

# A Polar Diagram for the Analysis of Gamified Audiovisual Works

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## Abstract:

GAPPP – Gamified Audiovisual Performance and Performance Practice is a project in the field of artistic research, which has been running since 2016 at the Institute of Electronic Music and Acoustics of the University of Music and Performing Arts Graz.<sup>1</sup> The main interest of this project is to investigate the aesthetic effect of game elements in the context of performance-based audiovisual compositions. The goal is not to produce musical games, but to explore game related behaviors in order to expand artistic means of expression.

New works are commissioned for this project that focus on specific questions relevant to the research.

A triangular research design is applied, to analyze the newly created audiovisual works from three distinct perspectives: 1) the perspective of the authors of the work, 2) the performers, and 3) the audience.

As of September 2018, 14 new works<sup>2</sup> have been created which differ strongly in a.o. their aesthetic approach, their technical setups, the roles they assign to the performers, or the way how they relate to the audience. With the growing repertoire it became increasingly difficult to compare the works with each other, due to their diversity. As analytical methods in the field of audiovisual works and performance practices are at best scarce, and since the specific combination of game elements and performance-based multimedia is a very new 'genre' in itself, it became necessary to develop a suitable method to compare these works with each other.

This paper introduced a method that we developed for the project GAPPP. It combines concepts from game theory, composition, and performance analysis. Although the method has been oriented towards our specific combination of game-elements, performance and audiovisuality, with minor adjustments it could be applied to setups beyond this particular scope.

Keywords: audiovisual composition, multimedia performance, computer games.

## 1. Introduction

The method centers on a polar diagram comprising five axes and ten parameters. When using the method values of the parameters are marked graphically on the axes. By connecting the marks of the ten parameters a shape results that allows intuitive comparisons between graphs that stem from different works or different sections of the same work. Similar shapes indicate commonalities between works, which might at first not be obvious and vice versa.

This approach builds on previous publications by Birnbaum et al (2005), Magnusson (2010), and my own method for the analysis of performance practices in Electronic Music (Ciciliani 2014, and Ciciliani and Mojzysz 2015).

## 2. The Axes and the Parameters

Each axis comprises two parameters that are referring to the same or to related phenomena. Thereby the part of the axis that extends to the upper half of the polar diagram refers to issues that address the perspective of composition, while the lower part of the diagram relates to the perspective of performance. The five different axes are named Interface Axis, Determinism Axis, Agency Axis, Representation Axis, and Ludic Axis.

The following paragraphs are explaining the axes and their parameters. Generally speaking, the entire audiovisual technological system is considered as a single component of the work that a performer interacts with. Both are addressed in the following descriptions as singular agents, although the former might be composed of very diverse components and the latter might be a larger group of individuals.

1 GAPPP is funded by the Austrian Science Fund as part of the PEEK program for artistic research. Project number: A364-G24.

2 Simon Katan: "Conditional Love" (2016/17), Kosmas Giannoutakis: "Self-Sustaining Play" (2016) and "Attractive Correlations" (2017), Christof Rossi "Game Over" (Space Invaders Version) (2017), "Game Over" (Tiles Version) (2018), Martina Menegon & Stefano D'Alessio: "Tonify" (2017) and "To Kill Two Birds" (2018), Marko Ciciliani: "Audiodromo" (2016), "Atomic Etudes" (2016), "Tympanic Touch" (2017), "Kilgore" (2018) and "Chemical Etudes" (2018)

