

ART, SCIENCE, AND AUDIENCE PARTICIPATION: CROSSROADS FOR EMERGENCE

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Abstract

This article reflects on how in 2020, during the COVID-19 pandemic restrictions, Farout Artistic Research (FAR), in co-creation with composer Dr. Sergio Luque and astrophysicist Dr. Francisco Colomer, designed and created an immersive performance in which new music, astronomy and audience participation intertwine.

The point for the creative process was: *How can we trust our perception if we don't know what we are looking at?*; and through artistic research and transdisciplinary thinking, a second question arose: *What perspectives and new insight emerge if we open up the performance and include the audience as an active and reflective knowledge entity?* In this context, the authors explore the creative tendencies and the intricate design processes of emergence, focusing on the transdisciplinary nature of the performance, embedding the concept of emergence in an interactive symbiotic artistic/scientific performance. The article explains how this exploration is what allows for reflection, new insights, and creation of new knowledge, both from the creators' and the audience participation's perspectives.

Keywords: *Artistic research, Emergence, Music, Audience participation, Science.*

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1. *Telescope II: A Live Performance in Pandemia*

On 17 April 2021, the first audience members arrived at the Museo Universidad de Navarra (Spain). On entering the building, the soundscape of Sergio Luque's *Telescope I* for solo piano greeted them, as they were invited to an immersive performance of astrophysics, new music and audience reflection in three acts. Their journey would be led by the following questions: *How can we trust our perception if we don't know what we are looking at? What can we learn about the complexity of our world from the knowledge generated when science and art interact?* These questions also guided the creation and the performance of *Telescope II*: a performance that seeks to establish an artistic dialogue between astronomy and contemporary music, knowledge and perception between the creators, performers, and the audience. In this way, science, new music, and audience participation and reflection offered three complementary perspectives on the same fundamental questions of our existence.

The performance was commissioned by Museum University of Navarra (Pamplona, Spain) to FAR (Dr. Sef Hermans, Dr. Beatriz Pomés and Dr. Igor Saenz), in cooperation with composer Dr. Sergio Luque and astrophysicist Dr. Francisco Colomer, for their annual cycle *Music Cartographies*. It was premiered amid pandemic restrictions and uncertainties.

The objective of the performance was to find the connection between artistic research and scientific research as a generator for new connective practices and exploration. How do these two fields facilitate emergence and generate new insight, and knowledge through inter and transdisciplinary research inquiries: not only for the creating and performing artists but also for the audience as an active participatory entity. Professor of Artistic Researcher Mika Elo identified as one of the lines of argument in the second phase of artistic research: *both science and art are creative activities, and their mutual difference is a historic variable. Artistic research promotes the convergence of sciences and arts by dismantling the hierarchies between the different processes of knowledge production and by joining in multidisciplinary collaborations* [2022: 12]. Moreover, during the development of *Telescope II*, the guiding question was, how can science and art connect and jointly find a common ground or starting point from which we can reflect on existential but sometimes abstract concepts such as space, time, distance, and perception? Referring to the essence that astrophysicist Dr. Colomer explains in the performance, we do not know if we are alone in the Universe, but what we do know is that we are isolated, and that everything and everybody you know lives on what Carl Sagan once called this *pale blue dot*.

The performance was designed in five stages, as follows:

1) Arrival

From the moment the audience entered the Museum, the sonography was designed to create an immersive environment from the beginning, favoring the coming

to the right mindset for the performance with the soundscape of *Telescope I*. The staff was indicated to fulfill their role as hosts merging with this atmosphere and only to speak if necessary. Entrance and reception took place on the ground floor. The audience members were invited to take at their own choice one of the cards numbered 1–15 and a pen, all displayed on a table. The number on the cards would predetermine their seat in the performance, though they did not know the implication at that time. These cards also included two questions, relating to the existential principles that guided in the performance, and space in the cards to write their answers. They would then walk down the stairs accompanied by scenic lighting and *Telescope I*, across the corridor to a black room where...



Figure 1. Participatory cards distributed to the audience in *Telescope II*.

