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## Stabilizing and Destabilizing Agents in Laptop Orchestra Improvisation

### Agents stabilisateurs et déstabilisateurs dans l'improvisation en orchestre d'ordinateurs portatifs

Eldad Tsabary

Apprentissage et enseignement de la musique au 21<sup>e</sup> siècle : l'apport des sciences et des technologies

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#### Article abstract

The purpose of this study is to explore effective strategies for successful collective improvisation in laptop orchestras. Collective music-making requires listening to and interacting with others in order to create a cohesive performance. However, musical expression also involves a sense of agency (Maus 1991; Levinson 2004), which may be perceived most prominently when individuals take temporary creative leadership roles and intentionally destabilize the sense of cohesion, either to rejuvenate it or to catalyze change. In my experience teaching and directing the Concordia Laptop Orchestra (CLOrk), I have observed that orchestra members learn to be attentive to stabilization and cohesion and to apply those concepts to their music-making relatively quickly, but that they have more difficulty learning and applying destabilization and catalysis techniques. Through interviews and questionnaires with CLOrk members, I have learned that the obstacles to taking destabilizing actions while improvising may be technical (primarily monitoring challenges), personal (ego depletion and attentional limits), and/or social (risks of peer rejection, exclusion, and shame). CLOrk members proposed strategies to address these challenges, including (1) arranging the orchestra in subgroups to improve audio monitoring coherence and to reduce attentional load and (2) communicating regularly about all relevant matters, including emotional and social obstacles in order to promote a mindful environment of sharing and a safe space for trial and error in the creative process.

## Stabilizing and Destabilizing Agents in Laptop Orchestra Improvisation

Eldad Tsabary  
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Collective improvisation is a risky business. Improvising with others brings our real-time inner processes to light, allowing us very little opportunity for error correction, and leaves us feeling exposed and vulnerable. Improvisation can be raw and quick, and our mistakes may remain forever in the memory of our collaborators and audiences, or in performance documentation. We may perceive these mistakes as sources of shame and insecurity. Yet we embrace the risks of improvisation because of their exhilarating nature and potential benefits. Improvising collectively allows us to connect with others in creating and learning together, and by potentially sharing the sense of risk as well as the joy of successful interactions. Improvisation can bring us to a state of *flow* in which our interaction with our surroundings feels natural, immediate, connected, and enjoyable (Csikszentmihalyi 1990). Moreover, improvisation can catalyze our artistic evolution (Neeman 2014; Tsabary 2017) as we explore new domains of expression and experiment with new technologies, instruments, and musical settings.

Effective collective music-making requires attention to cohesion: listening to others and interacting with them in order to create a performance with a form that, “like a natural being [...] has a character of organic unity [and] self-sufficiency” (Langer 1966, 7). Musical expression also involves agency<sup>1</sup> (Maus 1991; Levinson 2004), which may be perceived most prominently when individuals take momentary creative leadership roles in which they act to destabilize the sense of cohesion, either to rejuvenate it or to catalyze change.

I have taught the Concordia University Laptop Orchestra (CLOrk) since 2011, in which most of the music making is improvisatory. I have observed that orchestra members

learn to be attentive to stabilization and cohesion relatively quickly, and to apply those concepts to their music-making, but that they have more difficulty learning effective destabilization and catalysis. For instance, during the improvisatory performance *Dancing with Laptops*<sup>2</sup>, by CLOrk and Le Collab’Art de Stéphan B dance collective, the orchestra followed and responded to the dancers’ movements. At one point, the improvisation became stuck in a slow beat-based loop and the tempo remained static, despite the dancers’ effort to increase the performance’s energy by accelerating the pace of their body movements (see 23:50-26:37 in the video documentation). When this was unsuccessful, dancer Émilie Morin resorted to a more radical bid for change: screaming. The orchestra eventually responded, somewhat reluctantly, with a buildup of intensity. This was a risky gesture by Morin but it did succeed in releasing the improvisation from stagnation. After the show, she stated, “I didn’t believe I was doing that, but I had to continue what I started” (Morin, verbal communication, 30 January 2014). In rehearsals for a separate collaborative improvised performance<sup>3</sup>, CLOrk collaborator Tim Brady also noted the shortage of destabilizing agency. He felt that “listening and togetherness among orchestra members were good, but [that] individual expression and climax were insufficient” (Brady, verbal communication, 6 February 2014). He expressed a need for “more drama and bigger dynamic changes.”

The source of this problem is understandable. Imitative response, complementarity, and allowing space for others are clear stabilizing tasks that all of the collective’s members may be invited to undertake simultaneously. These tasks are shareable by all and lead to a sense of improvisational cohesiveness. Catalysis, however, requires individual action and the collective must support this action in order to

<sup>1</sup> In sociological theory, *agency* relates to the causality between the micro level of actions by individual “agents” and the macrostructure of society (Cosío 1998).

