On PIGS (Percussive Image Gestural System).
Artists' interview with audiovisual developers/performers Amy Alexander and Curt Miller.
June 2018

Amy Alexander and Curt Miller discuss mixed modal improvisation with their custom integrated software systems PIGS (Alexander, visuals) and The Farm (Miller, sound.) In this free-flowing discussion, Alexander and Miller discuss historical visual, music and programming practices including abstract animation, graphic scores, and object-oriented programming. They discuss how these trajectories feed into the development of PIGS, a system designed to facilitate improvisation by using drums and visual controllers to perform structured visuals. The artists then discuss the specificities of mixed-modal collaborative improvisation, including the impact of representational content (algorithmically curated YouTube videos) on their responses as improvisers. They review responses to PIGS performances to date and discuss future plans for new PIGS performance context. They conclude with a discussion of PIGS as audiovisual performance research and propose some ideas for the future role of frameless visuals in music ensemble performance.

PIGS (Percussive Image Gestural System) website and video documentation:
http://amy-alexander.com/pigs

Introduction and Early History of PIGS

[aa] Hi Curt! So here we are interviewing one another about this "PIGS" thing we've been doing for the past….. Hmmm, how long's it been?

[cm] Maybe 4 years? I think we first started discussing my involvement with it during a graphic score show in 2014!

[aa] Aha…. Didn't remember that… yeah, you were doing some interesting work with [audiovisual correspondences / non-correspondences](#) already.[1] I should inject here the early history went back to late 2012, when I started doing the initial research and testing during my residence at iotaCenter in Los Angeles. I started it then, did a lot of tests/reworks over the next couple years. Wojciech Kosma did some programming on it too, around 2013-ish.

[cm] What did those early tests look like?

[aa] Mostly abstract. They're on YouTube someplace. I remember doing some tests with fluorescent tubes that were lying around iota. Making "light worms" out of them. Then some other tests trying to figure out how to get the fluid irregular layers going. I was also doing the early YouTube-content tests then though -- the early version of the "[AlgoCurator](#)" that we just recently implemented. But I couldn't get that to work in any useful way at the time (it could download but not really "curate" at the time.)

[cm] So there were always concerns with both an abstracted gestural interface and a percussive way of triggering whatever the layers of content or forms you were creating? Where did the idea for the gestural component come from?

[aa] I'd been doing the VJ Übergeek / [CyberSpaceLand](#)[2] shows for a long time already. Übergeek uses intentionally "physical" -- but absurdly so -- interfaces to perform real-time visuals. Game pads, dance pads, "air mouse," etc.

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[1] Miller, C. *Curt D Miller: Transcripture*. [online] Curtdmiller.com. Available at: https://www.curtdmiller.com/transcripture.html Accessed 1 Jul. 2018.

[2] Amy-alexander.com. *CyberSpaceLand – Amy Alexander*. [online] Available at: http://amy-alexander.com/live-performance/cyberspaceland.html Accessed 1 Jul. 2018.

But before a show, I'd always spend a lot of time practicing -- just jamming to some music. And I discovered when I was "in the groove," I would just start scratching out gestures on the trackpad without really thinking about it. The scratching gestures seemed intuitive. Not gestures (in air) so much as scraping (percussively, like a guiro.) So I wanted to make a performance project that could demonstrate that approach to visual performance. There's hundreds of years (literally) of work that's been done mapping pitches to visuals. It's fun, but I think there is a less explored, but useful approach if you think of visuals as a percussive "instrument."

On visual rhythms, Fischinger and Brakhage.

[cm] As someone whose pre-digital performance practice was on an acoustic instrument, I'm curious about your experience of the CyberSpaceLand 'scratching' as an intuitive reaction to the music -- did it seem like an experience of mimicking the way that you would interact with sound instrumentally (i.e. the guiro) or that the resulting visuals were connected to the sound in a way themselves that were also intuitive?

[aa] More the first one. Yeah, I should've mentioned that although I've not performed professionally since I was about 19, my pre-digital performance practice was also on acoustic instruments. I played a whole slew of instruments in school and eventually started college as a

music (percussion) major. Percussion (snare and kit) are the only instruments I've really continued playing during adulthood. So maybe that's why I think it's intuitive. (Then again, most everyone finger drums now and then.) That disclaimer aside: there is a rhythm to animated visuals -- at its most basic level, the rhythm of light and dark. "Visual rhythms" were an overt part of the practices of abstract animators like Oskar Fischinger, but they're also very apparent in work by people like Stan Brakhage, who worked with rhythms of light and dark and the subconscious rhythms of representational images.[3] Considering Brakhage's focus on vision as subject, you could consider his approach the rhythm of vision. Rhythms are inherent in any kind of visuals dealing with forms and time. So you could argue that applies to all animation at some level (though I probably wouldn't.)

[cm] In previous practices like Fischinger's where "visual rhythms" were an overt part of the practice, how often were they working with music?

[aa] Good question: although a lot of the early (and later) "visual music" was performed to music, there's always been emphasis among visual music practitioners (aka abstract animators) on the rhythms being fully visual, without regard to whether music was accompanying. Fischinger was big on this, though he was often required by his sponsors to animate to music. The opening of Radio Dynamics (a silent film), includes a title admonishing theatres to keep it silent and not play music in the background!

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[3] Stan Brakhage - "Cat's Cradle" (1959). [online] Available at: https://www.youtube.com/watch?v=Cur2P5Ym3Yw Accessed 4 Jul. 2018.
[4] "Radio Dynamics by Oskar Fischinger from CVM on Vimeo." https://player.vimeo.com/video/123382580?app_id=122963. Accessed 30 Jun. 2018.

And again, going back to Brakhage -- most of his films were silent. So the rhythms of light and dark you might "hear" in your head are entirely visual. I sort of think Brakhage is a better example in some ways of "visual rhythm" because it encompasses a broader range of rhythm, but since his rhythms aren't regular the way Fischinger's tend to be, it can be more difficult to understand at first. (Though Randolph Jordan's essay lays out Brakhage's approach pretty well for those interested in reading more. [5]) I think the "visual rhythms" in PIGS have some elements of both approaches.

On scores, notation, and Cage.

[cm] That's interesting, I've had a side interest of my own in recent years of describing the timing or rhythm of all kinds of events with scores as a general notation for time -- the common denominator of all these practices of course…

[aa] Yeah! Interesting you bring up scores, and you mentioned graphical scores earlier. When I think of graphical scores, I think of using images/visuals to describe (declarative) or direct (imperative) sound. But can it work the other way around?

[cm] As in, sound that would direct images in a way that was not just diagrammatic?

[aa] I don't know; I'm just intrigued by your bringing up scores as a general notation for time in this context! What did you have in mind?

[cm] Ah I see, yeah I guess that is part of the interest with the scores--that Western score notation is made to notate a culturally specific form of sound, particularly one which uses a specific set of scales in combination with rhythms based in duple or triple time but that it can be stretched to represent time in a more general way. They're both concerned with an experience of time which is shaped by 'rhythmicizing' it maybe…

[aa] Interesting to think about Western score notation that way; I was still thinking about graphical scores, but of course, Western notation *is* graphical to begin with. But, maybe the elephant in the room is the kind of scores Cage did:

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[5] Jordan, Randolph. "Brakhage's Silent Legacy for Sound Cinema – Offscreen." (2003) http://offscreen.com/view/brakhage3. Accessed 30 Jun. 2018.
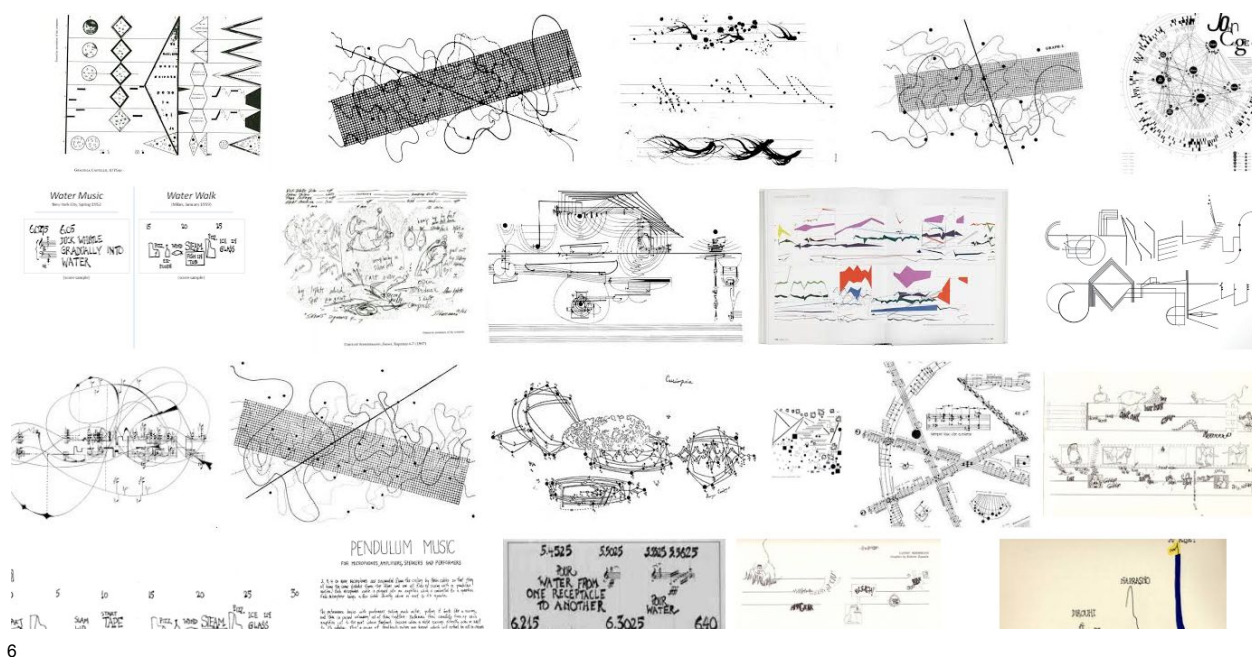
6
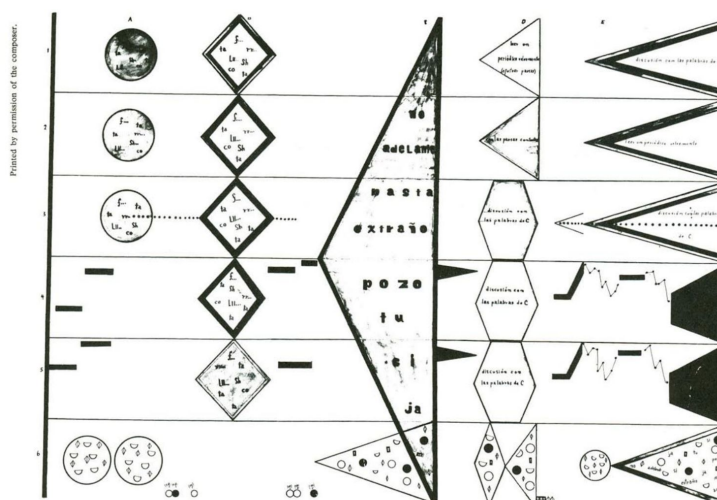
GRACIELA CASTILLO, *El Pozo*

[aa] Especially something like…

…. which looks like it could also be sketches for a Fischinger-style film or painting.

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[6] *Google Search: John Cage Graphic Score*,
http://www.google.com/search?q=john%2Bcage%2Bgraphic%2Bscore. Accessed 30 Jun. 2018.

[7] *Notations: John Cage Publishes a Book of Graphic Musical Scores, Featuring Visualizations of Works by Leonard Bernstein, Igor Stravinsky, The Beatles & More (1969)*.
http://www.openculture.com/2018/01/notations-john-cage-publishes-a-book-of-graphic-musical-scores.html .
Accessed 1 Jul. 2018.

And of course there were connections between Cage, Fischinger.[8] (and just about everyone else).

So… not to go too far afield, but do we see, for example, the possibility of scores that can be used in lieu of storyboards for visuals, more like we're used to seeing them used for sound?

On scores, GUIs, software and Sutherland.

[cm] Totally, the relationships between what is doing the representing or directing becomes really loose--these classic graphic scores often get displayed as pieces by themselves, or like you say, could be used to direct anything, not just the making of sound. And not just directing humans of course--these would have been around the same time as … what was the early gui interface … Sketchpad? Using human drawn diagrams to direct a computer. And if Sketchpad is a graphic score, then is Max?

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[aa] Ivan Sutherland's "Sketchpad!" Interesting to think of Sketchpad as "human drawn diagrams to direct a computer." There was a lot of discussion and writing (notably by Florian Cramer) ca. 2000 on the relationship of scores to software code (scores as an executable language.)[10] When I think of "Sketchpad" nowadays, I think of "the precursor to Adobe

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[8] BROWN, R. (2012). The Spirit inside Each Object: John Cage, Oskar Fischinger, and "The Future of Music". *Journal of the Society for American Music*, 6(01), pp.83-113.

[9] MIT Lincoln Laboratory. (1964). *Ivan Sutherland : Sketchpad Demo (1/2)*. [online] Available at: https://www.youtube.com/watch?v=USyoT_Ha_bA Accessed 1 Jul. 2018.

[10] Netzliteratur.net. (2001). *Florian Cramer: Digital Code and Literary Text*. [online] Available at: https://www.netzliteratur.net/cramer/digital_code_and_literary_text.html Accessed 1 Jul. 2018.

Illustrator -- a drawing program." But of course, in the early 1960s, it seemed much more radical, and much closer to the reality you alluded to: the drawing is essentially a set of software instructions; parameters to the code. (Illustrator, etc., function this way too.) The line between code and parameters gets blurry. Another way to think about it is that the line between code [instructions] and data [parameters, drawing, etc] is blurring. Which is applicable to PIGS, too. What do you think?

On computer music: instruments, code, metaphors, and liveness.

[cm] Yeah, we tend to talk about computer music tools as instruments but they are at least as much scores with dynamically created parameters. In that sense, the speaker is always the instrument when making music with a computer -- the interfaces we make, even if they are physical interfaces which control parameters in the computer are always modifying a digital score which is the software. You've brought that up in discussing PIGS as a potential 'live-coding' interface (which could be its own discussion).

[aa] Wow, I don't remember saying that! So, as this is "new" to me, let's unpack it: The "speaker" as always the instrument is an intriguing idea (and implies that the projector or screen is always the instrument in live visuals.) But, what do we think of as an "instrument?" A trumpet has an output: the bell [the speaker, metaphorically.] But it also has inputs: the valves [should I say pistons?], the mouthpiece, etc.   Since we don't consider the trumpet only the bell, is it really only the speaker that's the computer instrument? That blurring of lines I think is also relevant to the other part of what you brought up: live coding.   To what extent live coding is performance of an instrument vs. composition/improvisation is a question that has come up (though I think it doesn't really get discussed enough.)

[cm] Good point, I suppose if the instrument is the entire apparatus which translates the score into sound (which in classical terms would include the performer, the culture of music which allows for the score to be translated in a meaningful way and the physical instrument -- this is getting problematic fast) then the digital instrument would be all of machinery necessary to convert the code into sound including the, say, compiler, the dac, the sound card, the wires to the amp, the speaker. But there are many places in that signal chain to introduce other equipment that could be 'compositional', say an effects pedal.

[aa] I'm not sure we need to extend the metaphors into too much detail, but let's loop back to the first part about the performer. Why would the performer be considered part of the instrument? I think that part of the metaphor does extend between acoustic instruments and digital ones, but for some reason, it gets overlooked. The role of the performer, at least in every digital instrument I've built, is as significant as it is in acoustic instruments. (Even though I admit I try to build the ones I perform to accommodate my own awkwardness as a performer.) I guess some people build them to lessen the role of the performer, but as an advocate of "liveness" and a pre-digital old person, I've never really understood why people would do that. Though I guess there's pre-digital precedent, for example, tape music performances.

[cm] It does seem important here to distinguish between the live coder's performance or you performing PIGS as potentially a 'live composer' and the traditional performer of scored music who has interpretive license but is largely representing the content of the score.

Pandora's Box: On improvisation, structures, drum kits and object-oriented programming.

[aa] I have only approached PIGS in terms of improvisation. I haven't really thought about what it would mean to perform to a score. Though I'm used to improvising to non-improvised music: in the PIGS performances with Arshia Haq, as well as in my years of VJ shows with CyberSpaceLand, etc.

