Isozaki, as cited in Bellink, 2025, p. 29) Further Bellink (2025) notes that it is something appearing through time in space by the use of people. As such “Ma” is transitional and can shift in its being in relation to the use and reception by the people inhabiting it – a relational space composed by the traces of life passing through it.



Hand drawing of personal visual representation within three variations of the concept of “Ma”.
The numbers 1 and 2 stand as variables or two opposites as self and other.
(Image Source: MM June 2026)

2.2: The Fugal In-Between: Flight, Plurality and the Experience of Duration

The term "fugue" derives from Italian “fuga” or from Latin “fugere”, meaning flight [2], but can be read also as a physical representation of an “In-Between space”. Both terms “fugue” and “in-between” can exist only as in between at least two distinct other entities. As such they imply intervals, distance and interstices. Within an architectural context as Spirito frames it, it is in these interstices that the temporal dimension comes into play and the relationships between the past and present unfold (Spirito, 2015, p. 11).
These interstices read from a spatial and temporal dimension and by assuming that they exist only as in between two other entities, they not only unfold but transcend time in a state connecting past, present and future; we come from a place, are currently within another and go somewhere else. This “being currently within” implies a state and place: the fugal in-between.

Within this state there is activity and activity defines a living entity. We are as long as we move, whether internally or externally perceivable or not. At times these movements occur in such micro-scale or so subtle in their being, that they seem almost impossible to be grasped. But still they are active and move.
In 1909 the German philosopher and sociologist Georg Simmel within his writing “Bridge and Door” describes the movement of life, as going equally from inside to outside and from outside to inside (Simmel, 1994, p. 9). This description doesn’t imply a single direction, or a tempo, it rather determines life as a state of being that moves in-between two other states. Going further into orientation, the philosopher Byung-Chul Han in his book “The Scent of Time” notes:

> “Pure orientation towards the goal deprives the in-between space of all meaning, emptying it to become a corridor without any value of its own. Acceleration is the attempt to make the temporal interval that is needed for bridging the spatial interval disappear altogether.” (Han, 2017, pp. 37-38)

While in regard of the temporal dimension Han writes:

> “As soon as one looks deeper into being one recognizes that all things are interconnected, that even the least of them communicates with a whole world. But the age of haste does not have the time to heighten perception. Only in the depth of being does a space open in which all things lie close to one another and communicate with one another.”
> (Han, 2017, p. 47)

[2] The Latin noun fuga (flight, escape) derives from the verb fugere, to flee. For a full etymology see https://www.merriam-webster.com/dictionary/fugue

The mentioned space opening up for that becomes a space where temporal references and similarities do exist but are suspended by a heightened perception, allowing us to perceive all things that lie within that space as well as how these things communicate and relate to each other. Within this context, the fugal in-between becomes that relational space that enables plurality to be experienced within a suspended and subjectively perceived space-time continuum.

The subjectivity of time can be consciously experienced through a variety of actions that a human performs. Waiting is one of them. While waiting the boundaries of time and space can seem to dissolve, enabling the waiter to be somewhere in-between in a very subjectively experienced time and place. According to why we wait or what we're waiting for, time is altered in a way singular to the subject; waiting has the potential of lasting some time in-between a perceived eternity or a fleeing moment.

When the hour does not pass, time must suddenly be endured rather than traversed, Harold Schweizer notes – felt rather than thought. And further stepping into the felt realm he writes:

> "Lacking the charms of boredom or desire, waiting is neither interestingly melancholic nor despairingly romantic. Between hope and resignation, boredom and desire, fulfillment and futility, waiting extends across barren mental and emotional planes."
> (Schweizer, 2008, "Why Wait?" section)

The way we feel, the way these feelings are endured — the subjective, felt experience of time is what the fugal in-between produces; a condition. And so do all the things, as Schweizer wonderfully notes: they merely are, they endure, and their endurance is their very condition of being (Schweizer, 2008, "The Waiter's things" section).

2.3: The Waiting Room as Sonic Superposition: Coexisting Realities and the Omnipresent Now

Inspired by the philosophical connotations of quantum thinking rather than its physics, the concept of superposition represents a metaphor for what the waiting room in this context proposes: multiple simultaneous realities occupying the same space-time, none more real than the others.

A little more than 100 years ago, Albert Einstein elaborated the theory that space and time are relative concepts, perceived differently from each observer. Travelling further back in time to shortly after the big bang, cosmologists confirm that acoustic oscillations in the primordial plasma produced the first pressure waves in the universe, whose frozen signature remains detectable today (Whittle, n.d., p. 2).
As artist Nicole L'Hullier poetically frames it, these were quantum fluctuations rippling the plasmatic universe (L'Hullier, 2025, p. 77). Even further physicist and astronomer Mark Whittle finds that:

> "Primordial sound, then, plays a crucial role in the origin of all structure – without it there would be no galaxies, stars, planets or people." (Whittle, n.d., p. 1)

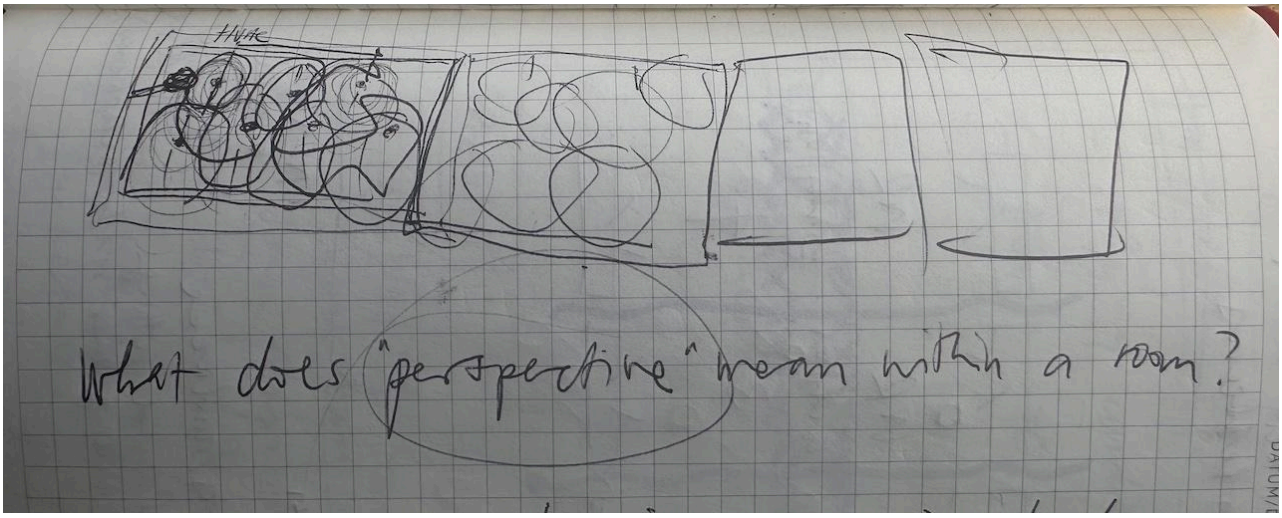
According to the previously mentioned theories and confirmed cosmological findings, it follows that the universe and all its components – beings throughout past, present and future – resulted from and therefore are sound. Within our sounding being, we can be listened to and we can listen to all other sounding beings no matter what shape or size. Moreover, the relation between emanating sound and listening affects each within their respective state of being. As stated by composer and explorative listener Pauline Oliveros:

> "As you listen, the particles of sound decide to be heard. Listening affects what is sounding. It is a symbiotic relationship. As you listen, the environment is enlivened." (Oliveros, 2024, p. 9)

Throughout their research, Oliveros explored and developed techniques of what she defined as *Deep Listening* and *Quantum Listening*. Deep Listening, in their own words, is learning to expand the perception of sounds to include the whole space/time continuum (Oliveros, 2005, p. 23). Expanding that thought into the quantum realm, they state that quantum listening is listening to more than one reality simultaneously (Oliveros, 2022, p. 1).