<sup>2</sup> *Dancing With Laptops: Concordia Laptop Orchestra (CLOrk) and Collab’Art de Stéphan B (Montreal 2014)*—YouTube, <https://www.youtube.com/watch?v=IOIzk6Rr14k>, accessed 11 August 2017. Performance held on 30 January 2014 at Concordia University, Montreal.

<sup>3</sup> *CLOrk improvising with CCE, Bradyworks, Doug Van Nort, and Ricardo Dal Farra*—YouTube, <https://www.youtube.com/watch?v=tziLNM-ugBQ>, accessed 11 August 2017. Performance held on 13 February 2014 at Concordia University, Montreal.

realize its power. Multiple simultaneous catalysts diminish precision and dramatic impact because they may cause members of the collective to react indecisively. Catalysis therefore requires addressing additional questions: who will be the destabilizing agent? Will the collective follow and support that agent? When is action called for? To what end? The risk of acting against the collective, or without its support, may feel considerable to improvisers because it exposes them to the possibility of public rejection. Taking this risk is associated with the heavy responsibility of leading the collective improvisation somewhere “better,” which could fail. Within a group setting it is easier to respond than to initiate; easier to hide in the collective than to stand out; and easier to follow, or even to stop playing altogether, than it is to make oneself vulnerable to failure, rejection, exposure, or social exclusion.

The dichotomy of stabilization and catalysis is admittedly rather simplistic. These terms are useful not in indicating an absolute truth, but rather in elucidating individual improvisers’ perceptions. These perceptions guide their performance decisions: at any given moment, improvisers have the binary choice between a stabilizing action and a destabilizing action (or no action, which could be either stabilizing or destabilizing). In my experience with CLOrk, a stabilizing intent feels safer and more attractive to improvisers, whereas the risk involved in catalyzing change or high attentional impact makes them reluctant to take it. I have discussed strategies for encouraging leadership through catalysis and risk-taking in collective improvisation with CLOrk students via interviews and anonymous questionnaires. This article reports the results of this investigation. I begin with a brief background of CLOrk and a description of the context in which this study took place.

## Background

Concordia Laptop Orchestra is a large electroacoustic ensemble of about 25 advanced undergraduate students of electroacoustic studies at Concordia University. The group meets primarily in the framework of a university course in the winter semester, though occasionally performances take place in the fall. Most students are members of CLOrk for only a short length of time, most commonly three to six months. As a result, the group builds new bonds and finds a new voice every year.

CLOrk has performed in dozens of shows of various formats and scopes, most often in collaboration with other artists and ensembles, usually in interdisciplinary settings. Its main performance space—the electroacoustic classroom at Concordia University—is small and intimate and can

hold approximately 30 audience members. On occasion, CLOrk has performed telematically with remote artists for audiences in North America, Europe, and Asia. Most performances are highly improvisatory and experimental and are suitable for small non-mainstream audiences. CLOrk has also occasionally given higher profile performances at larger venues (e.g. Ariane Moffatt & CLOrk at Musée d’art contemporain de Montréal, 30 September 2016<sup>4</sup>).

Despite being very active artistically, CLOrk’s primary *raison d’être* has always been its educational mandate (Tsabary 2014). CLOrk seeks to develop students’ live electronic performance skills (including artistic, technical, and people skills); but artistic merit remains an important gauge for its educational success. CLOrk’s experimental nature is designed to push performers beyond their comfort zones and to encourage them to ask important questions about effective music making, improvisation, and technological solutions to the emerging artistic needs.

CLOrk provides an interesting and valuable context for studying “improvisatory collectiveness” (the sense of cohesion of the improvising group), catalysis, and risk for several reasons. First, the fact that it is made up of mostly new members every year allows for revalidating the effectiveness of emergent improvisatory techniques repeatedly over multiple years. Secondly, the dynamic and innovative nature of laptop orchestra practice requires constant evaluative attention to the creative process and its necessary technology. Thirdly, the unspecific nature of the laptop instrument forces imagination and flexibility of thought regarding its use in various situations. Performing on a laptop requires that the musicians make creative pre-arrangements and decide which sounds, parameters, and processes to have available and how to control them. The laptop instrument can also be used to control others’ sounds as an autonomous agent or network device. While this versatility opens up new modes of improvisation, it also means that sound production on the laptop is not as immediate or natural as on an acoustic instrument—you cannot bang it or strum it. The laptop actively engages the player’s logical thought during performance but less so the player’s body.

## The laptop instrument and musical expression

In acoustic music, performers utilize rhythm, dynamics, register, tone, texture, agogic stresses, tempo, rate, and other parameters to express certain moods and emotions. Many researchers (e.g. Jaques-Dalcroze 1921; Papousek 1996; Repp 1993; Sloboda 1996) link musical expression to the human body, primarily to physical gestures, facial

<sup>4</sup> Ariane Moffatt with Concordia Laptop Orchestra: CLOrk 22h22 (complete show)—YouTube, [https://www.youtube.com/watch?v=DqW\\_UWcOPs8](https://www.youtube.com/watch?v=DqW_UWcOPs8), accessed 11 August 2017. Performance held on 30 September 2016 at the Musée d’art contemporain, Montreal.

expressions, and speech, all of which are physically connected to sound generation and transformation on acoustic instruments. Musicians and conductors also use physical gestures and facial expressions to enhance and communicate their musical expression to audiences and other performers during performances (Davidson 1993; Spitzer et al. 2001).

