Poiesis and the performance practice of physically polyphonic notations

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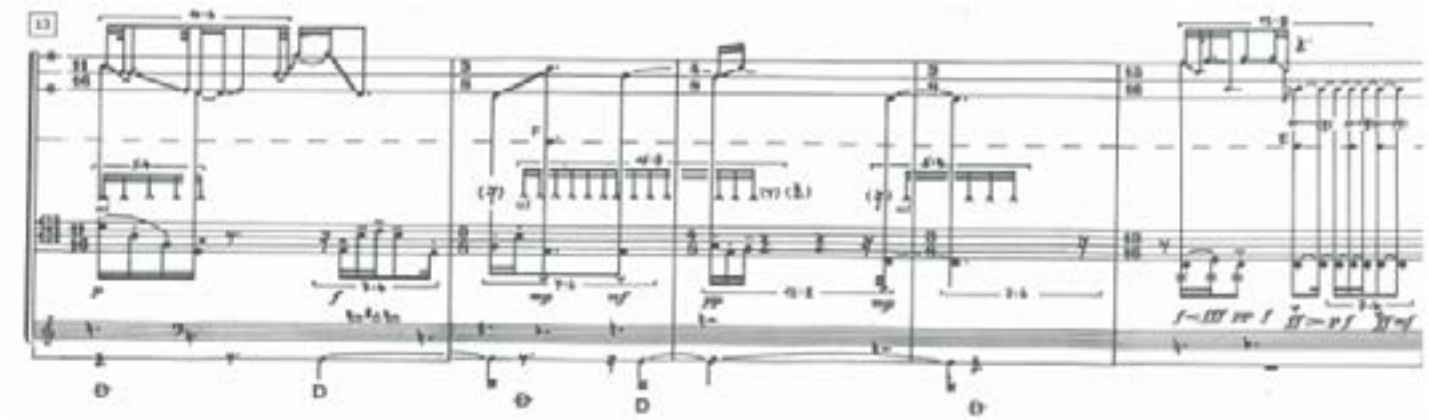
1. Introduction

1.0 Preamble

This thesis investigates the learning process in music as a locus for interaction and entanglement. Musical discourse is susceptible to compartmentalizing stages of agency: the genius composer alone at his desk, the virtuoso performer performing musical acrobatics onstage, the audience enraptured in their plush seats just beyond the fourth wall. Are these activities really so discrete? And if not, then how can one reveal the circulation between these chambers of activity? These questions have concerned me particularly as a performer of complex, avant-garde contemporary music. Many of the scores I perform have extremely complex notations, which serve as a barriers of entry not merely to casual listeners but even to highly trained classical musicians.



Klaus K. Hübler: *Cercar* for solo trombone (1983): mm. 13-17

The staves, from top to bottom, indicate slide position, valve action, diaphragm vibrato, harmonic partial, vocal action, and mute (either with mute (D) or without)

This remove is then exaggerated in performances, as hectic whirlwinds of virtuosity merely reinforce the distance between those initiated and those not. All of this serves, of course, to elevate these compositions and performances, and why should I complain, as a performer who benefits from the awe that these monoliths of complexity inspire? In spite of this, I always felt a great sense of unease in these situations, because the acceptance of these delineated roles of creativity—intellectual composition, virtuosic performance—elides the sometimes more complex intertwinings of these threads of action, creativity, and agency. I wanted to find a way to demystify these pieces and to celebrate, rather, the complexity and ingenuity that emerge in the course of the learning process.

To this end, I have focused this research on the means by which complexity and virtuosity emerge, holistically, through the learning process. Rather than fetishizing the final performance—which may still be a sea of complex polyrhythms overlaid in increasingly uncomfortable patterns on a performer's body—I have attempted to unearth the longer gestations through which an entanglement of creativities coalesce around new musical expression. These intersections of the creative process do not always occur in specific times and places, as will be examined more closely in the course of the study; nonetheless, in examining how the learning process exposes itself to this interplay of agencies, its situatedness in the performer's body becomes a crucible for entanglement. Although complex music can be fetishized as a feat of intellectual athleticism, it is often the result of a much longer incubation within the performer's body, as the intellectual stimuli are dissolved in solution, digested, and only subsequently embodied. My research has attempted to work through both the philosophical and experimental traditions of embodiment and situatedness, to find templates for learning that embrace the acts of doing and making as forms of knowledge production in and of themselves. I examine them not as means to executing knowledge, but as the loci where knowledge

is, in fact, generated. The learning process is not an intellectual, cognitive act that trickles down through the pliable body, but rather a creative process itself in which the body can and often must take the lead. Doing and making become the levers of intellection themselves, to the point where they can not only supplement but even supplant the consciously creative energies of the brain. I have used experimental music notations to foreground questions about how embodied learning can cultivate responsiveness in the face of ever-changing notational stimuli, which is to say, I have attempted to investigate how a single performative body can seamlessly adapt to new notational prompts with equally fresh creative learning strategies. This research project investigates how a performer can build a complex personal performance practice capable of satisfying standards of rigor and replicabaility, while still remaining flexible to the emerging possibilities (and constraints) that new notations invariably engender.

In this context, learning music may be viewed as a form of research-as-making. Throughout the thesis, the concept of emergence plays a key role: how can experimental research in music produce new knowledge without succumbing to teleological notions of performance subsumed to notational intention? In other words, I hope to create a space for engaging with notations that allows for artistic practices to emerge processually, creating an embodied research methodology that remains responsive to the changing notations it encounters. I seek to avoid situations in which expectations about notations and performances can preclude the responsive process of learning music with and within situated temporal and physical constraints. In order to construct this space, I narrow my research down to a specific type of music notations which I herein call "physical polyphony." As a compositional trend, the idea of decoupling discrete physical actions emerged in the late twentieth century and crept into a number of musical aesthetics, from graphic notations to the intricate notational palettes such as those associated with the New Complexity. From a performer's perspective, the fact that these notations represent a relatively circumscribed cross-section of notations which have nevertheless also contaminated a variety of compositional aesthetics made them an ideal laboratory for problematizing the learning process with respect to music. More specifically, as the proliferation of physically polyphonic notations has flourished, the only true criterion which all these notations share is precisely the manner in which they all differ from one another. This intrinsic variability of notational and physical parameters provides me a platform for investigating emergent research methodologies, such that each new piece undertaken can more easily problematize the entire learning process, from initially learning to read the notation to its eventual execution in performance.

In pursuit of new knowledge about embodied—or situated—learning, artistic research in music provides an extremely valuable point of departure. Because physically polyphonic notations cultivate a space for the holistic assimilation of new and variable stimuli, music has the capacity to enact research while embedded in a process of progressive—albeit singular—embodiment. Research in embodiment and learning requires some sort of processual embedding, and while this can in some ways be a hindrance—as such embedding is necessarily linked to personal or anecdotal practice—it can also be an advantage, as it allows processual transformations to be reified directly in the act of research. As previously stated, physically polyphonic notations provide a unique combination of notational stimuli that recur in everchanging, ceaseless transformation. This allows a personal research methodology to expose itself to a progressive series of notations and to experiment with learning strategies that optimize adaptability within a framework of replicability. In searching for models for this type of research, I found myself returning repeatedly to the fields of embodied cognition and anthropology. The latter, in particular, has always been forced to accommodate forms of research-in-practice, in this case because of its reliance on field research (although the conflict between theory- and field-based progression has been present as long as the discipline itself). Perhaps for this reason, it has also proven capable of producing reliable templates for embodied and

embedded knowledge production, such as the conceptual frameworks of way-faring and storytelling.

Tim Ingold's conception of way-faring, examined more closely in chapter 2, explores a notion of perpetual wandering in which maps emerge from the journey and are useful only until the next map and the next departure present themselves. Anna Löwenhaupt Tsing, whose work is also addressed in more detail in chapter 2, houses a similar idea within the ecological concept of disturbance. For Tsing, disturbance is a state of being, something that "is always in the middle of things: the term does not refer us to a harmonious state before disturbance. Disturbances follow other disturbances" (Tsing, 2015, p. 126). In charting a trajectory through the mutable landscape of disturbances, she chooses to house her research methodology within the framework of storytelling, in which development is necessarily processual. Unlike an academic study of literature, in which a concept and its discussion can exist external to the story, open to examination at any remove or duration, the act of storytelling demands a certain pacing and progression, a containment within the unfolding. Ingold's way-faring indicates a similar path, celebrating the situated vantage points that emerge through the research trajectory. He deems it not only acceptable but moreover advantageous that research require situatedness and welcomes shifting frames of reference. Another thinker who hovers over these pages, Donna Haraway, enthusiastically welcomes the partialities that emerge from such situatedness: "[W]e do not seek partiality for its own sake, but for the sake of the connections and unexpected openings situated knowledges make possible" (Haraway, 1991, p. 196). For Haraway, Ingold, and Tsing, partialities and disturbances make possible the generation of uniquely productive knowledge-producing activities. My research has sought to chart a similar way-faring journey through the realm of physical polyphony, in the hope that the maps that it unfolds might prepare the embarkation for some other journey with other vantage points.

Way-faring and storytelling become valuable tools for harnessing artistic practice as a form of research-in-practice. They become a means to harness anecdotal experience as a rigorous methodological framework: in this case, (personal, situated) learning is a methodology: a practice of epigenetic personal transformation through entanglement with other agencies (e.g. composer, notation). Embodiment and situated learning emerge as a practice-based medium for establishing responsive performance practices. This, of course, opens up the complicated question of how to judge what, exactly, it means to be responsive. Once again, I will turn here to the field of anthropology for guidance, mining the resources available within that discipline for models of value systems that embrace consistency alongside constant variation (which discussion occurs chiefly in chapter 1.1). The field of embodied cognition (treated in depth in chapter 3) provides a further useful model, though. In particular, the developments within the field of artificial intelligence over the last several decades have provided invaluable evidence for embodied research-as-practice. In the course of developing very constrained artificial intelligences, and in expanding those experiments over decades, this discipline has provided evidence within drastically simplified situations (i.e. reduced variables) for how intelligence and knowledge are produced emergently and situatedly. In the long progression from computationalism (the idea of intelligence as a computer) to radical embodied cognition (distinguished by situated, emergent enskilment), much evidence has emerged to support the idea that Haraway's situated partialities can underpin concrete, rigorous, and replicable learning strategies that simultaneously embrace embodiment, emergence, and response-ability.

With respect to music, I extrapolate two primary methods from the experimental traditions of radical embodied cognition. First, from the fields of artistic intelligence, I reference Pfeifer and Bongard's design principles for emergence (Pfeifer and Bongard, 2007, p. 87). These principles guide the construction of learning strategies for physically polyphonic notations that mirror those used in designing artificial intelligences, which serve chiefly to facilitate the emergence of efficient, adaptable learning strategies in robots. This integration of adaptation as a structural design element stands opposed to

a computational strategy that seeks to use pre-determined templates of performance practice to assimilate new stimuli into a pre-existing pattern of behavior. In order to maintain some level of rigor, I introduce also the tenets of a simple task analysis, as proposed by Wilson and Golonka (Wilson and Golonka, 2013, p. 2-3), which propose specific questions to reflect on this adaptive enskilment process, thereby providing a consistent means to assess the efficacy of the embodied learning strategies.

I map these emergent strategies onto various pieces of music, thereby highlighting aspects of musical performance that can be optimized that may otherwise be easily elided through more traditional, classical music learning models. Similarly, I address emergence as a valuable analytical tool, proposing it as a medium for theorizing the role of non-representational elements in music notation, which elements can similarly be overlooked or ignored in more traditional (harmonic- and rhythmic-based) musicology. I do not hope to challenge or supplant these other modes of learning, thinking, and analyzing, but nonetheless harbor hope that by elucidating the role of emergence and embodiment in learning and performing music, this thesis can enrich the already fertile terrain of musical interpretation. To add balance to these reflections and their relationship to more traditional modes of thinking, I provide a short appendix which examines other performers' journeys with some of the same pieces of music. It demonstrates that, far from existing in binary opposition to one another, traditional classical and emergent modes of learning entangle with and contaminate one another as each performer charts their own solutions to these musical problems. In the course of this research, I mine insights from these varied disciplines in order to develop targeted learning strategies within the context of physically polyphonic notations. It is to be hoped, of course, that these strategies can also migrate back into the disciplines from whence they came, that the contamination does not come to rest in physically polyphonic notations but rather runs back into other research practices, as well. Just as the targeted, bounded research done by Pfeifer and Bongard in robotics helps me to extrapolate the general principles of emergence and embodiment to the problems of learning music, I hope that by similarly focussing on applications of emergence and research-in-practice, my development of learning strategies for music can in turn influence also other researchers, be they roboticists, anthropologists, or others besides. By focussing on research-in-practice, I aim not only to aid other music performers engaging with physically polyphonic notations, but also to create frameworks for the practical application of embodiment that may also prove useful for interdisciplinary borrowing.

By focusing on the development of these research-in-practice strategies, I continually circle Hannah Arendt's conception of poiesis. While navigating these various transdisciplinary fields to support the development of effective artistic practices, Arendt's understanding of poiesis provides an invaluable model for a marriage of creativity and craftsmanship. For Arendt, poiesis demarcates the creative act within what she calls work, one leg of a triumvirate also including labor and action, all of which together describe the metabolistic survival and interaction of human society. As the creative expression of work, poiesis exists outside of strictly temporal, goal-oriented situations, and indicates instead the creative process of tool-building. The resultant tool may then be used to effect other learning and creative enskilments. This idea of a creative process geared towards the development of tools rather than objects proves extremely fertile as a support to artistic research-in-practice. It enables these reflections on enskilments to coalesce around concrete learning strategies that remain adaptable to the mutable mental and physical demands presented by each new physically polyphonic notation. It also encourages the metabolism of interdisciplinary research by which the specific tools developed in these pages may resonate further into other studies of music or other fields entirely. Those strategies, though, require a certain amount of way-faring, a certain amount of unfolding within these musical-notational topographies. This preamble serves as a short preliminary ambulation, a preface to the subsequent circumnavigations, contaminations, and disturbances that will allow a poietic performance practice to emerge. By the end, this thesis should indicate pathways by which new vantage points and performance practices can continue to develop, well beyond the few propositions contained in these pages, but before that, one must begin from the beginning, with an exploration of poiesis and its relationship to the creative process.