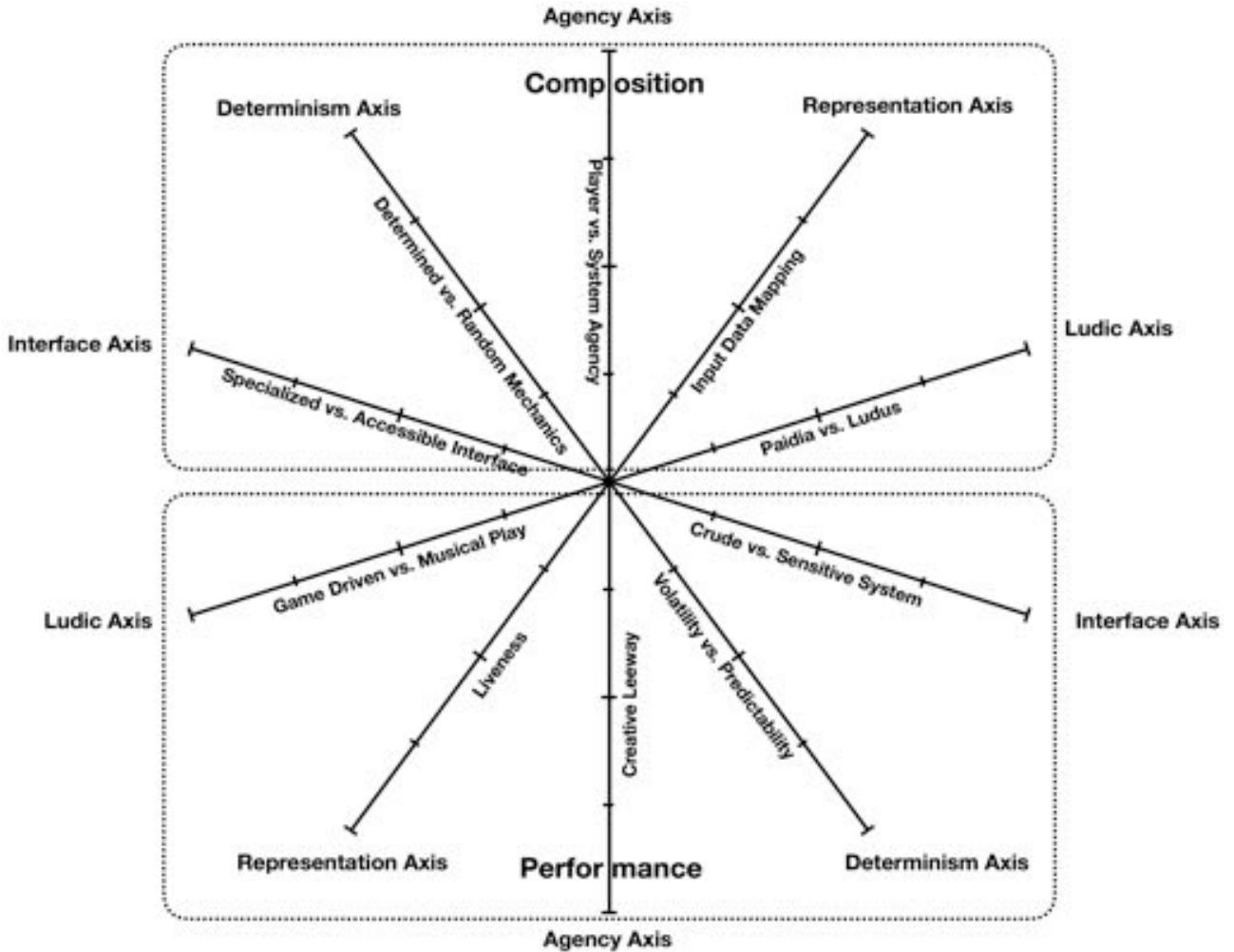


Fig. 1: The polar diagram for analysis of gamified performance-based audiovisual works

## 2.1 Interface Axis

The interface axis qualitatively describes the means the performer is provided with for artistic expression.

### 2.1.1 Specialized vs. Accessible Interface

This parameter indicates whether the interface requires practice and expertise to be used or whether it is a generic device which can be used without prior training. The former includes practically all traditional instruments, which usually take many years of practice to be mastered. The latter applies to interfaces that can intuitively be understood and used, as for example joy sticks.

This question disregards details about mappings and sensitivities in the response that depend on the software implementation. Rather, this parameter indicates whether the interface communicates to an audience that its use requires a shared tacit knowledge (accessible), or specialization. Since the choice of a particular interface is usually made during the process of composition, this parameter is positioned in the upper half of the diagram.

### 2.1.2 Crude vs. Sensitive System

Here, the interface is described with the corresponding implementation on the software side. It is thus understood as part of a larger input system. This parameter indicates whether the control provided to the performer is sensitive and fine grained or whether it only allows crude choices to be made. This addresses not only the sensitivity how a single parameter is mapped and processed but a general sense of control which might also include the number of degrees of freedom, or – in other words – the overall range of parameters the performer can access.