These practices of deeper and more attentive listening can be enacted outwards towards other realities – resounding singularly and as multiple realities at the same time within an Acoustic Space [3] – or inwardly towards the self. In being and resounding within a space – the sounds and sounding beings entering the space and the sounds already belonging to the space, inhabit two states of being at the same time: singular and multiple. The Acoustic space alters sound as well through its surfaces, reflecting it back into the space itself. As such the sounds already multiple, are reprojected as well as altered by the physical characteristics defining the space sonically. This multitude, within its nuances and alterations can be heard and accessed through the act of deeper listening. Enacted in one space inhabited by multiple listeners, the concepts of coexistence within a space are ultimately multiplied and become an act of care and attentiveness to self and other. Pauline Oliveros reframed this within the quantum field and empathetically, opening up possibilities of perception and coexistence:

> "Quantum Listening is listening in as many ways as possible simultaneously – changing and being changed by the listening. I see and hear life as a grand improvisation – I stay open to the world of possibilities for interplay in the quantum field with self and other – community – society – the world – the universe and beyond." (Oliveros, 2024, p. 30)



Hand drawing on thoughts circling around superposition and perspective and how to reflect it sonically within a room. (Image Source: MM June 2026)

[3] The term "Acoustic space" is defined as where time and space merge as they are articulated by sound. (Oliveros, 2005, p. xxiii)

2.4: Atmosphere, Dwelling and the Waiting Room Condition: Toward a Working Definition

In reflecting on waiting rooms and conditions implied by waiting within such a space, several thoughts crossed my mind. The waiting room can be both a philosophical and physical proposition. The characteristics defining a waiting room as an in-between space can trigger an inner condition [4] resulting from the act of lingering or waiting. This condition is experienced singularly within a space as a state of being by the one who inhabits it. At the same time, a space can be inhabited by multiple presences, all experiencing different and subjective states of being and coexisting within an omnipresent, multifaceted now.

As such, not only the waiting room, but also the condition experienced while dwelling within it – the Waiting Room Condition – becomes a space to inhabit. Ultimately it evolves around the possibility of suspension within a space and movement within rather than through it – defined by its relational potential, by the qualities of dwelling, coexistence and becoming. This becomes particularly resonant in current times wherein, according to Byung-Chul Han we are experiencing a hyperkinesia of everyday life, depriving human existence of all contemplative elements and of any capacity for lingering (Han, 2017, p. vii)
This is what the Waiting Room Condition aspires to – not only to define a physical space, but to move the one who inhabits it. In relation to the architecture and physical spaces with exactly this intention, Peter Zumthor writes in *Atmospheres*: “Quality architecture to me is when a building manages to move me.” (Zumthor, 2006, p. 11). For Zumthor the term atmosphere represents a singular density and mood, a feeling of presence. Evolving this thought further, I would extend the “feeling of presence” into a perceivable and as such an active presence, a reality – the presence and for that the reality of a space itself.

Such is an in-between space too; as mentioned previously, it is an active, fugal and relational space. Within the fugal in-between and as explored in a previous subchapter, the movement of life unfolds between inside and outside. In representing a transcendent space, it is within these in-betweens that the dimensions of both space and time coexist, becoming subjective and plural. While dwelling, time stretches, contracts, and is experienced differently by each presence, depending on their inner state and the nature of their waiting within this in-between. In this context, bringing into relation all the previous subchapters, the Waiting Room Condition can be defined as a state of being wherein multiple singular conditions coexist within the same space/time continuum. It is an active fugal in-between and relational space between inner and outer spaces. Expanded to the sonic realm, its intention unfolds as an invitation – for the listener to stay, linger and become part of what the space is in its multiplicity.

[4] The term “condition” is used throughout the whole text to describe a state of being that can be inner and or outer.

Chapter 3: WFS as the Technology that Makes The Waiting Room's Coexisting Conditions Inhabitable

3.1: WFS and its Unique Spatial and Artistic Properties

Wave Field Synthesis represents a spatial sound field reproduction technique with the ability to reproduce holographic sound rendering within a physical space. Technically, it places virtual sound sources in real space through a large number of loudspeakers arranged as an array system. Stereo or other available surround techniques rely on the listener being in the “sweet spot” – a limited area where the localization of sounds can be experienced. WFS, however, allows the listeners to perceive the precise placement of the virtual sound sources from anywhere within the active sound field (Goebel et al., 2019). Ultimately WFS allows the listener to notice the distance to the points where the sound sources are located, an effect detected even better when moving within the listening area (Lopez et al., 2011, n. p.). This effect enables the listener to perceive their own presence in relation to the sound sources present within the listening area. As such, WFS opens up possibilities for surrounding and moreover for graspable auditory experiences even when operating only in a planar setup on the x and y axes. It is through the ability of holographic sound rendering, that the projected sound sources become almost physically graspable enabling the listener to almost “get in touch” with sound – a concept beautifully described by Marshall McLuhan as follows:

> “Our very word "grasp" or "apprehension" points to the process of getting at one thing through another, of handling and sensing many facets at a time through more than one sense at a time. It begins to be evident that "touch" is not skin but the interplay of the senses, and the “keep in touch” and “getting in touch” is a matter of fruitful meeting of senses, of sight translated into sound and sound into movement … ” (McLuhan, 1964, p. 72).

In addition to the technical abilities of the WFS, my personal and artistic interest lies more in its potential as a perceptual and phenomenological medium rather than as a purely representational tool. The effects that a specific technology is able to evoke, channeling the intention through the use that is made of it and without the need for further explanations, is utterly intriguing to me.

> “The effects of technology do not occur at the level of opinions or concepts, but alter sense ratios or patterns of perception steadily and without any resistance.” (McLuhan, 1964, p. 18)

Translated to WFS, McLuhan's cited observation finds resonance: the technology alters the listener's sense of space by shifting the perceptual ratio in this case from the visual to the auditive. The sounds projected into space through WFS are so precise in their localization that they not only alter the subjective perception but also the listener's movement within the physical space — drawing attention first and the body second toward them, inviting "to get in touch" with and furthermore enabling the listener to step in and out of them. As such and through their movement within the listening area, listeners are enabled to even "become" one with the sound source rendered in space.

Unlike a conventional stereo field, which positions sound in relation to a fixed listening point, WFS allows the listener to physically step into a sound source. The perceived sensation is bodily and immediate: when entering the sound, the experience is one of being within it. As soon as the listener steps out, the sound seems to flee – shifting immediately to either the left or right side of the body according to the direction of movement. In this sense WFS changes the relationship between the listener's body, their spatial perception and the sonic environment in ways that operate on the level of conscious interpretation, reaching into the subconscious. As Bachelard wrote in *The Poetics of Space*: "by changing space, by leaving the space of one's usual sensibilities, one enters into communication with a space that is psychically innovating." (Bachelard, 1964, p.206). This psychic innovation reflects precisely the potential of WFS to make sounds spatially and bodily available — as a physical and perceptual experience unfolding through the listeners movement within the listening area.

Artist Char Davies in her work *Osmose* in 1995 created an immersive virtual installation in which technology was used to undo habitual perceptions and produce altered states of spatial awareness. The intention of the work was to enable the experience of being a sentient, living being embedded in a spatially enveloping, living, flowing world (Davies, 1995) Quoted in a conversation between Davies and writer and media artist Frances Dyson, Davies states:

> "Always what was important to me was the notion of being immersed in enveloping space, and the sensation that you're fully enveloped, . . . it's not about interactivity but the fact that you are spatially encompassed and spatially surrounded—it's all around—and that's what sound is." (Dyson, 2009, p. 107)

3.2: The WFS Array of the ICST as Compositional Medium

A couple of years ago I was introduced to WFS and briefly to this specific array system of the ICST through a workshop in spatial scenography led by Rama Gottfried, who also built the system. The possibilities for authentic sound reproduction and holographic sound rendering in space were immediate triggers for compositional ideas. Moreover, listening within a holographically sounding surrounding becomes bodily – the body has to rebalance according to the almost graspable reproduction of sound in space. This specific array was built in-house as a research project at the ICST [5] (Institute for Computer Music and Sound Technology, Zurich) and consists of 256 loudspeakers subdivided into 8 modules, that are individually placeable in space. The 256 loudspeakers are arranged into 32 virtual sources and addressable through a patch in MAX [6] and via OSC [7].

> "As I waited I heard a multitude of small sounds, and knew simultaneously that I had been hearing them all along…" (Schweizer, 2008, "Lingering, Tarrying, Dwelling Upon" section)

My personal intention lies in composing a sonic field that does not unfold in a linear narrative and is not primarily object-related, but unfolds through a textural sound approach within an inner and outer layer. These two layers are meant to surround the listener and at the same time enable them to step into the sonic conditions, experience them and as such become part of the piece through listening and lingering in the space for a fixed duration. The specific properties of the WFS – its ability to project sound into physical space as a holographic presence rather than a directional illusion, and the possibility of placing sources both within and beyond the array system – enable the composition of a sonic field in which multiple coexisting realities can be simultaneously inhabited.

The physical setup of the WFS array system opens up the possibility of composing the space so as to embrace the listeners and recreate a room-in-a-room situation – a physical room inhabited by a sonic field to be entered and bodily experienced by the listeners. Within this room no listening position is privileged over another, but the composed space is genuinely shared. As such WFS is not only a technical property but becomes the phenomenological and ontological structure of the Waiting Room Condition.