1.1 Poiesis: *Vita Activa* and Theories of Value

Poiesis, though as a word almost impossible to translate, has proven exceptionally fertile for transplantation to many different disciplines. In Greek, it sketches the outlines of an idiosyncratic concept of craftsmanship—a craftsmanship engaged in production as a literally creative/creating act, neither necessarily material nor immaterial. In addition to tasks considered craftsmanlike today, Greeks also used poiesis to describe the arts of both poetry and legislation, thereby underscoring the deliberative technical and aesthetic aspects of these creative acts, each both fabrication and handicraft. A combination of formal rigor and attention to social context constrains (or seems to constrain) these arts, but is nevertheless accompanied by a necessity to reimagine those constraints in order to stimulate the production of new ideas (as in poetry), civic functions (as in legislation), and relationships (as in both, of course). Poiesis construes the act of creativity as an open-ended utility. This utility is not about the simple conversion of material into new objects, but denotes rather a type of creating act both aesthetic and mundane, producing new objects, relations, or ideas that would in turn produce other things themselves. Giorgio Agamben elucidates the sense of creativity and production that the concept of poiesis evoked:

> The Greeks, to whom we owe all the categories through which we judge ourselves and the reality around us, made a clear distinction between poiesis (poiein, "to pro-duce" in the sense of bringing into being) and praxis (prattein, "to do" in the sense of acting). As we shall see, central to praxis was the idea of the will that finds its immediate expression in an act, while, by contrast, central to poiesis was the experience of pro-duction into presence, the fact that something passed from nonbeing to being, from concealment into the full light of the work. The essential character of poiesis was not its aspect as a practical and voluntary process but its being a mode of truth understood as unveiling, ἀ-λήθεια. (Agamben, 1994, p. 42)

Unveiling is itself a useful term, because although poiesis entails production, the unveiling process differs from the immediacy of action that Agamben ascribes to praxis. Unveiling is focused—teleological in a localized context—and yet opens outwards with an entropic, irreversible directionality. This directionality has an arc of unfolding; it requires some duration to incubate. This period of creative metabolizing effects the ultimately ateleological nature of poietic unveiling, through which it encourages ever new branchings of potential. Poietic creativity produces a tool, often with a predetermined purpose, but the tool-building process itself can also discover or create alternative uses. Poiesis emerges from this confluence of localized specificity and terminal indeterminacy, open-ended, but not unending. It is a process that can produce relations and alter the world around it, and yet still differs from both mundane acts of production and grand visions of dynamic, ceaseless transformation in the world. As such, the concept of poiesis helps to bridge a very simple but influential division between the study of objects and their set identities on the one hand, and the study of their relations in constant flux on the other. These two poles of understanding, themselves descended from the Greek tradition (Parmenidean and Heraclitean, respectively), have been at odds for much if not all of the history of Western thought. In diffracting these two modes of understanding through each other and pushing beyond this falsely binary impasse, Hannah Arendt developed her own distinct and unique theory of poiesis. In the present work, I will explore her interpretation of the concept and then present it as a methodological framework for learning physically polyphonic musical notations.

In *The Human Condition* (1958), Arendt outlines what she calls the *Vita Activa* (the active life), in which she centers her analysis of human society through a lens of activity and social relations. In contrast to much of Western philosophy, in which the human condition was examined through a lens of inner reflection, Arendt focuses rather on how human activity within the pluralistic domain of

social interaction comes to define the human condition. She identifies this active life (i.e. life within pluralism and social interaction) as the primary driver of creativity, among other things, and divides it into three key components of human character: labor (*animal laborans*), work (*homo faber*), and action (*zoon politikon*). She characterizes the differentiation of these three modalities of being so:

> Labor is the activity which corresponds to the biological process of the human body, whose spontaneous growth, metabolism, and eventual decay are bound to the vital necessities produced and fed into the life process by labor. The human condition of labor is life itself … Work provides an "artificial" world of things, distinctly different from all natural surroundings. Within its borders each individual life is housed, while this world itself is meant to outlast and transcend them all … Action, the only activity that goes on directly between men without the intermediary of things or matter, corresponds to the human condition of plurality, to the fact that men, not Man, live on the earth and inhabit the world … this plurality is specifically *the* condition … of all political life. (Arendt, 1958, p. 7)

Labor is organic, cyclic, unending; Arendt references Marx's description of labor as metabolistic. Work, by contrast, is focused on producing things ostensibly outside of time, which is to say, outside of the temporal cycle of labor. Work, for Arendt, produces things that survive beyond their use in labor and contribute to further creativity within and through those cycles. Action, in contrast to work and labor, is engagement in society. Action is centered on humans as political beings, where plurality and interaction are inevitable and indispensable. Action emerges from social relations and what it produces, creatively, are further refined social relations. Labor and work produce the context in which action can emerge. Each of these three elements correspond to a different level of human creativity, from labor as the most fundamental, metabolistic creativity that produces for immediate consumption in the service of basic needs, to action as the social realm where actions are produced in dynamic relation to others and move outward in ever-growing, concentric ripples of agency that belie easy reduction. Work, situated between these ends of the spectrum, is used to outline a totally different form of creativity, a poiesis, in which tools are built which will enable the further creative processes of both labor (metabolistic production of the means to living) and action (the dynamic production of social relations). For Arendt, poiesis is situated outside the cycles of both labor (production and consumption) and action (social interaction). Labor is the continuous (re)producing of material or immaterial products that provide the basis for continuous interaction in the social realm of the *Vita Activa*. Poietic creativity, in contrast, is situated distinctly outside the social and political arena of the *zoon politikon*, as its products—the tools themselves—are still contained in some definable way, outside the currents of history that swirl in the purely social realm. The tools, as they are used, open outwards into the world (and in so doing are often repurposed beyond their original design), but the creative process of tool-building itself occurs in an isolated space outside the metabolistic cycles of labor and action. For Arendt, this concept of the atemporality of tools is a crucial demarcator of poiesis; these tools will be used later to effect new forms of creativity. As a consequence of that, she envisions the creative act of tool-building as a radically different form of creativity than those involved in labor and action.

Each of these categories has a parallel in music and performance practice. When preparing a piece of music, any piece, there are discrete procedures involved that fit into all of these categories: the laborious, time-consuming tasks drilling isolated passages; the work of crafting a performance technique that enables this labor of learning pieces; and the public act of performing in society, exposing the fruits of creative labor and work to the public gaze. These elements—the metabolistic cycles of practicing that maintain musical practice, the tool-building phases that hone technical mastery, and the performances that release the creative act to social absorption—define the basic categories of performance practice. As a musician engaged in building a practice and learning

individual pieces of music, looking closely at these three Arendtian categories can reveal some of the ways in which conventional performance practice sometimes confuses these three discrete modalities in the construction of learning strategies.

In addressing specifically the learning process of music, it is often ignored or elided that there is in fact a huge and appreciable difference between the actual execution of difficult pieces in performance and the rather different process of learning them (in other words, the instantiation versus the gestation). If this distinction is properly parsed, though, we can identify two distinct types of pieces in addition to those that are difficult (or easy) both to learn and to execute: 1) pieces that are easy to learn but difficult to execute; and 2) those that are difficult to learn but subsequently easier to execute. The mere execution of difficult music (the instantiation of virtuosity) is not very interesting; how they are learned and incorporated into practice, though, triggers a fascinating set of questions about the performer's engagement with composers, notations, and most notably themselves (the gestative process of learning new skills). This study focuses on the difficulties present in a particular notational trend that arose in avant-garde classical music in the late twentieth century, physically polyphonic notations. These notations typically decouple different physical actions within a single performer's body, notating them as separate strands of polyphonically distinct voices which will then be incorporated into the performer's body in the act of learning and performing. As will be seen, these pieces actually come in a huge variety of styles and no two notations are the same (itself perhaps a more interesting departure from the traditions of classical notation than the decoupling of physical gestures itself). What unifies them more than a particular notational appearance is, in fact, the difficulties they present within the learning process. Engaging Arendt's modalities of creativity enables an elucidation of the learning process whereby the variability and adaptability that pieces such as these necessitate can be situated within the organic needs and potentialities of the performer's body. Poiesis, the unique creative process of *homo faber*, constructs the tools that enable creativity and labor, and so provides a useful organizing principle for a rigorously variable methodology of learning, as will be seen in the ensuing discussions of physically polyphonic repertoire for the trombone.[1]

The poietic act within Arendt's *Vita Activa* helps to propose a reimagination of performance practice. As she notes very clearly, the role of work is to produce what she refers to as tools. These tools are the "instruments which can ease the effort of labor considerably" (Arendt, 1958, p. 121). A tool in this case can be almost anything—remember, for example, the variety of acts considered poietic (e.g. poetry, legislation), all of which use a variety of physical and intellectual tools to produce new poems, laws, etc. In music, the development of tools can refer to embodied physical skills as much as to theoretical and mental constructs that enable one to approach a piece or a passage within a piece. And, just as with creative acts like poetry or legislation, the raw materials that enable the construction of these analytical or theoretical tools can be mined from the realm of action: that is, from the realm of plurality, where people meet and their differences and values encounter each other. This germination within plurality enables the effective construction of new tools and new creativities. The poietic act is a bridge between the realm of plurality where we encounter radically different pieces and demands, and the realm of labor where we internalize and effect the execution of one of these pieces in isolation. Arendt writes that, "[d]uring the work process, everything is judged in terms of suitability and usefulness for the desired end, and for nothing else" (Arendt, 1958, p. 153). This implies that the

1 The trombone itself is arbitrary. For the purposes of this study, I have limited my research to pieces that I have both learned and performed personally; as a trombonist, I have therefore been limited to pieces for trombone (with one brief exception in the conclusion). The products of this research on the learning process of physcially polyphonic notations are intended to extrapolate more generally beyond the purview of the trombone alone, and concern solely the activity of any instrumentalist facing the challenges of reading and learning these notations, rather than the specific performance practice of the trombone.

poietic act takes place within a specific context; work, unlike action, is localized. The production of a tool implies a goal for its initial use, the "desired end," by which the craftsman manipulates material to produce a tool that can effect that end. As with most tools in the hands of craftsmen, though, whether potters or poets, the localized goals that provoke the creation of a new tool are not the only situations in which that tool can come to bear.

This paradox sums up what can be so difficult about tool-building as it applies to the musical tasks of practice-building. Performers are driven to produce tools and practices that apply to a variety of contexts, and yet, each context will also demand new tools or modifications to existing ones. If, as Arendt writes, "the actual work of fabrication is performed under the guidance of a model in accordance with which the object is constructed" (Arendt, 1958, p. 140), then the model in question will change with every new piece of music, each of which will in turn provide a new model, and therefore a new impetus to the tool-builder, the practitioner. The correspondence between tools that maintain their use in new contexts and the necessity for new or varied tools provides the essential challenge in approaching experimental repertoire of any kind. Here, again, Arendt's spectrum of labor-work-action proves useful. Although the localized work of tool-building is task-specific, we must recall her observation that this work mines the "desired ends" of these tasks from the realm of action and the pluralistic motives and needs of society. In music, these pluralistic influences come from both the composer and the public, from the history of the instrument as well as its inherent potential outside of that tradition. All of these elements come to bear forcefully upon the musician engaged as *homo faber*, working dynamically to hone tools that enable the blossoming of creativity within the learning process.

Arendt points out, quite rightly, that these acts, and the intersections of action, work, and labor, are very much about the creation of values. After all, the act of tool-making is, as has been just examined, inherently teleological in the design and construction of specific tools, even as those tools themselves may inevitably outlive their initial teleologies. Poiesis is therefore also imbued with fundamental biases towards some system of values. That is to say, tools are imbued with fundamental purposes, however radically their eventual use may migrate from that initial conception. If these poietic acts are indeed intrinsically connected to the domains of labor and action, drawing motives from and then enabling cycles of creativity and action in both domains, then the values that determine the goals of the tool-building process become immensely critical. In other words, the system of values that determines the purpose(s) with which a tool is imbued matter. Arendt writes that, "[v]alues, in other words, in distinction from things or deeds or ideas, are never the products of a specific human activity, but come into being whenever any such products are drawn into the ever-changing relativity of exchange between members of society" (Arendt, 1958, p. 164). This relation to the scalable demands of metabolistic labor and social activity means that the poietic act, as it relates to the teleological design of enabling tools, is intensely susceptible to whatever value system guides that teleology. How those values are decided cannot be casual or lackadaisical. Too often, the use of tools (i.e. learning strategies, technical practices, etc.) create biases of values in the learning process, guiding a performer down one interpretive path or another based not on the idiosyncrasies of a particular piece or its notation, but on the idiosyncrasies of the pre-existing practice that may best be suited to one or another "desired end." To quote a common English adage, if all you have is a hammer, everything looks like a nail. Choosing (or using) the tools of performance practice in learning new music is no different.

Arendt diagnoses this confusion of ends as a "perplexity, inherent in all utilitarianism," which results from "an innate incapacity to understand the distinction between utility and meaningfulness, which we express linguistically by distinguishing between 'in order to' and 'for the sake of'" (Arendt, 1958, p. 154). Delineating the roles of creativity in Arendt's modalities reveals how these values come to be

reified in performance practice itself, wherein old biases of traditional techniques guide performers to interpret a new notation merely "in order to" achieve some resultant sound (i.e. the resultant sound is consequent to and hierarchically downstream from what the technique determines as idiomatic). Recasting that process "for the sake of" the notation and the resultant sound entails an entirely different approach to establishing values—the right and wrong, correct or incorrect, accurate or inaccurate of a musical interpretation. A poietic approach proposes establishing values "for the sake of," an alternative system in which those values are crafted and honed with respect to individual pieces, case by case and attuned to specific situational demands. The interpretive tools—everything from reading the notation to embodying the prescribed actions through instrumental practice—do not need to be invented completely anew over and over, but can be repeatedly reopened to the creative act of poiesis, the craftsmanlike commitment to building (new) tools, primed to optimize the creative process in each new task.[2]

Arendt's action-based philosophy is still rooted in political philosophy, and thereby concerns itself chiefly with closed systems (ancient Greece or Rome, modern nation-states or labor markets—that is, closed political and social systems). If we take seriously her statements that values emerge from the pluralism of the social and political domain, that is, the field of action, then such closed systems cannot suffice to understand how value can be mined therefrom. She writes herself that "action, moreover, no matter what its specific content, always establishes relationships and therefore has an inherent tendency to force open all limitations and cut across all boundaries" (Arendt, 1958, p. 190). Anthropologist David Graeber has explored precisely this question: "What if one did try to create a theory of value starting from the assumption that what is ultimately being evaluated are not things, but actions?" (Graeber, 2000, p. 49). Like Arendt, he sees social values as emerging from the relations that "cut across all boundaries," rendering the creation of value systems relevant and supplying the dynamic contexts in which those values emerge and fluctuate (as they inevitably do). "Value … can best be seen in this light as the way in which actions become meaningful to the actor by being incorporated in some larger, social totality—even if in many cases the totality in question exists primarily in the actor's imagination" (Graeber, 2000, p. xii).

The field of anthropology offers us open systems that explore the ramifications of both intra- and inter-cultural values. Graeber's work on a theory of values for anthropology takes action and interaction as the essential locus of value creation, as opposed to more object-oriented approaches favored by his anthropological predecessors, themselves based on either sociological, economic, or structuralist premises.

> There are, one might say, three large streams of thought that converge in the present term [value]. These are:
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> 1. 'values' in the sociological sense: conceptions of what is ultimately good, proper or desirable in human life
> 2. 'value' in the economic sense: the degree to which objects are desired, particularly, as measured by how much others are willing to give up to get them
> 3. 'value' in the linguistic sense, which goes back to the structural linguistics of Ferdinand de Saussure (1966), and might be most simply glossed as 'meaningful difference'
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> When anthropologists nowadays speak of 'value'—particularly, when they refer to 'value' in the singular when one writing twenty years ago would have spoken of 'values' in the plural—they are at the very least implying that the fact that all these things should be called

2 Although this thesis deals primarily with instances of physical polyphony, the final chapter explores several cases that extrapolate these processes to other notational strategies.