Expressivity on the laptop instrument does not work in this way because the connection between physical gesture and sound generation/transformation is indirect. The laptop instrument utilizes a user interface that, typically, includes a keyboard, a trackpad, and pre-programmed sensors and gestural controllers. With these input mechanisms, the user generates sounds (pre-recorded or synthesized) and transforms pre-assigned, predefined parameters. Therefore the body language of laptop performance typically involves sitting, thinking, typing, moving fingers on a trackpad, and occasionally more elaborate (but still indirect) gestural motions. Often, laptop orchestra directors request players to dramatize their motion (Ogborn 2014; Hwang 2012), for example by raising a hand high before hitting a key. While these gestures are useful theatrically and as a means of communication, their virtual nature is transparent—the audience knows that pressing an enter key is not affected by a large hand gesture. This indirectness limits the immediacy, naturalness, and communication value of improvisatory response among the players and audience, which may reduce the confidence of performers to take improvisatory risks, as will later be shown in interview responses.

While acoustic instruments have the advantage of connection and immediacy, the laptop instrument is more versatile and flexible. Its programmability demands preparation time, but this also means that the instrument can change radically in function and capabilities, sometimes even within a single performance. It is an open-ended meta-instrument (Tanaka 2009) on which other instruments can be designed (McCarty 1975; De Laubier 1998). Open-ended instruments are often created specifically for a single musical work and therefore blur the defining lines between instrument design and composition (Tanaka 2009). The laptop orchestra can therefore change its nature much more radically than an acoustic orchestra, which consequently invites more innovation (with the cost of increased uncertainty).

## Research context and method

Since 2013, investigating improvisatory collectiveness and risk taking in CLOrk has unfolded in the context of an educational research-creation project titled *The Interdisciplinary, Telematic, Networked, Laptop Orchestra Project* (INTLOP). This research involves cycles of action, observation, group discussion, critical reflection, and

adjustments agreed upon by the group, which lead back to more action, observation, and so on, *ad infinitum*—as is common in *action research*, a method originally proposed by Kurt Lewin (1947, 143). It is a democratic research process that involves the researcher and participants as stakeholders in a shared, evolving environment and demands attention and engagement from everyone. The accumulating observational data of this research includes all of CLOrk's creative and educational activities: communications, ongoing questionnaires, surveys, and discussions. Studying improvisation as a mix of creative, internal (perceptual, emotional), and external (social) processes has the underlying objective of understanding how these processes are learned and how they help the learning of other skills.

The participants of the current study are 25 CLOrk students from a single academic term (the length of the course), four of whom were taking it for the second time. They are undergraduate music students majoring in electroacoustic studies at Concordia University and are in their second year or higher. They have acquired fairly advanced theoretical, aural, technical, and compositional skills in computer music and sound production. All qualitative data for the current study were collected from four anonymous online questionnaires throughout the semester and extensive interviews with nine CLOrk students at the conclusion of the course, followed by participant feedback. The questionnaires and interviews included questions about improvisatory collectiveness, destabilizing agency and risk-taking. Students were asked to propose strategies for maintaining cohesion and for encouraging risk-taking by individuals. The questionnaires were short and typically included 2 to 4 open-ended questions. The interviews were extensive and detailed, and were followed with further questions, clarifications, and responses. Data were reduced manually on a MS Word document and then organized in a MS Excel spreadsheet. All the interviews and questionnaire responses were reduced to 621 representative codes (458 from interviews and 163 from anonymous questionnaires) based on grounded theory principles (Charmaz 2006). In the findings below, I cite items from the data with consistent random numbers, so that all comments from a single interviewee are identifiable as such (i.e., student 9 is always the same person). Data from the anonymous questionnaire are cited in an Anon X format, where X remains consistent for the same person in the same questionnaire.

## Collectiveness

Collectiveness—the sense of oneness in the ensemble—is a natural expectation for a large ensemble such as CLOrk. Why go to the trouble (logistical, managerial, social, emotional, artistic, etc.) of putting together a group of 25 performers,



if not in order to create a coherent ensemble identity? As Dan Trueman, cofounder of Princeton Laptop Orchestra, notes, “One of the most exciting possibilities afforded by the laptop orchestra is its inherent dependence on people making music together in the same space” (Trueman 2007, 177). This is particularly meaningful in the context of electroacoustic music, which for decades has been produced primarily by composers working in solitude in the studio. Making music together with laptops enables new ways of interacting and produces novel creations.