[5] https://www.zhdk.ch/en/researchproject/wave-field-synthesis-system-604123
[6] Max is an interactive, visual patching environment for musicians, artists, and anyone who loves creating, inventing, or prototyping their own unique software. https://cycling74.com/products/max
[7] OSC (Open Sound Control) is a protocol for networking sound synthesizers, computers, and other multimedia devices for purposes such as musical performance or show control.

Chapter 4: The Waiting Room Condition as Installation — From Concept to Sonic and Spatial Matter

4.1: Translation from Concept to Space and Condition

The starting point of thought and conceptual sketch was to compose an installative piece, that would enhance the perception of “in-between” and “fugal spaces”. Following the concept of superposition and subjective modes of perception by the listener, the intention was condensed into shaping a sonic field within a physical room, where multiple states of being so-called “conditions” occupying the same space-time could co-exist.

To break down the imaginative space from a general narrative to a concrete physical space containing the initial triggers of thought, the decision fell onto the waiting room. The waiting room as such is defined entirely by its transitional nature – you are there because you are going somewhere else, you are between where you were and where you’re going (to be) –, it is structurally an in-between, as well as in-between one state of being and another.

More in detail and evolving around the core idea of “condition”, the idea can be framed as follows:

A physical room is inhabited by listeners – in the case of a waiting room, of people waiting. The people waiting all linger within different conditions, implied by the act of waiting. The physical room pre-exists the listener and is ultimately altered by the presence of the listener with each additional state of being entering the room. The distinct “conditions” are sonically translated into sound and as such become part of the experienced room, from distinct points of perception. Within the waiting room they do coexist in singular and in superposition within each other – becoming part of *The Waiting Room Condition* – without hierarchy, no one being more real than the other.

The Waiting Room Condition also represents a space where time is multiple and subjective – different humans in the same waiting room are each potentially inhabiting radically different durations of time and states of being. Ultimately it is a fugal space where multiple presences in flight from and toward different futures coexist. As such *The Waiting Room Condition* condenses every point of interest and research sketched in the concept and theoretical framework: coexisting realities, subjective time and states of being, active in-betweens and the listener as an additional layer of co-existence.

4.2: Translation from Concept to Compositional Framework

The term “fugal in-betweens” can be read as multiple: spheres of encounter and of division as well as singular spaces between multiple states. This conceptual framework defines the intention and function of the sonic field to be composed as “place where all the sounds occur” (Schafer, 1994, p. 152) and coexistence – an overall sonic texture as well as single sounding presences. Rather than guiding the listener through a linear narrative unfolding within a space, an additional intention of the composition was framed so as to enact a condition. Ultimately through the encounter between the space and the listener, transforming the space into something else: a condition experienced through the act of deeper listening, enabling the transcendence of boundaries between spatial, temporal and personal realities within an omnipresent now.

According to these initial conceptual triggers, various sketches continued to shape the compositional framework strongly related to the actual sound testing and exploration through the WFS array system, as described in the following subchapter. The shaping of distinct sound material according to texture, spatiality and the physical and emotional perception of the sounds in space, represented a crucial part of the exploration process. While in the beginning the idea of the compositional arc was the one of a fixed piece with clear beginning and ending, during the exploration process and through reflections on a conceptual level, the piece evolved into a seamless loop. In its evolution the aspect of a composed room with a clearly recognizable architectural sonic presence, that would transcend time and pre- and post-exist the listener entering it, became more and more conceptually coherent. In entering a waiting room, the act to be performed is the one of waiting, independently from and simultaneously with other presences inhabiting the same room.Through waiting a subjective narrative and perception in time can be experienced. The composition as such should not evoke a compositional narrative but rather invite the listener to inhabit a waiting condition, listen deeper to self and the surrounding sonic field and experience the space as a condition to ultimately coexist with it.

4.3: Sound Design Process Documentation – Composing, Experiencing, Reflecting and Acting with the WFS Array System

This chapter describes the phase of testing and composing with the WFS array system at the ICST Labor at ZHdK for a period of almost two weeks between 3 and 15 June 2026. The following documentation is the summary of a daily testing journal, reorganized thematically following the testing and compositional discoveries made during that period as well as creative decisions taken to shape the final piece. Contextualised within Schön’s “Reflective Practitioner” the practice adapted and described in the following subchapter can be summarized as follows:

> "Usually reflection on knowing-in-action goes together with reflection on the stuff at hand. There is some puzzling, or troubling, or interesting phenomenon with which the individual is trying to deal. As he tries to make sense of it, he also reflects on the understandings which have been implicit in his action, understandings which he surfaces, criticizes, restructures, and embodies in further action." (Schön, 1983, p. 50)

4.3.1: The Sonic Material: From Pitched to Architectural Sound

The initial sonic material setup for testing consisted in Shepard tones and sine waves of various frequencies, a choice made because of the psychoacoustic effects these sounds could have on the listener. One phenomena interesting to me was the one of "acoustic beating": a perceived pulsing volume change, produced by two sine waves with slightly different frequencies playing at the same time. Another phenomena was relating to Shepard tones and their potential to produce the sensation of a continuous loop either climbing or descending in pitch endlessly.

In my experience and exchange with others, waiting and inhabiting a waiting room can produce a state of dizziness as well as suspension in time and space. While trying to translate sonically and reproduce a potential state of being experienced within a waiting room and on the WFS array system, sine waves and Shepard tones produced physically perceivable effects. However, more than inviting into a "condition", they even seemed to impose an emotional state, which was not the composition direction envisioned.

This insight led to a central compositional decision very early on in the testing process: Pitched sound material or clearly as such perceivable, even if stretched and processed potentially making a clear recognition impossible, in my exploration seem to address a rather emotional realm. Tonal material and moreover harmonic material recognized as musical, invited the listener to feel in a certain direction and further associate the heard to musical genres such as Ambient music. [8] On the other hand noises, room tones and architectural sounds appeal to a condition and even more shape the atmosphere of a sonic space rather than narrating it. The condition that the listener could inhabit remains therefore personal according to the subjective sphere of perception of the experienced sounds in space.

Another interesting sonic phenomenon emerges with the use of field recordings and event-based sounds. For the fugal condition the sound of bird wings flattering was used – on a perceptive level a fleeing sound –, processed through a phaser. The phaser or phase shifter as effect was chosen because of its potential to recreate moving peaks in the frequency spectrum and create swishing, swirling sounds. The sound produced

[8] Ambient music is a genre of music emphasizing tone and atmosphere over traditional musical structure or rhythm, using textural layers of sound and encouraging a sense of calm or contemplation.

a clear fugal effect: it seemed to flee when approached physically within the WFS square array and this was conceptually correct. At the same time though, it introduced an unwanted effect of creepyness experienced by myself and other listeners that came to visit during the testing phase: the sound took the imaginative form of a creature capturing too much attention and opening up clearly a narrative presence. This phenomenon pulled the listener immediately into the unwanted role of observer rather than into a listening condition.

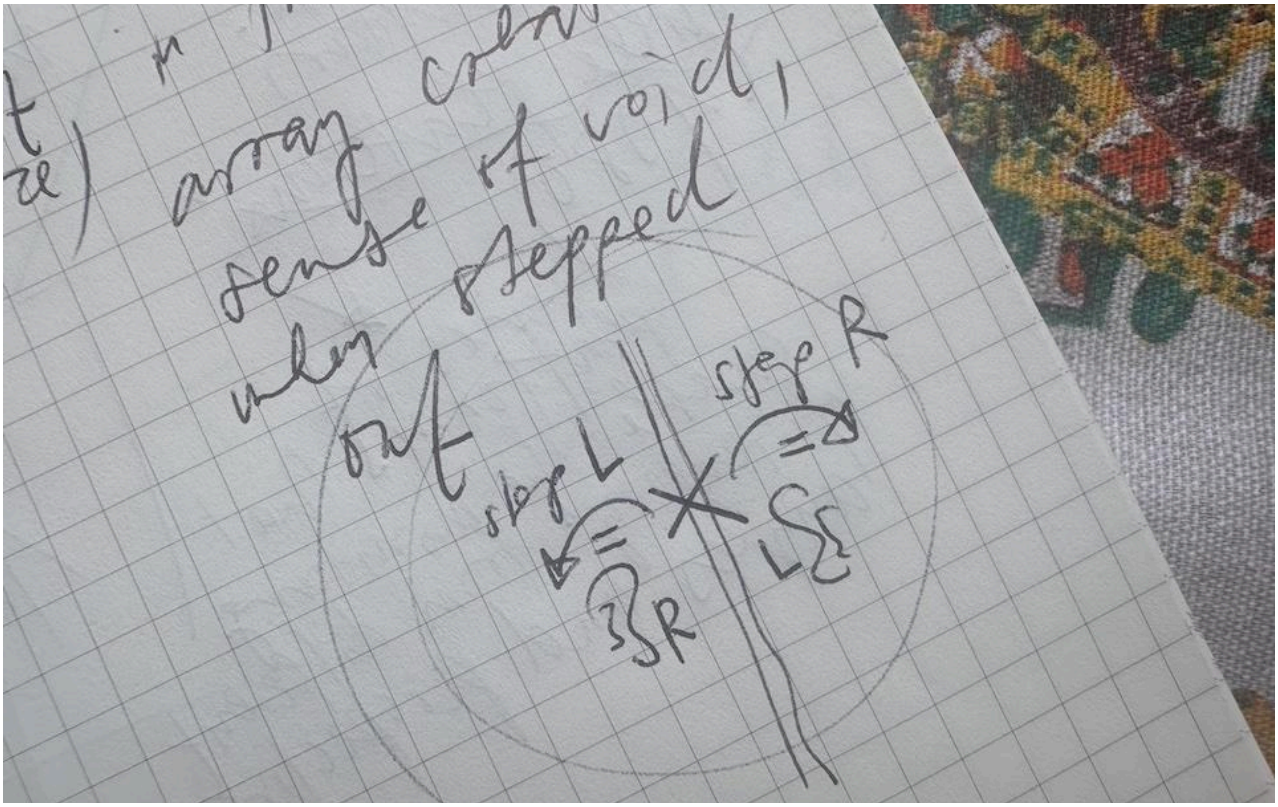
Basically the main revelation through this test was that as soon as a sound becomes clearly localizable in its source and associable with a specific object or event, it produces an undesired effect of hierarchy, taking over the narrative and unbalancing the overall sonic field. The important compositional decision taken after this recognition, was to frame the use of primary sonic material ultimately toward room tones, architectural noise, resonances and ventilation sounds. Secondarily, the use of few carefully chosen sonic events was kept open as a possibility to describe specific functions necessary to anchor the conceptual framework within the piece. This matters because it affects the possibility of creating multiple non-hierarchical sonic realities within a non-narrative overall sonic field.