> by the same word is no coincidence. That ultimately, these are all refractions of the same thing. (Graeber, 2000, p. 1-2)

But Graeber moves in a much different direction, influenced by a handful of anthropological predecessors including Marilyn Strathern, Nancy Munn, and Terence Turner. He eschews an objective (or objectifying) approach, in which an object is a vessel that inherently contains some (fixed) specific value. This staticism afflicts all three of the examples listed above. For Graeber, "[v]alue, then, is realized mainly in the public, communal sphere, in the forms of concrete circulating media" (Graeber, 2000, p. 74). As does Arendt, he sees the roles that these items take on in the dynamic, pluralistic flux of society as the true containers of value, which is to say that value is stored not in the objects themselves but in the interstitial relations they share with others. And, again similarly to Arendt, he notes that this does not divorce value from the object itself, but actually entangles the object even more intimately with the material world that surrounds it, its valence thus emerging from a radiating network of other intertwined objects, media, and agencies. "This is the sort of materialism … that sees society as arising from creative action, but creative action as something that can never be separated from its concrete, material medium" (Graeber, 2000, p. 54). Value is generated, created by use, and imbued with meaning through that utility. Graeber sketches the same sort of paradox as Arendt's poiesis, in which the task-oriented construction of tools is subsumed into an unpredictable web of relations and engenders creativity and production both of and within that web of relations.

The interesting point for Graeber, though, is also how unconsciously this whole value-creating and -storing process emerges, which contributes to the very human tendency to presume that one's values are either objective or universal. He describes the way that social structures produce value through enacted and reenacted actions.

> 'Social structures'—like any other sort of structure—are really just patterns of action. But they are very complicated patterns: they not only coordinate all sorts of intentional human action, they are also the means through which actors are continually redefining and even remaking themselves at the same time as they are reproducing (and also inevitably, changing) the larger context through which all this takes place. (Graeber, 2000, p. 59)

This is rarely a conscious process, though. Graeber cites Jean Piaget, who also studied the development of knowledge and social structures using a framework of action rather than contemplation. Piaget relied heavily on Kurt Gödel, whose incompleteness theorems state that "in any consistent formal system *F* within which a certain amount of arithmetic can be carried out, there are statements of the language of *F* which can neither be proved nor disproved in *F* … such a formal system cannot prove that the system itself is consistent (assuming it is indeed consistent)" (Raatikainen, 2015, n.p.). Graeber uses Gödel's work on mathematical systems to help demonstrate that in order to have a theoretical understanding of one's actions and this construction of social space, a critical distance is necessary, just as in mathematics a higher order of complexity is necessary to prove any theorem. Such a vantage point from a higher order of complexity is rarely present in the quotidian web of social relations and actions that create values, though; "individual actors tend to be aware of only … the specific thing they are making or doing, the specific end they have in mind" (Graeber, 2000, p. 59). Rather than engaging a particular goal or value and consciously crafting their actions in the world around that, the opposite tends often to be the case. The systems of values and larger order structures that come to organize and make sense of these smaller actions are in fact creative products thereof. They are themselves rather more dynamic than static, typifying the emergent intertwining of creativity and utility that Agamben ascribes to poiesis. "The crucial point is that what we call structure is not something that exists prior to action. Ultimately, 'structure' is identical with the process of its own construction. Complex abstract systems are simply the way

actors come to understand the logic of their own interactions with the world" (Graeber, 2000, p. 61).

Piaget's work, though much of it is now debunked or fallen out of favor, provides a key to unlocking how this comes to be important for the interpretation of musical notations. In studying children, he examined how the solipsistic imaginations of objective values are gradually overcome. For Piaget, this occurs as children gradually outgrow their early egocentrism, recognizing slowly that other perspectives exist and must be accounted for. In Piaget's study of children, this informs many very basic interactions in the social sphere, from learning sharing or even dissembling. In anthropology, as well, the necessity of accounting for these cross-cultural perspectives is an obvious factor (though has still been too easily ignored on occasion). In music, however, this egocentrism is much less acknowledged, in part because it can occur more unconsciously and has been little discussed. The fact that it can elude consciousness or discussion, though, is itself a product of how easy it is in most situations to rely on pre-existing and pre-constructed practices (and thereby value systems) that have proven useful in the past. It is much easier to ignore the suggestion that different actions necessarily construct different values, and equally easy to overlook the fundamental idea that neither one technique nor another is inherently more true or correct than the other.

After all, value is a loaded word: good versus bad, right versus wrong, valid versus invalid—all these concepts come into play when we interpret music, whether we like it or not. I propose engaging with physically polyphonic pieces analogously to the pluralistic conceptions of Arendt and Graeber, recognizing that "value is not *created* in that public recognition. Rather, what is being recognized is something that was, in a sense, already there" (Graeber, 2000, p. 77). If these structures are consubstantial with the actions that create them, then we have the opportunity to embrace our own agency in choosing which actions we take to provoke the emergence of the values that pertain in each situation. We have to meet these pieces in a field of plurality, recognizing what is very obvious anthropologically, namely, that every place (or piece) can have a separate system of values, of right and wrong, good and bad, and that that is not only appropriate but necessary, if not inevitable. "Development, in turn, becomes a matter of internalizing the fact that other [subjective perspectives on the world] are possible; or, to put it a bit more technically, creating structures which are really the coordination of different possible perspectives" (Graeber, 2000, p. 63). From a critical distance that acknowledges these variable perspectives, we may engage with a piece from our own role as an implicated observer, and then come to terms with the particular, localized set of values that is demanded or offered by the situation, which includes the demands of instrumentations, notations, composers and audiences, etc. All of these elements can and will be constructed anew in each situation (as the following chapters will explore), even if ultimately some previous values or interpretive decisions still pertain. How this poietic construction of values unfolds in practice should become apparent as the study progresses.

Poiesis provides a methodology for embodying particular actions that contribute to the creative process of value creation in the pluralistic domain of music. Embracing theoretical constructs that allow us to approach a piece on its own terms—and not on our own or other preconceived terms—allows us to overcome the childish egocentrism of the performer embedded in a static practice. It allows us to embrace the itinerant and exploratory role that we have as performers. The piece is not a visitor to us, forced to integrate into our own values. We are all plural to each other, and we must approach the piece responsive to how our interactions with it will uncover a set of values that is uniquely tailored to the specific situation. We must develop cooperatively with a notation, crafting tools that enable the performer and the notation to both most efficiently embody their creativity in each local task. *This* is the poietic act: constructing tools and methodologies to engage responsively with each individual piece's physical and mental demands. If a structuralist system of values seeks meaningful difference, than a poietic system of values seeks instead *meaningful interaction*.

1.2 Poiesis as Musical Method

I. Vinko Globokar: *Echanges* (1973)

But what does this look like in practice? A poietic approach eschews the impulse to approach scores looking for footholds that conform to our preexisting values of execution. Rather, we must experiment with a piece physically and mentally to find the points where meaningful interactions appear, where different parameters rub against each other and interfere or cooperate most dramatically. These moments of meaningful interaction help us to empirically determine a productive theory of values for an individual piece, but how it does so may always vary.

Vinko Globokar's solo *Echanges* (1973) poses a few serious problems for the performer (in this case, any player of a brass instrument). The score is comprised of a collection of successive boxes, each indicating four parameters: mouthpiece, articulation, dynamic, and mute, each of which in turn has four variations.

Vinko Globokar: *Echanges* (1973), excerpt
The indications to the left explain the four parameters and their respective four variations. Each box within the score on the right contains one marking for each parameter.

The four physical parameters are meant to be in constant flux, overlapping within a constant stream of activity and sound. When playing the score verbatim, though, box by box in the order prescribed, it simply doesn't work. The changes from box to box are too synchronous, such that pauses would be inevitable in any literal reading of the text, in direct contradiction to Globokar's indicated priority of unceasing sound, activity, and especially energy. When making so many simultaneous changes (of mute, articulation, mouthpiece, etc.), the sound is inevitably broken, inconsistent, fragmented. In order to overcome this and to maximize the energetic qualities of the piece, Globokar instructs that the performer "should develop a version derived from the prescribed material" of the score (Globokar, 1973, p. ii).[3] Globokar's own performances bear this out; they are typified by a constant stream of evolving, metamorphosing sound as he charts his own course through the notated boxes.

3 "Ausgehend von dem vorgeschriebenen Material soll der Blechbläser eine Version ausarbeiten, in welcher durch den Wechsel der Mundstücke oder der Dämpfer keine Pause entsteht" (Globokar, 1973, p. ii; trans. mine).

Perhaps for this reason, it is almost never played. It is impossible to read through it strictly and denotatively, and yet, at the same time, improvising is also completely out of the question, given the clearly circumscribed gestural and sonic vocabulary of the piece. To prepare *Echanges*, I had to develop a different way to approach the piece, because after attempting a typical reading of the score, or even just a rearrangement of the score—as the performance notes at first seem to suggest—clearly did not suffice. In some ways, that is part of the ingenuity of Globokar's system here, in that it does not allow the performer any option to work traditionally, precluding the escape hatch of habitual practice. They will at some point run into these paradoxes and contradictions and be forced to work their way out of it (or perhaps, into it).

I spent many hours working on the types of actions and gestures in the boxes, working with the instrument and with the mouthpieces and mutes required, reading Globokar's essays on his own works, and listening to his own recordings while carefully marking his own trajectory through the jungle of parameters. Practicing various boxes alone gave me an understanding of the piece's logic and vocabulary, sensing physically and slowly more intuitively the patterns of action that construct the operational system of values for this piece. By being responsive to the demands of the augmented instrument and to Globokar's more general aesthetic identity, I was able to internalize the priorities that emerge from the parameters as they interact, interfere with, and amplify each other. By building a set of tools for engaging with the technical elements of the different mouthpieces and the embodied logic of constantly swapping mouthpieces and mutes (which demands a unique sitting posture since both arms are often away from the instrument), I was able to construct a value system for the piece that was not an intellectual reaction to the score, but an embodied construction assembled alongside and diffracted through the score.

Three examples show this transition: 1) a literal reading of the score (with all changes occurring from box to box simultaneously); 2) a version with transitions between boxes merely obscured and elided; and finally, 3) an expression of the precise language of the piece delivered more intuitively than recitatorily. When Globokar requests that the performer "develop a version derived from the prescribed material," he is in fact implying this higher-level abduction from the notation, in which the vocabulary of the circumscribed language is internalized to the point where replication is replaced by recursivity.

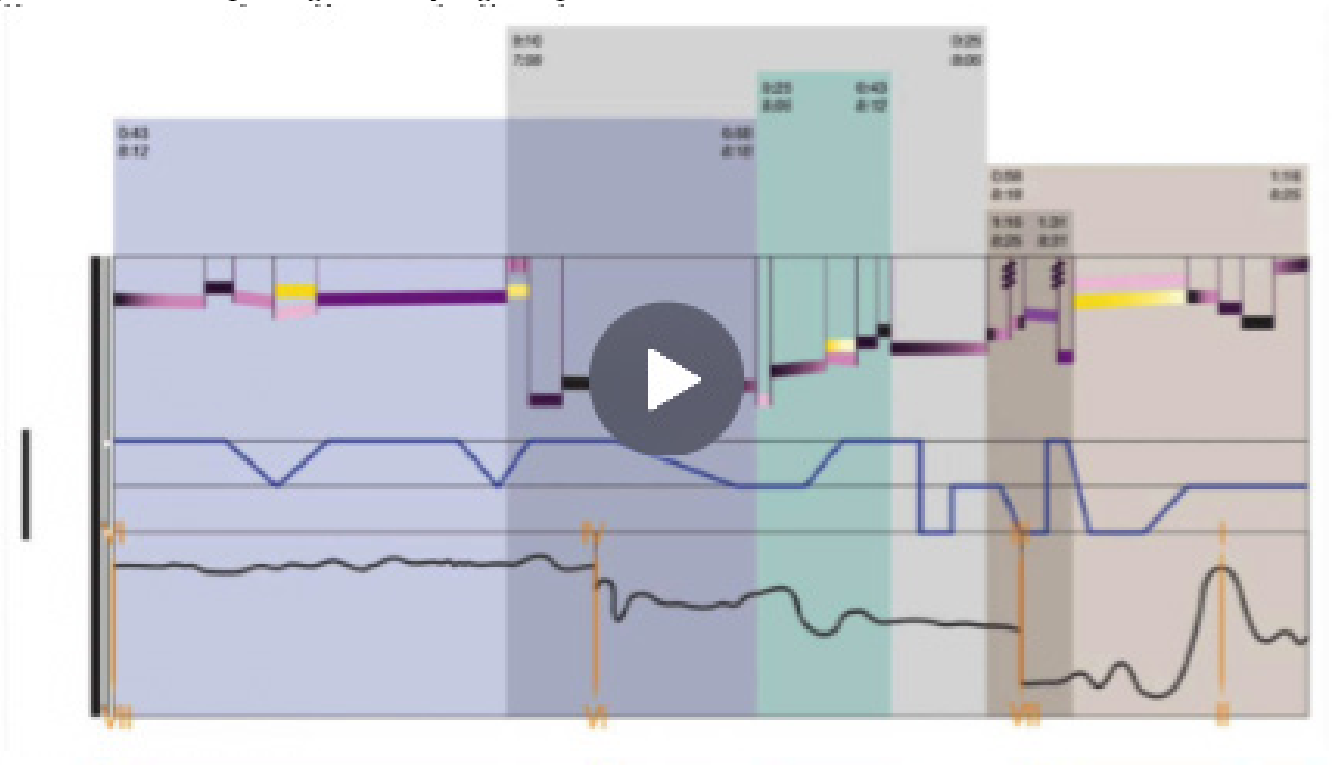
The poietic process entailed disorienting myself from my own personal practices and biases and listening responsively to the score as a living rather than static document. In this case, for this one piece, I arrived at a theoretical approach that allowed me to perform it in a convincingly idiomatic but still very precise language. This poietic methodology deprivileges authorial intent as an *objective* indicator of what constitutes a right or wrong interpretation, but it does nevertheless allow for an interplay between the composer's interventions or statements and the performer's trajectory in learning and performing the piece. In my case, at the same time as I learned *Echanges*, I also learned *Res/As/Ex/Ins-pirer*, another solo piece of Globokar's for brass instrument from the same cycle, *Laboratorium*. Unlike with *Echanges*, I did find myself capable of performing *Res/As/Ex/Ins-pirer* verbatim, performing every box as written and in the order they appeared on the page. Interestingly, Globokar's responses to hearing these pieces revealed his commitment to the preferences of abduction over reiteration stated in the scores. Although I was able to play the material of *Res/As/Ex/Ins-pirer* very precisely, and although it was technically completely accurate, it was lacking something more important for Vinko, something that he expected to emerge intuitively through the energy of the piece. The values with which I had ended up approaching the piece failed, despite all of the preparation I had done, dutifully faithful to the denotative prompts of the score and very precise in seemingly objective ways. In contrast to that, Globokar was completely satisfied and practically elated with my performance of *Echanges*, which emerged from a more complex study of the vocabulary of the score, enunciated by my own performative energy. Globokar's overwhelming affirmation of this abductive learning strategy is, of course, reflected in his performance notes; and yet, like many conservatory trained musicians, I found myself hesitant to embrace it fully. I desired to play the exact notes on the page, and so to elide my own agency in reifying the performative energy of the piece. After working with Globokar, I found myself moving very radically in the opposite direction: I not only embraced fully my poietic contribution to *Echanges* and relearned *Res/As/Ex/Ins-pirer* in the same mode, I also began to actively adapt this learning strategy to other pieces, as well. The experience was, for me, a lesson in exactly how important this sort of responsiveness is in approaching a piece—it is absolutely critical to be able to construct a compatible system of values by which to be precise, because not all forms of precision are the same. There are too many different ways to be accurate. Adaptability, in this respect, becomes an invaluable part of the performer's arsenal.