[cm] But even if you were playing PIGS from a score, if we are thinking of the code as a dynamic score then even your improvisation would be creating a score live that is being simultaneously realized by the computer. Which could certainly be done without the computer, like the game based scores of improvisers like John Zorn's "Cobra" or the practice of "conduction" where a conductor basically directs a group improvisation through a predetermined set of symbols. But the experience of improvising with PIGS sounds like it feels more like instrumental improvisation, would you say that?

[aa] You've opened Pandora's box with that question! Maybe we should talk about what improvisation means, what instrumental improvisation is like, and how PIGS is designed "under the hood" as well as how it's performed. The first two are too broad of topics to do justice to, but, I think a useful start for our purposes is visual performance artist Grayson Cooke's essay on audiovisual improvisation, "Liveness and the Machine." [11] Cooke starts out by introducing what's usually considered the "problem" of liveness in visual performance: media and mediation (i.e., that we are often using prerecorded media, and that we are using mediating technologies.) Cooke argues that the juxtaposition of live and mediated technologies are so self-evident as to be entirely unproblematic:

> The live, improvised event is that unheralded occurrence that refuses the mediation – on ontological grounds, according to Phelan – which would render it indebted to past or future, and instead, remains staunchly a thing that disappears as it occurs.

> But is this really the case? In *Liveness: Performance in a Mediatized Culture*, Philip Auslander asks whether the celebration of the 'live' in live performance is not a kind of blindness to the degrees of mediatization operating always in the background of what is considered live. He notes that the notion of the live only comes into being with the introduction of recording technologies. "Prior to the advent of those technologies (e.g., sound recording and motion pictures), there was no such thing as 'live' performance, for that category has meaning only in relation to an opposing possibility" (Auslander, 2008: 56). Liveness requires mediatization (the event requires the machine), it is not ontologically prior to mediatization but rather

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[11] Cooke, G 2011, 'Liveness and the machine: improvisation in live audio-visual performance', *Screen Sound,* vol. 2, pp. 9-26.

conceptually reliant on it. In his analysis of Phelan's argument about performance refusing the economy of reproduction (which in itself is problematic given the likelihood that any given performance will function as either or both a cultural or economic commodity and must perforce operate within a general system of reproducibility, exchange and equivalence), he notes that performances of whatever sort – theatrical, poetic, musical, dance – will always rely on some means of expression that is sense-able and therefore reproduceable, and therefore always- already reproduced (ibid: 45).[12]

Eventually, Cooke concludes:

> What emerges, however, both in thinking through the live a/v situation and in reading such accounts, is the clear and unproblematic relation between improvisation and pre-conception or preproduction, and thus also between liveness and mediatization. Live a/v is self-evidently mediatized in its very conception, premised on technologies of reproduction, recording and representation, and as such, has from the beginning gone beyond the binarism of live versus mediatized identified by Auslander.[13]

I would agree with Cooke's assessment. Although in some cases visual performances include live feeds for specific purposes -- e.g. cameras on performers or audience members, telematic live streams -- in most cases, especially those where the media itself are objects represented within the performance, it would seem to be of no detriment to "liveness" to improvise using recorded media. Further, the common overemphasis in visual performances on the content of media (instead of media as content, which lets us think about representation) is one reason I've now "delegated" the selection of videos to the AlgoCurator (algorithmic curation.)

But the problems of defining "liveness" in contemporary performance practices aren't limited to media. Particularly in digital practices, which are typically associated with extensive preparation at a computer keyboard, performers often question how much pre-preparation is legitimate in a live performance context. This has been a central concern of many performers within the live coding movement, where software code to perform music is typically written by performers from scratch on stage -- yet the coder/performers must inevitably draw upon programming environments and libraries written beforehand.[14] Throughout "Liveness and the Machine," Cooke discusses the problems of drawing a hard line between improvisation and composition. I.e.,

> Just as the figures of author and artist as inspired creative geniuses have been thoroughly problematised in structuralist and post-structuralist thought over the past 40 years, so too has improvisation as spontaneous creative activity been critiqued, both as an a-historical fantasy that denies the importance of tradition, and—in relation particularly to the role of African-Americans in the development of jazz in the mid-20th century—as a racist construction of the 'primitive', 'instinctive' and 'unconscious' jazz musician (Ramshaw, 2006: 2). Some kind of composition, some degree of pre-conception will always haunt improvisation, even in its most experimental or exploratory moments, just as composition will always involve some opening up to the unfamiliar, and it is on this basis that Scott Thompson claims that "there is no justifiable difference, in theory, between composition and improvisation" (Thompson, 2008: 1) and Viyay Iyer claims that "the binary between composition and improvisation is false" (Miller and Iyer, 2009: 8).[15]

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[12] *Ibid:* 16-17

[13] *Ibid:* 18

[14] "About | TOPLAP." https://toplap.org/about/. Accessed 1 Jul. 2018.

[15] Cooke*:* 15

So, if we think about instrumental improvisation as being inherently somewhat precomposed, what might that mean? I don't have the breadth of experience you do, but back in my days of admittedly amateur jazz and rock improv, there was usually some spoken or unspoken structure, at least to start -- 4/4 time, a blues progression -- some sort of structure so that everyone had some idea what to do next at any given moment. I think we should come back around to this, but for the moment, let's just assume that structure might be useful in improvisation. Let's bring it back around to abstract animation, which is what PIGS is at its core. If we think about probably the most famous old-skool abstract animation film, Fischinger's Allegretto:

There are structures that are pretty easy to spot. Big circles (probably the least rhythmic element), run continually as a "drone" in the background. Then on top of that are the various layers: staccato diamonds, legato worm and kite-shapes, etc. In general, each group has a common shape and movement, and there are temporal and spatial structures that repeat. That's essentially how visual rhythm works. So that gives it structure. You can imagine if you had an Allegretto Machine, you could push a button to spit out groups of staccato diamonds, s-drawing kites, or whatever, and if you pushed the buttons with some deliberate sense of rhythm, you could improvise a film in the style of Allegretto. But it would be important to have some structure (e.g. "staccato diamonds") within each button, and it would also be important for you to have some structure in your performance (of pushing the buttons.) Otherwise, it would just seem to be random chaos. Now, we're roughly a hundred years out from Fischinger, so we might find those old modernist structures a bit dated. So maybe you want more 21st century structures, but I'd argue that you'd still want structures; otherwise, you'd have random "noise." (Noise can of course also be desirable, but that's the another story…)

[aa] We are starting to describe not only Fischinger films, but object-oriented programming structures "in the wild," i.e., separate from computer-related thinking.

I've argued that traditional drum kit performance pedagogy and limb independence is inherently object-oriented.   The left hand playing the snare drum which has a certain pitch, timbre, and timing… all of which can be varied, but which have to be executed independently of and simultaneously with the other limbs/drums. I've written some python scripts[16] to illustrate.

Putting it all together: Object-oriented improvisation with PIGS.

[aa] Now, if we put these ideas together, we get PIGS! We have four main animated video layers. Each layer can take a gestural form -- and that form gets applied to one of several graphical primitives. That gesture is then replayed with animation and video variations by playing one of four main drums. The most important animation variations are size of the shape

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[16] Alexander, Amy. *uebergeek999/oodrums*. GitHub. (2018). [online] Available at: https://github.com/uebergeek999/oodrums Accessed 2 Jul. 2018.

and the speed of the movement (based on drum stroke velocity). The variations in size, based on how hard I hit the drum, allow me to have a visual counterpart to musical attack. So for example, a suddenly large form functions visually like a an accented note does aurally. I recall you and I worked this out collaboratively during the PIGS research phase: we knew we wanted to communicate visual "attack," and I recall our trying a couple of things before realizing it would all be down to implementing animation timing strategies, like having a form scale abruptly. Algorithmically replaying the points within the gesture more rapidly during rapid performance was another thing we realized we needed to implement; when performing "fast" the speed of the point movements within each replayed gesture varies accordingly -- so fast playing doesn't end up feeling visually too "legato." These two are the most basic animation variations, in addition to changing the primitive itself. Then we have several others: rotation of the shape, position, the way it moves across the screen, tiling, scrolling, length of the form, etc. I also intermittently use ambient sonic changes + a "random walk" algorithm to create some roughness in the forms by displacing points. Though I'm normally disdainful of overly literal "Mickey Moused"[17] sound and image, I find that using more complex sonic-based manipulation can work as counterpoint with performed gestures.