What makes an orchestra a single cohesive entity? This is a complex, multilayered question, particularly in a situation such as CLOrk’s, where the membership changes every cycle, allowing a very short temporal window for group bonding. Scholarship on common traits of art collectives offers some answers, namely 1) ambiguity regarding authorship; 2) a perceived collective identity, or “nouvelle personnalité artistique supra-individuelle,” as described by Caroline Soyez-Petithomme (2011, 32) (i.e., performances are credited to CLOrk rather than to named individuals); and usually 3) a democratic creative process that allows all members to contribute equally (this may remain invisible to the audience) (Soyez-Petithomme 2011, 32). These traits are indeed characteristic of CLOrk, but they are not sufficient to define a collective *sound*.

Asking CLOrk members to elaborate freely on those elements that created a sense of collectiveness for them in the orchestra yielded multifaceted responses, though usually with a strong focus on improvisatory collective *sound*. As Student 3 stated:

CLOrk really opened up my eyes to this idea of collective consciousness, which has always been super interesting to me on a non-musical level, but seeing how this idea works with music really blew me away. The idea that one small action can affect everyone else is very interesting to me. Almost like a spider web of ideas working together to stay one.

Many students agreed that maintaining a perceived unity amidst a multiplicity of actors was a central aspect of collectiveness in the ensemble, though they had diverse views about how this unity is achieved. They described the orchestra’s overall sound as a kind of living entity: “You don’t think individually anymore, you become careful of the surroundings and contribute to the breathing sound environment” (Student 8).

In practical terms, “To have a collective improvisation is a matter of continuous practice and communication. The group needs to find a balance [...] like a newborn baby [learning to walk]” (Student 1). Maintaining collectiveness demands “communicating and working toward the goal of creating a more bonded community” (Student 5). It is a process that needs

time to unfold. “For laptop players to come together there needs to be a lot of rehearsal time” (Student 9), “learn[ing] through playing, each time understanding their role in the group more clearly [...] learning to move as one by playing more and more together” (Student 2). Becoming more “one” is an interactive process, where “the created sounds are the result of the interaction between the performers” (Student 4). “The more interaction there is, the closer we are as a group and the more comfortable everyone is together in regards to sharing ideas, improving upon methods, and adapting technologies” (Student 5). According to Student 8, “that ‘living being’ [...] is the result of a group of naive performers forever changing and adapting [to the] environment.”

Ambiguity regarding ownership, a perceived unity, a democratic creative process, communication, working towards a shared goal, interactivity, constantly adapting to the environment, and sufficient time are all elements that support collectiveness beyond specificity to the laptop orchestra or even to music-making. However, the laptop orchestra context has its unique challenges, advantages, and benefits. For example, the performers’ naiveté to which Student 8 referred points to the novelty of the ensemble experience and stage settings for most electroacoustic music students, who are typically more comfortable in the studio. In order to maintain improvisational collectiveness, they need to convert their non-real-time studio skills into performance skills at a level of aural, creative, and technical fluency that allows for real-time interactivity. They need to divide their attentional resources efficiently between their music perception and compositional mind, and their technical operational and troubleshooting mind. Additionally, their computer screens take much of their visual focus, making eye contact quite rare among the players and requiring the performers to alter existing visual habits and find new ways of maintaining a connection with others.

The desired unified sound also depends on interpersonal relationships and mutual support. “Knowing your collaborators, and having developed a musical relationship with them” builds and strengthens the sense of collectiveness (Student 6). Student 2 maintains that “in the group dynamic it may be important for the musical tastes of each member to be known [for creating] stronger, more interesting performances.” Student 1 believes that improvisation is an excellent tool for the group to “understand how to help each other when projects [do] not go as planned.”

Based on these descriptions, collectiveness could be described as a synergetic life force that breathes and evolves through the interaction of its constituent parts. It is complex and multilayered, and contains diverse—and sometimes conflicting—approaches. “Players are focusing on a common goal, but each can decide how to reach this goal through

creative choices” (Student 2). This synergistic nature means that collectiveness is simultaneously multiple and singular, and its balance is in constant flux amidst conflicting judgments, perceptions, goals, proposed solutions, and more. For instance, Student 5 felt that a performance of a game composition by Jeremie Jones<sup>5</sup> “required certain methods that were unclear, so preparation was hard and therefore the group felt like an uneasy collective when it came to performing.” In contrast, Student 7 described the same performance as a successful example of an “involved and structured piece [where] everyone had to keep track of their part and respond to the live score.” In Student 7’s view, “getting the students to stand up, be goofy and yell was effective [...] when the ice gets broken you set everyone free.” In this instance, not only did the orchestra members’ perceptions regarding the effectiveness of methods and pieces differ, but the students also interpreted the overall group response and mood differently.

There are also opposing views in the group regarding the nature of collective improvisation and whether it should be free or restrictive. Student 5 asserted, “Improvisation is great, however I feel like it needs to be with direction. In other words, having general guidelines of what we’re going for.” Similarly, Student 4 stated, “Collective improvisation can be achieved by having a set of guidelines that give a different role for each performer.” However, Student 8 believes that “it wouldn’t feel natural to be distracted by more boundaries. The lack of boundaries and freedom is what makes the performance during improvisation good and effective.” This view is supported by Student 6’s statement that “the best improvised passages occurred during rehearsals [...] when people would feel freer to jam.” These views are not necessarily in opposition, however, as collective improvisation may be completely free and aimed at breaking away from old patterns, or restrictive and designed to establish new skills or new compositions (Tsabary 2017). The beauty of collectiveness is that seemingly conflicting ideas can be integrated into wider intelligent networks designed to contain them and produce a shared, complex end result. This complex unity is made from multiple forces and is achieved and maintained through open and accepting communication, and active listening and adjustment.