As a performer and composer both, Globokar exemplifies this approach. *Echanges* is, once again, a useful example, as the composer was also the first performer of the work before going on to play it nearly 300 times in 30 years. Globokar insists that as a composer, he gives himself up completely to his fantasy, writing whatever he imagines irrespective of its technical difficulty or realizability. Only afterwards, once the piece is complete, does he pick up the instrument and begin to look for solutions to the problems of his own notation (conversation with the author, 19 October 2018). This division of labor is very telling. Although *Echanges* was written in the early years of Globokar's role at IRCAM as its first head of instrumental and vocal research, he insists that it was not written as a means of research, and that specific experimentation with the technical effects of the piece (notably, the use of different mouthpieces or, in *Res/As/Ex/Ins-pirer*, ingressive playing) was not a part of his compositional method. In *Echanges*, he notes only an obsession with the idea of parameters, which was in those years very much a part of the *Zeitgeist*, and referred all discussion of the gestational process not to compositional or even individual work, but to his collaborations with colleagues at the time, both improvisational and in notated music. As such, the almost romantic fantasy of composition Globokar describes emerges as a borderland isolated between the two bodies of more situated knowledge: the first built in collaboration with his colleagues while experimenting in the field; and the second built through his retrospective engagement with the score as he searches for performative solutions to his own fanciful score in personal, embodied practice (conversation with the author, 16 June 2019). This predilection for finding both questions and solutions not through intellection

but through embodied practice is one example of a poietic approach, capable of building creative learning strategies responsive to localized, situated performance problems. Globokar embraces the fact that actions construct systems and their values emergently, and therefore eschews the impulse to over-dramatize the intellectual components of the score-reading process in a piece like *Echanges*. Rather, he designs a notational system that closes off the possibility of a normal, classical approach, and implicitly welcomes the performer to construct an interpretive system actively, by embodying the demands of the piece in real time and allowing the poietic construction of a methodology to emerge organically from that engagement. In doing so, the performer constructs a unique conception of accuracy rooted more in the energy and dynamism of the piece's 'changes' than in the denotative replication of particular boxes of material. This approach can only be arrived at through active interaction with the piece and a poietic approach that welcomes the entanglement of score and performer and their collaborative construction of tools to develop unique creative expressions.

II. Joan Arnau Pàmies: *[Vltbn]^4 (o quatre panells per a trombó sol) (2013)*

Joan Arnau Pàmies's work poses many very interesting and completely different problems for a potential interpreter. His first trombone solo, *[Vltbn]^4 (o quatre panells per a trombó sol)* (Pàmies, 2013b), uses a parametric approach that splits up pitch (upper staff, with vocal material in yellow), valve (middle staff) and slide position (both shape of motion and varying regions of the slide given by boundary positions in roman numerals). Furthermore, he notates what he calls "*temporal displacement notation*," (Pàmies, 2013a, p. 179), in which time stamps are given for the performance of fragments from the passage in varying temporal durations.



Joan Arnau Pàmies: *[Vltbn]^4 (o quatre panells per a trombó sol) (2013)*, panel I
The piece begins at zero minutes and ten seconds (ten seconds after beginning the stopwatch), and each box is marked with the time stamps at which that passage will begin and end in the upper left and right hand corners, respectively. As the notation is performed twice through in different instrumental configurations, the lower time stamps in italics refer to the second passage through the four panels.

For a performer intent on breaking into this score, one of the first and most interesting aspects is the pitch notation. No pitches are given, nor is the range even precisely specified, only that the "vertical position of the violet lines indicates (higher/lower) approximate register only in relation to the harmonic series. Specific partials are not indicated" (Pàmies, 2013b, p. 5). This leaves quite a lot up to the performer. To give an idea of how much is left to the performer, here are two versions with markings to show potential pitch organization: on the left, treble and bass clef staffs have been superposed on the score to show where pitches might lie given an even distribution visually; on the right, the partials are indicated, meaning that as the distance between the partials increases in the upper register, the rate of change in pitch decreases.

Excerpt from the author's score showing two versions of interpreting pitch: on the left, a more or less even pitch gradation show by a grand staff from four ledger lines below the bass clef to the top of the treble clef (an average proficient range for a professional trombonist); on the right, a similar range notated with each harmonic partial separate (as comparison to the left, the four Bb's from below the bass clef staff to the middle of the treble clef staff can be seen as partials 1, 2, 4, and 8)

Both readings are equally valid, and can even both be considered conventional as they respectively adhere to different aspects of traditional trombone performance practice. And yet, the first notated pitch line in the green box would be around a D below the bass clef in version 1, but around a G at the top of the bass clef in version 2—more than an octave difference! Perhaps even more troublingly, unlike in some other pieces where the relative pitch information is given by very thin, comparatively precise lines, the pitch here is notated in large bands. Essentially, any line could be interpreted anywhere within a range of a third to even a fifth. How does one do this 'precisely' when such a broad range of possibilities all seem equally valid?

A poietic approach would look at these parameters and question whether the specific pitch is the most important criterion. Perhaps, given the biases of traditional performance practice, these concerns about the specific pitch are a distraction from rather than a support for a responsive (response-able) learning strategy. In preparing this piece myself, I resolved this impasse by seeking more recordings of Pàmies's work and reading his published writings. In doing so, I found that these interpretive problems were not a byproduct but a central component of his work. In his 2013 essay *Noise-interstate(s): towards a subtextual formalization* (2013a), Pàmies outlines a compositional approach that embraces the constructive aspects of noise in information theory.

In information theory, noise was always acknowledged as a natural component of any communications system, but was originally only formulated as an element subtracting from and obscuring semantic content, called equivocation.[4] Only later, through the work of Henri Atlan,[5] did this equivocation come to be seen as a potentially productive phenomenon, a surplus not only of information but also of potential. Atlan, a biophysicist, identified situations in which "it is possible to imagine a viewpoint in which the equivocation is constructive rather than intrusive, for example when it causes a system to re-organize itself at a higher level of complexity" (Hayles, 1988, p. 3-4, quoted in Pàmies, 2013a, 175-6). Following the previous discussions of Arendt and Graeber, this formulation immediately invites associations with the poietic provocation to creativity in

4 cf. Shannon, Claude E. (1948). A Mathematical Theory of Communication. *Bell System Technical Journal*, 27(3,4).

5 cf. Atlan, Henri. (1974). On a Formal Definition of Organization. *Journal of Theoretical Biology*, 45, 295–304.

unpredictable situations and the construction of values through enactive structural processes. This use of equivocation and noise as constructive, integral components of the compositional process is the hallmark of Pàmies's noise-interstate:

> The noise-interstate is a psychological state that exists within the performer's psyche during the interpretive process of my work. Its primary goal is to contribute to the elaboration of multiple potential sonic outcomes whose particularities share certain essential characteristics among themselves and in relation to the original musical score. While the identity of the resulting music stays intact, the noise-interstate diversifies the potential interpretations of the work, thus presenting a greater degree of sonic variation across a number of performances … What I propose is an approach to notation that allows the noise-interstate to intervene. (Pàmies, 2013a, p. 177)

Pàmies is adamant throughout that the interventions of the noise-interstate can be reserved for particular qualitative elements, and do not justify liberties taken by the performer with respect to information recorded more efficiently. In his own words:

> The type of reorganization that takes place during performance is not left completely to the performer's discretion but instead assists in the redistribution of potential sonic relationships in such a way that the piece is dimensionalized but its integrity remains intact. The performer is thus capable of creating degrees of variance, which may suggest unaccountable formal paths that transcend both the peculiarities and the original implications of the compositional process of the piece. (Pàmies, 2013a, p. 177)

This approach, though it seems to reflect a certain conservatism with respect to the division of labor between composer and performer, resonates strongly with the task-oriented nature of Arendt's poietic act. Rather than reinventing whole swathes of behavior, the craftsman designing interpretive tools within Pàmies's noise-interstate must be responsive to the qualities and quantities of equivocation present, and must then tailor the resultant learning strategies to the types of potential afforded by the physical and mental demands of the piece.

In learning *[Vltbn]^4 (o quatre panells per a trombó sol)*, I took the ambiguities in the pitch material as opportunities. As with Globokar's piece, I allowed physical experimentation with the piece to guide me, rather than beginning from a point of externalized intellection. Pàmies writes in the performance notes to the piece, "**The use of a stopwatch is required during rehearsal as well as in performance**" (Pàmies, 2013b, p. 2, emphasis in original). Although this may seem to be an excessive micro-managing of the learning process, it is really an attempt to gently guide the performer towards this type of emergent learning strategy, wherein the logic of the piece is felt in the real-time embodied demands of the shifting tempi and the resultant transformations in the physical logic of the gestures. Actually practicing that way, with a stopwatch on from the very beginning, forces the performer to immediately reckon with the composed equivocation.[6] The performer then builds the tools for effecting this creative process, solving the riddles of deliberate equivocation, allowing the actions themselves to develop the structures that will govern their interpretation.

Practically, this means that the piece takes on a much noisier character. In a piece of more traditional music, in which the precision of pitch is typically very high in the hierarchy of interpretational importance, I always prioritize the cleanliness of that parameter. In *[Vltbn]^4 (o quatre panells per a*

6 Pàmies also writes: "Therefore, it is strictly discouraged that the performer facilitates this notation into a more conventional practice (i.e., standard notation), for that would miss the potential multiplicity of sonic outcomes when performing from the original score" (2013a, p. 2).

trombó sol), though, that parameter takes on a much different character. When allowing the execution of the pitch bands to occur simultaneously and with equal attention to the slide and valve motions (all within the fluctuating flow of the temporal displacement notation), the lips inevitably find spaces between partials, voicing noiser multiphonic textures in place of cleanly articulated pitches. This is accentuated by the motion that is present in almost every pitch band: each band, particularly those of long duration, contains some small motion and is almost never static, but that motion is typically carried over the entire duration. These long, slow motions in the lips, attempting to incorporate very small pitch gradations over a period of time, interfere with the slide positions. Even when a pitch is articulated cleanly and the lips find a stable partial upon which to land, the sudden changes in slide position or the slow motion of the lips up or down inevitably move away from that cleanliness and find other, more liminal, noisy textures. This effect is only accentuated by the extreme dynamic demands and the layered vocal material that further distorts the sonic texture. The time spent practicing within these peripheries of technique, for example on the borders of harmonic partials or dynamic stability, make possible the further abductive leap that Pàmies desires, namely, that this will engender not only a noisier texture, but also inculcate a willingness to mine these liminalities for "the elaboration of multiple potential sonic outcomes" (Pàmies, 2013a, p. 177).

As a performer, one must take a great leap of faith to embrace an approach like this. Everything in my conservatory training prepared me to prioritize certain parameters, especially pitch, and the impulse to do so can override specific notational directions to the contrary in even the most intrepid experimental performer. In the case of *[Vltbn]^4 (o quatre panells per a trombó sol)*, Pàmies has designed the score and requested specific practice strategies that guide the performer into allowing certain physical interactions with the notation to explore sonic textures outside the realm of traditional performance practice. Trusting this process is perhaps the most difficult part for a performer, for it means overriding many deeply ingrained impulses. In doing so, though, a whole new method of interacting with the instrument is opened up, developing new skills tailored to the unique demands of the piece and demonstrating a virtuosity that emerges from the task-specific questions posed by the notation. One of the hardest biases to overcome is the idea that, by performing these noisy textures, one will sound 'out of control,' like a trombonist deliberately failing. In my personal experience performing this piece, though, that has been anything but the case. Once the trust in this learning strategy bears fruit, the resultant sound, for all of its noisy texture and less-than-classical pitch accuracy, retains a great degree of control and intentionality, which audiences seem to intuitively grasp.

Learning to be responsive to—and to collaborate in developing—a system of values that prioritizes deliberate equivocation and noise-interstates over clearly articulated classical control is a skill in itself. The chapters that follow will continue to explore how this skill can be nurtured, so that a virtuosity of execution can be accompanied by an equal virtuosity of learning, but these first two examples help to outline the strategies by which a performer can begin to build responsivity to the task-specific demands of individual notations. Poiesis describes the methodology by which this can be achieved. It is a form of handicraft, in which the craftsman's responsiveness to the material she is working with may and must vary from piece to piece. It is the craftsman's responsiveness to the milieu in which she works: the plurality of society and the dynamic, constantly reenacted set of values at play in any situation. Poiesis demands a commitment to creating tools to facilitate the physical and mental creativity required in order to meet each piece on its own terms, as a unique individual and agent in the search for meaningful interaction.

1.3 Physically Polyphonic Notations

I will be using the term physically polyphonic notation to indicate several varied but related trends within music composition that arose in the second half of the twentieth century and expanded radically at the beginning of the twenty-first. In its simplest form, physically polyphonic notations can be described as notations that isolate distinct physical actions and gestures and notate them separately and asynchronously from one another. This can occur in many ways, but the most prevalent notational format for recording these sorts of decoupled actions is a tablature.[7] The idea of using a tablature to decouple and dissociate strands of activity considered unified and holistic in traditional performance practice can be traced back to compositional developments from the twentieth century, especially but not only total or integral serialism. Earlier experiments with the parameterization of individual musical elements certainly existed, perhaps most famously in the Second Viennese School's serialization of pitch class. Other experiments existed as well, from isomorphic parameterizations of tempo in the *Ars Nova* even up to Stravinsky's method of stratifying temporal relationships (though this was first discussed analytically in the 1950's, cf. Cone, 1962). With respect to the parameterization—whether serial or not—of multiple musical elements simultaneously, and specifically the polyphonization of explicit physicality rather than of musical semantic items, the story begins more recently.

In *Mode de valeurs et d'intensité* (1949), Olivier Messiaen composed a short study parameterizing not only pitch (which had already been extensively parameterized, most famously by the serialization of Arnold Schoenberg and the Second Viennese School) but also durations, attacks, and dynamics. Although he himself would already leave this idea behind in the ensuing years, his role leading the early Darmstädter Ferienkurse für Neue Musik exposed a younger generation to these ideas, and they in turn became a central component of the aesthetic that emerged from that milieu in the following decades, notably in the work of composers such as Pierre Boulez, Karlheinz Stockhausen, and Luigi Nono. Boulez's own massive work from 1951, *Structures Ia*, exemplified this approach, far surpassing previous parameterizations (such as Messiaen's in *Mode de valeurs et d'intensité*) and encompassing a much more ambitious treatment of the four parameters of pitch, duration, articulation, and dynamics.

These early investigations were particularly augmented by the advent of electronic music. In the early studio for electroacoustic composition in Cologne, Karlheinz Stockhausen was particularly outspoken about the potential offered by delimiting different musical parameters and composing them separately. He described his understanding of these parameters in his highly influential essay "…HOW TIME PASSES…" (1959), detailing the ultimate consubstantiality of rhythm and pitch: a rhythm sped up transitions into a low pitch, and then, sped up further, into any other higher pitch within the realm of audibility; furthermore, changes in internal rhythm contribute to timbral variety. Stockhausen later summed up this development very tellingly, noting that "once such a continuum becomes available, you can control it, you can compose it, you can organize it" (Stockhausen, 1971, p. 93).

In the same period, indeterminacy proposed another means of decoupling parameters of musical expression, such as in John Cage's *Variations*. In *Variations I*, a map of dots with a transparency containing five lines overlaid force the performer to interpret five different parameters (relative pitch, duration, amplitude, order, and noisiness) by measuring or interpreting the distances from points to lines (which vary depending on the pages of the score that are used, hence the title).