2) The documentary: The astrophysical perspective

... the second stage was set. In this exposition room of the museum, a short documentary was projected, in which Dr. Colomer offered the astrophysical perspective and reflection to the performance, building a connection between natural sciences and performing arts. This documentary was created especially for this performance in one of the oldest planetariums in Utrecht, the Netherlands. The goal was to present the audience with the theoretical and conceptual framework, as well as some of the key concepts and questions that had motivated the creation of *Telescope II*. As Dr. Colomer would elaborate: *Is the universe infinite? How did the stars and planets form themselves? Is there any reason for their beauty? Is there a limit to our knowledge? Are we sure about our perception? How much of it depends on randomness? We observe the universe through a window of time. Thanks to the great distances between objects, we can only see them how they were in the past. To give ourselves an idea of these vast distances we use the speed of light as a measure for distance. (...) Light has now been traveling through the universe for 13.7 billion light years. In this immense space almost all the universe is empty. All the planets of our solar system fit in the space between the Earth and the Moon. (...) The importance of understanding this concept, is as important as understanding the silences in music. This is where we meet. This gives rise to the question, are we alone in the universe? Is it possible that there are other civilizations out there? How can we know? However, the thing we are certain of is, given the enormous vastness of the universe and the separation of the celestial bodies is that: we are very isolated* [Pomés, Hermans & Saenz 2021].

The audience was then invited by Dr. Colomer to continue the tour to the next exhibition space where...

3) *Telescope II*, the sonological reflection on space, time and perception

...the audience finds the musicians displayed in specific positions throughout the room. As mentioned earlier, the number on their card would refer to the numbered seat, which were mixed with the musicians', breaking with what is traditionally conceived as the musician's space. They, the audience, were the performative element *coming on to the stage*, and their positions varied from just sitting next to the pianist, in front of the violinist, or just at the last corner of the room. A white tape connecting all the positions (performers and musicians) depicted the *Draco Constellation*, one of the largest constellations that can be seen with the naked eye at the northern skies. This spatial design revealed another connection between the spatiality of astronomy and performative spaces. Once sat, *Telescope II*, the new music composition by Dr. Sergio Luque was performed: nine minutes of music written for piano and string quartet. Dr. Luque's elaborates on his compositional technique: *This piece was composed with the help of algorithmic composition procedures that combine rules and*

stochastics. I implement my methods for the generation of chords, chord sequences and rhythms in the programming language SuperCollider, as part of a feedback process that is meant to be intuitive and guided by my ear [Pomés, Hermans & Saenz 2021].

Dr. Luque pays attention to the chord's overtones and resonance interaction in order to find the optimal progression for his composition. In this way, with meticulous sensitivity for musical color and resonance differences, he listens to hundreds of sound clusters and chords until he finds the next progression. Therefore, a substantial part of the actual music is what happens in between the notes, when the resonance of the chords interacts with the space or concert hall, creating spontaneous resonances, overtones, and new harmonies.

This revealed yet another connection between both fields: Dr. Luque's music and Dr. Colomer's both seek to explore the space in between, the resonances, the silences. As the astrophysicist explains: *All the planets in our Solar System would fit in the distance between the Earth and the Moon. And if we made a model where the Sun was a sphere with a diameter of one meter, Neptune would be 3 km away and would only be a sphere with a diameter of 3 cm. Therefore, the universe is mainly empty. The importance of understanding this – the importance of understanding the resonances and silences in music –, that's where we both meet [Pomés, Hermans & Saenz 2021].* In this setting and under these artistic guidances, the position of the listener is key in the perception of these cords, even if he is unaware of this fact.

