RCO: Investigating Social and Technological Constraints through Interactive Dance

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ABSTRACT
We describe the research led by the performance Radical Choreographic Object (RCO). RCO is a participatory performance where the audience responds to instructions and interactions sent to their mobile phones as well as invitations to dance from the performers.

The performance provides an experimental ground where we question how humans participate to the dance and how they relate to their mobile technologies.

Through observations and conversations with participants during several showings, we show that the participants progressed from obeying and feeling hostage of the interactions to re-interpreting and re-appropriating them. We then discuss these findings in the light of the norms and constraints that are imposed by social behaviours and by the abundance of mobile technologies. We also reflect on the alternatives that emerge where people break free from those norms, embrace eccentricity and dare to dance.

CCS CONCEPTS
• Human-centered computing → HCI theory, concepts and models.

KEYWORDS
Dance, Performance led Research

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1 INTRODUCTION
We witness the emergence of a body of work within Human Computer Interaction (HCI) that builds upon artistic and design practices in order to capture and design for the diversity of human experiences [38, 45, 48]. Within such HCI contributions, performance has proved its potential to provide an experimental ground to study how humans interact with technologies [8]. Such approach is what

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2 BACKGROUND
2.1 Art and dance in HCI
In Entangled, Christopher Salter reflects on how technologies are entangled with performance from early works such as Diaghilev’s Ballets Russes in 1917 to current digital and interactive art [56]. Some of the earliest experiments illustrating such an entanglement were the 9 Evenings interactive performances [46] that linked prominent
performance and sound artists with engineers from Bell Labs in 1966. In dance, Merce Cunningham is a major figure of modern and contemporary dance that explored computer-based visualization on stage in the 1990s [58]. Since then, linking dance and technologies through movement capture and effect generation has been widely explored and its culmination is visible in the emergence of various interactive systems to support dance practice since the 1990s [28]. We can cite interactive systems with projected visualizations that are designed to augment dance performances [2] and to represent the dancers’ movements and qualities in real-time [23, 35, 37]. Other examples of interactive systems applied to dance training are designed to extend participants’ movement vocabulary [24], to enhance their movement awareness [27, 41] or to allow them to better train with videos [14, 53]. There are also HCI studies that take political stances on technological innovation. More recently, Smith et al. proposed a broader critique of the anthropocene agenda and ties to industry and Silicon Valley [5]. As examples of critical approaches in HCI we can cite feminist HCI [6] that reveals patriarchal values within HCI’s dominant paradigms, approaches highlighting the underlying hegemonic structures of production in HCI [63] and those resisting corporate Silicon Valley agendas [32, 50]. We can also cite works engaged with activist communities [4] that take political stances on technological innovation. More recently, Smith et al. proposed a broader critique of the anthropocene within HCI [60]. We believe that these design approaches that are led by practice and that embed reflection and criticality laid the groundwork to open HCI to art practice as a fertile experimental and reflective ground.

Figure 1: Audience members collaborate to carry a dancer following an instruction on their mobile phones ©Fabien Leprieult

2.2 Practice based research in HCI

The intersection of HCI and practice is particularly clear in the rising voice given to designers’ practices [30, 36] as well as the formalization of a research through practice method – an investigation undertaken in order to gain new knowledge through practice [66, 67]. An overview that summarizes the large literature arguing for HCI research to meet design practices can be found in [30].

Recently, Pierce et al. argue for openness to authorship. In their essay on design practice, they argue that authorial voices are clearly acknowledged in design and provide alternatives to user-centered design (UCD) and solutionist views in HCI [51]. Such an argument is supported by a variety of works in interaction design within the HCI community that diverge from UCD and critique its methods such as design thinking and its goal of creating average design according to acceptable user needs. According to Mark Blythe in his essay *Anti-solutionism through Design Fiction*, the roots of UCD solutionism go back to the main scenario that HCI traditionally addresses, which is solving the problems at the workplace [11]. In a more unionized context the scenario aimed to support labour and historically implied a participatory approach to design as exemplified in Scandinavian interaction design traditions [12]. Since the last two decades, interaction designers in HCI are exploring alternative scenarios other than the workplace problem and where the “monster” to fight against is the lack of informed debate and the need for more reflective and critical practice and discourse in design, quoting Mark Blythe [11]. These scenarios embody a critical stance on UCD and a political stance on HCI’s productivist agenda and ties to industry and Silicon Valley [5]. As examples of critical approaches in HCI we can cite feminist HCI [6] that reveals patriarchal values within HCI’s dominant paradigms, approaches highlighting the underlying hegemonic structures of production in HCI [62] and those resisting corporate Silicon Valley agendas [32, 50]. We can also cite works engaged with activist communities [4] that take political stances on technological innovation. More recently, Smith et al. proposed a broader critique of the anthropocene within HCI [60]. We believe that these design approaches that are led by practice and that embed reflection and criticality laid the groundwork to open HCI to art practice as a fertile experimental and reflective ground.

2.3 Performance led research HCI

Tuning into performance practice specifically, we can cite several contributions in HCI that used performance as a tool for research. For example, researchers used performance to investigate the relationship between the viewer and the artwork [63], to look at audience presence and engagement [20], to probe audience participation [15] or to reflect on audience civic engagement and dialogue [55]. In fact, Benford et al. draw a large view of how performance has provided an experimental ground to study how humans interact
with technologies in the wild. They define this approach as performance led research. It is the set of projects that combine the staging of public artworks with HCI research [8]. These projects engage real users with interactive technologies. They are also performed in the wild, meaning in real settings [54]. They usually originate from the creative vision of artists in collaboration with researchers that develop and study the resulting production. However, several performance-based research projects in HCI have been led by individuals that play the dual role of artist-researcher as seen in Taylor et al.’s performance Humanaquarium [63] among many others. Benford et al. describe such research through the triangulation of practice relying on artist-led experiences, studies consisting on understanding experience in the wild and theory encompassing the resulting concepts and frameworks.