## 2.2 Determinism Axis

This axis describes how the audiovisual system is algorithmically designed and how this translates to the performance.

### 2.2.1 Determined vs. Random Mechanics

This axis indicates whether the system is designed in deterministic ways or whether many random processes are involved. Thereby it is necessary to observe the impact of the algorithms. Random processes can be applied to surface phenomena in large quantities, that often do not characterize a work as much as for example random decisions regarding the generation of form.

### 2.2.2 Volatility vs. Predictability

This parameter describes how the algorithmic design of a work is experienced by the performer. Details of the implementation are disregarded. Rather, this parameter describes whether the experience of the work changes with every performance due to unpredictable or surprising events, or whether the overall experience is every time similar. The former usually asks for more spontaneity on behalf of the performer, while the latter enables strategic planning and preparation of details in the interpretation.

### 2.3 Agency Axis

This axis describes the distribution of agencies in the basic design of the work and how this affects the performance.

#### 2.3.1 Player vs. System Agency

This parameter describes whether dominant agencies of the work are given to the performer or whether they are implemented in the design of the technological system. If an agent takes a proactive role it forces the other agent to behave reactively.

#### 2.3.2 Creative Leeway

This parameter describes to what degree the performer can shape the work while developing an interpretation of it. If the performer mainly reacts to proactive behaviors coming from the system, the overall creative leeway of the performer can be expected to be lower than in an inverted relationship. However, the creative leeway is not merely a consequence of the distribution of agencies but also of the magnitude of impact that the agencies have on the overall work. A particular work may for example allow a lot of flexibility in the interpretation of a performer's part, while this shows no impact on the behavior of the rest of the system.

### 2.4 Representation Axis

This axis describes whether actions of the performer are propagated through the system. Here the term 'representation' indicates that the performer is given a presence in the behavior of the other components of the performance.

#### 2.4.1 Input Data Mapping

This parameter describes whether actions by the performer are fed into the technological system. It also indicates to what extent these data are mapped to other aspects of the system's behavior.

#### 2.4.2 Liveness

This parameter describes the responsiveness of the system to actions by the performer. The term liveness is here understood in John Croft's meaning as "aesthetic liveness, by which [...] aesthetically meaningful differences in the input sound are mapped to aesthetically meaningful differences in the output sound" (2007). In other words, this parameter indicates to what degree the system is experienced as part or as an extension of the instrument the performer uses. This does not focus on the sonic representation alone but also to potential visual translations of the performer's actions.

### 2.5 Ludic Axis

This axes refers to how game-related aspects manifest themselves in the context of the artwork.

#### 2.5.1 Paidia vs. Ludus

The differentiation between these two terms goes back to the game theorist Robert Callois, where "Paidia represents wild, free-form, improvisational play, whereas ludus represents rule-bound, regulated, formalized play" (Salen 2004 : 308). The former usually encourages an explorative approach on behalf of the performer with free variations, whereas the latter puts the performer in a more rigid framework which dictates its behavior. Which of these two concepts is implemented is a decision made in the general design of the work, usually at the macro-level of planning.

#### 2.5.2 Game-Driven vs. Musical Play

Generally speaking, when performing works that incorporate game elements, the performer needs to balance game-driven and musical play. The former refers to the adequate adherence to any set of rules that are part of the work. However, as experience has shown, merely conforming to game related rules will usually not lead to a satisfactory performance. In the realization of the work, the performer needs to balance a musical interpretation of the work with the rules that are underlying the game elements (for a more detailed discussion please see Lüneburg 2018).

This parameter expresses which type of the two sorts of play dominate from the perspective of the performer.

### 3. Point Symmetry as a Heuristic Design Decision

The axes and parameters have been arranged in such a way, that a hypothetical standard situation would lead to symmetric plottings of the parameters belonging to the same axis. A high value of one parameter in an axis is likely to produce a high value on the complementary parameter of the same axis:

- With the Interface Axis, a specialized instrument that requires extensive training can be expected to offer more

control than a generic interface.