The variations I've been describing so far are animation variations (variations to the moving forms themselves.) The other variations are video variations: processes applied in real time to the video media. We can make the image more or less legible (blurring, etc.); reposition and slide the video within the shape (which gives it an additional sense of movement); apply a delay effect (which gives it a softer look but also a slower sense of movement.) There are also several others, including some graphics rendering variations. But while the video variations technically affect the video rather than the moving form, many of these -- perhaps the majority -- are geared toward changing the sense of movement too.

So: we have various animation and video effects, but -- we still have the basic structure, which is the gesture (at its core), and the video within it.   Any of the methods or properties (to use object-oriented programming lingo) aka timings, movements, and characteristics, for any of the four layers can be modified at any time as you improvise, depending on how radically you want to change the layer. And you are absolutely improvising, just as you can improvise on a drum kit. But you have some structure too -- the basic gesture for each of the four layers (which functions as the object, in our OOP example). Keeping a central structure to an abstract time-based work hopefully avoids what my animation instructors back at CalArts famously called -- when you'd failed in your attempts at anything beyond random soup in abstract animation -- "Just Stuff."

A couple caveats to what I described above:
- Although I've used drum kit performance as an analogy, PIGS is not performed like a drum kit! That would be a facile superimposition. Drum kits are useful for certain kinds of percussion performance; PIGS is not one of them. While

[17] "Mickey Mousing - Wikipedia." https://en.wikipedia.org/wiki/Mickey_Mousing. Accessed 3 Jul. 2018.

percussion is a useful interface, since PIGS is about performing visuals, it needs to be approached differently, rather than having some other paradigm shoehorned in.

- We shouldn't try to take the analogy to drums too far. Drums don't have time and space based structures. So they are less "pre-composed" than PIGS. PIGS is an algorithmic instrument, and algorithmic instruments are different than acoustic ones. They can have time-based structures instead of timbres. But that doesn't mean we give up liveness, nor risk.

Speaking of risk: another thing I like about Grayson Cooke's essay is that he talks about the role of risk in live digital performance.[18] Risk is inherent in live performance; I think the fact that humans have the potential to screw up is a reason we enjoy watching them perform live. But oddly, the role of risk is often overlooked in discussions of live digital performance.

[aa] Alright, I've filibustered long enough; I told you it was Pandora's box! Now I'm interested in what you think about all of it. But especially since you started out asking me about whether PIGS felt like instrumental improvisation: what instrumental improvisation feels like is something you definitely have more serious experience with than I do. So -- what do you think about my inexperienced assumptions about instrumental improvisation?

[cm] The Cooke is a useful starting point; the porous distinction between improvisation and composition was interesting to me too, including the problematic narratives that we use to discuss people who engage in these activities like the racist narrative he cites around the "unconscious" jazz musician and how that also disregards the experience of compositional practice which can be, as he says, "opening up to the unfamiliar." I'm reminded of the experience of teaching a Renaissance counterpoint class which, regardless of how it was actually composed at the time, now involves learning a rigid set of harmonic and melodic rules and writing a lot of exercises which put those rules into practice. It's amazing that even in this inflexible framework there is still a part of the experience that feels creative in the moment or moments when you feel that you've ingrained the practice and are operating at a point just beyond your conscious negotiations with those rules. One of the things that makes it so difficult to identify the parts of instrumental improvisation that are "pre-conceived" is the amount of that material which is inherited from previous practice through a lot of training which makes things that are not at all intuitive seem intuitive or made up on the spot. It is also easy to forget that the instrument itself contains a huge amount of musical material built into it when you have spent a long time removing the distance between what you want to play and what you play.

[aa] I'm not as good an improviser as you are; I'm not a "real" musician, plus I've only been learning this "PIGS" instrument a few years. There's still plenty of distance between me and it. Even though I can apply experience with percussion performance to it somewhat, there's a lot that's different, and the fact that I necessarily modify the "instrument" over time in response to

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[18] Cooke: 13-14.

what's lacking in its performability. I.e., the more I perform with it, the more I know what it needs, so there's a feedback loop between performance and design/building. And once something's resolved in terms of design, then it requires sufficient practice to build facility with whatever I've implemented. So, improvisation with PIGS is still a strange beast. On the other hand, I sometimes agonize over the "history of the instrument:" PIGS visuals look Fischinger-esque sometimes at other times they look like Len Lye, Brakhage, etc. Yet I'm also aware these similarities are inherent to 2D non-representational animation to some extent, because of "the history of the instrument" in modernist cinematic practices -- as there are commonalities among different clarinet performances, among hundreds of years of portrait painting, etc. Yet even as these histories are ingrained and encapsulated within contemporary practices, the practices have shifted and expanded.

But I'm curious, since you've got a lot more improvisation experience than I do: how does crossmodal (audio-visual) improvisation compare for you to improvisation with other musicians -- and how does improvisation with a mixed acoustic/computer system compare to acoustic-only clarinet improvisation? (Feel free to tackle in any order!)

On the improvisation feedback loop between the two performers.

[cm] At least in my own mode of improvising with the computer I have a sense that I'm not necessarily actively shaping the sound in every moment; I am very actively considering what is happening or what's happening next but I often feel that I am setting parameters for a system and then waiting to see what comes back to me. Even with the clarinet I might try something that is unstable, some technique that I haven't tried before maybe, and I won't be sure what is going to come out -- the instrument is always separate no matter the level of virtuosity with it -- but the response is immediate. It tends to feel unmediated perhaps because the feedback loop of listening to oneself play is so fast. But with the computer that feedback loop is considerably lengthened. Actually it is very much as you said that the metaphor of acoustic drums breaks down in that it doesn't have time and space based structures and of course neither does the clarinet. Its only time based structures are compositionally imposed on it by the performer, if that makes any sense. Whereas the controls for the computer interface that I'm using are largely ways of organizing the potential sounds the program can make into longer musical structures. Improvising with visuals also tends to lengthen that feedback loop, at least for now since it is a relatively new experience for me.

 [aa] It's interesting you bring up the indeterminate aspect of performance with an algorithmic system. A lot of algorithmic/generative performers, filmmakers, and I'm guessing composers(?), have pointed to the indeterminacy of the system as what they find appealing; they like working with an almost sentient-seeming other that continually surprises them. And this is certainly an aspect of PIGS performance; allowing the system to insert variety and "surprise," but having a balance of chaos and control that it's manageable for me to perform with.

But you've added an interesting point: the length of the feedback loop: between performer and instrument; between performer and performer; and, by inference, between performer and the other performer's instrument! I'm willing to bet that if we walked in to rehearse and I just kept playing the very simplest abstract visual patterns on PIGS, you'd find the feedback loop shorter. My hunch is that it's not entirely the fact that it's a different modality that makes it difficult, but the fact that you have to deal with the indeterminacy of my system on top of your own. Now that I think about it, I have sometimes been surprised by your system, which is in some ways being surprised by my system (as when the video changes and the sound does something surprising.) That was something I had to learn when we started improvising with the systems influencing one another, i.e., if I do X on my system I'd better be prepared for Y on your system. But, we have only tied (networked) the systems together in terms of representational content, and only in the most recent version of PIGS. I.e., when I switch a video, to the extent you're incorporating that video's sound track, that sound track will switch. So to get to my next question: how much do you think the difficulty/lengthening of the feedback loop in improvisation with PIGS has to do with the representational content of the videos vs. the abstract forms I'm performing?

[cm] That's interesting, sometimes I actually felt like the way our systems were tied together would suddenly give me a push to change more quickly; if suddenly the sound changed under my feet I would need to scramble to fit it in. But it's true that most of the time it would add another element to listen for and listen long enough to get a sense of what my new sound materials will be. There are enough things to juggle between the changing, unknown video content, the behavior of my own patch and your performance that I tended to be a little less attentive to moment to moment details of those abstract forms.

On mastery: rehearsal, jamming, practice and pedagogy.