The approach proposed by Benford et al. on performance led research in the wild frames our research. Indeed, our work is led by the art practice that is involved in making RCO. It also involves a study in which we describe how RCO unfolds and in which we draw on observations and interviews of the audience and team members to provide insights on people’s experience when they engage with the artwork and with the interactive mobile system within it. Finally, from the insights gained, we reflect on a set of theoretical concepts that describe people’s embodied and social experiences and relationships with their mobile phones.

2.4 Mobile studies

Finally, we dig into studies involving humans’ relationships to mobile phones, which is the object of our investigation in RCO. In HCI, mobile phones are usually studied for what they enable such as geolocation or communication through social media. There are also studies on practices around mobile phones such as gaming or learning. Finally, mobile phones are studied in the different contexts in which they are used such as schools or personal and professional spaces. In designer and socio-anthropologist Nicolas Nova’s latest book, Smartphones, he summarizes the literature on mobile phones in sociology and science and technology studies [47]. Broadly, mobile phones have been described in terms of facilitating connection by blurring the boundaries between the private, public, professional and personal spaces [19]. In terms of enhancing individual privacy, mobile phones have been described as a shield and a social refuge to stay in one’s bubble [64]. In terms of enabling remote communication, mobile phones have been described as a mean of creating social cohesion [40]. In terms of augmenting the human capabilities, mobile phones have been described as a “prosthesis” or an extension of the person allowing to belong to various social circles [34]. Finally, in terms of agency, mobile phones have been described as a means of self-expression [3] but also as an alienating device [1]. Inspired by these concepts, Nicolas Nova ran a series of ethnographic studies that allowed him to further describe six metaphors around the use of the mobile phones: the “leash”, the “prosthesis”, the “mirror”, the “cocoon”, the “magic wand” and the “empty shell” [47]. Through these expressions, he addresses the current tensions related to the use of the smartphone with regards to the crisis of attention, the externalization of cognitive and daily life functions, the feeling of isolation as well as the obsolescence of these devices.

In studying RCO, we are particularly interested in the two polarities confronting the expressive versus alienating qualities of interacting with mobile phones. Indeed, we have designed mobile interactions that prompt the audience members to participate to the dance piece by moving and interacting with the performers. Thus, we use the RCO situation to observe and describe how mobile technologies can be viewed as constraining people’s choices or freeing their expressive potential.

2.5 Participatory Art

In Participation, Claire Bishop compiles an anthology of key writings on the topic of participation in art [9]. She describes the desire to move the audience members out of the role of mere observers into the role of producers as one of the latest major trend in art. Such take on participation in art originated from theoretical writings by Roland Barthes, or in Jacques Rancière’s famous book The Emancipated Spectator where he questioned the presuppositions of the spectator’s passive role opposed to the active performer [52]. Later on, Claire Bishop’s book Articial Hells: Participatory Art and the Politics of Spectatorship provides a historical, theoretical and social overview of participatory art and aesthetics in the twentieth-century [10]. Just like RCO, these earlier works produced situations in which relations are formed among viewers and performers. The particular use of mobile phones to generate these type of relations has been investigated in HCI. We can cite for example performance works such as Theatre Engine that integrate smart phones as interaction mechanisms for live theatrical performances [49]. We can also cite the performance of Cerratto-Pargman et al. where audience members contribute to the performance by sharing their opinions and emotions via text messages [16]. Another example is Mobile Choreography that explores ways of engaging audiences in the art of story telling using their mobile phones before the premiere of a theatrical play ². What these projects highlight, similarly to RCO, is how the mobile phone became a medium that successfully provoked audience participation, engagement and critical thinking.

3 RADICAL CHOREOGRAPHIC OBJECT

3.1 Artistic and theoretical intentions

RCO is an interactive participatory dance performance. For a duration of 30 to 90 minutes (depending on the context), the choreography unfolds according to the physical behaviours of the audience members and the performers.

In order to invite the audience members to participate, we ask them to connect to a server online through their mobile phone and send them a set of text instructions and prompt them to perform a set of gestural interactions as shown in figure 2. Additionally, the participants are invited by the performers to interact with them as shown in figure 3. Thus, the piece creates a triangular relationship between the performers, the participants and an interactive system on their mobile phones. Our intention was to create a participatory piece where the audience members take part in the dance voluntarily, according to their desire, regardless of age, physical or mental condition or dance practice. However, they are free to engage in

²https://www.mobilechoreography.org
the interactions or not and simply contemplate the course of the performance.

The performers, on the other hand, are the agents of such an open, self-organized situation. They alternate between set dance sequences (performed in duets and quartet) and relational sequences in which they can pick from a pool of interactions with the participants. For example, the performers can mimic the participants, make them dance, carry them or touch them as shown in figure 3. In terms of the quality of the dance, we trained the performers to disrupt their usual dance patterns. Such a quest for non-habitual movements is inspired by the making strange method [42] and is meant to destabilize the participants and disconnect them from socially acceptable gestuality. Instead, it creates a dance in which all behaviours are possible and eccentricity is welcomed.