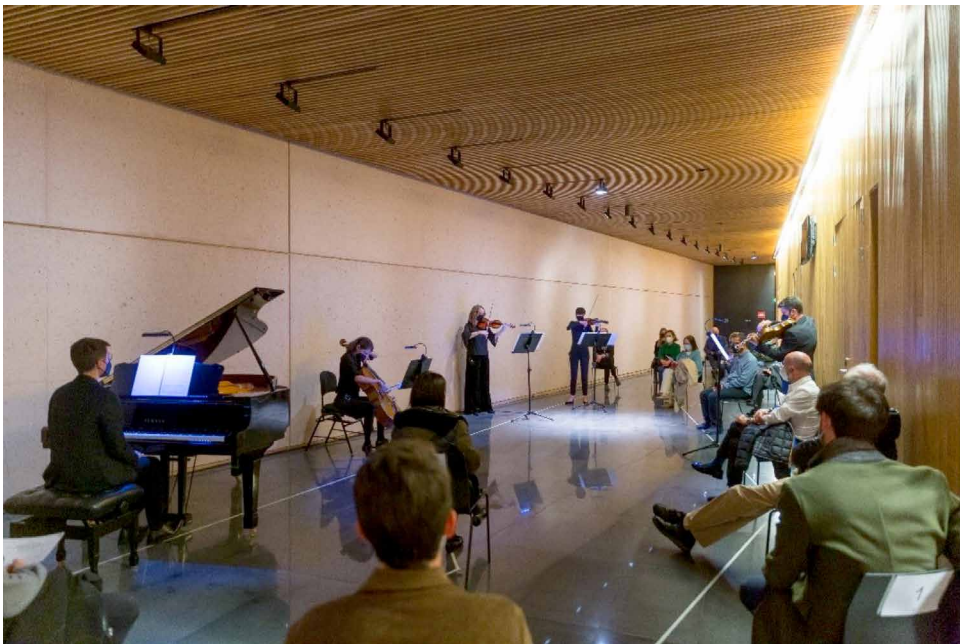


Figure 2. An impression of the performance.

4) The audience's contribution and reflection

Silence is broken for the first time. Dr. Hermans takes the lead in introducing Dr. Luque, seated amongst the musicians and audience members, and invites the audience into the last room, where the *Draco constellation* continues. There, they were invited to an interaction with the composer and FAR team, an exchange of insights, an active reflection of the audience, which was guided by the questions they found on their card and the ideas and concepts planted by the documentary, but not limited to them. In the set-up of the room care was taken to break hierarchical thinking by placing the seats in a circle and mixing the audience with the performers/conceptualizers, although the role of moderator was taken on between the members of FAR. This resulted in the diversification of every conversation that was held. The audiences' perspectives, the knowledge they brought to the conversation and the reflections that they made, illustrated the performance's appeal to the need of reflection on the common questions on human nature and our existence in our universe. Giving a constructive common denominator to our differences in perspectives, conceptual ideas and points of departure.

5) Reflection and analysis

At the end of this journey, cards were collected for further research, and for those audience members who felt eager to contribute, were encouraged to share further insights to a camera prepared to record their reflective contributions.

2. Transdisciplinary Artistic Design

From its inception, *Telescope II* was set out to be of interdisciplinary-transdisciplinary nature. The idea that the interaction in different disciplines and expertise can lead to the generation of new insights and knowledge has been well documented in various disciplines. However, from the onset of the project the concept arose to try to find a way to integrate and use the audience as an active participant in that endeavor. In order to clarify the terminologies and the differences between interdisciplinarity and transdisciplinary, we refer to Henry [2021], as cited in [Willison 2021]: 1): *in general, multi-disciplinary refers to comparison of many different disciplinary perspectives; interdisciplinary relates to the integration of knowledge drawn from different disciplines and, with transdisciplinary we refer to the dialectical relationship whereby both integration and opposition of disciplinary knowledge results in new overarching perspectives.* Following the concept of transdisciplinary, since its origins in the 1970s it reifies, not only increasing the scope and comprehensiveness of interdisciplinarity, but also producing knowledge, insight, and analysis at multiple

levels that renders a theoretical framework more suited to analyze complex social problems [Augsburg & Henry 2016].