[aa] I'm recalling one evening when we got to the end of rehearsal and somehow started "jamming" to a funny video of a car. It was interesting to notice the difference in "jamming" with PIGS and The Farm (your system; I don't think we've mentioned its name here yet) vs. more focused improvisation rehearsal as we normally do. It was, to me, reminiscent of my practice jams with CyberSpaceLand that revealed what I subconsciously was trying to do (i.e. finding myself performing a trackpad like a guiro.) Also because we didn't have the pressure of trying to move through representational material for an audience, we could explore improvisation in a more direct way, I think. Perhaps in a world where people spent as many years learning audiovisual performance as they do learning musical performance, there would be a pedagogical method where you would have to play one video over and over with different patterns -- like musicians do with scales and rudiments -- and then you'd go into ensemble and do similar exercises. I think this points to the difference in instrument mastery/expectations for algorithmic instruments of all sorts (vs acoustic ones.) Maybe I'm being contentious -- What do you think?

[cm] Well the scale idea is interesting in that it relates to that pre-conceived part of instrumental practice in that you practice scales partially as a way of limiting the musical material and focusing on instrumental technique but also largely so that you have already practiced the building blocks of the music that is commonly played on that instrument. If you can play all the major and minor scales and chords you're already pretty far into learning a bunch of pieces that make up the classical canon. Maybe instead of going into ensemble you would then go back into the mode where all content would be new at all times and have the technique to deal with it. What would the PIGS rudiments be? Learning all the effects presets by number? Moving a specific video to each layer and back?

[aa] Haha, this sounds horrible! Maybe that's the punishment for students that didn't practice! Let me think though, because I actually do practice these things on my own, though perhaps not down to the rudiment level. Some of the things I practice: Stickings around the pads, different stickings with accents, etc. (Basic stick control exercises adapted from the ones I use for snare/drum kit.) The reason for applying that to PIGS performance is to be able to fluently animate forms at different scales and timings, which is really just implementing some traditional design and animation principles.

I also do practice going to different major sets of presets, e.g., it's important in performance that I can get between the "home" bank, the staccato bank, the legato bank, and one more bank that doesn't have a one-word description. From there, you can easily make minor shifts, usually to one pad at a time, but it's important that I can quickly get "around" the major styles. And I practice applying some of the major visual processes that are applied in PIGS with sticking sequences, so I can have facility in applying those sequences without thinking much.

But: PIGS is a specific thing: how does that translate for more generalized visual performance practice? This might depend. A big difference between PIGS and some traditional "VJ" applications is it's essentially a system for real-time **animation --** forms moving across space -- as opposed to some VJ/live cinema approaches that work from a live action approach, i.e, consider the frame as a photographic rectangle. If you're taking an animation approach, I think your rudiments would be the same as in animated film: time and form. So you'd want to practice, on whatever your instrument is, getting control over time and form. If you're taking a live cinema / photographic approach, it might be different.

That said, I do think ensemble performance practice would be essential for the visual performer of the future (and present), just as it is for instrumentalists.

[cm] So the other thing that is being practiced in instrumental training besides the instrumental technique might be getting close to what you're getting at with the 'jamming' example, which is learning the difficult-to-pin-down notion of "musicality" or "expression" -- not just learning what to physically do to play the instrument but the stylistic aspects of the music that aren't necessarily notated. For example, in earlier scored music, what is the culturally appropriate way to interpret a phrase so that it sounds right for a given style or time period. So I'm wondering if there is

some kind of "visuality" that you're learning or discovering in that moment when you're playing around with the forms that is not so much technical practice? Or maybe: what is happening during that jamming when it really starts to feel like you've gotten to a satisfying place with the animation?

[aa] This is a great question, and I feel like it would have many possible answers. I'd probably need to sit down and review some recorded rehearsals/performances so I could spot a few of those "aha" moments, but offhand: We mostly deal with YouTube content, in ways that is simultaneously realistic and appreciative. So when we've been able to do things (you, me, or both of us) that somehow nonverbally highlight that juxtaposition, that's when I've felt like things have really "clicked." For me, that's sometimes meant coming up with a technique where two videos -- seemed to melt in and out of one another in an interesting way (or sometimes one video melts in and out of abstraction.) Sometimes I hit on a kind of movement, or combination of movements, that I feel like really clicks into the "channel changing/radio tuning" theme that broadly underlies the performances. Sometimes I hit on something completely formal, when the visuals are just thin lines with no discernible content, that I feel like hits on some kind of digital/existential tension. And I like responding to some of the things you're improvising with the sound from the YouTube clips. Sometimes you take a clip of someone speaking, and you let them speak it through sincerely but also slice it up into samples which start to become more formal, percussive, etc. I know this was something we talked about when we started improvising to unseen algorithmically curated clips -- i.e. that we wanted to avoid turning people's voices into samples without letting them speak, but I think you've found a good way to do both, i.e., let them speak while also creating something else.

On live improvisation with unseen, dynamically curated content. And on how voices change everything.

[aa] But I'm curious what you think about this? We only recently started using the AlgoCurator.[19] [The AlgoCurator is a Python script that uses OpenCV (computer vision) and other strategies to curate content for PIGS from YouTube videos of the past several hours. Although it can be modified in the future to curate a variety of specifically themed compositions, in its initial composition, "Utopian Algorithm #1," the AlgoCurator seeks out "personal narratives of the moment" from among the least viewed of videos uploaded to YouTube in the past few hours.]

In the past, we knew what videos/sounds we were performing with beforehand; now we don't. So we have to improvise to certain YouTube subcultures, e.g., vloggers. How has this changed things for you?

[cm] In general, using spoken voices in a musical context was already a new challenge for me. In the past I hadn't really considered using voices other than my own in a musical context. This

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[19] Amy-alexander.com. (2018). *The PIGS / AlgoCurator FAQ – Amy Alexander*. [online] Available at: http://amy-alexander.com/the-pigs-algocurator-faq.html Accessed 2 Jul. 2018.

happened in earlier versions of our performances too but The Farm has grown to have slightly more sophisticated ways of analyzing the sound to automatically locate events in the sound samples and that makes it a lot easier to chop up voices in ways that make what they're saying less legible and the samples found by the AlgoCurator represent a much wider range of voices from around the world that are often not speaking in English or occasionally vlogging from points of view I don't espouse. This actually ended up pushing the idea of connecting our systems to give me the ability to mix the live video sound so there would be a way of not just running the video sound and accompanying it with music but allowing me to dip in and out of that representational sound. That really changed how I was thinking of the musical form of my improvisation. Those voices became a thread that would connect together sections and I was suddenly paying a lot more attention to the video content of your improvisation where before I tended to respond more to the gestural/formal parts of it.

From voices to VanDerBeek. How the AlgoCurator nibbles the forbidden fruit of Stan VanDerBeek's utopian vision.

[aa] The voices change improvisation for me, too. When you're letting a voice play through, I have to think about how long we should let that person talk -- and separately, how long to leave their face on screen. They definitely influence the way we structure the performances now. The thing you mention about the voices from around the world and the vloggers whose points of view we may or may not espouse is a good one.   In this first implementation of the AlgoCurator ("Utopian Algorithm #1") I intentionally set it to pull in a lot of vloggers from around the world. [There are also various other "curatorial" algorithms. E.g., having a low view count -- which favors non-commercially oriented bloggers, in opposition to YouTubes algorithms that encourage high view counts. It looks for a certain proportion of vloggers who mainly just talk to the camera, etc.] Anyway, in future versions, AlgoCurator may look for videos from certain geographical regions, or focus on certain topics, etc.

But, the "Utopian Algorithm #1," besides being an idea I've wanted to try for awhile, is supposed to be a loose implementation of what Stan VanDerBeek envisioned as the "Culture Intercom"[20] -- a global video network in which people would send videos of themselves around the world (to viewing domes), where other people would watch them one after another, with several videos projected at any one time. People around the world would then come to understand one another (As with much of his postwar practice, VanDerBeek was motivated by the aftermath of the Atomic Bomb.) It's of course easy to look at YouTube as the realization of VanDerBeek's dream and dismiss his vision as naively utopian. But, when we try to 'algocurate' something that resembles what VanDerBeek had in mind out of the commercially-biased YouTube network algorithms, I'd argue that it realistically comes pretty close. When confined to vlogging into a camera, people presenting exclusionary points of view tend to lay them out

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[20] VanDerBeek, Stan. "Culture: Intercom" and Expanded Cinema: A Proposal and Manifesto", *Film Culture* 40 (Spring 1966), pp 15-18. Available at: http://www.stanvanderbeek.com/_PDF/CultureIntercom1,2,3_PDF_LORES.pdf Accessed 1 Jul. 2018.

matter of factly. With the benefit of non-verbal communication (facial expressions, voice inflection), intention is clearer than in text-based flame wars with ALL CAPS where EVERYTHING GETS MISUNDERSTOOD AND NOBODY HEARS EACH OTHER!   The worst part of YouTube is the comments, don't forget.   Awful points of view are still awful, but they'll always be there. I'd argue that a realistic utopia is one where we survive them.