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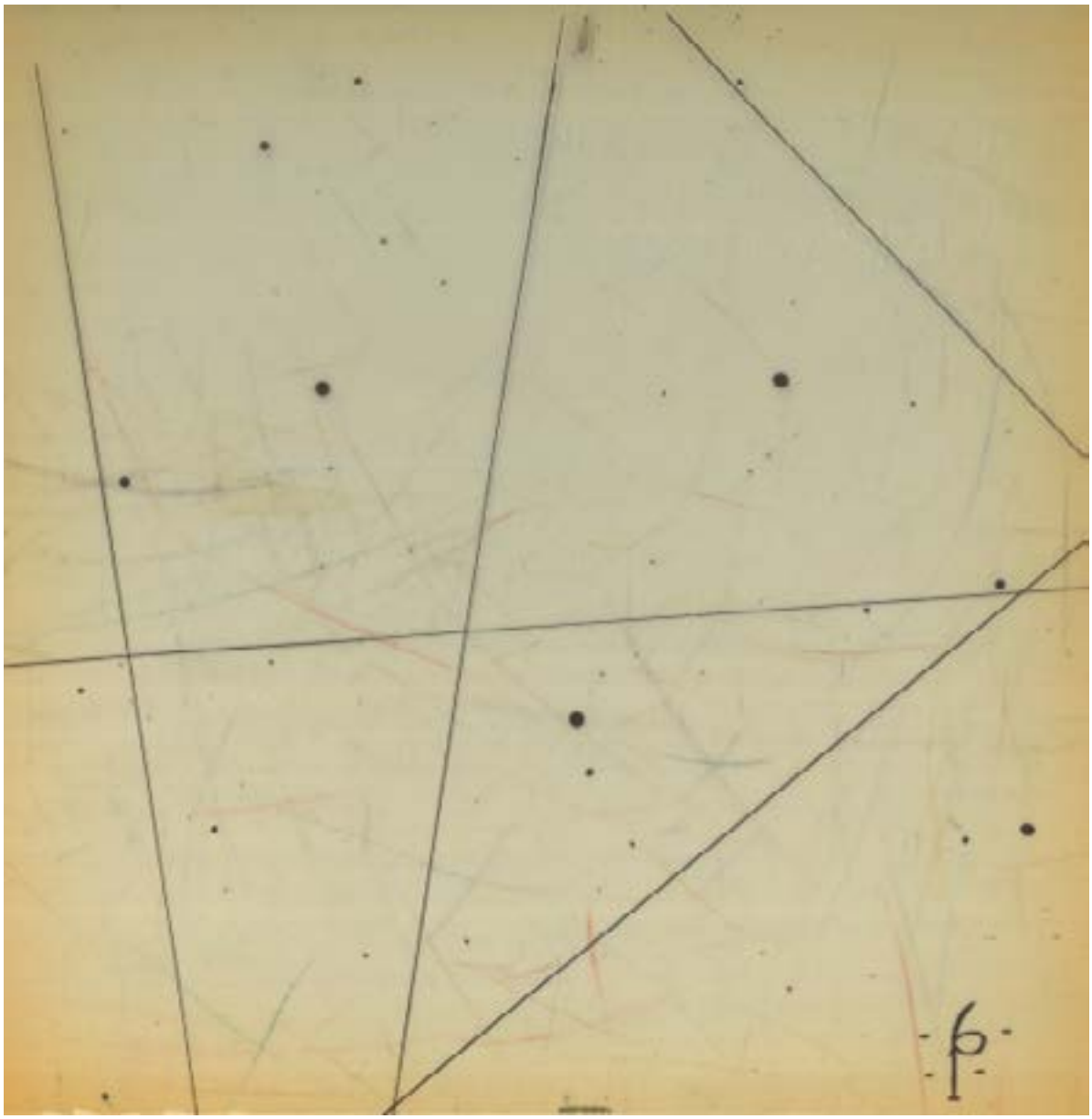
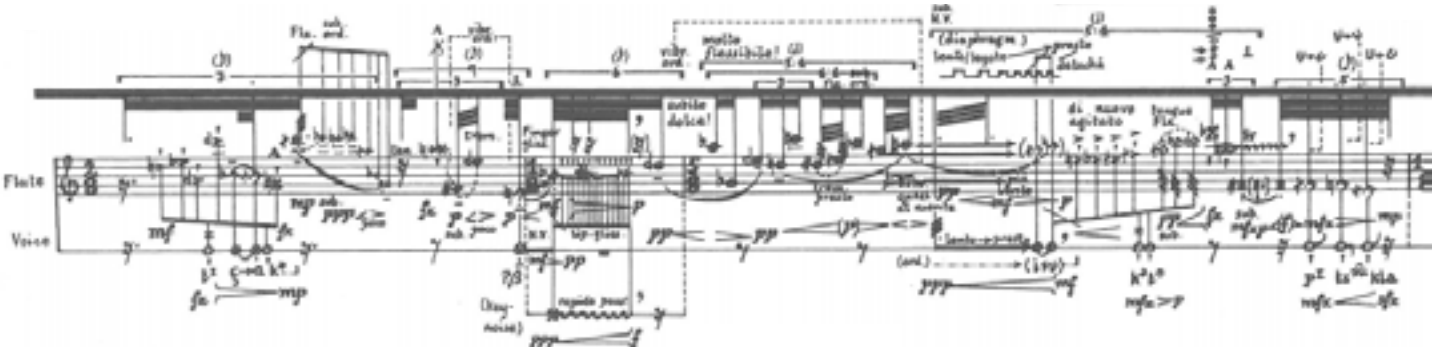
7 Tablature notations specifically will be explored more fully in 3.2 Tablature, Shared Performance and Klaus K. Hübler's *Cercar*.



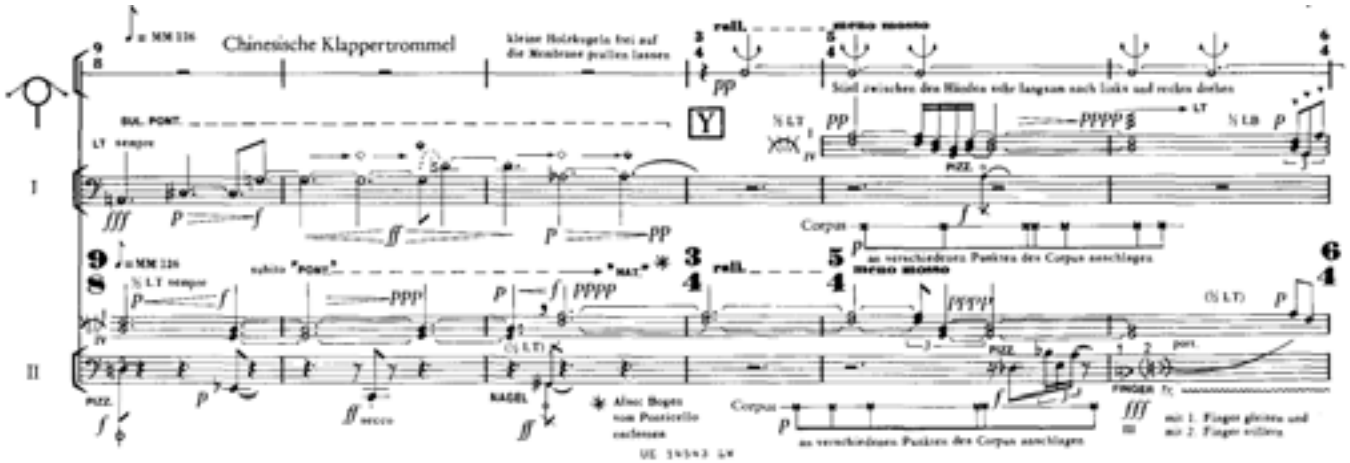
John Cage: *Variations I* (1958), transparencies 1 and 6, overlaid
The performance instructions indicate that each dot is to be interpreted with respect to its distance from each of the five lines, which respectively indicate "lowest frequency, simplest overtone structure, greatest amplitude, least duration, and earliest occurence" (Cage, 1958, p. 1)

Whether as a result of intellection such as Stockhausen's or Cagean straitjackets of indeterminate prescription, the temptation to control seems to permeate much of the early experimentation in parameterized physical actions. In fact, the dissociation of elements along these continuums was itself a deconstruction of technique. As these trends evolved beyond their serialized instantiations, they became characterized by exertions of control that threatened to perforate the physical possibilities of a single performer's body, as in the works of Brian Ferneyhough, where multi-stave notation is used to facilitate the prescription of detailed directions for not only played notes, but also mouth-shape and vocal activity.

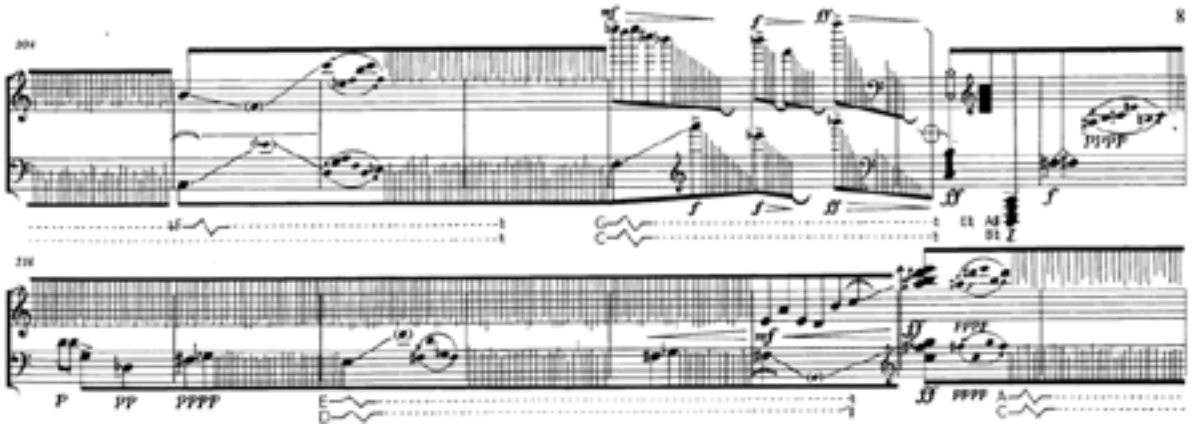


Brian Ferneyhough: *Unity Capsule* for solo flute (1975), p. 2
In addition to the many indications vying for the performer's attention in the primary staff, there are additional layers of vocal and key noises beneath; note the stems that run from the beams down through all three staves, indicating a synchronous if complicated superposition of actions

Although connected to elements of increasing control, early experiments with tablature notations in Western experimental classical music are characterized more by a parameterization of physicality than of musical elements. The earliest examples date to Mauricio Kagel's reconstruction of the cello as a theatrical competitor in *Match* (1966) and some of Luciano Berio's experiments with instrumental technique in early *Sequenzas* for harp (1962) and trombone (1966).



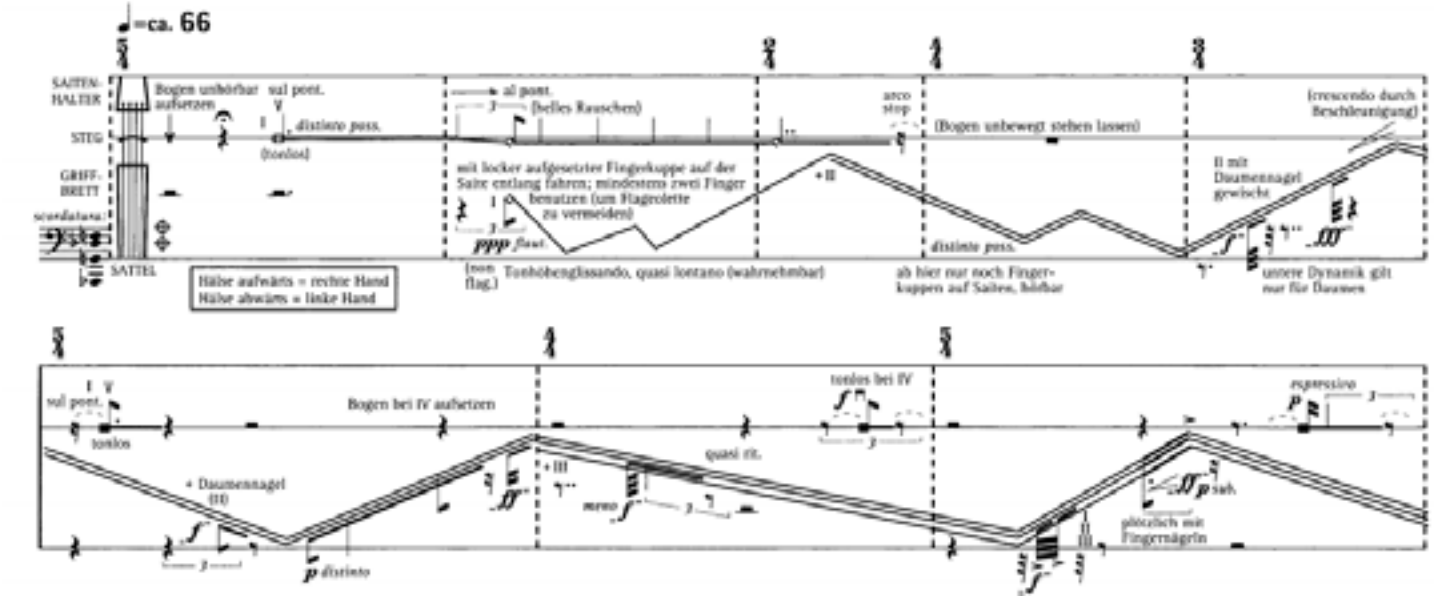
Mauricio Kagel: *Match* for two cellists and percussion (1966), p. 18
Most notable are the indications for the cellists (I and II) to strike the body (corpus) of the instrument, notated asynchronously but graphically



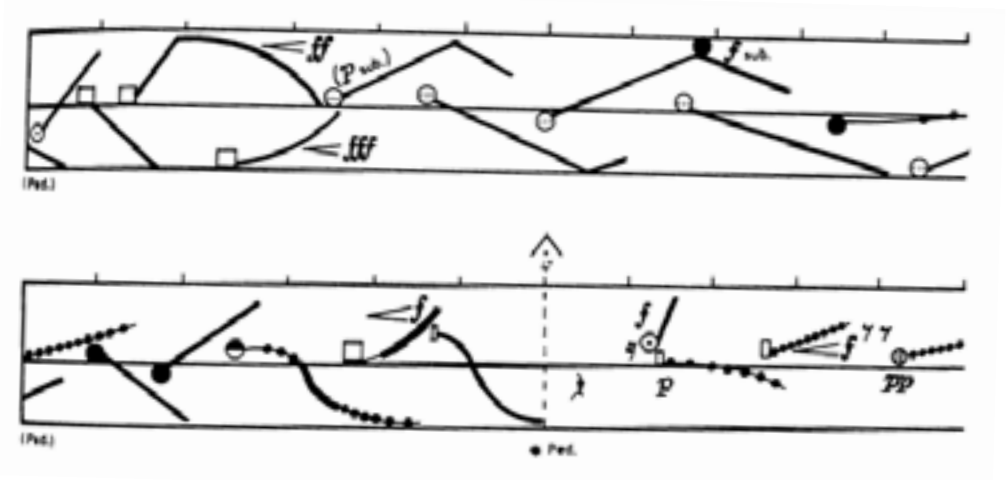
Luciano Berio: *Sequenza II* for harp (1962), p. 8
The pedal notation indicates foot motion that is continuous and dissociated from both the notated parts in the hands and, occasionally, from one another; these motions begin synchronously with other musical actions but continue independently

These examples evolve from a disassembly of the instrument, and yet notably, maintain a high degree of synchronicity between the multiple strands of activity. As with the multi-staff notation above, these tablature notations seem to embrace parameterization for primarily organizational purposes, facilitating the accurate transmission of superposed but synchronous actions. In the case of Kagel, for example, this tablaturization follows similar, highly physicalized notations in other works (e.g. *Music for Renaissance Instruments* of the same year, 1966) and seems to extrapolate from those notations of gesture a further choreography of indeterminately asynchronous actions (as in the example from *Match*, above). Moments of asynchrony, as in the imprecise pedal notations in Berio or the gradations of change implied by oral actions in Ferneyhough, are ancillary rather than primary material.