## Leadership, Catalysis, and Risk

Collectiveness is not all that is needed for music making, however. Music also requires surprise, adventure, destabilization, and catalyses for change. In the CLOrk

course, students are required to take a leadership role as part of the course’s grading scheme. This leadership role can include composing, conducting, directing a subset of the orchestra, taking an extended solo, building/programming an instrument that others can use, or even taking responsibility for promoting a concert. All of these tasks require that the student choose a course of action that will have a positive effect on the entire collective and see it through to completion.

Leadership during collective improvisations may be defined as an individual action that affects the entire group in a positive manner. Students are asked to act individually to destabilize cohesion, initiate change when they deem it sonically necessary, lead the orchestra to a musical climax, or introduce a new musical idea or pace. Leadership in this instance manifests through producing or modifying the (musical) direction of the collective. According to Lucia Crevani, the production and modification of a collective’s direction, is “a central aspect of leadership [that] is seldom spelt out in definitions of leadership” (2015, 6).

Such catalysis involves risk—primarily the risk of not being followed by the collective or of leading it to an unsuccessful end. Failing as a leader is risky because it is preceded by an increased level of attention and expectation. Additionally, destabilizing agency is a risky act because its musical success often depends on the behaviour of others, which is unpredictable. However, these direction changes are crucial for the success of collective improvisation. Without them, transformations are slow at best and improvisations tend to fade into predictability and disconnection. In democratic settings it is difficult to determine who should take these risks and when, and it is possible that the other musicians will not follow a destabilizing action. As an analogy, imagine trying to lead a democratic hockey team in which all players are free to choose an individual game plan in real time. Following any game plan through to its end is unlikely. Nonetheless, in the case of a laptop orchestra, which has an educational mandate, this type of challenge helps students learn about the nature of leadership and about democratic human interaction.

Many of the participating students agreed that destabilizing agency is necessary in laptop orchestra music making to get out of “moments [when] things get really placid” (Anon 2),<sup>6</sup> “to help the piece move or mature” (Student 1); “for musical impact and direction” (Student 5); for “quickly getting interesting results” (Student 2);

<sup>5</sup> *Concordia Laptop Orchestra (CLOrk): A Game Composition by Jeremie Jones (2016)*—YouTube, <https://www.youtube.com/watch?v=9fdOelbfrLs>, accessed 12 February 2018. Performance held on 24 March 2016 at Concordia University, Montreal.

<sup>6</sup> The designation Anon X is for data from anonymous questionnaires, which cannot carry a student’s identity from one questionnaire to the next. Codes from non-anonymous interviews are designated “Student X” remaining consistent per student throughout the interviews and participant feedback, while maintaining confidentiality.

and “for exploration of a medium, and for development of personal skills” (Anon 3).

Individual destabilizing agency, however, appears to be quite difficult to achieve in CLOrk’s improvised performances. In their interviews and questionnaires, students listed various challenges that prevented them from attempting to make an impactful gesture or lead the orchestra to a climax or in a new direction. These challenges are sometimes complex and encompass both *internal* (emotional, intellectual, attentional, skill-based) and *external* (social, interactional, technical) aspects of the performers’ experiences. They are listed below along with solutions proposed by the students. Among these challenges, signal monitoring, the nature of the laptop instrument, and depleted attentional resources are specific to a laptop orchestra setting. The listed social and emotional challenges are relevant to collective improvisation at large.

### Signal Monitoring

The technical challenge of signal monitoring appeared very frequently in students’ responses. Overwhelming loudness and monitoring issues often prevented the performers from making impactful contributions to the improvised performance because they could not hear themselves and others very well. As Student 6 explained, “In many cases, due to having a limited number of sound sources, and a variable position to each one, as well as no control over the loudness of each other, it was easy to feel overpowered, not hearing your impact in the mix.” Student 1 added, “Without the capability of hearing everything that was going on, I didn’t know if there needed to be a part of myself taking a leadership role.” In another response, a student described the primary obstacle to taking a leadership role as “not being able to hear how present I was with the overall sound. Was I doing too much or too little?” (Anon 4). Monitoring issues are therefore an underlying problem in overall orchestra communication, sometimes drowning the performers in sound and making it difficult to decide when an impactful agency is necessary or even to gauge whether it is at all possible. Students suggested some workarounds that could improve the situation, including: following the instructions of a conductor, who is in a position to hear the overall balance, as to when to take leadership roles (Student 1); arranging the orchestra in functional subgroups in order to give students a more accurate perception of the overall sound and a better understanding of its constituent parts (Students 2; 8; 9); and assigning individual roles based on spectral registers (Student 1). These potential solutions, however, are all non-real-time, non-improvisatory pre-arrangements.