On voices and risk.

[cm] I think at first I was avoiding really letting people speak in the early rehearsals with the AlgoCurator to avoid having to deal with these points of view by treating the samples as fodder for granular synthesis. But especially when you can see the faces of the speakers on the screen it becomes very conspicuous that they have lost their voice which is at least frustrating to the audience and at worst appears to be either insulting or inflicting a kind of violence on their speech. That avoidance brings me back to your earlier question of risk in digital performance in that allowing for whatever content the AlgoCurator comes up with takes a lot of control out of our hands which is a certain kind of risk. I've spent a lot more time as a clarinetist playing scored music in which the inherent risk is more the possibility of failing to play what has been written or failing to do it in a way that is very convincing. With improvised performance I find the notion of risk to be more slippery. There is, of course, the risk of presenting your own ideas to an audience and being critiqued not only for your technical ability to represent something else but for the artistic practice itself, but in a lot of experimental instrumental improvisation or in computer music in which the way that sound is produced is more hidden or exploratory it is difficult to locate that technical risk. What parts of performing with PIGS seem to take on risk for you?

[aa] In visual arts practice, the term "risky" is often used to refer to controversial content. That's one thing if you might be at actual risk of being harmed, threatened, harassed, unemployed, etc. It's another if it's just a matter of edgy content. So, I have some problems with using that term in too broad a sense.   But some types of "art-risk" are involved here: Getting back to our earlier discussion -- since everything in PIGS happens as a result of my performing the PIGS "instrument," there's always risk that I won't perform up to snuff. In fact, I'm usually dissatisfied with my own performance, just as I was when I played acoustic instruments publically. But with PIGS, performance risk is compounded by the fact that I've also designed the instrument; i.e., there's both the matter of my own mastery of the instrument and the matter of whether I've designed its "playability" adequately. And PIGS performances (so far) are something of a shift from my character-based performance art (e.g. VJ Übergeek), in that I'm performing as myself, so in some ways my performance is more exposed (although I always took my visual performance seriously even when I performed funny visuals in character, I'm not sure the audience did!) With PIGS I'm performing for an audience earnestly as myself -- which is not strange in a music context but is odd in a visual arts context, where performance art has a home but there's an uneasy relationship with performing arts.

In practice, one of the "riskiest" aspects of PIGS may be developing a research/performance project that doesn't fit easily within the confines of usual practice in visual arts, musical performance, or abstract animation. The direct concert style performance, dual nature of the software and content, and the seriousness about formal concerns, technique, improvisation, liveness, etc., are strange for visual arts. It's the wrong modality for musical performance. And there's too much content for contemporary abstract animation. Nobody can figure out what it is! But that is what it is: cultural forms globbing into one another as they inevitably do.

But, back to the probably more important question: the risk of dealing with indeterminate content. That's a funny one; it's either completely risky or not at all risky depending on which practice you ask. Visual artists tend to see algorithmic determination as an abrogation of responsibility, and therefore risk. Whereas musicians, more steeped in traditions of indeterminacy dating back to Cage, see it as an embrace of risk. (I'm overgeneralizing, I know; but the tendencies are there.) Both of those responses, of course, overlook the authorship and subjectivity inherent in writing an algorithm. So while the YouTubers can "say anything," I've deliberately set up a system where they probably will say things I wouldn't say. As you mentioned, we have worked toward making sure the YouTubers, and the "talking heads" in particular, are heard as well as seen. So they have to own what they say, and I (and you!) have to own letting them say it. Of course, I've got the magic pedal in performance that can click right on to the next person whenever I want to. But I don't think I've ever clicked past someone because I disagreed with them; I'm actually the most fascinated with listening to those voices. I think the AlgoCurator has YouTube's "safe search" filter set to moderate (the default), so that seems to visually filter out most people exposing themselves and so on. But the idea of letting people on YouTube speak and say a combination of awesome, silly, awful, and ordinary things is really not one of the most frightening experiences I've dealt with.

On indeterminacy then and now: YouTube vs. Cage.

[aa] Since we keep bringing up Cage, I'm struck by the difference between tuning radios onstage and tuning YouTube, as we're essentially doing. I wonder what it would have been like if YouTube had been around when Cage was writing those pieces.[21] But I'm not so up on the use of indeterminate content in contemporary music practice. Are people still doing that kind of thing?

[cm] Well performers are still performing Cage but I realize that's not your question. It does strike me that the operation of the radio is a very clear kind of indeterminacy in which the audience knows exactly what the stakes are and why the sounds coming out sound like they do whereas because of the authorship of the algorithm the audience would need a fairly in depth description to know why the AlgoCurator is picking what videos. The radio is also something that any audience member could come up on stage and operate which in some contexts could

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[21] "Imaginary Landscape No. 4 (March No. 2)" (1951). *John Cage Complete Works*. [online] Available at: http://johncage.org/pp/John-Cage-Work-Detail.cfm?work_ID=104 Accessed 1 Jul. 2018.

still be an 'edgy' idea, that you would go to a concert to watch someone do something completely unremarkable in terms of virtuosity.

[aa] The difference I was thinking about was more the range of content: YouTubers can say or do a lot of different things, whereas radio spectrum is limited so normally under the control of governmental or commercial entities. Which still leaves lots of room for strange things to happen: talk radio, call-in shows, state-controlled media, etc. But -- it's still very much filtered. Anyway, to me it's not an issue that the audience doesn't know how the AlgoCurator works. I deliberately leave that ambiguous -- the presumed work of an earnest, vaguely sentient, AI -- so people won't try to overthink it. Once you're hit with a range of talking heads and weird background videos, you can make whatever you want of it. The point is, AlgoCurator creates a feeling/vibe/texture, which is always fairly consistent for any given algorithm, no matter what specific content shows up on a given day.

[cm] I'm no Cage expert but it would seem to be for him, even with a wider range of content, still more about removing control from the composer.

[aa] Yes, good point! It's easy to get lost, but AlgoCurator is not about indeterminacy; it's pre-determined in the way it needs to be. Cage was about indeterminacy, because it was 60 years ago, and that was the thing that he wanted to address. It hadn't much been dealt with back then. Algorithmic determinacy is about authorship, the exact opposite goal of indeterminacy.

On public perceptions of custom software.

[aa] Speaking of authorship: I get a lot of skeptical questions about software I develop and use in performance: i.e., PIGS, and even CyberSpaceLand (the software I perform with in character as VJ Übergeek). The skepticism is in regards to why I would develop software if the point is not to distribute it to the public. Especially given the emphasis on open source and sharing, the implication seems to be that I'm hoarding something that, if released publicly, could be useful to others. But -- besides the fact that making user-friendly software is a large project in itself -- the point that tends to be overlooked is how subjective custom software is. In other words, if PIGS software were distributed, then everyone's performance would look like PIGS. I'm guessing that other visual performers would like their visuals to conform to their ideas and aesthetics, not mine! But it's interesting that artists who develop algorithmically continually need to explain that. I think the word "software" itself has such a general purpose, utilitarian connotation, that perhaps it can't be escaped. Maybe we need another word: I propose "blurpware." Do musicians have a similar experience?