At this point, these two strands of parameterization (of musical elements and of tablaturized physicality) were connected mainly by their exertions of increasing control over the agency of the performer. It is when these notations began to break into asynchrony that they emerged as true compositional trends. Although the tablatures of Berio maintain rather strict homophonic rhythmic relationships, shortly after this period, the tablature notations in Helmut Lachenmann's works of the late 1960's would initiate a disassembly of idiomatic actions into occasionally asynchronous and decoupled layers of activity.



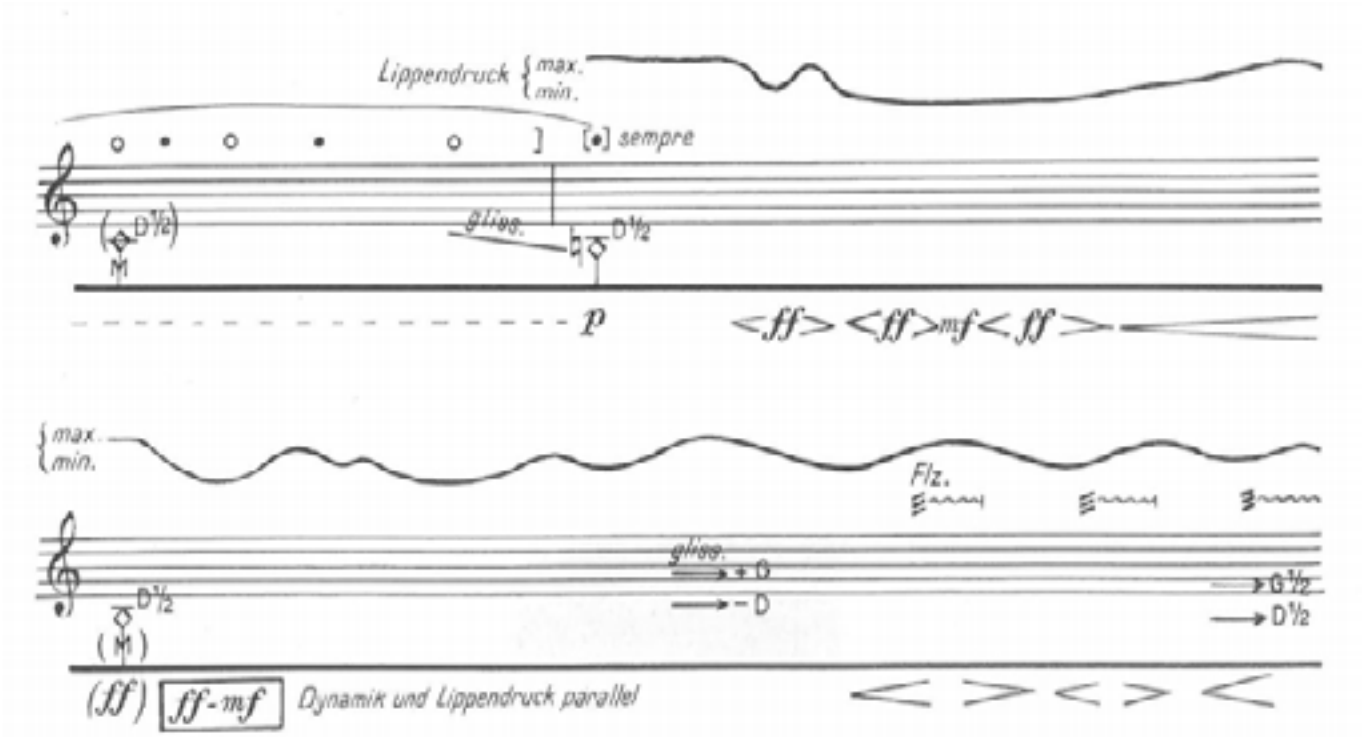
Helmut Lachenmann: *Pression* for solo cello (1969), p. 1



Helmut Lachenmann: *Guero* for solo piano (1970), p. 4
Both of these scores show multiple actions overlaid, e.g. the isolated actions in *Pression* that are notated above and below the more continuous lines indicating bow motion, and the polyphonic hand motions that are superposed on one another in *Guero*

Lachenmann termed his compositional style *instrumental musique concrete*, a direct homage to the electroacoustic *musique concrète* of Pierre Schaeffer, in whose studio Stockhausen studied and experimented with the electronic manipulation of parameters that would prompt his later pronouncements on the potential of parameterization (Tutschku, 1999, p. 30). Lachenmann's use of the term also indicated a commitment to exploring the idiomatic capacities of the performer-instrument interface that then reveals the fault lines between physical body parts that he exploited in these heavily graphic notations.

Similar patterns would emerge in other notations, such as Heinz Holliger's notation in *Studie über Mehrklänge* (1976), which, though reminiscent of Berio's notations, breaks into asynchronous, polyphonic layers of activity reminiscent of Lachenmann's *instrumental musique concrete*.



Heinz Holliger: *Studie über Mehrklänge* for solo oboe (1976): p. 1
Note the tablature notation of lip pressure that enters above the primary staff, decoupled here from dynamic action and flutter tongue articulation

One overwhelming trend should by now be clear: despite the complex web of associations and mutual influences that are clearly present, no two notations are the same, even from the same composer. Somehow, the exploration of physical polyphony as an organizational principle for notation has proven resistant to systemization, even within single composers' works. Although certainly minor, superficial similarities can be noted and accounted for, the clear diversity of directions that these notations mine seems to be an inherent trait of this notation, one which continues to be evident in works up to the present day. It is this fact, in stark contrast to previous parameterizations such as integral serialism, that sets apart physically polyphonic notations as a subset of repertoire demanding attention: more than perhaps any other trend in notation, it is the variability of notations rather than their similarities that proves to be the defining feature of the set.

This remains true even as these trends diversified. The repertoire most heavily associated with physical parameterization comes from the 1980's and a second heyday of the Darmstädter Ferienkurse, the latter often linked to the influence of Brian Ferneyhough (Hockley, 2018, p. 2). In this decade, a number of young composers began experimenting with increasing and increasingly

diverse systematizations of complexity, a trend coined by Richard Toop in his famous essay on "Four Facets of the New Complexity" (1988). Although not one of the young composers addressed in Toop's essay, Klaus K. Hübler's radical experiments with physical polyphony would come to be hugely influential on the ensuing development of trends associated with New Complexity.[8] In fact, it is largely due to this influence that physical polyphony is seen today as overwhelmingly associated with this period and style of composition, despite its much longer lineage, as detailed above. Since Hübler, an increasing number of composers have begun to make use of similar notations, from Richard Barrett and Claus Steffen-Mahnkopf, to Aaron Cassidy and Wieland Hoban, to a younger generation including Joan Arnau Pàmies, Sehyung Kim, Andrew Greenwald, et al. The proliferation of composers experimenting in this tradition has only increased its diversity.

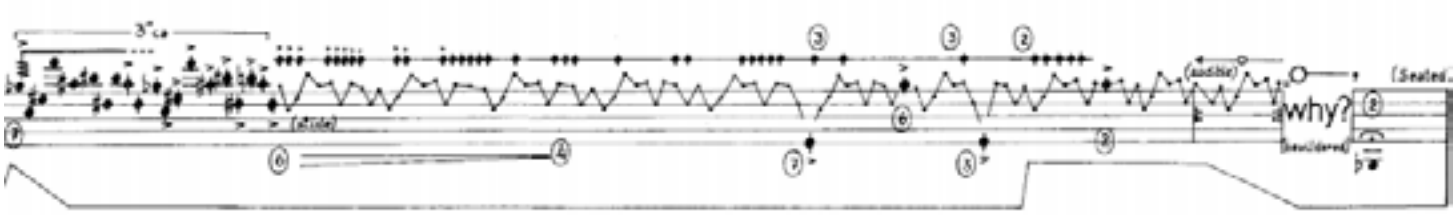
As has been noted, originally, there were two more or less distinct trends—serialized or serial-influenced parameterization and tablaturization—that merged increasingly despite the proliferation of diversity within notations demonstrating aspects of physical polyphony. Given the variety afforded by such notations, I propose two distinct criteria in the course of this research by which repertoire can be identified and organized. The first, noted already, is the identification of *variability* as a defining feature. The second is *asynchrony*. As has been seen, certain obvious early experiments with these notations are not strictly polyphonic in their treatment of physicality, and even later, there remain tablature notations that are both asynchronous (decoupled) and synchronous (coupled). What these two elements (variability and asynchrony) demarcate is not an aesthetic boundary but a barrier to entry in the learning process.

This dissertation is concerned with performance practice and the learning process of physically polyphonic works. As such, it focuses on the experience of the performer, not on an analysis of compositional methods. This repertoire presents itself as a uniquely unified group despite its aesthetic and technical variety because of its unique demands in the learning process. Ever since I first began playing this repertoire, I have been continually struck by the wall that these notations present to even many very adventurous new music specialists. I invariably receive admiring respect for my ambition and fortitude in tackling these pieces from players who, as I well know, perform other pieces that are in fact more virtuosic and challenging from a purely technical, instrumental standpoint. I always wondered, what is it that is so intimidating to them? And why does my willingness to embark on these pieces instill in them such respect, or even envy? After many years of reflection, and after noting carefully which pieces seem to provoke these responses, it has become quite clear to me that the technical difficulty of a piece has little or nothing to do with the barrier of entry that it presents to the performer. Rather, the disorientation from traditional technique required to reimagine instrumental practice when approaching these experimental notations seems to be the primary—if not only—defining feature demarcating the limits of the repertoire that resides behind this barrier of entry. These disorientations are necessitated not only by the truly polyphonic treatment of physicality, but also by the fact that each new piece presents a different version of that polyphony, demanding thereby different dis- and re-assemblies of instrumental practice. It is for this reason that, in organizing the purview of this research, I deliberately omitted some pieces that display obvious tablaturized and physicalized notations, while including others that might seem out of place in respect only to the consistency of aesthetic or compositional trends. This will become clear in a short review of the specific trombone literature.

The first piece to use overt tablature notation for the trombone is the aforementioned *Sequenza V* (1966) of Berio. In the piece, Berio notates the plunger mute on a separate staff, where it moves from open to close synchronously with the played actions on the normal staff, occasionally rattling

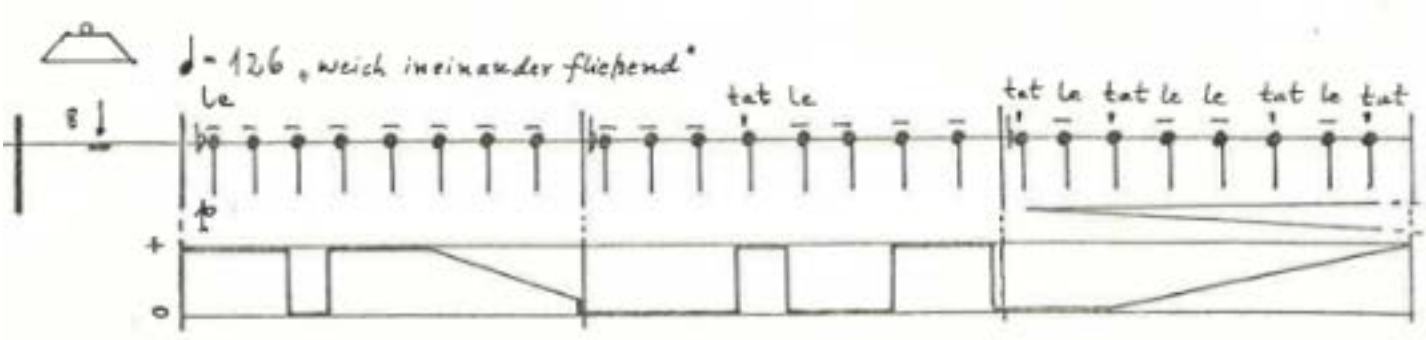
8 For a more in-depth discussion of Hübler's music and the development of his notation in this period, please see section 3.2 Tablature, Shared Performance, and Klaus K. Hübler's *Cercar*.

in the bell during sustained notes (both played and sung). Although the mute action remains strictly homophonic, there is also one interesting outburst of physical polyphony at the end of the introduction (part A), where the slide and articulation become decoupled graphically, to which notation many different players have found varying solutions. This vagueness of intention perhaps limited the influence of the passage as an example of physical polyphony. The mute writing, though, influenced many composers, such as Nikolaus A. Huber, whose *Presente* makes use of the same homophonic decoupling.



Luciano Berio: *Sequenza V* for solo trombone (1966): p. 1, part A
As the notated pitches disappear, the remaining graphic notation indicates a decoupling of slide and articulation.

Luciano Berio: *Sequenza V* for solo trombone (1966): p. 1, part B
Note the line below the staff, which notates left hand mute action (plunger mute) separately from but synchronously with actions in the primary staff



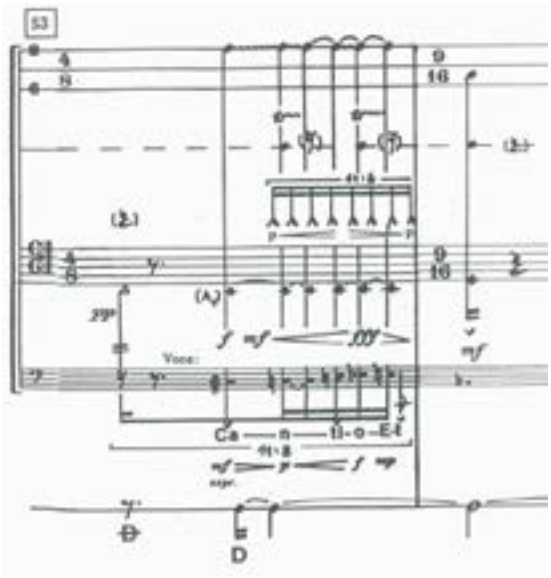
Nikolaus A. Huber: *Presente* (1979): p. 4, system 1

Berio's notation is a huge departure from previous trombone pieces, but its intense demands are rather more physical than notational. *Echanges*, Globokar's solo from 1973, is the opposite; although the techniques required to perform the notated gestures on the variety of mouthpieces and mutes are not terribly demanding, the disorientation of traditional performance practice is. Globokar wrote the piece while preoccupied with issues of musical parameters,[9] and the piece demands a constant, dynamic interchange of four different parameters simultaneously and, effectively, asynchronously (as detailed above, cf. section 1.2).