- Regarding the Determinism Axis, a deterministic design is likely to yield a more predictable situation to the performer than a system which builds on many random decisions.
- With the Agency Axis, it is expected that player agency enhances the performer's creative leeway.
- Regarding the Representation Axis, strongly pronounced or elaborate mappings are expected to enforce the feeling of liveness during performance.
- Finally, with regards to the Ludic Axis a design that orients itself towards the Paidia concept is expected to support musical rather than game-driven play.

Provided that all these assumptions would indeed take place, the value that is assigned to one parameter of an axis would be mirrored on the other part of the axis. The overall shape of the plotting would therefore be point symmetrical.

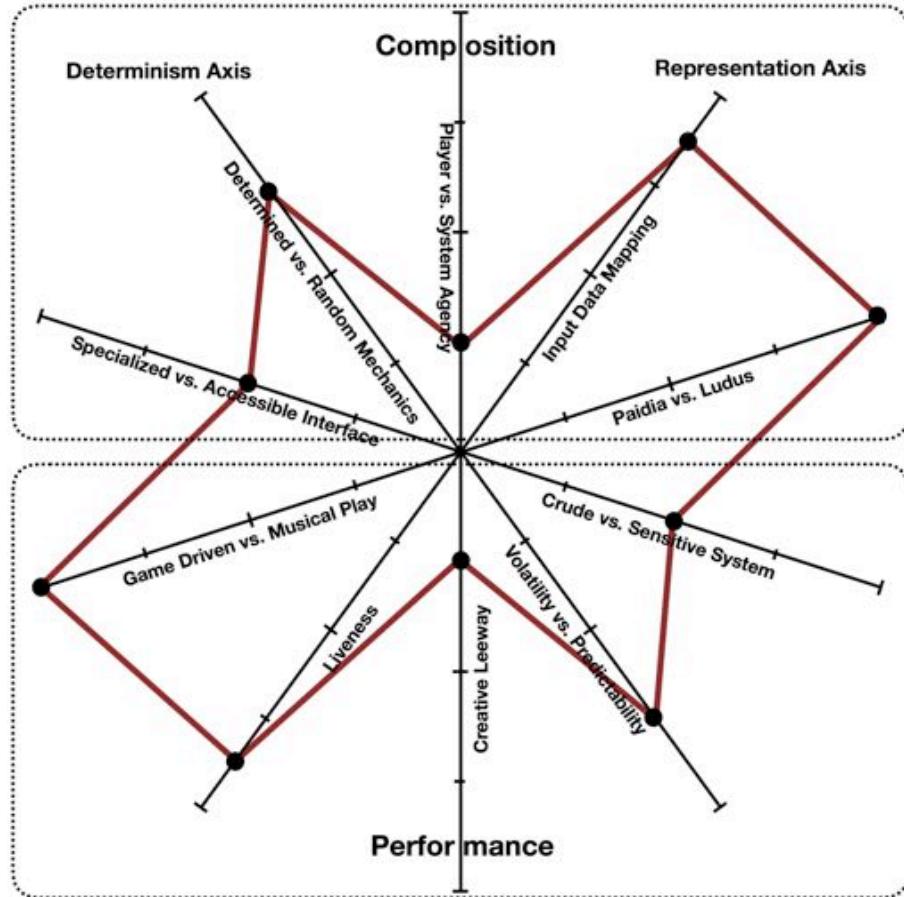


Fig. 2: A hypothetical analysis that shows perfect point symmetries

When applying this method to concrete works, the parameters on a single axis will rarely be truly symmetrical. To assume point symmetry as a standard model, though, is a suitable first criteria when analyzing a plot. It is interesting to observe where and why asymmetries occurred in particular places. That way the individual characteristics of a particular work can more easily be assessed.

#### 4. Examples

Space does not allow do present detailed analyses of works. In order to show how differences and similarities between different works result in particular shape, four examples are presented and briefly commented.

The four plottings shown in Fig. 3-6 show various settings for each of the following works: *How to Kill Two Birds* by Martina Menegon & Stefano D'Alessio, *Game Over* by Christof Ressi, *Conditional Love* by Simon Katan, and *Kilgore* by the author.

*How to Kill two Birds* is a work for two performers that can also be performed by audience members. It consists of an adaptation of the classic game *Pong* combined with a physical interface. Instead of controlling the virtual racket on the screen with a joystick, the performers have to move their hand vertically which is mapped to the screen. Various items are bouncing back and forth between the players and the events are sonified in musically subtle ways. The piece has a transparent rule and goal structure with a level design and usually results in relatively short performances.