3.2 Team members

From the beginning, there was a common desire between the two choreographers (authors of the paper) to make a piece in which they explore relationships between participants and performers and to mediate it with simple, usual everyday technology such as applications on mobile phones. We auditioned multiple dancers and chose four of them for their capacity to improvise and to create relationships with people (not for the virtuosity of their dance). We also hired a developer to develop the web application on mobile phones. The creative process was a collaboration between the choreographers, the performers and the developer. The roles were defined but the boundaries were loose: choreographers took artistic decisions based on the performers’ improvisations. The choreographers have extensive past experience working with interactive systems on stage, and one of them is also an HCI researcher. During the rehearsals, the entire team contributed ideas around choreographing the relationships with the participants and with the phones. While this paper is written by the two choreographers, we will also carefully narrate the artistic and intellectual journey shared among the other collaborators and participants.

4 REHEARSALS AND SHOWINGS

4.1 Initial Residencies

We followed an iterative step-by-step research through practice method [43, 59] and let artistic, design and research ideas, opportunities and questions emerge. Our process consisted of a number of rehearsals with all the team members, during which we iteratively created the choreography and developed mobile phone prototypes. It was also based on iterative evaluations through open studios and follow up conversations with participants. Using the notion of practitioners’ trajectories developed by [21], we describe our research through practice that includes iterative cycles of choreographic practice and scenario design that we carried out during tree initial residencies.

- Residency 1 (4 days): End of April 2017, team members were in the theatre and experimented with choreographic ideas (without the interactive system). On the 14th of April we invited audience members to participate to an open studio performance. 10 people participated.
- Residency 2 (8 days): in September 2017, team members were in a studio and experimented with the first prototypes of the mobile application and first scenarios of RCO. On the 15th of September we invited audience members to participate to an open studio performance. 30 people participated.
- Residency 3 (4 days): in October 2017, the team members were rehearsing in a black box. We finalized the system, the interactions and the score. On the 27th of October we invited audience members to participate to an open studio performance. 8 people participated.

RCO’s initial rehearsals were hosted by 3 dance institutions for 3 weeks in the area of Toulouse where the dancers were based and the piece was financially supported. The institutions organized the open studios during which a work in progress version of RCO was shown to the general public. During the open studios, we carried out observations and discussions with the participants in order to
iterate on the performance and the interactive system. The goal of these observations and discussions was to articulate the bonds that have been woven between the participants and the performers and to understand how the audience perceives, receives and acts on the instructions and interactions sent to them.

4.2 Preparation for the showings
RCO was hosted by 2 theatres during residencies 4, 5 and 6. These residencies served to rehearse the final version of the piece that was shown as part of the theatres’ regular programs.

- Residency 4 (4 days): in December 2017, the team members rehearsed in a black box. On the 19th of December we performed the piece in its current form. 50 people participated to the showing.
- Residency 5 (10 days): in February 2018, the team members were rehearsing in a theater in preparation for the premiere of the piece.
- Residency 6 (10 days): in April 2018, the team members were rehearsing in a theater. On the 13th and 14th of April, we performed the official premiere of RCO and approximately 60 people participated each day.

Following the three showings of RCO, we conducted a series of observations and led conversations with the participants. We report in section 6 on the data captured during these observations and discussions. Our goal was to gather knowledge on people’s experiences and critical thoughts that RCO provoked, related to their bodies, others’ bodies and to mobile technologies.

4.3 Participants
A large variety of audience members participated to the observations and conversations during the open studios and the three showings of RCO. In addition, the performers also participated to the conversations after each event. Given the large number of participants, we are not able to report on their age nor their gender precisely. However, we can report that among the participants, there were adults with age ranging from 20 to over 70 years old. Participants were general audience members that either came to the performance or the conversations.

4.4 Data collection and analysis
The observations and conversations took place in the studios and theatres where we performed. The observations took place during the performance. The conversations were carried out in groups after the performance. We asked the participants to sit all together on the floor in a circle and had 30 to 60 minute group conversations with them about their experience of the piece. We favoured discussions over questionnaires in order to encourage exchanges among the participants about their individual and collective experiences. In order to initiate the conversations with the participants, we asked them the following questions: (1) How did you experience RCO? (2) What was your experience of interacting with the performers and with other audience members? (3) What was your experience of the mobile technologies in RCO? The discussions were facilitated informally: they started with the questions and then followed the flow of the conversations among the participants.

We took notes during the observations and the follow up conversations with the participants at each showing. We transcribed and analyzed these notes using a thematic analysis approach [31]. From the selected responses, we defined concepts using the words of the participants (open coding) and grouped them in categories (axial coding). The analytical categories that we generated focused on the expressive and alienating qualities of the relationships people had with their bodies and with their mobile phones. We verified and discussed our analysis with an additional coder who previously read the transcriptions to insure that the analysis captured the data.

4.5 Ethics
4.5.1 Consenting to participate to the performance. RCO exists as a dance performance independent of the academic study that is reported in this paper. It has been performed in more than 15 different art venues and has been successful in attracting an audience eager to experience it. The piece as such is designed for sharing a moment of collective pleasure and is not intended to be malicious. Thus, as articulated by Benford et al’ RCO is firstly deployed "as a professional and public artwork" in its own right while still being used for the study that "documents and analyzes the experience of the artwork from various perspectives" [8].