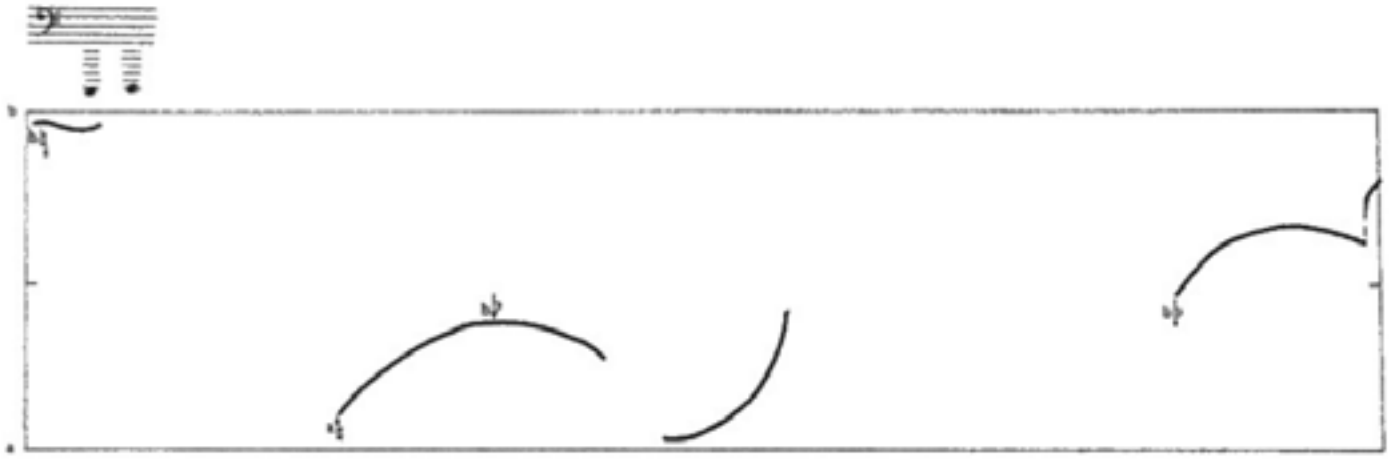
Globokar's notation, although not tablaturized in any specific way, makes use of superposed parametric changes to demand a physically polyphonic learning and performance strategy of

9 Interestingly, as with many of Globokar's works, in spite of the prevalence of noisy and unpredictable techniques and timbres, he retains a strict serial organization to pitch content, in this case deriving all normally pitched material from one of his favorite all-interval tone rows.

the performer, unlike the complicated but ultimately still rather traditional demands of the Berio *Sequenza*. The drastically, incomparably richer performance history of *Sequenza V*, while perhaps due not only to this reason, underscores dramatically the barrier of entry that physically polyphonic works pose in contrast to tablaturized works that maintain a strong connection to traditional performance practice and coupled notations. A similar split occurs with the two famous tablaturized notations for trombone solo from the early 1980's, Klaus K. Hübler's *Cercar* (1983) and John Cage's *Ryoanji* (1985).



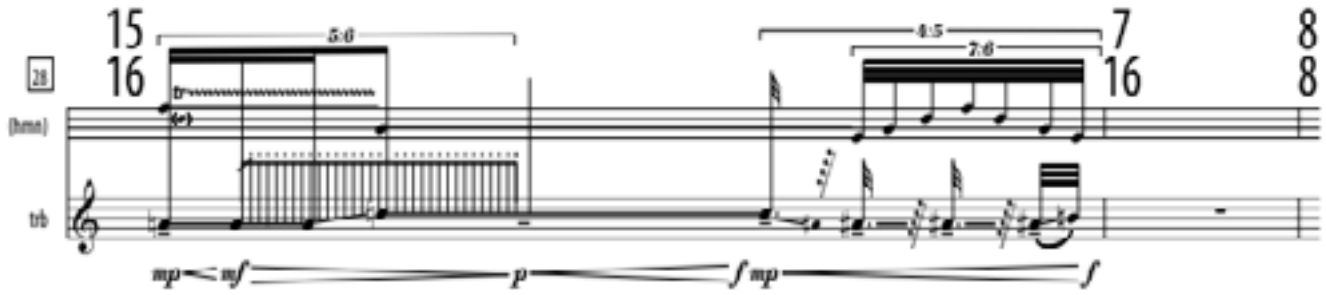
Klaus K. Hübler: *Cercar* for solo trombone (1983): p. 7
The staves, from top to bottom, indicate slide position, valve action, diaphragm vibrato, harmonic partial, vocal action, and mute (either with mute (D) or without)



John Cage: *Ryoanji* for solo trombone with obligato percussion (1985): p. 6
The lines in the box indicate played notes (all *glissandi*) within the specified range

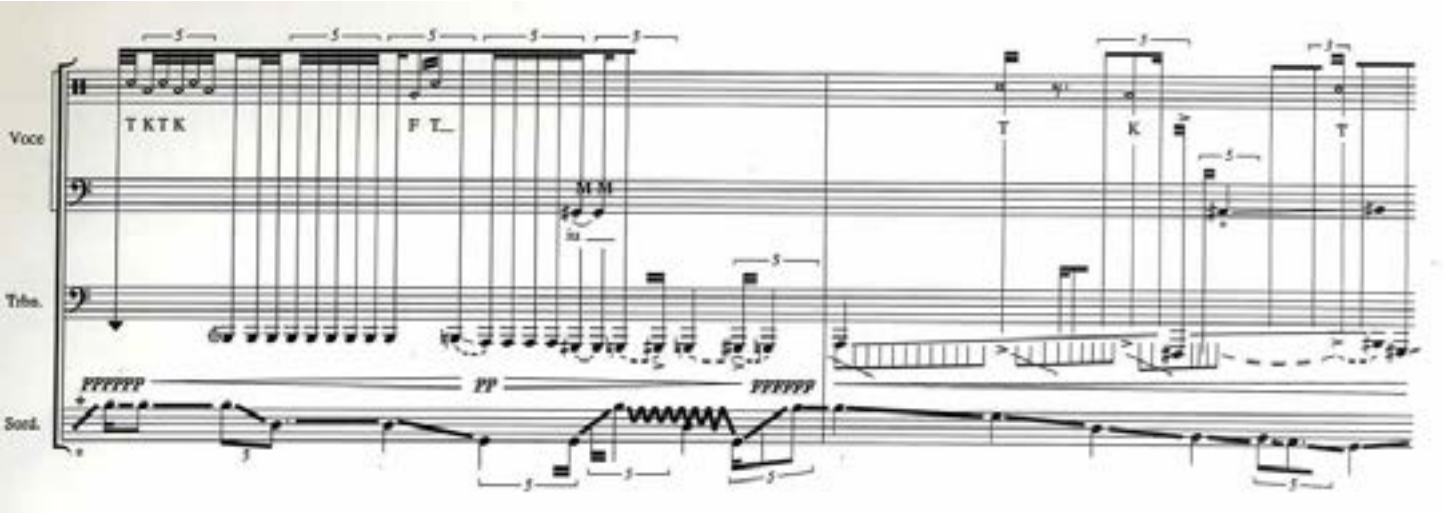
Cage's notation is a fairly rudimentary tablature expressing one-dimensional slide motion across time (with pitch references written in), and as with the Berio, its difficulties are primarily technical (in this case, the extreme low register). Hübler's solo, though, contains an extremely thorough decoupled tablature notation, containing a complex tapestry of polyphonic physical activity, as will be discussed at length in section 3.2. Cage's piece, though not as popular as Berio's *Sequenza*, also enjoys a much richer performance history than Hübler's piece, which stands in the repertoire as a monolith of complexity and notational difficulty.

Following Hübler's tablature, which parameterizes virtually every possible element of trombone technique, a number of other composers began to slowly incorporate physical polyphony into their writing for the trombone, mirroring his influence and the general trends in the broader repertoire. Richard Barrett explores decoupled trombone notations in several works, including both of his earlier works for trombone, *EARTH* (1987-88) and *basalt* (1990-91),[10] as well as more recently in *membrane* (2017-19).



Richard Barrett: *membrane, IV. song* (2017-19): mm. 28-29
In this movement, the upper staff indicates gradations of opening and closing the harmon (i.e., wawa) mute

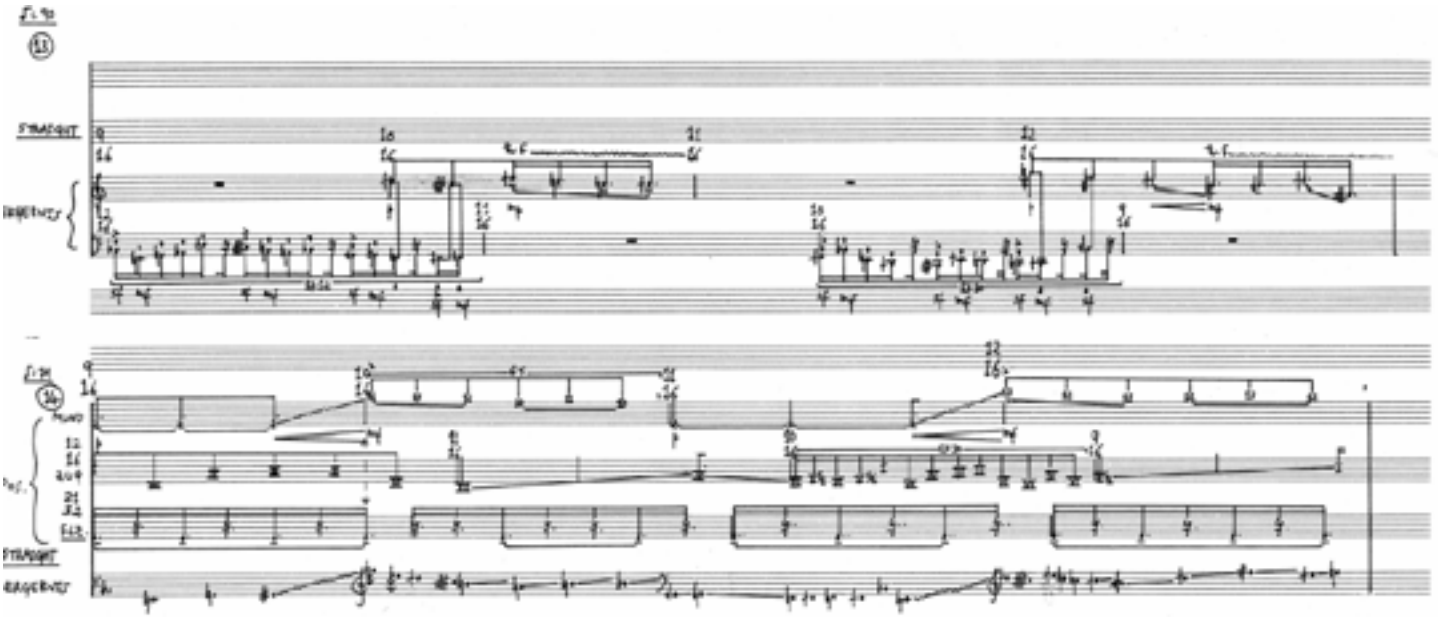
Luca Francesconi also experimented with physically polyphonic notations for trombone in both *Respiro* (1987) and *Animus* (1995), the latter a reworked version of the former with live electronics. Francesconi maintains a fairly traditional notation with voice and mute notated on separate staves, but occasionally these multiple voices do diverge into polyphony.



Luca Francesconi: *Animus* (1995): p. 3
The three staves indicate voice (both percussive, above, and pitched, below), normal played notes, and mute actions

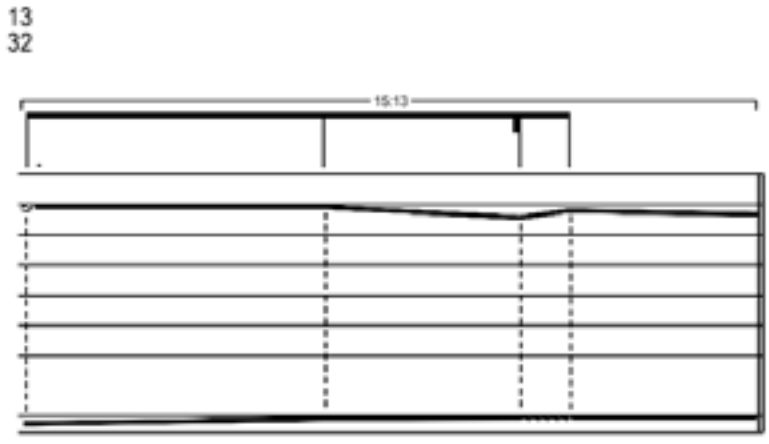
Wieland Hoban, who has written extensively on both physically polyphonic notations and the music of Klaus K. Hübler, has also developed his own language of parameterization, such as in his trombone solo *Zerscherbter Wahn* (2002), in which the notation morphs from periods of traditional polyphony (realized within the single trombonist) and physical polyphony as it has been defined here.

10 For a more thorough discussion of the latter, see 3.3 Radical Embodied Cognition, Guides to Discovery, and Richard Barrett's *basalt*.



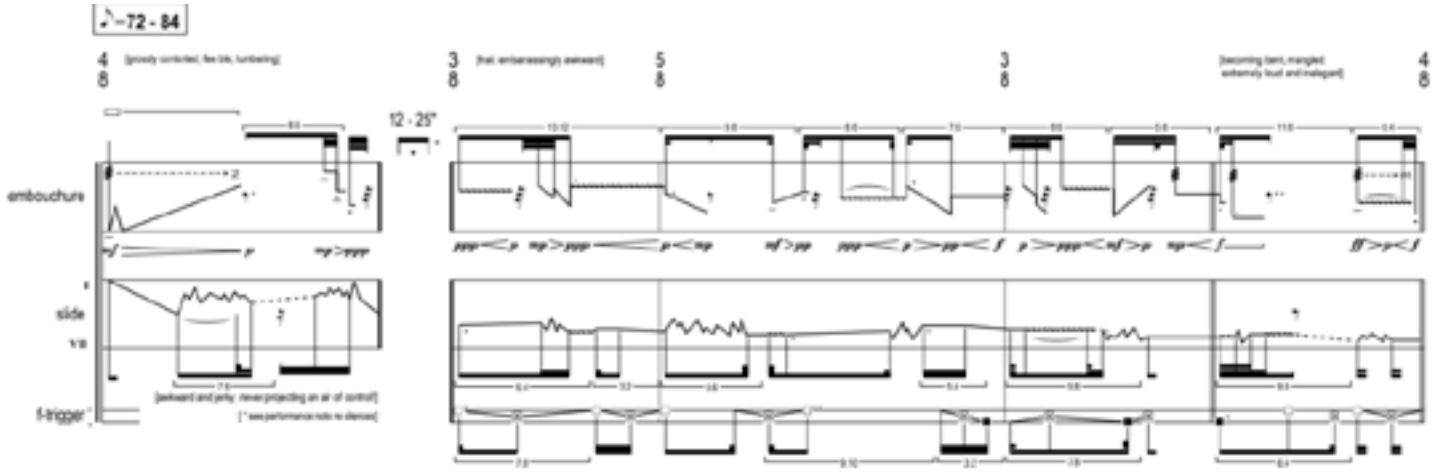
Wieland Hoban: *Zerscherbter Wahn* (2002): systems 13 and 14
System 13 shows two polyphonic lines, performed simultaneously by the trombonist, "akin to a split personality" (Hoban, 2002, p. 2)
System 14 shows a physically polyphonic passage in which the embouchure (harmonic partial) and slide position are notated above (Mund and Zug) and the resultant pitches below (Ergebnis). The resultant pitches serve primarily as an aid to the performer, as there are clearly more microtonal variations from the polyphonic superposition of embouchure and slide position than can be notated clearly below.