In the necessary balanced scheme of transdisciplinary projects, we relied on artistic design and artistic research to carefully *integrate and oppose* the commonalities found in science and music, and throughout the process of artistic design. In it we embed the invitation for audience reflection and participation, allowing for new connections and perspectives to surface, for new *overarching perspectives*. However, finding a model and the form for the gathering and collection of this knowledge was not straight forward. Furthermore, finding this sensitive equilibrium had its own challenges: in 2021 Spain (in particular Navarre) was under strict COVID-19 restrictions. The pandemic circumstances and the reality that Government guidelines to the presence of/ or number of audience members in attendance could change at a moment's notice, made it challenging to design the different artistic stages. To comply with the then acting norms, the decision was made to divide the audience of a maximum of 45 people, in three groups of each 15 members, entering in 30-minute intervals of each other. In order to comply with the distance measures then in effect (1.5 m), the audience was positioned in chairs divided over the three rooms, with a set number assigned to them. Furthermore, the decision to shape Dr. Colomer's contribution in the form of a documentary was made after it became obvious that his presence would be a liability for the performance, due to travel restrictions. At the time of development, we were not aware of how or in what way this would affect the design staging, however it did prove itself to be a guiding and essential part of *Telescope II*, in what Candy would label *reflection-on-surprise* [2019].

3. Shaping the Conception: Common Ground Model

In the field of artistic research, methodology is always at the forefront of the discussion. How can we, in a process that often entails multiple identities and shifting paradigms, bring clarity and academic discourse to a process with often unforeseen tendencies that emerge from the interactions between multiple disciplines and artists, in the reality of a flexible performative spectrum. In order to encompass the theoretical framework for the creation and artistic process in the conception of *Telescope II*, we turned to the *Common Ground model for Practice-based research design*, developed by Dr. Falk Hübner [2022]. Hübner clarifies, the common ground model *tries to two seemingly opposing aims: 1) to provide some strictness, precision and clarity; 2) at the same time to be flexible enough to accommodate unforeseen events*. To clarify, the aim of this model is not to incapsulate a rigid theoretical design but is developed to *offer multiple perspectives on how the artistic researcher can think about their desired approaches and methods* [2022: 323].

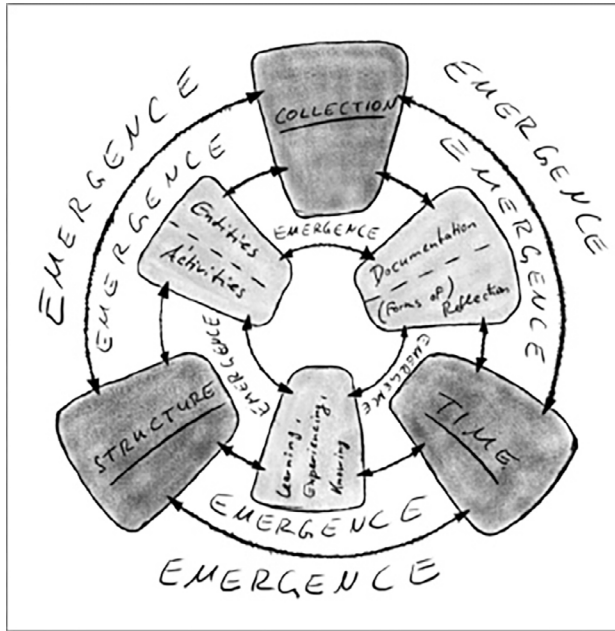


Figure 3. Common ground model [Hübner 2022: 324].

The practice of the creational processes, of ingredients that make up this conception, we now like to give an insight on how the starting point and definition took place.

In the preparation or initial phases of the process of creation, consisted of a series of videoconferences with composer Dr. Luque in summer 2019. In an attempt to find the first conception common nominator, the composer spoke about his newest developments in his music. However, because of sheer coincidence we realized we had the exact same book displayed in both of our bookshelves on the background: *Expanding Universe: Images from the Hubble Telescope* (2015). Our mutual fascination for the images and concepts in astrophysics immediately proved to be the common ground to develop a project together. From this point on, the idea arose to incorporate the astrophysicist Dr. Colomer in the project became obvious and a key definer in the conceptualization.