> *Personal Note: I do perceive an emptiness and guess it lies in the sonic characteristics of room tones leaving space for me to be present in the waiting. The perception I get from this sonic field is that it invites me to linger and listen to and through inner and outer spaces. The room feels not narrative and I don't look for a narration. The less I am active, the more the overall sonic field becomes clear within its multitude. The more I activate and move within the room, the more every single layer becomes perceivable within its texture and the more I start to step into the sonic structures of both the single sounds themselves and in co-existence with the other sounds. And I wonder what connects or divides them.*

4.3.2: The Spatial Subdivision: Inner and Outer Layer

The concept of spatial subdivision – for the sonic material and around the spatial setup –, was sketched before starting the actual testing and was structured around two spatial layers being enacted simultaneously through the WFS array system. Inspired by Murray R. Schafer, pointing out how the eye points outward and the ear draws inward (Schafer, 1994, p.11), the compositional intention became not only a physical subdivision of the sonic field but also with the intention to draw the listener to listen inwards and into self.

During preliminary testings the phenomena of how sound is reproduced and perceived according to the placing of the virtual sound sources around the WFS array square became integral part of the compositional idea. Ultimately the subdivision in two distinct sound layers could be sustained through the specific possibilities of sound reproduction inherent to the WFS array system: while sound sources virtually placed behind the WFS array system are vaguely localizable regarding their position on the x-/y-axis and perceived as more diffused, the sound sources placed in front of the WFS array are clearly localizable within the listening space and even further than the listening space – and this is an integral conceptual and compositional component – the listener is able to "step into the sound source" physically and experience on one hand a sort of "sonic void" and on the other hand a shift in balance between left and right when "stepping out of the sound source".



Hand drawing of what happens perceptually to the body through the act of stepping in and out of the sound sources. (Image Credits: MM, June 2026)

Following these insights the spatial subdivision as inner and outer sound layer was composed as follows:

The sonic material of the **Outer Layer** — placed as virtual sound sources behind the array and representing the physical aspects of a waiting room — consists in field recordings of waiting room ambiences: ventilation sounds in different pitches and room tones. These sounds are further processed through a convolution reverb with long decay time. Occasional sonic events such as steps, a distant door that is being opened or an elevator sound inhabit these ambiences too but rarely.

Because virtual sources placed behind the WFS array as mentioned before are not clearly localizable, this layer is perceived as diffused and surrounding. It creates the impression of a room, a reality existing beyond the composed space. At the same time the volume balance of this layer is calibrated to intertwine subtly with the WFS array's own fan noise and the actual room tone of the exhibition space, which underlined the perceived dimension of room-in-a-room and further introduced the question of "What is real?" through melting composed and actual room into one sonic dimension.

Personal Note: I wonder and think about the terms "audible", "perceivable", "real" and "composed". I mean, what is "real"? Something is real to me in the way I perceive it. If someone else perceives that same thing differently, the "real" of this other person differs from my personal "real". Over time, the thoughts of these terms and questions about them emerge while listening… it feels like them becoming an active additional action going in parallel, even being evoked by the listening condition itself.



Screenshot of the virtual sound sources placed within the WFS MAXMsp patch.
The four black bars represent the four sides of the WFS array.
(Image Source: MM, June 2026)

Simultaneously the **Inner Layer** with its virtual sound sources placed in front of the array and within the WFS square array, contains the four waiting room conditions. Here the physical phenomena and possibility of "stepping into the sound source" was crucial to multiple compositional aspects: the shaping of the singular sounds, the perceived listening effect and the forethought of the listener's movement in space. Moreover, as the listener moves and steps into the different sound sources, a shift in sonic texture can be perceived defining the sonic shape of the four waiting room conditions.

> *Personal Note: After I've been exposed to this listening room for 30 minutes composed only by outer and inner layers, I feel embedded into a transitioning soundscape, somewhat still but still evolving. The outer layer feels real and happening in the surrounding, somehow detached. The inner room transcends within itself. Potentially I could further and more delicately adjust the levels to see if the two sonic entities, outer and inner layer, could intertwine a little more. At the same time a detachment could also be fitting the thought of "fugal in-betweens" and make the in-between layer audible or perceivable.*

The perceptual architecture of the room-within-a-room is again and further enhanced through the intertwining of this other additional layer to the ones mentioned before. Now the sonic field comprises four simultaneously co-existing sonic dimensions: the Outer Layer, the Inner Layer, the WFS array's own acoustic noise floor, and the exhibition space itself with its acoustic properties.

The volume balance between all of these layers appeared to be very delicate and at the same time a decisive compositional aspect: to find the right measure that intertwines composed ambiences and actual acoustic conditions and at the same time to not lose the singular shape of the sounds and the spatial definition while emphasizing the conceptual aspect of co-existence. At this point balancing the volumes of the different layers, represented even more a negotiation between sounding presences and their place in balance between their singularity and as part of an overall sonic tissue – none more real or more present than the other. In order to detect unbalances within the overall sonic tissue and remain able to switch between point-alike listening and a more overall listening, it was necessary to take breaks, for the ear to rest and reset.

Personal Note: I continue to microtune the gain level of the overall composition and in between the virtual sound sources, it seems to be a delicate and subtle matter to really take care of. And it needs time! I've been waiting and listening, lingering and perceiving a lot of time in-between the active compositional process and the shaping of the sounds. In my perception and as the single layers move between forwards and backwards, they do alter the overall perception; their coexistence within the sonic field shifts. As such this micro-tuning of volume levels and frequencies has a major impact on the listening state and the perception of the piece. And also the inner and outer sound layer, who in time seem to dissolve, becoming equal co-existing layers inhabiting together one "waiting room as in-between space" – becoming one.

4.3.3: From Concept to Corporeal Listening Experience: The Four Waiting Room Conditions

The four Waiting Room Conditions are conceived as inner states of being, so to say different ways of inhabiting a waiting room. Before the actual testing and composing phase, I decided that the illustration of these conditions should consist of translations of objects or sensations related to a waiting room on a perceptual level rather than on a narrative level. The abstract translations were developed in a personal, subjective exploration first and later refined in exchange with others, according to the subjective perception of the sounds and the state of being unfolding while listening and lingering.

The path of translation traversed multiple stages: from object associated with and within a waiting room, through an abstraction to inner condition and further to how this state of being could be represented from a sonic point of view. The four waiting room conditions conceived to together shape the inner layer are: **Time**, **Fugal State**, **Disclosure** and **Memory**. These four inner conditions and the path leading to them, as well as the sonic representations, were defined on one hand by remembering and imagining the experience of waiting in a waiting room, and on the other by exchanges centering around the topic as well as collecting subjective experiences and associations with it. The exchanges resulted in defining some archetypal objects and states of being occurring while inhabiting either a state of waiting in general or having to persist physically for a certain amount of time within a waiting room. The act of waiting and listening attentively to the sounds in space, resulted to be at least as important as the actual testing, shaping and composing of the sounds. So was the invitation extended to other listeners, that helped shape the overall sonic tissue further and more in detail, according to their subjective point of listening and perception, resulting as follows:

Clocks generally are present within waiting rooms and they can stand on a more abstract level for the dimension of time, which ultimately reversed onto an inner condition implies the relative perception of time while going through a state of waiting. **Time** is expressed in elements of sub-pulses, rhythmically composed high-frequency noises and processed recordings of the WFS array's own ventilation. The frequency spectrum moves between mid-low to high frequencies across the whole duration, seemingly leading to a perceived sense of suspension without ever resolving. This inner condition is mostly related to the experience of relative time perception while waiting.