The institutions that showed RCO, knowing fully the content of the performance, advertised it as a participatory piece in which the audience members are invited (and not forced) to move and interact with people and mobile phones. The publicized description of the piece also informs people explicitly that they have the choice to participate or not. They can refuse to participate either by not engaging physically or by not using their smartphones. They can watch from afar and they can leave the stage at any time. The doors of the studios and theatres were open and chairs were available for the audience members who do not wish or feel uncomfortable to participate. The show goes on even if everyone chooses not to participate. Moreover, audience members are informed that it is not obligatory to connect their phones to the local network.

The dancers are aware of the possible interactions that are involved in RCO (they developed them with us) and are also informed that they are free to stop out of them at any given time.

From an artistic point of view, we cannot reveal additional details to the audience members about the actions that will occur. Otherwise, we break the surprising and spontaneous quality of the artwork. The artists and the art institutions considered that if people were informed of the participatory nature of the artwork and of their freedom to participate or not and if they agreed to come, then they consented to take part in it.
4.5.2 Consenting to participate to the academic research. The academic research reported in this paper is related to the data collected during the open studios that served to iterate on RCO and during the showings that served as a basis for our study.

At the beginning of each event (open studio or showing), the participants were informed verbally that a researcher would observe the RCO situation from a remote position. They were also invited to participate to the follow up discussions. The participants expressed their agreement by signing a consent form at the beginning of each event. The consent form in addition to a note guiding the participants to connect to the servers with their mobile phones was presented to them in the hall of the art venues before entering the performance. The consent form served to protect the participants’ data collected from the observations and discussions. It was approved by a university review board and was part of a larger IRB procedure developed for a project on HCI and professional artists.

5 MAKING RCO

5.1 The interactive mobile phone system

We designed the interactive system as a web application for mobile phones. We created a web server in Node.js (Javascript) that can handle multiple client connections through a standard website (HTML, Javascript and CSS). We used a web server for portability among several platforms: mobile phone for participants and laptop for coding and debugging. The client side is optimized for mobile phones so that a large number of participants can access the website through the URL http://rcolri.fr. From this website, the participants receive a set of instructions and gesture-based interactions sent by a coordinator (one of the choreographers) using an interface created in PureData\(^3\). This interface allows the coordinator to send instructions to one participant, a pre-defined group or all of the participants. Thus, the coordinator has full control on the instructions sent to audience members.

5.2 The instructions and interactions

We ran brainstorming sessions with the dancers and the developer to imagine the instructions and the scenarios during the second residency. Some of the possible scenarios that we invented included arranging the participants in space, communicating the score through vibration, tracking the general energy of the audience. Among these potential scenarios, we selected a first set that is based on text instructions that have a potential to encourage participants to engage with the dancers and with each other. We also selected a second set of gesture-based interactions that are the most movement inducing. These selections resulted from our iterative testing with the performers and the participants during the 2nd and 3rd rehearsals periods.

5.2.1 The text instructions. The text based instructions invite the audience members to perform specific actions with their bodies, individually or collectively. We defined and scripted text instructions as follows: (1) Illuminate the dancers (2) Stroll throughout the space. (3) Follow the steps. (4) Get close to one of the dancers. (5) Get close to an unknown person or a person of your choice. (6) Stay in the rhythm. (7) Enter the dance. (8) Follow the dancers. (9) Find a dance partner. (10) Cooperate with the dancers. (11) Carry one of the dancers. (12) Lay on the floor. (13) Run away. (14) Dance as much as you want (15) Melt on the floor. (16) Kiss a person of your choice.

We designed the text instructions to directly link with the choreographic score and to induce awkward relationships between the audience members and the dancers. For example participants were asked to cooperate with the dancers when the dancers got naked. They were asked to disrupt the dancers by carrying them when they were dancing specific duets. In addition, the choreographer acting as coordinator was free to invent and send text instructions on the fly depending on the situation. She would adapt the timing for launching the instructions according to the “feel” of the audience. Thus, there was a part of improvisation in the instructions themselves.

5.2.2 The gesture-based interactions. The gesture-based interactions prompt the audience members to perform specific gestures with their phones and enforce these behaviours through sound. We designed 4 gesture-based interactions:

(1) The shaker: they are asked to shake the phone as much as possible to stop an annoying noise. This interaction uses the energy data from the accelerometer.

(2) The sketcher: they are asked to use the phones to sketch in space and their gesture varies the pitch of a sinusoidal sound. This interaction sonifies the data from the gyroscope.

(3) The compass: they are asked to rotate the phone to find a specific orientation that will turn white noise into a nice bossa nova sound. This interaction uses the direction from the phone’s compass.

(4) The kick: they are asked to follow the rhythm of the general music by performing kicks with their phone that are sonified as beats. This interaction uses the acceleration data from the accelerometer.

The gestures that they perform are captured through the sensors in their phones (accelerometers, gyroscopes and compasses) and mapped to the sounds displayed individually on each device. We designed these gesture-based interactions to give the participants actions to do with the phones. Our intention was to coerce the participants into a role of a creator of sound and movement. As much as the participants could ignore the text instructions, it was harder to ignore the gesture-based interactions because of the sound that their gesture would stop or release. However, we informed them that they had the choice to not participate and to ignore the gesture based interactions by stopping the application.

5.3 Performance scenarios and scores

We designed the score of the piece (as represented in figure 4) through iterative testing of the dance sequences and the interactions on the mobile phones with the dancers and the audience members during the open studios following the initial 3 weeks of rehearsals of RCO.

We choreographed a set of scenes alternating between set dance sequences that the dancers perform and improvisations in which the dancers interact with the audience members. During these scenes, the audience members receive either text messages instructing them to perform actions or prompts for gesture-based interactions.