The next phase of the project was the collection of conceptual materials and ideas. The active conversations between FAR, Dr. Luque and Dr. Colomer, acted as milestones in the research, creation and design of the project. We shared insights, brainstormed, listened to Dr. Colomer's lectures, reflected on the images of the Hubble telescope and images that he provided through The Joint Institute for VLBI ERIC (JIVE) and talked about key concepts. In what could be described as the transfer of propositional and experiential knowledge, we talked about sonology,

new music, the concepts behind Dr. Luque's compositional language, creating an atmosphere for the emergence of new insights. This is what Anderson (1976) would consider the generation of propositional knowledge, that guided decision making in the ideas and concepts that apply to each of our professional and personal decisions in the creation of the work. Dr. Luque explains: *When I was composing, I was imagining, remembering the images of space in order to resolve doubts I had on how to compose a work, how the notes behave themselves, how brilliant or opaque to make the material, the harmonic colors, etc. So, I noticed that I fall back often to the images, to resolve the works, it works as much as an aesthetic answer, to see the symmetry in the universe, the imagination, the way it behaves itself unpredictable. As well as the reflections or questions that emerge knowing the immensity of the universe, how insignificant we are, how the universe does not take us into account (...). In other words, I see these images, and what they provoke in me, I try to let my music provoke the same feeling in me* [Pomés, Hermans & Saenz 2021].

In the design of the structure and timing of the performance, Dr. Hermans' *Ingredient model* [2021] proved to be of valuable guidance. The model provides a base to identify and organize the elements, agents, skillsets, to map its relationship with the different creative phases and the elements that emerge from the process. Hermans' model was based on Graham Wallas' *Four Phase Model* (1926) and its further development in Sawyer's *Explaining Creativity. The science of human innovation* (2012). The model gives insights to the skills, knowledge and materials used by the separate identities that take part in the conception of the work, and how these contributions affect the phases of the creative process in direct correlation to the aesthetic and performative demands of the creative process. Although in this production the role dividers were quite clear from the start and the role pattern within the transdisciplinary process was in an approach which Choi and Pak [2008] would describe as working in *parallel or sequential*, each entity was influenced and guided by the overlapping sharing of knowledge and insights. It is hard to pinpoint how and exactly when associative thinking, or inter-, trans-disciplinary thinking might affect the course of the creative processes within the work of each individual contributor, the consequential phases in creation of the work do function as a reflection of these processes.

4. Crossroads to Emergence

The layer of emergence had in the performance proposal a dual function. As it can be seen in the common ground model, emergence can occur during and in between all the named phases. During the phases of conceptualization, preparation, artistic composition, structuring or transdisciplinary balance, but also in the

designed audience participation, where the audience is used as an additional entity and as a vehicle or the generator of new knowledge. Emergence, in the words of Stephen Johnson, is *a form of higher-level knowledge and behaviors, emerging from low or local level interaction in complex systems* [2001: 233]. Peter Cariani continues by saying *the full gamut of emergence encompasses new forms, new material structures, new organizations, new functions, new perspectives, and new aspects of being* [2008: 2]. The possibility for these moments of emersion to arise relies on: a careful artistic design, a balanced interaction of the elements, a guarantee for enough flexibility within the structure, and a constant game between the propositional and the non-propositional elements. It is then that both procedural knowledge and propositional knowledge may occur.

As Niederer defines, *procedural knowledge can be understood as experiential knowledge in action*, while *propositional knowledge can be understood as the norms and principles by which to understand experiential knowledge* [2022: 246]. Following this concept, we understand that the moments of emersion can happen in both the artistic team and the spontaneous participation of the audience at the time of the artistic action. The sum of both approaches results in the final performance as well as the new ideas and questions that emerge from it, and altogether define this project as transdisciplinary.

In *Telescope II*, the audience is invited to reflect on the scientific and artistic matters, and to contribute orally and/or in writing. At the first station of the performance, a participatory card was made available to the audience with two questions that reflect upon perception and the ability to formulate questions as a vehicle to acquire new knowledge. These participatory cards were aimed at feeding their moments of emergence, and so leading to new experiential knowledge in action. Even though, as artistic designers, these moments cannot be predicted, it has been proven that when well-integrated in the performance, it can go beyond expectations. Some of the reflections that were written on the participatory cards as well as in the conversation and audiovisual contributions revolve around common questions on human nature and our existence in our Universe, with topics such as the development of technology, our place in the universe and the relationship to our planet, our ability to progress in knowledge through curiosity and trust.