Fugal State represents an inner condition, translated and carrying the conceptual and architectural components of "transcendence" belonging to a waiting room. Initially tested through the sound of flattering as in bird wings, and later processed through a phaser. The sound resulted in being sonically precise in its intention, but at the same time too narratively loaded and immediately associable, mostly adding a feel of creepyness to it. On the other hand noise-based sound material altered by frequency shifts produce a sense of fugitiveness and elusiveness without being clearly interpretable as a sound source, representing as such the wanted intention. When moving towards the sound sources, the sound becomes seemingly hard to grasp, it flees. These sonic characteristics, further enhanced by the precise properties of the WFS, invite and enable the listener to experience the fugal condition on a whole-body level rather than only from a listening perspective.

Personal Note: I perceive the sonic tissue as more rich and lively through the processed sounds and hisses and buzzes, the phasing and the modulations. Through phasing the sounds get an additional "touch of fleeing", like they become even more ungraspable. Also the automations in volume level and frequency shifts across the whole duration just make it feel about a little more "real" in the thought of "I am inhabiting a room-within-a-room". Over time the state of listening changes though, I can clearly feel an emotional and physical state of dizziness! If the high buzzes and shifts persist for too long though and the volume is too loud (or perceived as such maybe), it becomes hard to stand the listening physically – for sure an unwanted effect!

The sound of **Disclosure**, as of Disarray or Disunity, is shaped as a sub-bass element that during the testing phase varied in pitches in order to become an organic part of the overall sonic field and not take over too much attention. From a distance the sound is perceived as single, but when approached and stepped into it seems to separate into two individual and co-existing sounds. This circumstance enacted by the ability of WFS in close proximity to render sounds in space with holographic precision, resulted in being one of the most conceptually strong discoveries of the testing phase. Moreover it physically represents within one sounding condition, that a single space or entity can contain multiple coexisting realities that are only to be experienced in their multitude through physical inhabitation.

Memory appeared to be the most complex of the four conditions in the composition process. The intention lies in the potential that memory has to enter and exit our imagination and through it alter and transcend our perception of time and space during the act of waiting. This sounding condition wants to be composed not through a linear logic but through textures and small snippets of potentially recognizable sonic material, but in appearing only briefly these snippets would only result as a link to an open gate leading to dive further and into a subjective sphere of memory. Sonically it is composed as soundscape oscillating between pitched noise, tuned field recordings and one single personal sonic memory snippet — the only human trace within an otherwise non-human sonic field. Memory as an inner condition contains more compositional and sonic variations in frequency, content and textural shifts. This could result in detaining more attention over the whole duration of the piece and potentially trigger subjective associative resonances within the listener.



The virtual sound sources with the pink circles represent the four Inner States and are placed within the array square. There are five virtual sources, as one Inner State was shaped using two sounds and therefore two virtual sound sources.
(Image Source: MM, June 2026)

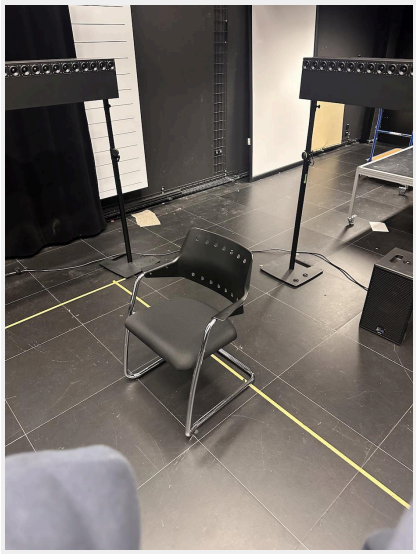
Personal Note: While moving in space I get the feeling that the choreography of movement in space will be essential for the listener. What draws them to move? Do I need to write instructions? I notice that following what sound suggested to me with my own body – obviously because I am not attracted anymore by the visual presence of the WFS array since I know it well –, the perception of stepping in and out of the condition sounds still triggers my attention and activates a bodily feeling to sort of interact with the sound and within the space. Somehow I start to shape this fugal in-betweens myself with my body, in interplay between body, space and sound: active fugal in-betweens activating an ultimate interaction of bodies in space through sound … interesting to keep in mind for the choreography of body in space.

4.3.4: The Compositional Space: The In-Betweens as Composed Space

The in-betweens as spaces between the four inner conditions are not empty sonically and compositionally spoken. In being one of the main foci of the thesis, these spatial entities between the four inner conditions had to be activated sonically and as such being potentially perceived as singular entities by the listener.

The main sonic material that composes these in-betweens consists of recordings of the WFS array system's very own ventilation. These recordings were further processed through a ping-pong delay and jump transition mode that produces sonic artifacts: high-frequency crisps with clearly audible transients which delineate sonically the threshold between the four neighboring conditions and at the same time coexist within the overall sonic field.

Further the WFS array system's ventilation as an additional layer was processed through a spectral resonator tuned to multiple frequencies and distributed throughout four positions within the array at low volume. As such this additional sound layer can be perceived as a single ventilation hum, potentially non-composed but as part of the WFS array's own real sound. When stepping into the virtual sound sources though the different tunings become perceptible rather than clearly audible. This phenomena enhances the architectural and textural perception of the sonic material through felt shifts from warm to cold during the whole duration of the piece.









The pictures are selfmade with an iPhone and portrait the delicate act of moving within the listening area, in and out of the sounds in reaction to them. The moving mostly consisted in finding a balance in-between the in-between sounds. (Image Source: MM June 2026)

Personal Note: Again those fugal in-betweens somehow catch my interest, they are where the most interesting bodily perceptions seem to happen. Stepping in-between the conditions produces a state of being neither one nor the other, potentially multiple and all at the same time. While moving in space this perception is even more enhanced. I feel somewhere in-between a bodily state of balance and unbalance while stepping in and out of the sounds, they seem to really be an active physical and graspable presence in the space. This is an important perceptual step I feel! And it keeps me moving and interacting with the sound projected within the array square. Also my movement is not hectic, I like that the perceived feel of "being within and out of the sounds" is delicate. As such it doesn't really catch my attention in a strong way, like I don't feel like it's about interaction, but I rather have to enter and discover the subtle shifts in perception by going deeper into listening. And then, since the shifts in sounds are subtle, I move subtly with, within and out of them. Feels a bit like balancing while lingering in-between the sounds and within the space.

4.3.5: Duration, Balance and the Listening Arc

The duration is an essential and interesting point to consider for the intention of the sound installation to unfold. Even more since time is experienced on a subjective level and by each listener differently. Depending on the reason for waiting and the conditions determining the waiting, the state of being of the person waiting, can shift throughout the duration of waiting.

In resonance with the conceptual framework and emerging from the personal testing, as well as reflected through feedback received by other listeners, a fixed duration of 15 minutes resulted in being an appropriate timeframe for the sound installation – long enough for the listener to initially explore the space, triggered by the visual presence of the WFS array, then to experience the holographic potentiality of stepping into the sound sources and later to enter deeper states of listening and subjective waiting room conditions.

The decision on the use of sound material, the balance within the multiple sound layers and the perception of both the overall sonic field in space and its evolution around the conceptual framework, resulted in a major challenge. Too much density through sonic layering and steady sonic activity put the listener in a state of active tracking, producing a rather hectic state of being, where events are followed superficially. As such it becomes difficult to lead the listener to a state of inhabiting a condition. Balancing density and perceived emptiness in sound, resulted in being key to voice the overall intentionality of the piece: invite the audience to experience the role of active listener, subjectively inhabit a condition and become an additional reality coexisting within the piece.

The introduction of compositional moments with few sonic events and so to say perceived emptiness, enable the listener to wait and persist within the sonic field, to inhabit the space and potentially an inner subjective condition. Within these moments of apparent acoustic void, the space's own sonic presence becomes more audible and as such allows the multiple sonic layers - compositionally introduced and already acoustically present - to become one in the omnipresent now.

Personal Note: In exchange with my mentor Daniel Hug it emerges that it could be interesting to keep a focus in the composition of "being of no consequences". In this way there is no expectation triggered through sound, which could be helpful for the listener to achieve a state of deeper listening also on a whole-body level. While actively working on choosing which sonic event stays and which one is too much, I notice that the overall duration does more and more suggest that architectural and texture-based feel I wanted to achieve. Seems to be the right direction to go!