\(^3\)https://puredata.info/
5.3.1 The beginning. The audience members are given instructions on how to connect to the RCO website on their mobile phones prior to entering the performance. Once the audience is in the space, the dancers arrive. The lights are off. The participants' phones are set to a white screen and they are asked to illuminate the body of the dancers. The dancers then start to perform what we called the "Living Paintings". For that, we selected postures in famous paintings and asked the dancers to transition between these postures and to invite the audience members to help them perform them. At the end of this scene, the lights are switched on and the participants are now asked through a text instruction to stroll throughout the space.

5.3.2 The flashmob. We created a scene called the "flashmob". The participants first receive messages on their mobile phones asking them to follow steps that consist in walking straight, turning right or left, jumping or zigzagging a certain number of times and repeating the sequence three times with increasing speed. Meanwhile the dancers simply stand still, looking at the participants stepping right and left like street fighter characters. Subsequently, the dancers start teaching the audience members a choreographed dance phrase by demonstrating it, without words, three times with increasing speed. At the end, the speed is so fast that the participants cannot keep up with the dancers.

5.3.3 The set sequences. After the introduction and the flashmob, the dancers alternate between interactions with the participants and set sequences that they perform in duets or quartets. We created these set dance sequences by first instructing each dancer to create a phrase by exploring movements and facial expressions that are unusual to them. Following a making strange process [42] that aims at disrupting movement habits, we modified the qualities, the body parts and the facial expressions of the phrases to make them strange and performative. During these set sequences, the audience members receive corresponding text instructions that invite them to interact with the dancers or with each other or gesture-based interactions that prompt them to move.

5.3.4 The interactions with the audience. We choreographed scenes in which the dancers interact with the participants following two choreographic processes that we invented and that we called "Observation, Relationship, Correspondance" and "Invitation to travel". The first process is a structured improvisation in which the dancers were trained to:

- Observe and act on the following behaviours of one audience member: stillness or dynamism, small or large movements, alone or in group, upper or lower body, standing or sitting, observing or distracted, centred or off-center, symmetric or asymmetric, opened or closed.
- Choose a relationship with the participants such as displacement in space around them, proximity, imitation, following, getting in contact, avoiding contact and vocalisation.
- Find a correspondence by mapping your gesture’s dynamic, space, body part to the element observed.

The "Invitation to travel" is a structured improvisation in which the dancers invite the participants to make an action that will have a consequence on their dance, thus the name "an invitation to travel":

- Touch me so that I dance (Invite a participant to touch the dancer).
- At the slightest distance, I dance (Invite them to recede).
- Help me to walk on the embers (Invite them to help the dancer walk).
- In your eyes my dance (Invite them to look at the dancer).
- My beginning is a... (Invite them to start the dance).
- I trust you when you hold me (Invite them to hold the dancer).
- I offer you my hollow spaces (Invite them to explore the empty spaces of the dancer).
- When you escape I release myself (Invite them to escape the dancer).
- Stop, so that I can dance (Invite them to freeze).

5.3.5 The cooperation scene. We choreographed a scene in which the dancers get naked by offering their clothes to the participants. The participants receive a message saying "cooperate with the dancers". They are thus encouraged to be accomplices to the act of nudity.

5.3.6 The end. For the last scene of the piece, the participants receive the message, "Dance as much as you want", and are invited by the dancers to enter a euphoric dance engaging them in a playful whirlwind. The participants then receive the message "Melt on the floor" and the dancers help them to lay on floor on top of each other. In that configuration the dancers perform again the “Living Paintings” on top of the participants. The participants then receive the message "Kiss a person of your choice" which ends the piece with audience members and dancers kissing and melting in the center of the room.
6 THE RCO SITUATION

We report in this section on the conversations and observations with a large variety of audience members and with the performers that took place during the three showings of RCO. Our goal is to articulate the personal and collective embodied and social behaviours that were provoked by the interactions with mobile phones and with performers in RCO.

6.1 Hostage or voyeur

A participant in the first showing reported that they felt that they had to "obey" an invisible authority while taking part in RCO. Approximately 2/3 of the participants that were present during the discussions agreed that they felt the same. Such feeling emerged in all the conversations following all three showings. The authority in RCO had no personality nor name. It was an abstract authority. However it was personified through the instructions on the phone. A participant said "I felt like a guinea pig. A laboratory rat with the instructions.", another one wondered whether "these are instructions or injunctions?". Because of that invisible authority, most of the participants felt that they were not free to refuse to execute what they were asked in the text instructions and the gestural interactions. This feeling was one of being held hostage of the necessity to interact and to move and to follow the envisioned scenarios of the piece. Such feeling was related to both using the mobile phones and to the set up of the piece. Indeed, a participant reported on the fact that the studio was set so that "there is nowhere to hide". Another participant said that "there is no possibility to escape". However, the nature of the instructions and interactions that were send to the participants' mobile phones also induced how they responded to it. Indeed, the four gesture-based interactions of the shaker, the compass and the kick required each participant to perform specific actions with their mobile phones in order to control the sound. Moreover, some of the text instructions were sent to sub-groups of participants which reinforced their responses. For example, "carry one of the dancers" was sent randomly to 1/4 of the participants. This forced this sub-group to collectively organize themselves in order to safely carry the performer. Thus, the use of the mobile phone, in addition to the set up of the piece, coerced people into performing actions that would not be performed otherwise.

As the conversations went on in every session, Approximately 2/3 of the participants reflected on their feeling of being held hostage as echoing their everyday life experience with their mobile phone. One of them said "The question is: why should I follow this mobile phone? Yet I do it". They reflected on the invisible authority behind the applications that they feel addicted to or incapable of ignoring.