### The Laptop Instrument

Another technical matter students raised is in the non-acoustic nature of the laptop instrument. As Student 2 explained, “traditional instruments are almost another part of the body for experienced players, but laptops, audio software, plugins, and effects provide a lot of steps to make in order to achieve a desired sound. The intent may be immediate, but the actual response is slow-going.” Student 6 added, “It’s not so obvious to know your instrument. A lot of mental energy has to go into the creation of the sound, figuring out what to play.” Several students addressed this problem by recommending better preparation prior to performances.

The laptop instrument can also be distracting due to its other functionalities. “When you have a laptop right in front of you, it’s really easy to decide to tune out for a while and click around on the Internet” (Student 7). The loss of interest in the performance probably goes beyond the nature of the instrument to personal or social matters, as will be discussed later.

Laptop performers’ body language is also different from that of acoustic musicians. Jazz improvisers often communicate with body language; in the case of laptop performers, however, “we can’t really demonstrate the energy through our facial expression and movement but it will be felt with the sound, visuals and lights resonating and diffusing in the room” (Student 8). Why is it that laptop performers’ body language is so minimal? Perhaps as a result of the high degree of mental engagement, and the minimal physical engagement, required in laptop performance. It may also be a result of the relative newness of laptop performance and the lack of conventional habits regarding stage behaviour. Either way, this minimal use of body language limits connections between players, and between orchestra and audience. It may be addressed by making a conscious choice to engage the body with artificial gestures, as is sometimes done in laptop orchestras (Ogborn 2014; Hwang 2012). Another common solution is to compensate for the lack of body language with on-screen chat communications (Freeman and Van Troyer 2011; Ogborn 2012; Tsabary 2017), a mode of communication that is very familiar to us in today’s society, especially via mobile devices. Indeed, many CLOrk students praised chat as a means of making connections during collective improvisation: “[The] use of the cellphone chat was hugely successful and acted as the invisible baton of the conductor” (Student 2); “it was a very effective [means] for guiding performances in a live setting by connecting many people” (Student 6); “[Chat] helped us greatly to direct each other, or initiate endings/beginnings of pieces, or saying something was lacking in the piece” (Student 1); and “Using the chat to



tell people to suddenly take risks really seemed to work in my mind!” (Anon 2). Using chat for communications during performances creatively turns an apparent disadvantage—the need for performers to keep their eyes on their screens—into the advantage of increased flexibility and detail in musical, technical, and organizational communications. It allows performers to make complex democratic decisions on the fly during rehearsals and performances, thus accelerating the integrative, hybrid creation process. It can also be used to “render musical thinking visible to the audience by projecting the text as it is written” (Freeman and Van Troyer 2011, 8).

## Attentional Resources

Playing, or “operating,” a laptop instrument while listening and responding to others in the laptop orchestra demands a high attentional load that often leaves the performers without sufficient resources to contribute further. In interview and questionnaire responses, students noted that the multitasking required of them during performances limited their ability to connect with the performance environment and take risks. For example, Student 2 noted, “the individual must be able to focus on both his/her own contribution and the sounds happening around them simultaneously. I think the issue in the laptop orchestra is that it takes time and practice to hone this skill.” It is “hard to listen while also balancing personal sounds and following hand signals” (Anon 20). Student 1 confessed, “Sometimes I was too fixated on what was going on with my controllers and sounds that I couldn’t pay attention.”

Attentional resources are limited and need to be managed economically for best results. The term “pay attention” offers an appropriate analogy for describing the nature of our attentional resources. “You dispose of a limited budget of attention that you can allocate to activities, and if you try to go beyond your budget, you will fail” (Kahneman 2011, 23). When students use up all of their attentional resources, a state called *ego depletion* (*ibid.*, 42), they have none left for making decisions, especially significant ones such as taking a risk and leading a change or a climax in the orchestra. Given that attentional resources are finite, one logical solution for ego depletion is improved attentional management. This might be achieved by reducing the attentional load of tasks—through practice and instrument skill development—or by reducing the number of tasks altogether. The latter could be achieved by arranging the orchestra into subgroups and assigning clearer functional roles: “Sometimes if members form groups within the orchestra this can lead to a focus on details not heard in the larger group setting,” proposed Student 2.

CLOrk has used subgroup arrangements successfully in some performances, as have other laptop orchestras (Toop 2008; Dannenberg and Neuendorffer 2014). However, subdivision of the orchestra can have a negative effect on overall collective bonding, as indicated by students’ negative comments regarding other groups in CLOrk’s performance with Cybernetic Orchestra at MusicAcoustica festival in Beijing, held on 22 October 2013 (Tsabary and Woollard 2014).