Personal Note: In this post-testing phase of composition I find myself more and more doing that exercise of fine tuning at low level volume. It is where the sonic textures seem to interweave just more seamlessly with the room itself and into an overall sonic tissue. I do also "get the feel" rather than actively hear that "superposition", like this coexistence on a sounding level. Sometimes I even get confused by what sounds are happening for real, meaning that they are non-composed by me, and which ones are part of the composition. That aspect feels very interesting, especially because I notice only by actively thinking about if the sounds are composed by me or not, whether they truly are or not. So even by knowing, while listening throughout the whole duration and after multiple times, I get confused. Nice!

4.3.6: The WFS System as Sonic Material and Spatial Instrument

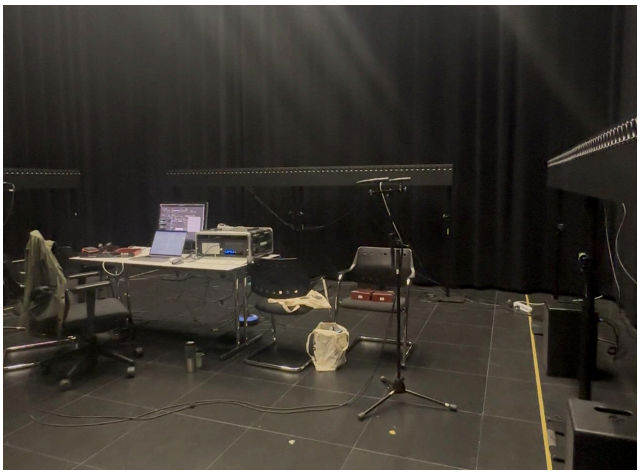
A significant compositional decision was to include the WFS array system with its own ventilation into the piece. As such the system inhabited a double role: an object through which a specific spatial audio technology was adopted and as a sonic object itself with a constant sounding presence, from a conceptual point of view even an additional physical reality. Furthermore the reprojection of an actual noise present already within the space, introduced the possibility of adapting the piece to exhibition spaces of multiple dimensions while keeping the WFS array system steady in both its roles and adjusting the volume balance between composition, actual noise floor and WFS array system.

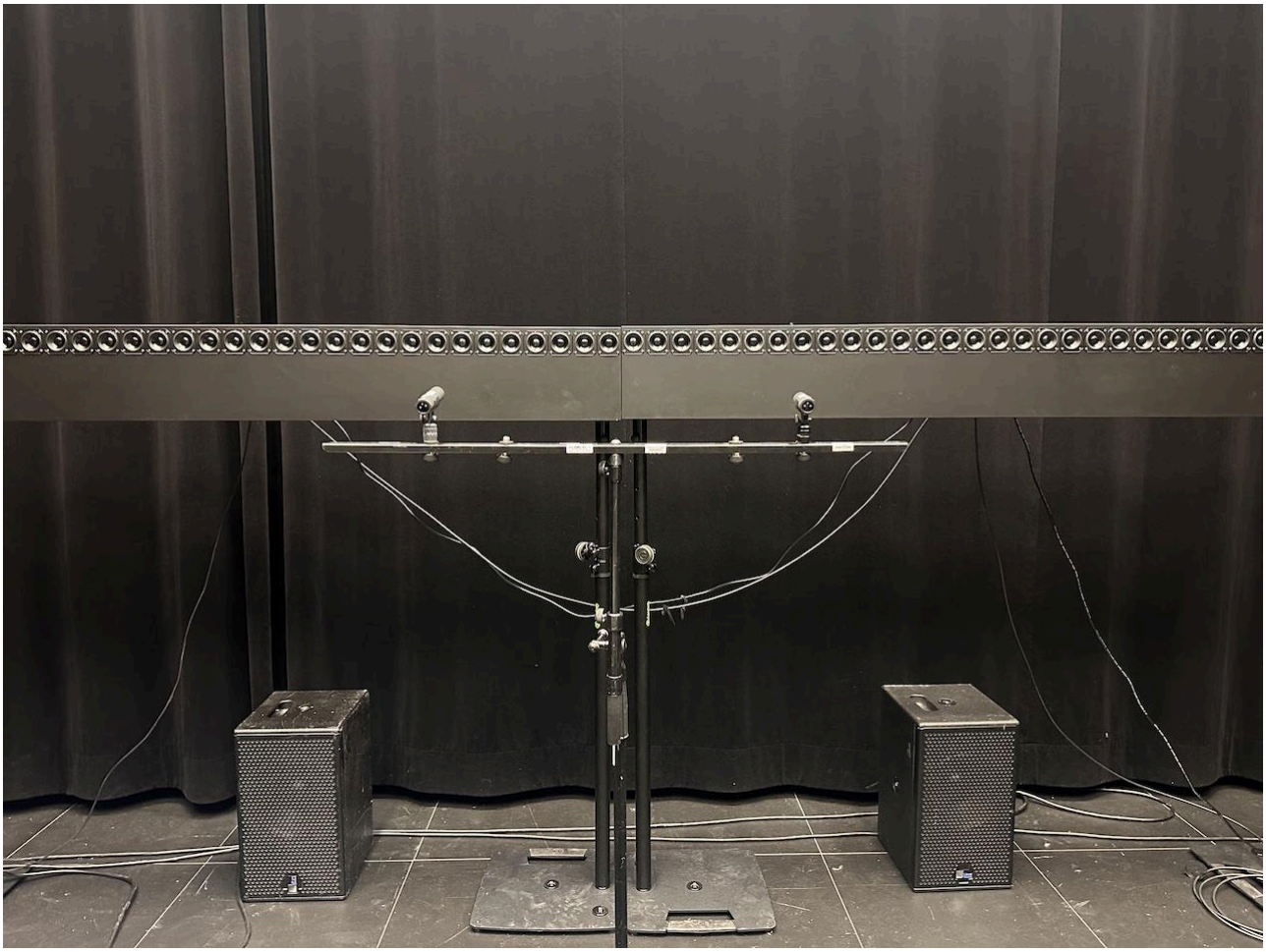
The recording of the WFS array system ventilation was made using four Neumann KM 184 microphones in a cross configuration positioned in equal distance from the WFS array. The KM 184 were chosen because of their ability to record a very clean and natural sound signal, as the intention was to play back the ventilation sounds through the same system that produced it. The clean ventilation sounds played back through the WFS array system, placed as virtual sources in order to match the recording positions, produce interesting modulations because they are never fully aligned. This superposition adds an additional layer of depth to the spatial environment and enhances the architectural feel of the overall sonic field.

The technical parameters that resulted as balanced involving all the compositional decisions taken – composed sounds, actual room sounds, the WFS array system ventilation and the possibility of perceiving the four Waiting Room Conditions – as both singular sounds and as part of an overall sonic field –, were settled as follows: gain at -3.1dB, subs at -30dB, and a square configuration of the WFS array system of approximately 5x5 metres. This setup works for the acoustic characteristics of the ICST Labor but has to be recalibrated to match the exhibition space.

> *Personal Note: To find a volume balance that enables the composed sounds to intertwine with the pre-existing sonic tissue of the exhibition space and as such to become part of it, while keeping a clear definition of sound through the WFS seems to be a key point. Further it opens up the possibility of recalibrating the sound installation to different exhibition spaces and specific room sound dynamics! In that sense it would be the condition implying or even transforming the agency of a room that wasn't intended as a waiting room but becomes one through the sound installation. So to say, it is sound changing the way we inhabit a room, inviting the presence entering the room to inhabit a condition.*







The two images show the ICST Labor at ZHdK, where the testing phase in June 2026 took place. In the first picture the WFS modules arranged in a square setup are almost entirely visible.
(Images Source: MM June 2026)

4.4. The Waiting Room Condition as Compositional and Installative Room-in-a-Room Space

The Waiting Room Condition came to be a sound installation evolving around the waiting room as a compositional space intertwined with the actual characteristics of the exhibition space itself and WFS array system as medium with an own sonic presence. It consists of a square of approximately 5x5 metres shaped by the WFS array system. This specific WFS array system consists of eight modules with each 32 speakers, that subdivided in the x- and y-axis and set up as two per side fronting each other, create a room-within-a-room — a composed sonic architecture inhabiting the physical architecture of the exhibition space. The piece unfolds within a temporal arc of 15 minutes and is structured as a seamless loop with the intention to invite to a state of deeper listening and the condition of waiting, within a sonic field shaped of non-human room tones, architectural noises and surface textures.