The participants also felt hostage of the RCO situation because they were subjected to physical and embodied constraints that are imposed on them by implicit social roles. A participant said "We are formatted not to act" and another one legitimized his actions through others: "I watch how others act to act". During each conversation, approximately 1/2 of the participants corroborated that interacting with other people was not ‘natural’ to them because they are used to traditional settings in dance where the performers must never be touched nor approached. A participant reported that they were asking themselves throughout the piece whether “the interaction with the performers was allowed, could I touch them or not?” Such incapacity to take action was also reflected in some of the confusion that we could observe from approximately 1/4 of the participants’ behaviours, where they did not know whether they wanted to sit or to stand, to stand by the wall or in the center of the room. A participant reported that the instructions to dance in public were “scary” and required bravery which the group dynamics infused progressively: “We are not brave to go dancing, the energy of the group brings you there.”

Besides the participants’ feeling of being held hostage and socially constrained, few (approximately 1/3 of the participants) were able to ignore the phone when it was the most present and when it “bothered” them or hindered their freedom of movement. A participant said “The machine annoyed me. At the end I dropped the mobile”. Another participant chose to go against the instructions and decided how to interact with the dancers on their own. They said “I wanted it to stop, I did not feel like doing it [the instructions]”. With this choice of ignoring the phone came the feeling of missing out on pieces of the puzzle, to which a participant responded with resignation that “It’s alright, I felt that I missed things on the phone. Everyone is free to take what interests them.” Among the participants who ignored the phone, some participated freely with the body (less than 5 participants at each showing) and others avoided participation (approximately 1/4 of the participants at each showing). A participant said “I wanted to watch the dancers rather than the phone”. The participants who refused to participate stood by the wall or sat on the available chairs and watched the dance. Watching the dancers without participating was considered by another participant as “a liberation and a pleasure”. Another one considered it as “discomfort, I felt like being a voyeur”. Indeed, this posture of watching without participating is the most common way of receiving contemporary dance. In the case of RCO, non partipation, although allowed, was perceived as uncanny. The participants that passively observed the dance took a posture of “voyeurs” that seemed to take pleasure in observing something private (and perhaps scandalous) that is disclosed (the dancers are in the same space as the participants), without taking the risk of getting involved.

6.2 Accommodating or reinterpreting

For each showing, we observed that only approximately 2/3 of the participants followed the instructions adjusting their behaviour to what was asked of them. According to the text instructions or the gestural interactions received, we observed the participants organize themselves collectively to carry the dancer, kiss each other, lay on the floor or shake the phone frantically. All participants that took part into the follow up discussions and that followed the instructions admitted that they always accommodated the instructions and they reflected on their obedience to it with a mixed feeling. A participant said: “I felt between fusion and resistance with technology”. Another participant wondered if they could have avoided being on the phone. They wondered if they could make other choices against what they are instructed to do: “Do I have to do what is asked of me or go against it?” At a moment during the piece, all the participants were asked to block a dancer on the floor which was considered aggressive towards the performer. One of the participants followed
the instructions until the moment when they saw this action as a moral limit to their obedience: "Until when do I accept to obey? When everyone was on top of the dancer, I was against the instruction, I left my phone."

Beyond following the instructions, we also observed that few (approximately 1/5) participants at times interpreted them and appropriated specific roles in the piece. At each showing, approximately 3 participants took the role of mediating the relationship with the phone. A participant reported "Some of us have appropriated the role of mediator and begun to show their screens to others to get the audience to participate. Although we did not ask these participants to take that role, they spontaneously did it to reinforce the instructions and make sure the scenarios were followed by all the participants. Other participants interpreted the instructions, exaggerated them or invented new ones because they wanted to interact more with the dancers. For example, one participant, when asked to collaborate with the dancers by holding their clothes when they got naked, started undressing the dancers himself. They then engaged in an improvisation with the dancers and manipulated one dancer’s head and shoulders and made another dancer dance naked with him. On multiple occurrences, we observed that participants went beyond the instructions sent to them, listening to their own personal desires to dance and to get more intimate with the dancers. For example, one participant said that the phone also facilitated creative freedom "When I entered the space with the phone, I was surprised to try creative things, it [the phone] made me want to create something". One dancer said that the participants made them change the score because they constantly reinterpreted the instructions: "I proposed something but they were attracted by the group. I had to be ready to change everything".

### 6.3 Sharing or worry

Participation was either viewed as worrisome or as creating beautiful moments of shared connexion. Indeed, a participant reflected on the moments during which they were invited by the dancers to do an action as "anxiety inducing" while another participant thought they were "beautiful moments of sharing".

Part of the anxiety was felt because when the participants interacted with the dancer, it attracted attention to them while in social settings efforts are made to avoid attracting attention as this can be interpreted as narcissistic or suspect. A participant that was targeted by a dancer reported that "When I was in the middle, my heart rate was accelerating, I thought something will happen". Some specific interactions were felt by few participants as intrusive or too intimate. Examples are when the dancers stared at or mimicked the audience members. A participant said "He [the dancer] is looking at me deeply, I say why me, there are a lot of people around me". Another participant said "There is someone we do not know [the dancer] who blows on my back, it is a sphere of intimacy that has become rare." Another participant also thought that "to stare at someone is intrusive". These shared moments of intimacy where seen by the participants as uncanny with regards to usual social norms. At times the four dancers also considered them to be oppressive. According to one female dancer "When you’re dancing it’s oppressive that the participants are all getting close to you". According to a participant this intimacy was uncanny because "I will not trust someone I do not know".