 [cm] For music it might be 'bleep-bloop-ware'... But that's interesting, I think there has always been a big emphasis in music production on an individual tailoring their 'gear' to be unique as a part of their musical identity. Even with the clarinet you get sucked in to this discussion of what reeds you use, what mouthpiece, your 'setup.' So for me the discussion has often just ended at

'I use Pd' but for something like my Talk Box setup (I use a Talk Box pedal (yes, a la Peter Frampton) to make feedback system with the clarinet) there is a sense that if anyone else used that same weird setup they wouldn't have their signature sound. I wonder if the popularity of the modular patching system of both analog synths and programming environments like Max have made it more commonplace in music to be designing a system that only you would use?
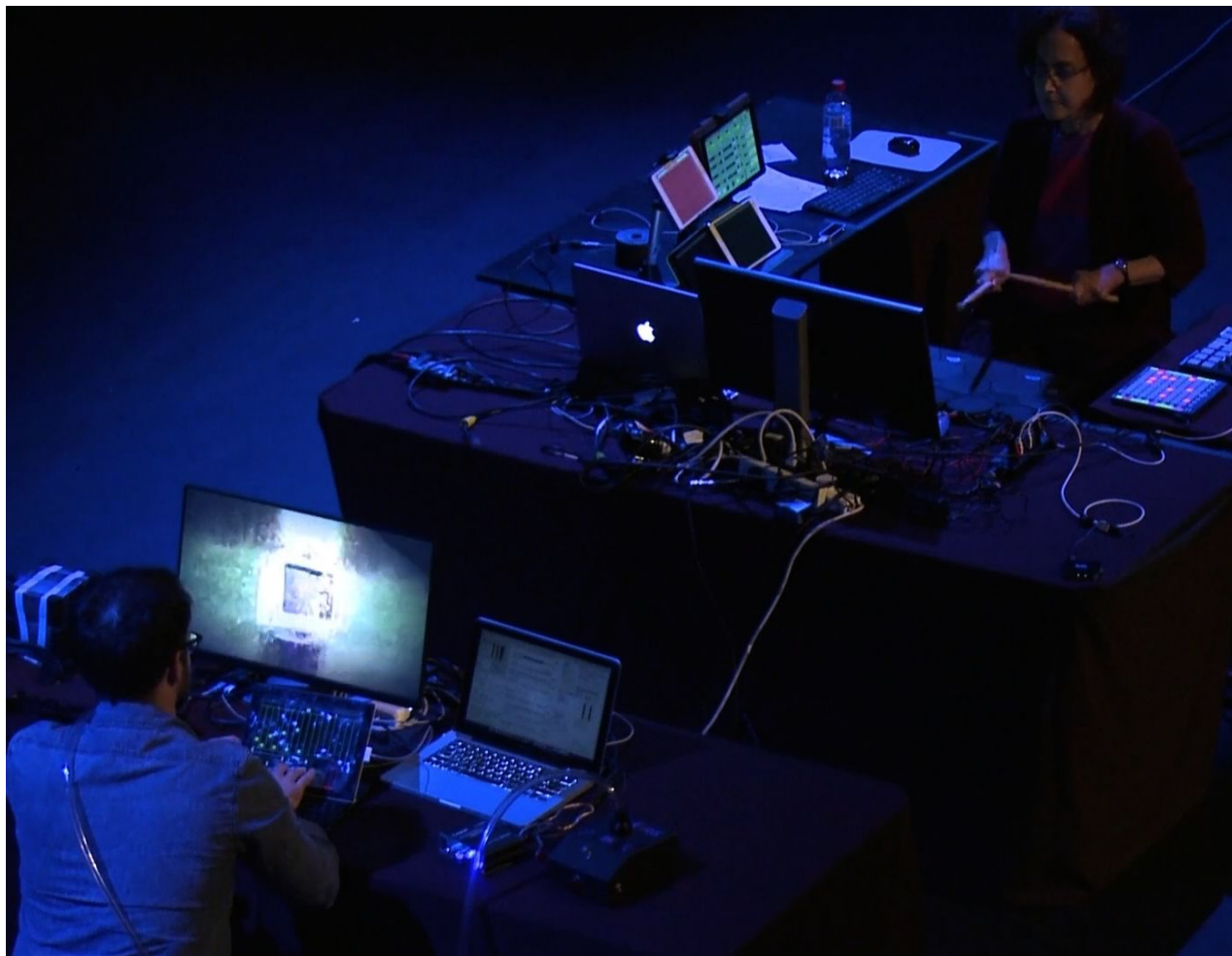
[aa] It's interesting that a discussion could end at 'I use Pd,' since Pd is really a development environment, not a piece of end user software. I get similar questions though. If someone asks about my software, I say, "I wrote it in Max," and they say, "Oh, I didn't know Max could do that." I guess that could mean "I didn't know Max could allow you to program visuals," but they often seem to refer to the whole thing: drums in -> [mystery] -> highly specific visuals out. It's not clear to people that the subjective aspects of [mystery], as well as the more specific functional ones, are programmed by the performer/user. The development environment (Max, PD), etc., provides certainly lower-level functionality of course. I could (but won't) make a theoretical argument that all development environments are end-user applications at some level. But the point is, audiovisual development environments -- or maybe patch-based development environments, seem to get confused with end user applications more than they probably should. I think the idea of artist/musician as programmer still triggers cognitive dissonance in the public to a large extent.
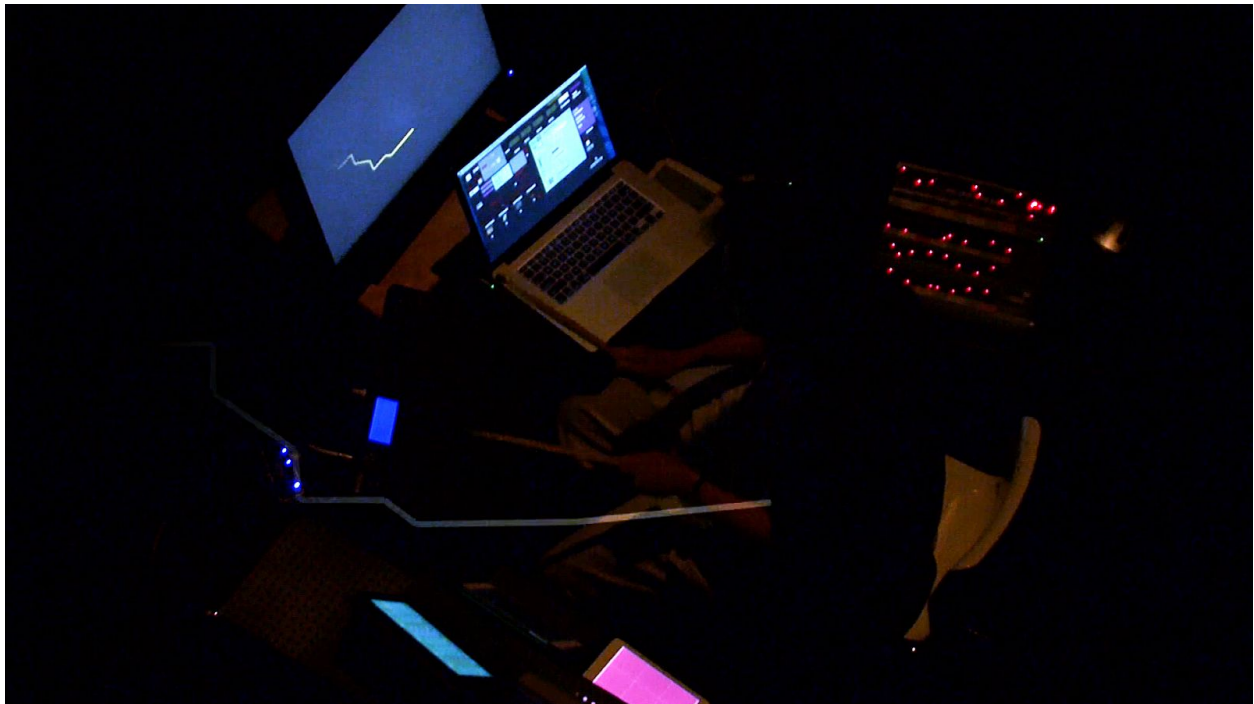
So, why then?

[aa] That said, there is of course more of a point to this than "Hey, watch us do this; hope you like it!" The point with PIGS is to distribute the idea, not the software. My hope for PIGS is that it can contribute to expanded critical discourse and development of cross-modal, improvisatory

live performance: The idea of approaching visuals as non-rectangular forms that allow for fluid improvisation, as one would improvise on an instrument. An animation approach, that focuses on light, dark, and form, rather than a "cinema" (frame-based) approach, facilitates this. And an approach to visual performance that, through both form and performance, facilitates "liveness."