*Game Over* adopts aesthetics of a 2D platformer game. It is performed by a clarinetist who has an accelerometer attached to the instrument. By moving the clarinet in various directions, an avatar character is controlled on a projection screen that can interact with the environment. It is designed as an open world game without any rules and goals. The world comprises a large number of different environments that are characterized by specific visual designs as well as

distinct musical affordances.

In *Conditional Love* the audience takes on the role of performer. With smart phones or tablets audience members can perform various actions as the piece progresses through different sections. The actions primarily consist of wiping the screens in various ways. The progress through the piece is controlled by the composer who supervises the various actions of the audience. In a later section of the piece, each audience member generates a visual representation of herself or himself on the projection screen.

*Kilgore* is a work for two performers. The main sections are performed with gamepads as controllers. Three smaller sections also make use of traditional instruments. Each performer controls a character in a relatively complex 3D environment. By moving around and following certain missions, an increasingly complex sonic texture evolves. The basic relationship between the players is competitive, but for musical reasons various situations offer them to engage with each other in coordinated ways.

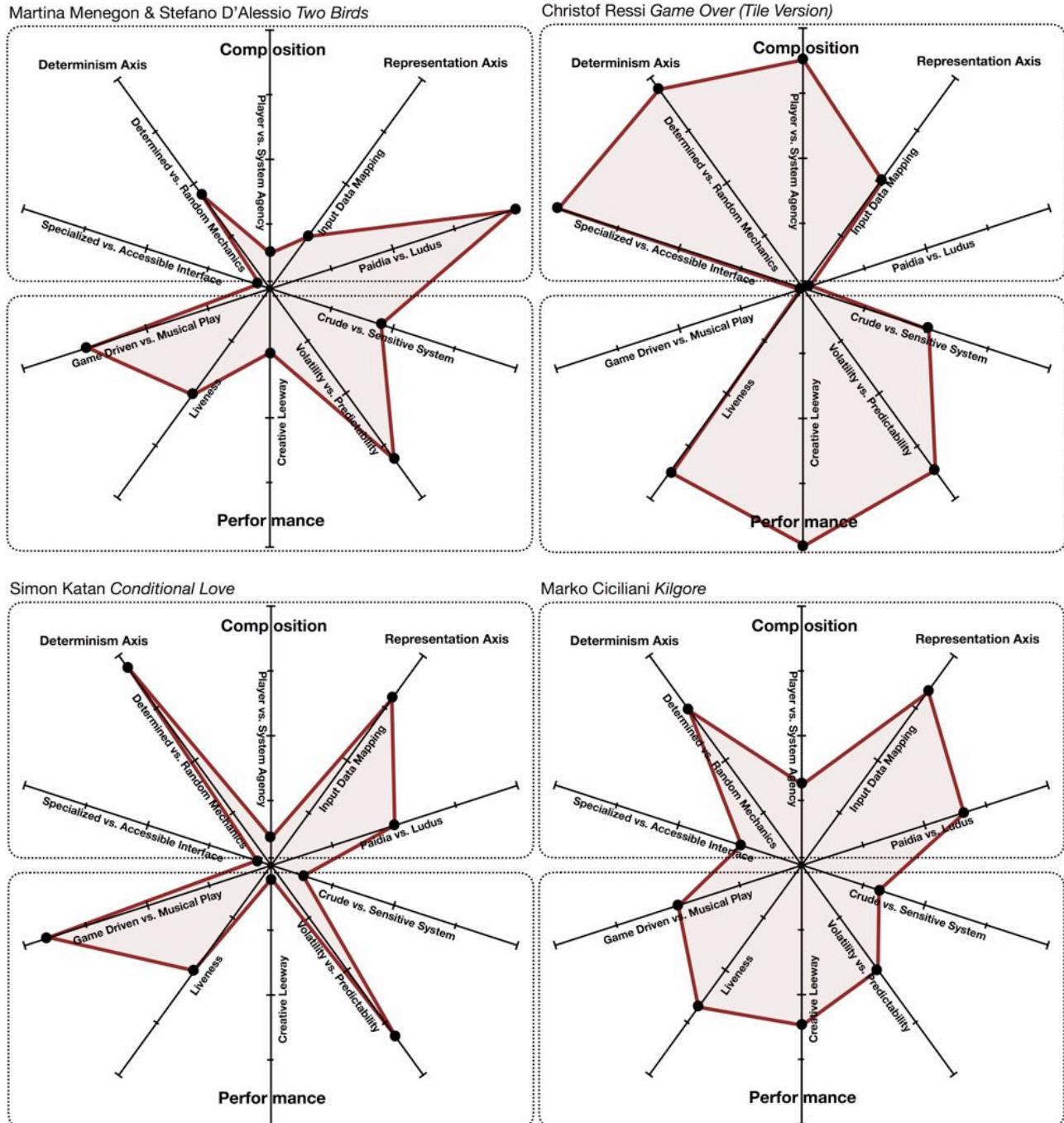


Fig.3-6: Four different polar diagrams describing the works, *How to Kill Two Birds* by M.Menegon & S.D'Alessio, *Game Over* by C.Ressi, *Conditional Love* by S.Katan, and *Kilgore* by the author

The plottings for each piece (see Fig. 3-6) clearly show that the resulting shapes differ for each work. Each shape displays different features that are characteristic for the particular work. However, the plottings belonging to *Two Birds* and *Conditional Love* do show some resemblance. Both of them display a predominance of system agency and

relatively low values for creative leeway. Also both make use of accessible interfaces and the works are highly predictable on repeated performances. Contrary to *Conditional Love*, in *Two Birds* the accessible interface does not feel as crude in the hands of the performer, hence we see a pronounced asymmetry on the corresponding axis. It is interesting to note that both of these works allow audience participation which led to a choice of interface that does not require much training or specific knowledge. In this context it is also noteworthy that the creative leeway is significantly lower than with the other two works, that require trained musicians who are familiar with the work. A check of symmetries makes a.o. the interface axis stand out in the case of *Game Over*. Here the interface is described as highly specialized. It consists of a clarinet with an accelerometer. The specific nature of the instrument however does not translate to a very sensitive system as it would be expected. In this particular case this is because the instrument functions largely independently of the audiovisual system. The interaction with the graphic elements in the audiovisual setting are often based on on/off triggers which does not offer the same sensitive treatment as the clarinet offers as an instrument.