Finally some of the worry came from the technology itself. A participant said that "Technology is not neutral, it changes everything". Indeed, most participants who took part into the follow up discussion and who used their phones in RCO reflected on their dependancy to it in everyday life. A participant mentioned: "We are dependent on the phone. It’s a usual frustration that we feel daily". The idea of receiving instructions and executing them was a metaphor of mobile applications to which they feel subjugated. Participants reflected on their choice to accept, despite their disagreement, the rules of big corporations with regards to data privacy and marketing. A participant said, with a taste of regret: "I realize that with this same phone, I give my data to Google for free services, how can it not bother me?"

Although the space set in RCO felt like an unusual intimate space, we were able to observe that the progression of the piece allowed all the participants to let go of their anxieties and enter a space of collective sharing whether they used their phones or not. A participant mentioned that the progression of the piece opened physical and mental spaces: "There is a progression, little by little all the possibilities are open". Another participant mentioned the flow of the piece that progressively encouraged participation: "We get caught up in the game, it’s less and less about escaping, and more and more about staying and engaging". A participant talked about letting go of their fears and worries throughout the piece. They said "At some point of the piece, it was me who was looking for and getting closer to the dancers".

Some (approximately 1/6) participants eventually perceived the phones as a medium that facilitated participation. One participant said "The phone is a window to go into the dance for those who are not artists, to dare to touch and feel". Another participant enjoyed participating thanks to the mobile phone: "I enjoyed participating, I’m not a fan of the phone but I appreciated the instructions." Most participants who used their phones thought that the gesture-based interactions allowed them to explore: "The orientation in space allows me to explore". We observed a tipping point in which the experience of participation becomes positive and pleasurable. At that moment the RCO situation looks like a utopia where absolutely all the participants share a moment of exaltation and where they dance freely with the performers and with each other. Participants reflected on the emergence of such collective beauty, delight and wonder. A participant said "It is a very beautiful discovery, it is everything we like in the dance, to be so close to the dancers". Another one expressed "It’s a real chance to be in the middle of the dancers, a special moment". Another participant said that the piece was "dynamic, playful, sensual and warm and interactive". Moreover, a participant did not want the piece to end: "When we arrived at the end I wanted it to continue". Every participant at every showing agreed that the piece progresses positively. A participant reflected on the collective playfulness that emerges: "It’s not aggressive, it’s not awkward, we indulge in the game with the dancers". They all reported a feeling of collective enjoyment, freedom and euphoria.
What RCO reinforced was a situation of uncanny social interactions. With the dancers and with the mobile phones were seen as uncanny, with performers provoked. The results of our observations and conversations with audience members and performers during several participants also reflected on the frames that restrained them within the interactions that the participants mentioned. This correlates to the intimate and perhaps intrusive quality of the feeling of being subjected to technology in RCO. 

Thus, power is not an authority exerted on subjects, but rather a hidden private area where individuals can drop their social roles and identities. In RCO, the behaviours enforced by the interactions with the mobile phones and with performers provoked. The results of our observations and conversations with audience members and performers during several showings of RCO allow us to reflect on people’s experiences with regards to social norms and to the predominant presence of mobile technologies. These reflections are relevant to both designers and technology makers in the HCI community. They are also relevant to our collaborators and to all audience members that participated in our performance.

### 7.1 Reflecting on social norms and constraints

What RCO reinforced was a situation of uncanny social interactions. For example, participants were asked to kiss each other, to carry a dancer or lay languorously on the floor. These behaviours challenge the everyday social interactions that the sociologist Erving Goffman calls "interaction rituals" [29]. In his book *Interaction Ritual: Essays in Face to Face Behaviour*, he compared people’s behaviours in their daily lives - their rituals - to theatrical performances. These rituals generate an onstage and also a backstage. In the onstage, people construct what Goffman calls the concept of the "face". It is a sociological construct of interaction that represents a positive self-image that people create according to different social situations and that they strive to maintain. The backstage on the other hand is a hidden private area where individuals can drop their social roles and identities. In RCO, the behaviours enforced by the interactions with the dancers and with the mobile phones were seen as uncanny, scary, suspect or embarrassing. They were not coherent with participants’ projections of themselves and required them to drop their social roles and enter the backstage, private area and share it with others. This correlates to the intimate and perhaps intrusive quality of the interactions that the participants mentioned.

In parallel to reporting on the their fear to be embarrassed, participants also reflected on the frames that restrained them within predetermined everyday rituals and that prevented them from imagining other possibilities of being. This echoes Michel Foucault’s concepts on the limits drawn within society that define the frame in which one is mad or criminal or deviant [26]. A group of people laying on the floor kissing each other would be considered a group of deviants. In RCO, there is a possibility to open up progressively for a social space where deviancy -among other uncanny behaviours - is possible, while questioning why it is not elsewhere. Foucault describes the social limits that define the areas of exclusion and inclusion. In these areas, "forms of subjectivity" arise as political and historical substrates rather than as a free individual substance. Thus, power is not an authority exerted on subjects, but rather the set of forces immanent to society, which are expressed by the production of norms and values. The political problem consists for Foucault in the resulting micro-powers that invest the body and define forms of domination. These micro-powers are what prevented our participant from behaving outside of the frame of social norms and values in RCO.

By disrupting social norms through forced participation, we created a situation of critical reflection both for the participants and for us on the mundane forms of social domination. This situation revealed the norms delimiting the body which are passivity and anonymity in public space, as participation is suspect and embarrassing. The reaction to such disruption was equivocal. Participants first resisted it by conforming to their social role and maintaining their “face” then collectively let go of their “face” by embracing the trance outside of acceptable social norms.