Alex McLean has said he thinks the appeal of live coding is watching a human create something from scratch on stage. I think that sums up nicely the point of a lot digital performance practices that address liveness. There is something weird about living in a time when people around the world are making movies, and those movies fly every second. So somehow, videos are flying around you at all times, new ones appearing every second. The videos themselves are very "live." And yet on stage there is this feeling of stasis with video. For the most part, performances of live visuals are largely canned (as in concert shows), or performed live as largely generative patterns or video mixes in the background at clubs and raves. There are definitely some interesting things being done, but it's usually in the context of filling a frame that serves as background for a musical performance. The visuals usually have limited liveness, and the visualist is rarely seen. Many performers and venues find the presence of the visualist distracting to the visuals. I can understand that reasoning, but as these decades of abrogating personal responsibility to algorithms keep marching on, I feel like there's a need for algorithmic performers to stand in front of the audience -- playing video drums, or whatever -- and show the human "behind the curtain."[22]

Something I've noticed: The research conferences where we find ourselves performing are mainly computer music oriented. There was a lot of energy from visual artists in developing live visuals in the early 2000s, when portable computers first became fast enough for real-time visual work. Though a number of experimental animators continue to create and perform work, a lot of visual / cross-modal development now ends up being done by computer musicians and music researchers. That's great, although I think it'd be useful for more people with cinematic backgrounds to push the field, since they've got the conceptual/historical background in moving visuals. But, computer music people really seem to have the "infrastructure" to keep this kind of development -- i.e. digital performance research -- going. I'm wondering what you think about this, coming from the music side?

On performance contexts.

[cm] Yeah, while the conceptual practice is very different, the basic stage format of the performance is of course the standard way that musical practice has generally been presented so it's very legible to an audience that is used to showing up to concerts. But the concert hall is a problematic space, there are a lot of expectations there about what audiences and performers are supposed to do and the formal concerns of experimental music, in particular, have a hard time interfacing with the outside world. It can feel like we're in the concert hall fretting about

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[22] Besides Wizard of Oz reference, oblique reference to: Alexander, Amy, Jahrmann, Margarete, Rokeby, David. "Pay attention to the Code behind the screen." (2003) http://thebot.org/notbot/text/codebehind.txt. Accessed 3 Jul. 2018.

pitch spaces and how to interpret a nested tuplet in a score while the visual arts have expanded out to include things like social practice and speculative design. Of course many musicians have more conceptual practices but I wonder how much that baggage of the concert hall makes it less attractive to practitioners in other fields, particularly when there are now so many possible ways of showing work digitally or in other looser kinds of spaces. I guess that's a question I have for you, particularly since previous projects have been done in lots of types of venues -- do you have any investment in that particular staged format? Or maybe, do you feel that the environment there is a hindrance to artists who are not used to those spaces?

[aa] I don't have a specific investment in that staged format. For most of my career, I've favored "public spaces" over "art spaces." E.g., the internet, the streets, night clubs; I've always liked to do art with broad audiences and where art isn't expected. I'd like in the future to do PIGS, and PIGS variants, in a variety of spaces -- outdoors, etc.   In particular, it'd be nice to expand the projection format; for now we are still projecting onto a rectangular screen, which is not entirely satisfying to me. However, other options can be more expensive (e.g. floating projections) or more difficult to find places where projections would be legible (this was always a challenge for Annina Rüst and I with the Discotrope urban space performances.) So it was necessary to start with a context and venues that could support the project technically. Now that we've got the kinks basically worked out, it can move on to terrorize less well-suited venues! Besides physical spaces, I've recently got recording/capture directly out from the system worked out, so we've just released our first "PIGS film." I'm also planning to try some Internet-based live streams centered on specific topics/events using PIGS visuals. We'll see how that goes, but it'd be nice to get back to the public space of Internet performance.

That said, over the years I've realized the lines between art museum / concert hall and public space can be blurry. (E.g. with "SVEN," my project that turns surveillance cameras into music videos, in the Whitney Museum we installed it into public spaces within the museum.) Concert halls are not inherently rarified spaces: people go to concerts. Ultimately, I'd like to expand the kind of concert situations where a PIGS type performance would take place. In my "utopian" world, when you'd go to a concert it'd be the norm to have a live visualist as part of the ensemble, performing visuals parts on a system that projects various forms throughout the space of the stage or concert hall. But -- the idea behind performing in concert halls in computer music research conferences is probably the same as it is for the musicians: to propose new approaches to performance that can extend to a variety of performance settings.

Potential: Visual rhythms in ensemble performance: from contemporary conditions to future prospects. On the problems of a history that never quite was.

[cm] One of the confusing things for audiences after our shows has been the division of labor; we are always getting asked how much of the sound you are making or what I'm contributing to the video. Particularly since they can see you hitting drum pads and I'm often using a less instrumental looking interface to control The Farm. So the other way that the format of what we're doing on stage looks familiar is that it has the appearance of an instrumental ensemble. Earlier in our discussion you started to talk about the kind of animated, frameless visuals you use as an inherently "percussive" instrument. Is that connected to this kind of instrumental ensemble playing as well?

[aa] It can be, indirectly. The "frameless" visuals would be the output of the instrument, and I think they are well suited to the percussive playing of PIGS. I guess I think of it intuitively as one integrated instrument. Even though I'm the one who mainly put it together, it's been awhile. But here's the thing: like most instruments, I see it as useful for either solo or ensemble playing. You could, e.g. make your own "Brakhage-style" film with it, by using a small subset of the animation options. But since we're focusing on ensemble playing, as one example: I envision PIGS -- and animation-based visual performance instruments in general -- as easily functioning as part of rhythm section. To make things easy, think of a traditional rock quartet line-up: lead guitar, rhythm guitar, bass, drums. They all play the same song at the same, but they all have different parts. Different bands have different line-ups: most have keyboard players now, some have one or zero guitars, and some have more than one percussionist. So live visuals could simply

function as one more part (i.e., the music definition of "part.") The difference between that approach and the more common contemporary approach to visuals -- usually semi-automated visual accompaniment that is subordinate to music -- is that it needs a human performer to deliberately *perform* (meaning consciously compose/improvise and play) a part.

Again, the rock band example was just to make an easy to understand example. The ensemble could be anything. By the way, audiovisual performance history includes hundreds of years of people trying to impose light scores into musical performance -- going back at least to the experimental color/music instruments of Arcimoldo in the sixteenth century and Castel in the eighteenth. Instrument building increased with the widespread availability of electricity in the early twentieth century, with artist/inventors like Alexander Scriabin and Mary Hallock Greenewalt actually producing written scores for color instruments performed with music. Some of those attempts at establishing mixed modal performance as a widespread model would have probably been more successful if not for the pragmatics of executing the performance (there's evidence that was the limitation for Scriabin.) It's more practical to execute visual performance in general now, but it's also become practical to develop more detailed performances (as opposed to the necessities of doing broad color washes a hundred years ago.) Personally, I also think with the ubiquity and immediacy of video in culture, there's more of a cultural specificity and urgency to visual performance than there once was. I suspect a major limitation to development of contemporary visual performance practices though, is the cynicism of the historical lens: people don't want to work on something that seems to be a hundred years old. But to equate contemporary approaches to visual performance to those of a hundred years ago seems reductive, just as it'd be reductive to dismiss music performance merely because it existed a hundred years ago.

What do you think? Can you envision a future where audiovisual performance isn't divided by sensory modality the way it is now? Maybe you'll add a visual component to The Farm without giving it a second thought? And bands will routinely include visualists? And -- flying cars! Am I being ridiculous?

[cm] I do wonder if a lot of the reason that computer musicians have gotten so involved is the ever-increasing sense that you can't have a real stage show without visuals. Especially once you start making at least part of the music algorithmically and you're already using an environment that can also generate visuals.

[aa] Good point. Hopefully, as performance and performers start becoming more integrated, cross-disciplinary literacy will increase: in terms of historical/cultural literacy, not just technical. Perhaps in addition to being trained in more than one instrument and studying music theory and history, it will be routine for musicians to study film history and theory -- and vice versa for visualists.

Well, now that we've got the future mapped out, from flying cars to thoroughly cross-disciplinarily trained crossmodal performers, perhaps this is a good place to end our interview. I'll see you on the dark side of the speaker.

[cm] Or -- when PIGS fly.