The sound composition is shaped around four sonic conditions, each one representing a distinct mode of inhabiting the waiting room. These four sonic representations of different inner states of beings are sonic abstractions of physical objects commonly associated with a waiting room and their metaphorical translation to an inner state of being through sound: Time, Fugal State, Disclosure and Time. As such these four sonic states of being are placed within four subdivisions of the WFS array square system as 32 static virtual sources. The outer layer and as such the surrounding sound layer is shaped by diffused field recordings of waiting room ambience sounds, that embrace the inner sound layer and the listener from outside the WFS array square.

> *Personal Note: While sitting in the middle of the WFS square I feel physically within the space. The ventilation could belong to the room I am physically present in or as well be composed. Interesting! Same thing happens to me with the few singular sonic events: at times I actually turn my head around because I think someone is physically opening the door of the Labor. Nice :) Something else: volume is really "the thing" and it seems to make "the difference". Or more than just volume it is about balancing the sonic presences, the sound layers to be perceivable as singular sound source but also as part of an overall sonic field. Also the sonic intertwining from the virtual sound sources with the physical noise of the WFS array system is exactly what I was aiming at, an additional superposition of sounding "realities". Having a breakthrough moment <3*

To sonically enhance the compositional and physical aspect of room-in-a-room, the inner and outer layers are intertwined with the room's own acoustic and physical presence; its ventilation, its resonances and the ventilation of the WFS array system itself. Envisioning the possibility to adapt the sound installation to various rooms and their specific room conditions, the ventilation of the WFS array system has been recorded beforehand from four inner listening perspectives on the x- and y-axis, so as to be reintroduced into the sonic field according to the actual noise floor and the listening conditions of the exhibition space.

From a compositional point of view and regarding the core of the sound composition, the aim was to not recreate an emotionally loaded space with sounds that could immediately and easily be associated to their physical representation, but rather to shape an architectural body of sound that would evoke a physical memory of a waiting room through its sonic textures without implying direct associations to specific objects or events. Following that path the main chosen elements that compose the overall sonic field are room sounds belonging to what is commonly associated with a waiting room as physical space on one hand, as well as sounding physical objects inhabiting a waiting room on the other hand – mostly ventilation systems and air conditioning machines, or sonically spoken room tones, hums and buzzes – noises.

This conceptual idea was especially adapted to the outer sound layer, where the aim was to shape a surrounding ambience that could be perceived as realistic. At the same time aiming at the core of the sound installation that was thought as to recreate a sonic field, where the architecture of a space could be perceived but not directly associated with, further processing of the field recordings was essential. To keep the textures of the sounds and empty them of associative material, the field recordings were chain-processed through a convolution reverb with high decay and wet percentage.

The compositional frame for the inner sound layer with its four conditions, even though a bit broader, contains still mostly pitched, stretched and phased noises. Some sounds have been chain-processed as well mostly through convolution reverbs and delays. As mentioned before, the main compositional aspect of the inner sound layer has been the abstract translation from an object associated with a waiting room to a waiting room condition, and further its translation to sound. To match this more abstract sonic idea the spectrum of potential sounds to draw from had to be more open. Since the testing phase revealed that as pitched recognizable sound material would evoke a rather more emotional state of being and as such potentially recall associations to existing musical genres like Ambient Music, the decision was taken to only use sub sine waves. Next to that only one single personal and harmonic memory trace is embedded within the otherwise non-narrative and non-tonal sonic field. Within the overall sonic field the single human memory snippet becomes a tangible trace, a manifestation of memory and as such to time – the sonic representation of past made present within the experienced in-betweenness of suspended time omnipresent in a waiting room.

Personal Note: Aarghh ... how to create that sonic balance between the waiting room conditions (the inner sound layer), the embracing waiting room ambi (outer sound layer) and the actual space with its sonic properties including the WFS array? I have to carefully introduce shifts in sound. Also I have to take care and be attentive to the evolution of the compositional material. Another thing to really choose carefully are the singular events, like what they represent and how they represent it. Some do have more impact than others within an overall listening condition. I have to introduce these sonic singular events well and carefully (takes time!), otherwise they catch too much attention from the listener, making it harder to enter a subjective condition of waiting and deeper listening.

Personal Note: This in-between space and shift from one to the other (lingering and listening) and in time is really needed, in order to see what effect the little shifts in volume-balance within the single sound layers produce and how they are perceived. But also super interesting because it opens up the possibility of recalibrating the sound installation to different exhibition spaces and specific room sound dynamics! Obviously that needs time to set up, calibrate etc. but this kind of feels part of the overall topic and somehow an exercise of "channeling the attention to the in-betweens in order to weave an overall sonic tissue where multiple sounding realities can coexist".

To further emphasize the room-in-a-room condition, additional components need to be included that define a room as such: the choreography of light and bodies within a space. As such, the sonic field, even if central to the piece, does not remain isolated within a black box. The Konzertsaal 1 as exhibition space is clearly identifiable as a concert hall, which is the reason why the light situation needs to be choreographed in order not to mislead the listener's attention.



The room in the image is the Konzertsaal 1 at ZHdK that will be used as exhibition space inhabiting the sound installation. https://zhdk.medienarchiv.ch/entries/59293e23-d06c-4f16-ba01-718135557f8a
(Image Source: ZHdK)

The first choreography of light resulted from an exchange with light designer Giulia Spek. We both perceptually and conceptually agreed on having the light shape an atmosphere rather than evolve within a linear narrative. The light situation most commonly associated with a waiting room appeared to be white and cold. Like the decision to work with room tones rather than pitched emotional material, the white light here is not intended to impose a mood. The only shift occurring is one between warm white and cold white. A light flickering additionally infiltrates the gradient shift, which is meant to be atmospherically perceived rather than visually recognized. The flickering is non-composed and non-contextual — occurring in no recurring interval in relation to the sonic field — and represents the grainy texture of light as an additional reality coexisting within the room at its own pace.

Personal Note: My mentor Daniel Hug notes that adding up to the compositional intention of working in a more architectural way on sound, it could be interesting to to shift in timbre between warm and cold for example. This insight is super interesting and could help me to further shape the sound but not only – like following the architectural intention in sound, I want to adapt the same intention to the light/stage design of the space. Further this idea of the cold/warm works really well for both and actually reflects what I was discussing with Giulia regarding the atmosphere of the space. Very subtle as an idea to follow but effective. Especially since happening mostly on the subconscious level or at least not on an obvious one, like it! Again here I guess it all comes down to finding a balance in levelling it all, the gain, the presences, the singular and the overall sounds, the light, what's there and how to intertwine it all.

The second choreography is that of the body in space and within the sound installation. It is self-composed and subjective, and will be enacted by each listener in different variations throughout the temporal arc. The physical presence of the WFS array and several seating objects will serve as triggers for movement or stillness, according to each listener's own interest and need — stepping physically into the virtual sound sources, feeling the shift in sonic texture while crossing them, experiencing sonically and bodily the fugal in-betweens. Through movement in space, listeners are able to hear what no fixed listening position could reveal. Furthermore, choreographing the body in intervals between movement and stillness will enable the listener to not only inhabit "The Waiting Room Condition" but to become part of it and interact actively with the sonic fugal in-betweens.

Personal Note: I go back and forth in levels to find that balance between and in-between the single sound layers… While doing it I notice that the act of fine tuning itself combines lingering, moving and attentive listening happening in intervals - another sort of balancing within the in-betweens. Especially also how the composed sounds intertwine with the pre-existing sonic tissue of the exhibition space. And also because I'd like to keep a clear definition of sound through the WFS, and this seems to be key point. Not easy to achieve without properly taking some breaks for the ear.

As described before, the sound installation unfolds within a temporal arc of 15 minutes structured as a seamless loop that can be entered by six listeners at a time. An important aspect to solve was on how to structure the rhythm of people entering and exiting the installation, without additional instructions. Often present and related to the act of waiting and to waiting rooms are ticketing or queue systems, through which people know when their turn is to exit the waiting room, to either enter another room or go to a counter desk for example. To include a ticketing system would ultimately require an additional component: within the sound field as a voice calling out the numbers, or as a scenographical object that could visually distract the listener. A more subtle option, both tactile and sounding, consisted in the use of pagers like the ones used in restaurants. The idea is to utilize a set of 12 pagers, distributed to groups of 6 people each. The pagers buzzing in intervals of 15 minutes, determine in an alternating rhythm one group that enters the sound installation and another one who exits it. The pagers coming out of the sound installation will be passed on to the next group waiting to enter, and so on until the last person has been able to visit the sound installation. Possibly the pagers will be programmed in intervals of a little more than 15 minutes, potentially 17 minutes, in order to count in the acts of entering and exiting the exhibition space. This could result in necessary to actually experience the installation for the whole duration of 15 minutes. As the idea to program the pagers as “choreographers of the audience-flow” was developed after the testing phase in June 2026, this idea will be tested and defined in its details once access is granted to the definitive exhibition space and the WFS array.