#### 7.2 Reflecting on technological constraints

We were able to observe that the audience members responded to the exhortations made by the technology by obeying it. Some participants have gone so far as to become mediators that reinforce the phones’ instructions among fellow audience members to make sure that the scenarios were followed by recalcitrant participants. Subsequently, participants reflected critically on their obedience to a technology that directed the course of the piece. Indeed, although they could disconnect or ignore the phones, most of them (approximately 2/3) chose to stay subjected to the instructions and interactions that should (implicitly must) be followed for the piece to unfold.

The feeling of being subjected to technology in RCO echoes how smartphones has been seen as devices that frame and alienate individuals [47]. According to the Italian philosopher Georgio Agamben, the mobile devices have the ability to capture, determine, shape and control the gestures, behaviours, opinions and speeches of human beings [1]. Such an alienating relationship to the mobile phone was reported by Nicolas Nova in his field studies in which he correlated the devices’ predominant presence with the metaphor of the "leash" constantly hanging on one’s neck or the "mirror" exhorting people into a narcissistic relationship with their image through selfie culture or tracking their daily behaviours.

The feeling of being subjected to technology reveals a deep unagency in the participants’ relationship to their mobile phones. This is particularly contradictory with the piece being initially advertised as "participatory dance" and therefore expected to allow for
agency as it is the case for interactive technology [65]. This un-
agency is linked to the relationship of compulsory dependance that
the participants have toward their devices despite their resistance
to its pervasiveness. Such un-agency can also be seen in the light
of our capitalist society that is initially advertised as allowing for
choice and individual freedom but that displays rigid value sys-
tems (around for example notions of labour, gender, family, beliefs,
and consumption). The possibility of liberating oneself from these
values and from “a pervasive sense of there being no alternative
to capitalist expansion” [39] is small and at the risk of isolation
and marginalization. In his book, Capitalist Realism, Mark Fisher
highlights the pervasive quality of capitalism that affects cultural
and economical activities and general thought [25]. According to
Fisher, “Capitalist realism ... is more like a pervasive atmosphere...
acting as a kind of invisible barrier constraining thought and action.”
However, as much as RCO made visible the constraints linked to
the use of mobile phones, the audience members also reflected on
how their devices allowed them to express and enter the dance. This
echoes what Laurence Allard describes, beyond technophobic dis-
courses constructed around mobile phones’ domination and repres-
sion, as mobile phones becoming a technique of self expression[3].
She elaborates on examples of “bricolage” with everyday inventions
(in the sense of de Certeau [17]) in which mobile phones are used
for mundane forms of expression through applications for sharing
individual creative media such as Tiktok or Instagram.
RCO thus clearly exhibits these two polarities in which mobile
phones are experienced both as oppressive and expressive. Indeed,
the same technology is oppressive because it prescribes people’s
behaviours, and expressive because it provides a space for individual
and collective emancipation.

7.3 A space for alternatives
After holding the participants hostage of awkward interactions
with the dancers and the mobile phones, RCO offered alternatives
that encourage collective euphoria in the last text messages sent:
“dance as much as you can!” or “kiss whoever you want!”. We
then observed a tipping point in which all the audience members,
whether they initially interacted with the dancers or with their
phone or not, joined a collective trance. Thus, the same interactions
that mediated participation firstly oppressed and then progressed
into a liberating experience.

Moreover, we observed that throughout the piece the partic-
ipants accommodated the instructions sent to them but always
questioned their obedience to it and to what was felt as a hidden
authority that expressed itself through the mobile phones. Such
critical reflection led some participants to drop their phones and
others to re-interpreting or exaggerate the instructions, thus taking an
active stand in defining the progression of their piece and their own
role in it. Echoing Benford and Giannachi, RCO generates hybrid
relationships and roles where the participants go from being by-
standers to orchestrators, to actors, that take part into a “complexe
and multilayered user experience” [7].

Thus RCO allows participants to articulate the conditions of
social and technological domination and to make the choice to
liberate themselves from it. It’s a form of hijacking the dominant
discourse imposed by proprietary software that sees users as people
in need of help and technology as powerful and enabling, which
justifies the pervasive quality of its design. The very fact of taking
over the same means of technological domination echoes other
examples of re-appropriation in cyborg feminism, in bricolage or
in meme and mashup online cultures. According to Lev Manovich,
these amateur practices of “deep remixability” allow people to take
control on the means of producing their own content on the internet
[44]. Similarly, RCO provides a situation in which all the audience
members are allowed to take control of the piece and the interaction
with their phones. And they all do. We observed in each showing
that all the participants break free and either get rid of their phones
or liberate themselves from social norms and constraints by taking
part in a collective trance and euphoria.

In summary, RCO generates a situation mediated by dance and
and collective emancipation.

8 CONCLUSION
We reflect on observations and discussions with audience members
and performers during showings of our participatory dance piece
RCO. In RCO, the audience members interact with the performers
and with their mobile phones through a set of instructions and
gesture-based interactions. We investigated how these instructions
and interactions with mobile phones prompted people to take part
in the dance. We showed that the participants went from obeying
and feeling hostage of the instruction and interactions into
re-interpreting and re-appropriating them. We reflected on our
findings using concepts related to the social norms and technolo-
gical constraints. We also reflected on how participants hijacked
these norms and constraints by taking over the artwork and by
entering a state of collective euphoria.

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