Student 5 recommended treating laptop orchestra performances similarly to TV and film productions, i.e., “formulating a full team production, with performers, conductors, collaborators, instructors, and recording [allowing] everyone a chance to develop and learn different areas of the creation [in order to] improve efficiency of understanding the direction, and respecting time limits as needed.” In general, however, actions designed to allow and encourage more agency must also address the limits of attention.

## Social and Emotional Processes

Additional obstacles to risk taking that students described included 1) emotional conditions such as shyness, timidity, lack of confidence, disinterest, impatience, or fear of isolation; 2) social aspects such as criticism of others, diversity of opinions, or a lack of bonding with others; and 3) interactions therewith. As CLOrk’s director and teacher, I aim to create a safe space for experimenting, taking risks, making mistakes, and adjusting, but this is easier said than done. Student 2 noted that “players are a bit timid or shy during the performances [causing] an ‘over-subtleness.’” Standing out unintentionally as a result of making a mistake may lead to feelings of shame: “it would be shameful to be doing an unexpected solo because a volume fader wasn’t correctly assigned” (Student 8). Student 6 explained that “creating the safest space possible for error during rehearsals” would encourage more risk-taking. This student may have found this safety in the anonymity of CLOrk’s sound; while playing, musicians may choose to hide in the orchestra’s dense sound, given that every loudspeaker typically serves several players. This “allowed for more margins [of error] to work with as one feared less the embarrassment of being singled out as an idiot, especially during a performance.”

As students and young composers seeking to lay the foundations of their future careers, CLOrk members are eager to establish a personal artistic voice “with their own vocabulary and place within the public and amongst their peers [...] thus, there is an anxiety to do/be a great thing now” (Student 7). This may cause a kind of anxiety, or an unfulfilled desire for personal expression, that results in a certain level of impatience. Student 7 proposed discussing

this anxiety openly among the orchestra members and encouraging participants to see past this anxiety to the potential benefits of collaborative creation and the associated opportunities for personal growth. This solution involves a mindful approach to learning, with the intention “to help the individual perceive reality more clearly; enabling students to understand themselves and others better and enjoy a more fulfilling and joyful life” (Albrecht, Albrecht, and Cohen 2012, 3). In the process of “talking about it,” students can observe their emotional obstacles with sobriety and allow themselves to put them under the scrutiny of critical thought.

In some cases, the lack of individual agency and initiative resulted from a generalized sense of disconnection among the performers. This may have been the product of varied and complex triggers. As Student 2 noted, “Sometimes it felt like we, as a group, didn’t have a clue as to what the intention of the piece should be.” In such instances, the performance had a “lack of direction [...] in regards to its macro-structure. Although there was a broad range of sounds, the players were not able to understand when to come in, when to stop, when to change to something new. There was a standstill pace” (Anon 24). Such moments are perhaps inevitable in free collective improvisations due to the lack of guidelines. Honest and critical communication is key to moving forward, away from stagnation, and trying something new. In a large ensemble, however, problems and criticism must be communicated with care or they may provoke defensiveness and tension. As Student 2 pointed out, “I think that in general there could be more ‘constructive criticism’ from both the teacher and students... Then again, this sounds like I want people to be harsher to each other, and maybe that’s not the best approach.” Student 7 was of a similar opinion: “I think there could be strategies to get students to focus a bit better during class in a positive encouragement way. Then again, sometimes firmness works.” Both statements invite prudent, constructive criticism while recognizing that careless criticism holds the potential to damage the sense of group connection. This kind of subtlety and sensitivity may help manage the complexity of human internal and external processes in a collective context.

## Discussion

I have discussed improvisatory cohesion and destabilizing agency as distinct elements in collective improvisation. In reality, however, this distinction is not clear-cut. Improvisers may strategize towards stability or instability as individuals, but catalysis is required to keep the collective moving forward and to prevent it from dismantling due to stagnation. In other words, while too much destabilization may hurt the unity of the collective, too little may do so as well. When the frequency of destabilizing agency is apt, the collective

maintains a balance between connection and forward motion. The vitality and integrity of the collective sound depend on maintaining a dynamic connection in which the performers manage forward movement collaboratively. While motion never stops at the acoustic-temporal level (sound results from pressure vibrations in time and time never stops), at the music-perception level we may feel that music stops when it becomes repetitive or directionless—essentially, when it ceases to surprise us. In such cases, the collective connection is no longer dynamic, it does not move forward anymore, and, like a bicycle that comes to a standstill, it collapses. To further this metaphor: listening and responding to others in order to maintain cohesion during improvisation is like maintaining one’s balance on a bicycle. Catalysis is like steering and managing speed. All three elements—balance, steering, and speed management—are crucial to successfully riding a bicycle.

Music, like most narratives, thrives on the balance between stability and instability (Toop 2008; Early 2012). Student 8 described improvisatory risk takers as “doers” or “initiators.” He explained, “The doer will be there to shake things a little and propose a dangerous situation that could enhance the experience of the piece. Too much risks [...] will result in failure in terms of sense of direction. This is why being an initiator is not simple but necessary.”