Some examples are given:

- *We need to remember that our perception might not be wrong, but it is incomplete, it is not the full reality. And it forces us to develop the ability to trust, that we have lost so much. We need to trust to advance.*
- *How does predisposition influence perception? How does context impact our senses? Even if what we perceive might not be the reality, science and technology*

can support us in the endeavor. Combining both perception and technology is key.

- *How can we perceive the unknown and the abstract? Can we build reality with the sum of everyone's perceptions? Or would it only lead to contradictions? Are contradictions part of the 'everything'?*
- *The combination of images and music made it impossible not to stop and think in this process. It is fascinating that as human beings can be aware of our limitations and yet advance, wonder, and know beyond them.*
- *The 'what' is revealed through perception. And if we know the 'what', perception can confirm. But knowledge emerges always from experience, our own or someone else's. And in this process, asking yourself questions is the key to growth and progress. When we stop wondering, is life over?*
- *Silence and emptiness have created in me an attitude that allows for introspection. While we discover the vastness of the Universe, we can still enjoy its beauty. The abyss is overwhelming, but can also be beautiful.*

We believe that these profound reflections, that combine cognitive processes and spontaneous actions of sharing, go beyond the performance of *Telescope II*, as they show that individual and social actions can be impacted by artistic experiences. Therefore, careful collection and analysis of the participatory information is needed to determine to what extent and how it affected the participants, and catalogue the knowledge and reflections gathered. Some of these reflective testimonies have found their way into the ongoing discussions of current and future artistic projects currently under development within FAR collective. A more in-depth analysis and sociological context will be offered in a future publication that focuses on the nature of these social inputs, from the individual to the collective, to further develop the ideas on culture as a vehicle for education and social transformation and connectivity.

Conclusions

The creation of *Telescope II* followed two lines of research leading to emergence crossroads, which could be seen as independent from each other, but are also intrinsically intertwined.

Firstly, the artistic creation and design of the performance itself. This encompasses the conceptualization of the performance, the creation of all the integral elements that conformed it (music composition, scientific documentary, spatial design), as well as the timing and transitions between these elements from a transdisciplinary approach, leading to the generation of insight and knowledge. This emergence crossroad occurred within the crafting methods, and the different creative

phases of artistic research. In *Telescope II* that new insight was produced not only by the interaction of the artistic and scientific languages, but by adding the audience emergent reflections into the equation. The duality in the emergence and reflective tendencies that this transdisciplinary approach entailed meant that art and science opened doors for new insights and the generation of an experience in which the commonalities and connectivity of the processes were centralized and expanded upon.

Secondly, the participatory dimension of the performance, through the participatory cards and interactions with the audience. The conceptual design was based on the initial idea of some form of active and/or immersive participation of the audience in a non-conventional performance setting. In other words, we wanted the audience to have time to walk, think, talk, and reset their (pre)conceived conceptions of a performance. Following that motivation, the final design invited the audience on a journey through various carefully connected spaces of the Museum, favoring the audience to submerge themselves in the atmosphere and sonological aesthetics, giving them the chance to calmly enter the mindset and time to activate cognitive processes on the matter, reflect and wonder. The objective was to incorporate the audience as an active knowledge-contributor in the performance model, creating an ideal environment in which audience participation and emergence could occur. In this line of thought, Michaels states: *If there is a contender that seems most associated with practice-based research, it seems to me that this is in the area of reflective/reflexive practice or action research* [2022: 48]. The audience members, in their diversity, are also entities which have their own propositional knowledge, procedural knowledge and experiential knowledge, that have shown to have a homogenous trade in their personalities, which is the curiosity and eagerness to know, share and learn.

The creation and performance of *Telescope II* showed that a carefully curated combination of both lines of research can expand artistic experience beyond our senses, impact our vision on the world while generating new insights and overarching our predetermined perspectives. And from there, new curiosities emerge.

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