## 5. Evaluation and Summary

As described above, the polar diagram generates different shapes with every work which visualize their characteristics. At the same time it also displays similarities between the two works, which have been conceived for audience participation. A check of the symmetries of the axes in one case furthermore revealed some more detailed characteristics of the relationship between interface and system.

All in all, the analysis system works in the sense that it facilitates a comparison between different works.

A caveat is that there are no solid criteria how values for the individual parameters are filled in. What is the reference measure, when for example a high value is selected for creative leeway? The values that are filled in are therefore highly subjective. Hence, this analysis system is primarily appropriate as a method for subjective reflection. The system should never be misunderstood as an objective and indisputable representation of a work's characteristics.

In our research team that consists of three individuals, we have applied the system independently and then compared the results. In some cases the results were indeed quite similar. In other cases, however, the resulting shapes differed significantly. In the latter case, the different plots nevertheless helped to have a differentiated discussion about our interpretations of the works and therefore proved to be helpful.

## 6. Critical Note on Categorical Systems

Any system that applies categories as this one is dangerous, as “[e]ach [...] category valorizes some point of view and silences another” (Bowker et al 1999 : 5). It is therefore important to use such systems critically and to verify with each investigated work, which aspects have been rendered invisible by applying this system of analysis. Also it is important to observe whether and how such systems feed back into the artistic practice. This is especially relevant in a case like ours, which is taking place in the context of artistic research and where the researchers are also the practicing artists. “[...] Even when people take classifications to be purely mental, or purely formal, they *also* mold their behavior to fit those conceptions” (ibid 1999 : 53).

This system serves for analysis by reducing complexities and isolating aspects that are conceived to be most relevant in our particular context. Apart from rendering us blind for other aspects it also increases our sensitivity for issues that are relevant for our research questions. We believe that such systems can be beneficial when used critically and while keeping aware of the risks the method entails.

## 7. Acknowledgements

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