The challenge of taking improvisatory risks within a collective is a complex human riddle that provides participants with an opportunity to learn, to understand more deeply their own drives and challenges, to build stronger connections and develop people skills, and to innovate and create. Investigating this riddle offers a chance to build a deep and honest musical and group bond that includes awareness of the dynamics between group and individual, between safety and adventure, and between internal and external processes. It propagates educational growth.

As previously mentioned, aiming towards a cohesive improvisatory sound in CLOrk has been easier than encouraging individual destabilizing agency, because the former is safer and poses less questions (i.e., who will lead the destabilizing action, and when). Aiming towards a cohesive sound may be justified as, or mistaken for, a more selfless act than taking the lead. In my view, however, it is exactly the opposite. Being a doer is the more selfless act because it involves risking rejection, exposure, and failure for the benefit of the collective, and for little potential individual gain, rather than choosing to maintain anonymity and safety in support of collective cohesion, regardless of the collective’s musical needs.

How can we encourage this selfless risk taking in light of monitoring problems, ego depletion, and emotional and social obstacles? With awareness. The obstacles need to

be brought to the group's attention so that members can communicate and explore how these obstacles affect the improvisatory creative process. Democratic action research involves all stakeholders in observing emerging issues, in contemplating causes and effects, and in designing actions to transform the studied process (Pine 2009; Mills 2010). There is no simple solution to this complex problem; and when obstacles are multifaceted, as they typically are in collectives, the group must address them together in a balanced, mindful, sensitive, and respectful manner. Sharing individual fears and concerns with the collective involves some risks, but it may strengthen the bond among members and lead participants to understand that they are not alone, that others hold similar fears, that the collective is an emotionally safe environment, and where mistakes are allowed.

Allowing mistakes is not a form of compromise, but rather a strategy for inviting innovation. Mistakes are like genetic mutations that lead towards the potential evolution of the ensemble's improvisatory sound (Tsabary 2017). In improvisation communities, mistakes are viewed as necessary "points of creative departure" (Barrett 1998, 611)—they make improvisations better. As Mike Zwerin writes, "If there are no mistakes it's a mistake" (1983, 33). Considering that mistakes are expected, accepted, and even invited, the term "mistake" may seem questionable in improvisatory contexts: How can it be a mistake if we invite it? In the present context, mistakes may be viewed simply as unintentional products (e.g. sounds, transformations, asynchronies, etc.), regardless of whether or not they are heard as "wrong." Mistakes have the (undesired) potential to make players reluctant to take risks but also the (desired) potential to drive newness.

## Conclusion

Many educational benefits to laptop orchestra participation can be found. The innovation-driven, improvisatory collective setup provides opportunities for students to develop their technical fluency and creativity, and to acquire the requisite knowledge and people skills for working in a group setting towards a creative goal. As students attested: "A laptop orchestra is great for improving sound design skills, live performance skills, collaborative and multidisciplinary work and individual attentiveness" (Student 8); "Performing in a laptop orchestra is not just entertainment, it's about learning how to use your mind properly, therefore the mastery of this is related potentially to all humans" (Student 4); "Because laptop orchestra is about teamwork, it helps students learn how to interact with each other in positive ways, which will prepare them for professional environments" (Student 7).

Collective improvisation is the platform on which this learning becomes the most apparent. It provides an immediate gauge for success through sound and musical movement. Over the years, CLOrk's performances of collective improvisations have achieved cohesive sound with effective listening and respectful interactive responsiveness, even with limited practice time. However, encouraging individuals to make bold, impactful musical gestures in order to drive the collective sound to a climax or in a new direction has been more challenging. As noted in comments by CLOrk's students, the main obstacles to destabilizing agency are:

- 1) technical: primarily ineffective monitoring and trouble in hearing oneself and others;
- 2) ego depletion: the laptop instrument requires thought and preparation, and "operating" it while listening to others and making musical decisions brings the attentional load to a maximum; and
- 3) emotional and social obstacles: making oneself stand out in the crowd is risky and may lead to public failure, peer rejection, shame, and exclusion. The relevance of these obstacles extends beyond laptop orchestra, or even beyond music-making.

Students proposed various solutions, including: 1) arranging the orchestra into subgroups in order to allow individuals to focus on smaller, more manageable listening tasks (this would address the monitoring problem) and offer a lower attentional load (this would address ego depletion); and 2) communicating regularly about all matters, including emotional and social obstacles, in order to promote a mindful environment of sharing and a safe space for making mistakes.

These emerging obstacles and proposed solutions are specific to CLOrk at this particular moment. Nonetheless, they may shed light on similar problems, and are likely applicable to varying extents in other ensembles. The described processes of observation, democratic critical reflection, and shared action among all stakeholders are transferable to other laptop orchestras and improvisatory collective settings and may lead to more understanding and innovation. Similar case studies in other settings may enhance our collective knowledge about laptop orchestras, risk taking in collective improvisatory creation, and human interaction in group settings.

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***Apprentissage et enseignement de la musique au 21<sup>e</sup> siècle :  
L'apport des sciences et des technologies***

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## NOTES

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