Example of pagers that can be programmed in groups and are in use in restaurants.
https://www.retekess.com/products/td175p-restaurant-paging-system
(Image Source: Retekess, 2026)

Last but not least, in order to introduce the audience beforehand into the condition awaiting them within the exhibition space, the entry to the exhibition space needs also to be composed. After a personal research while experiencing waiting rooms in real life, in exchange with others and brainstorming about waiting rooms with Giulia, again certain archetypal objects were defined: a water dispenser, plants, magazines, a clock, a tv or screen, a bin, as ugly and impersonal perceived paintings and ventilation. The scenographical concept is to choose a set of archetypal objects as well as a desk to be placed in the entry room. At the desk there will be a person greeting each visitor at the arrival and explaining the queue system determining when and how to enter and exit the sound installation. This act together with the spatial composition of the entry room will be staged and rehearsed in detail once the exhibition space is available for installation.



The image was found on the internet while researching about waiting room practices, related furniture and queue systems.
https://www.quest-me.com/blog/25-waiting-room-best-practices/

(Image Source: QUEST, 2026)

Chapter 5: Conclusion —The Waiting Room Condition and its Narrative Around Sound, Time and Coexistence

Looking back on the topic, the research process, the evolution of content but most of all the inner conditions unfolding during the whole duration of the project, it seems to me that the act of waiting – lingering, persisting – was exactly what my emotional and physical self was craving for. And so once again in following my pre-existing practice and revealed as intuitionally resonant: sound as a medium and tool of reflection can serve to observe, understand and narrate at least partially what defines our (co-)existence.

The choice of enacting and researching the topics of this thesis through the use of sound from a textural and architectural, non-narrative and mostly non-event-based perspective, was followed through and goes in parallel with my initial aim: to invite the listener through waiting to enter a condition. Further, to experience this condition through a composed sonic field within a defined space for a defined amount of time, while becoming an additional reality coexisting with other realities in the same room.

The Waiting Room Condition experienced through an installative piece resulted through my testing in being able to transcend space and time. Through the act of persisting by the listener within it, the room itself opens up the possibility of becoming multiple and as such does represent an active "in-between" space, time and condition. Because through waiting, the possibility emerges to inhabit the present, while navigating the past and furthermore guessing an uncertain future to come either sooner or later. The potentiality to experience the piece through multiple ways of perception is open to every single listener and I am curious to listen to the resonance and feedback that will subsequently come back to me. Especially as I perceive this thesis as a starting point and the compositional state of the sound installation as an ongoing process – in continuous shift and to rebalance according to the spaces inhabiting it in future, it will find its first complete exhibition form within the presentation of my master project.

To reflect it through my initial research question, I can state that Wave Field Synthesis is a technology able to make multiple sonic realities coexist. Additionally through its holographic sound rendering, it does enable the perception for the listener to step into and out of the sound sources – interacting and becoming one with the sonic field and as such additional reality coexisting within the listening area. The sounds composed and projected by the WFS array into space in interaction with the pre-existing sonic conditions and with the listener's movement in space, have so far shown an influence on the listener's perception.

These overall conditions, spatial and perceptual, enable the fugal in-betweens as well as the overall sonic field to become physically tangible, affirming my initial questions and beyond. The selection of the sound material shaped through the WFS array and intertwined with the sonic presence of the WFS array through its ventilation, resulted in an additional depth reflecting the thought of coexistence within an omnipresent now – framed in Wave Field Synthesis terms in horizontal and non-hierarchical superposition on the x and y axes.

Going deeper and reflecting critically the artistic process documented in Chapter 4, the translation of the initial concept into sonic and spatial matter resulted in being challenging and a continuous negotiation between the artistic intention, the technical properties of the WFS array, the exhibition space and the sound material. This became apparent early on with the first sonic material tested, that stood in contradiction with the envisioned compositional direction: Shepard tones and sine waves chosen for their psychoacoustic potential, in practice imposed an emotional state on the listener rather than inviting to enter a condition. It was exactly this friction that led me to the decision of moving the sonic material away from pitched, toward room tones and architectural noise. Another important finding emerged through the sounds designed as conceptually and sonically precise, such as the one for the Fugal State with its fleeing behaviour: pulling the attention toward sound as an object rather than toward the condition meant to evoke and producing an unwanted narrative charge. This effect was observed by me and other listeners as well with event-based and in general illustrative sounds, the reason why I chose to focus on noise-based sound material to compose the overall sonic field.

A further limit accompanied the compositional process on a more technical level: balancing the volume between the outer and inner sound layers, the WFS array's own ventilation noise and the acoustic properties of the exhibition space. In order to detect imbalances between the multiple sound layers, it was necessary to take breaks for the ear to rest – wait. The settings established during testing at the ICST Labor — gain at -3.1dB, subs at -30dB, in a 5x5 metre array configuration — are therefore not a fixed solution but will need to be renegotiated for every future exhibition context. Similarly, the choreography of audience flow through pagers remained at the time of writing, a concept envisioned only in theory and still to be verified once the access to the definitive exhibition space is granted. This open state leaves the compositional process as ongoing, to be intertwined with the pre-existing spatial conditions, rather than concluded with this thesis.

Working through this process and the related frictions, led to insights that reach beyond this specific piece and potentially can be of interest to other sound designers approaching Wave Field Synthesis. First, the potentiality of the WFS array to make virtual sound sources physically perceivable in space can become a compositional parameter rather than a side effect of the speaker placement: sound sources placed behind the array can be read as diffuse and ambient, while sources placed within or in front of it can become physically enterable.

Further, the degree to which a sound is recognisable as belonging to a specific object or event directly determines whether it is perceived as hierarchical and narrative or as atmospheric and non-hierarchical — an important decision enabling the coexistence of multiple sonic realities. Moreover, the practice of recording and reintroducing an array's own noise floor proved to be a workable strategy for adapting a WFS composition to different rooms. Finally, the WFS's precision at close range can let a single, apparently unified sound resolve into two distinct co-existing sources as the listener steps into it – a discovery that suggests further compositional potential for staging simultaneity and superposition within a sonic field physically rather than only conceptually.

> "Like color, the field of sound is not a chunk of divisible being, but is more like a state or quality, surrounding the listener, who is simultaneously hearing and being touched by the vibrating, engulfing, sonic atmosphere." (Dyson, 2009, p. 120)

Through the condition triggered by listening and waiting, the subjective sphere of sonic perception may suggest questions about what is real, what is composed, and if it does matter to experience a deeper state of listening. Unpredictably and while persisting within *The Waiting Room Condition,* some might get bored and some fascinated by the holographic sound reproduction possibilities of the WFS array. Some will wonder what other sounds are to come and from which direction the sounds will be projected into space. Some will recall a very personal memory emerging from the act of waiting maybe and others again will potentially fix their gaze on the physical presence of the WFS array and its 256 tiny and delicate loudspeakers almost able to perform "magic". Some will sit, some will move and some others will get dizzy. Following the multitude of unpredictable conditions and while inhabiting the space, through movement and stillness, the listener does become not only an additional reality but also the composer of a subjective narrative unfolding, for a duration of at least 15 minutes …

leading us back to the question of time, or times to end with: they seem to be driven by and driving towards an ever evolving acceleration. Meanwhile time and space have become a luxurious good not granted to everyone at the same measure. For now, to me, the spectrum of perception within *The Waiting Room Condition* – as condition and as a physical space – seems unlimited, and multiple, and able to inhabit a multitude of subjective realities all different from each other at the same time. In this context, to enact waiting in order to listen deeper becomes an act of resistance — and an opening toward relational spaces in-between, wherein all presences can co-exist in non-hierarchical symbiosis.

Appendix

Statement on the use of AI

Claude.ai was used to check formalities regarding APA 7, especially in relation to correct quoting, the insertion of footnotes and the references. The prompt contained questions regarding potential formal issues and grammatical issues in English. All suggestions were checked and edited personally. No AI was used in the production of the sound material, the composition, or the installation.

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"When the dialectics of the I and the non-I grow more flexible,
I feel that fields and meadows are with me,
in the with-me, with-us."
(Gaston Bachelard, *The Poetics of Space*, 1964)

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Declaration of Autonomy Master-Thesis

I hereby confirm that I have written this Master's thesis entitled "The Waiting Room Condition – Fugal In-Betweens and the Composition of Coexisting Realities through Wave Field Synthesis" independently and without outside help.

Any content taken from other sources such as texts, images, audio, graphics, software, etc., whether verbatim or analogous, is correctly cited with full attribution of authorship and source. In addition, all passages created with the help of AI-supported programs are clearly marked and provided with the exact name of the program used and the prompt applied. It is declared how AI tools were used for the translation of my own text, idea generation, brainstorming or similar.

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