This trend seems to explode (comparatively) in the 21st century, with several composers who acknowledge the influence of Hübler writing multiple works for trombone solo. Aaron Cassidy, well known for his works of physical polyphony and complex tablature notations, first wrote for trombone solo in 2006 with *songs only as sad as their listener*. This work, although it features a tablature notation and all of the trappings of physical polyphony, does not in fact contain any moments of asynchrony or decoupled activity. Despite the complicated rhythms underpinning the slow, gradual changes in slide and valve motion, they remain coupled throughout.



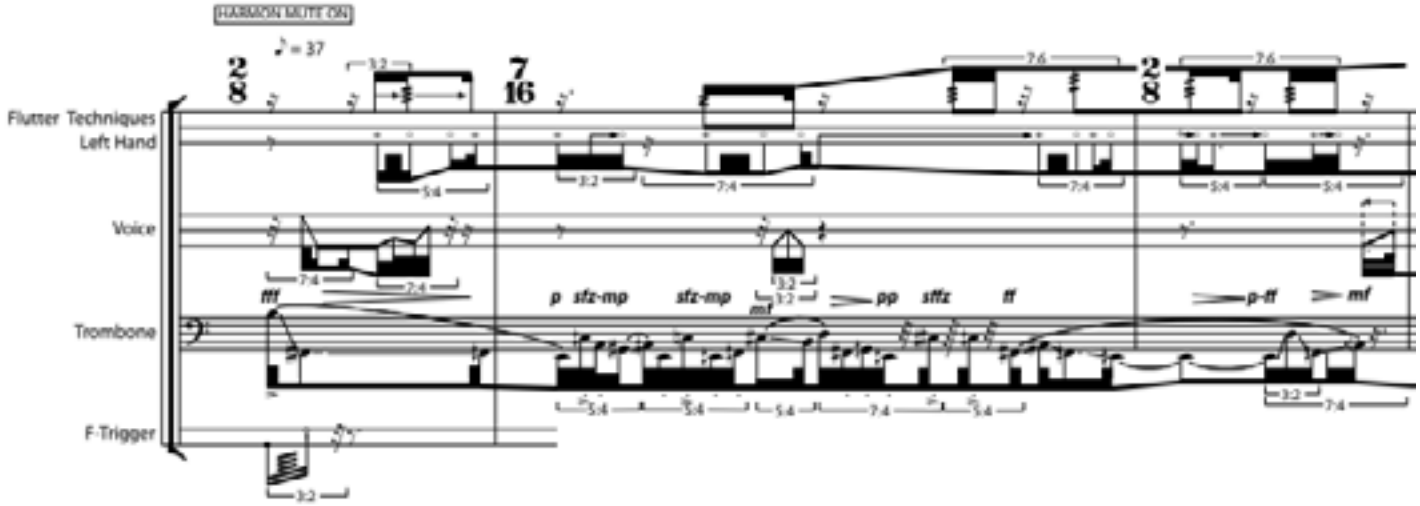
Aaron Cassidy: *songs only as sad as their listener* for solo trombone (2006): m. 8
The upper line denotes rhythm and the two lines (connected by dotted lines aligned to the rhythmic beams) indicate slide motion (on a single partial) and valve action

His second trombone solo, *Because they mark the zone where the force is in the process of striking (Or, Second Study for Figures at the Base of a Crucifixion)* (2008),[11] features a much more radical physically polyphonic notation, exploring the limits of interference in three parameters: slide, embouchure, and valve.



Aaron Cassidy: *because they mark the zone where the force is in the process of striking (Or, Second Study for Figures at the Base of a Crucifixion)* for solo trombone (2008): opening
The three staves indicated embouchure (harmonic range), slide position, and valve action

Timothy McCormack[12] and Joan Arnau Pàmies[13] have also written two trombone solos.[14] McCormack's two works, *Here is a sequence of sounds, each having a sound and a meaning* (2009) and *HEAVY MATTER* (2012), explore totally different methods of dissecting and reassembling trombone technique, as evidenced by their dissimilar notations (the former, heavily tablaturized; the latter, streamlined but with clear superpositions of polyphonic activity).



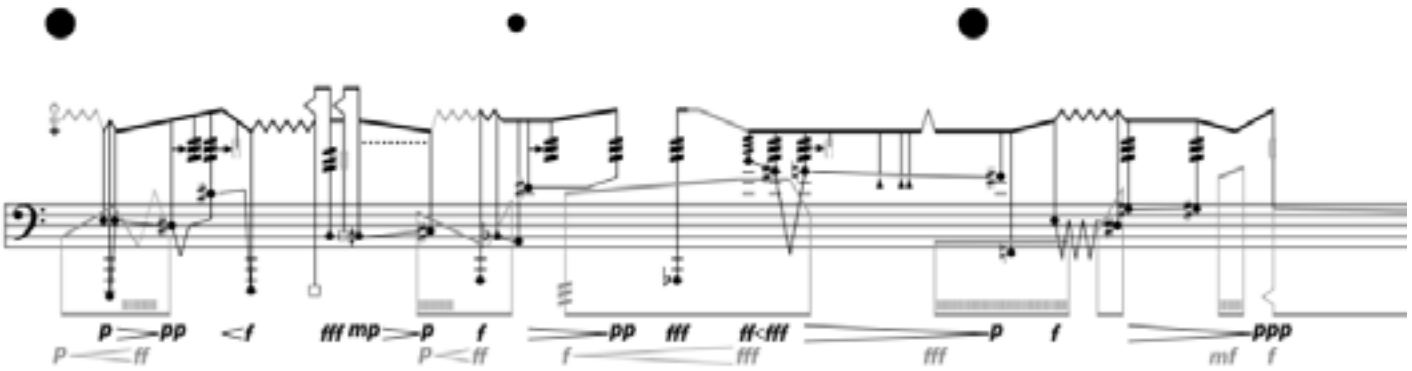
Timothy McCormack: *"Here is a sequence of signs, each having a sign and a meaning,"* for solo trombone (2008): opening
The staves indicate flutter tongue action, left-hand mute action (wawa mute), vocal action, played pitch, and valve action

11 See 2.1 *Haecceitas* and Aaron Cassidy's *Because they mark the zone where the force is in the process of striking (Or, Second Study for Figures at the Base of a Crucifixion)*

12 See 3.4.1 Non-representational rhythm and Timothy McCormack's *HEAVY MATTER*

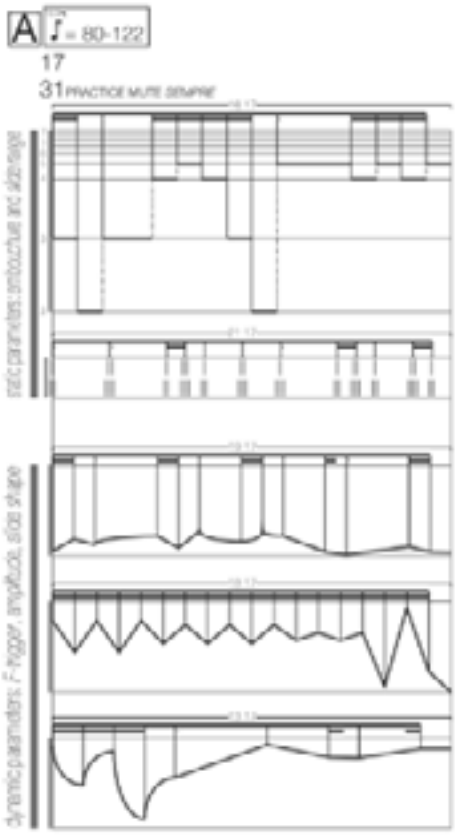
13 See 1.2 Poiesis as Musical Method and 3.4.2 Non-representational pitch and Joan Arnau Pàmies's *1≠∞ (EoM)*

14 In McCormack's case, that is more accurately phrased as two *extant* trombone solos, as his first exploration of the instrument and its potential for physical polyphony, *Map* (2009), has been rescinded.



Timothy McCormack: *HEAVY MATTER* for solo trombone (2012): opening
The overlaid lines indicate time (black dotes), played pitch (stems up and dark dynamics), vocal action (stems down and gray dynamics), left-hand mute action (within top beam), and articulation (beneath mute notation)

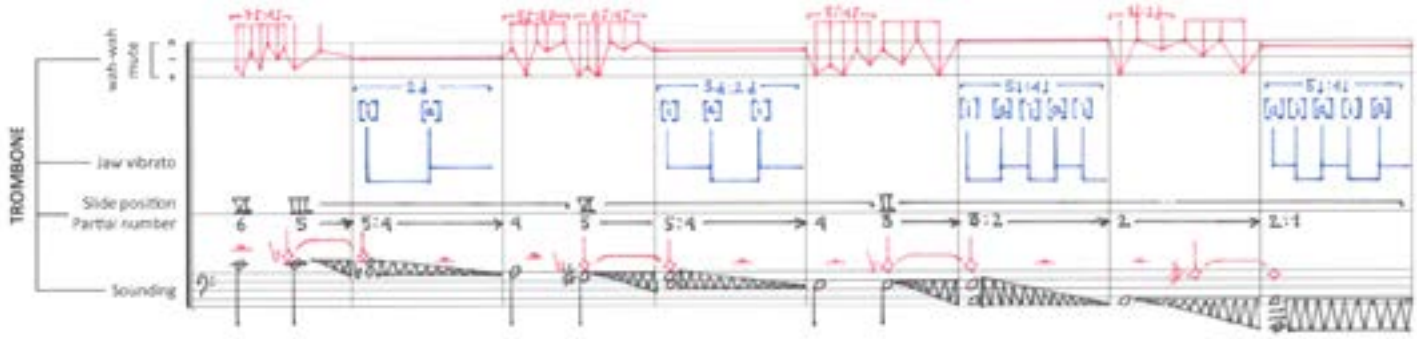
Pàmies's two solos also demonstrate two drastically different takes on the potential of the trombone's idiomatic qualities. The first, *[Vltbn]^4 (o quatre panells per a trombó sol)* (2013), has been examined above (cf. section 1.1). The latter, *1≈∞ (EoM)* (2015), takes an even more radical approach to shifting, unstable superpositions of parameters (cf. section 3.4), layering multiple, variable lines that change from iteration to iteration, even within a single performance.



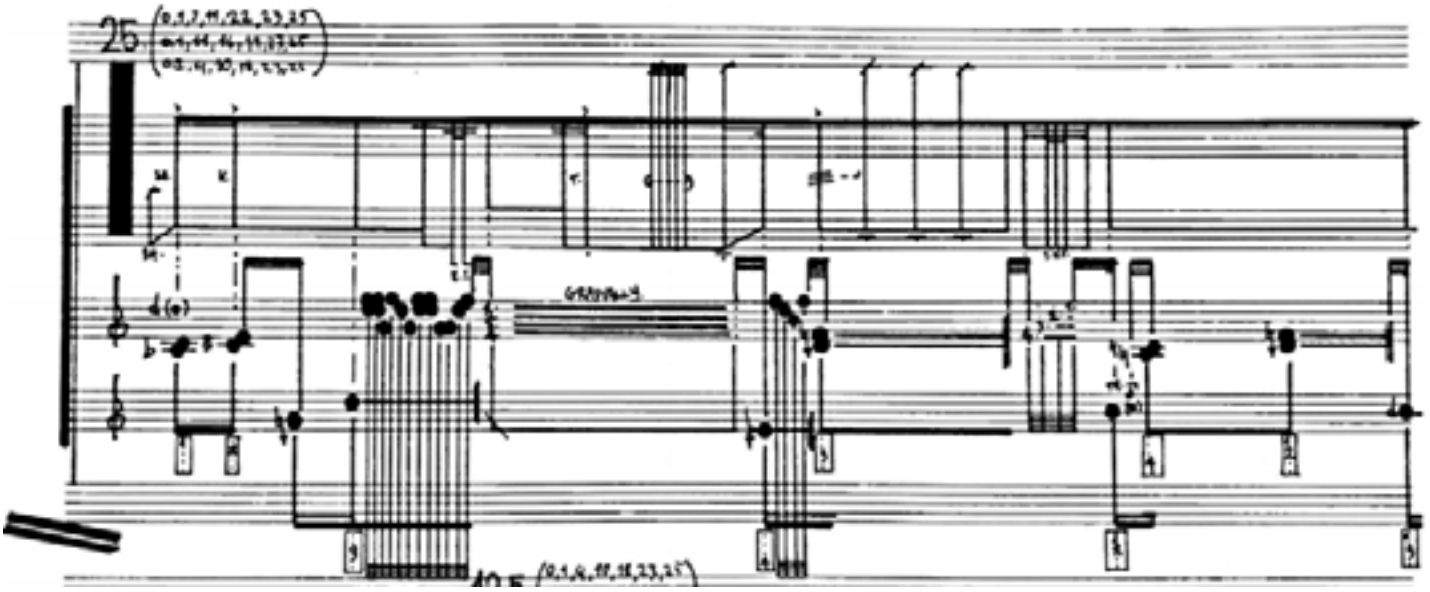
Joan Arnau Pàmies: *1≈∞ (EoM)* for solo trombone (2015): section A[15]
The top two staves indicate harmonic partial and region of slide movement; the bottom three staves represent (variably and interchangeably) dynamic, valve action, and slide motion within the specified region

15 See 3.4.2 Non-representational pitch and Joan Arnau Pàmies's *1≠∞ (EoM)*.

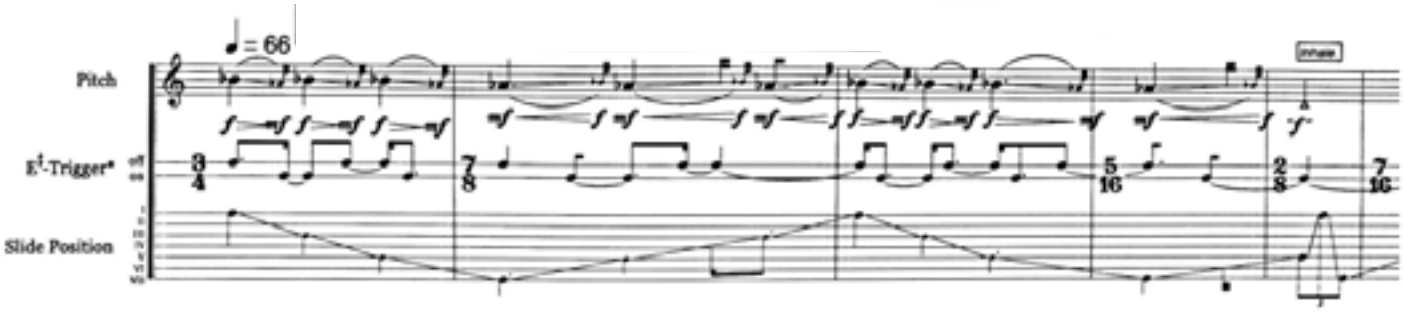
Other composers in this time period have written similarly heavily tablaturized, physically polyphonic notations, such as those of Michael Baldwin,[16] Sehyung Kim,[17] Andrew Greenwald, Yoshiaki Onishi, and Paul Hübner (himself a major proponent of such repertoire on the trumpet).



Sehyung Kim: *IL* for solo trombone (2014/2015): p. 4
The multiple staves notate left-hand mute action (wawa mute), jaw vibrato, slide position, harmonic partial, and sounding pitch (with vocal actions in red)

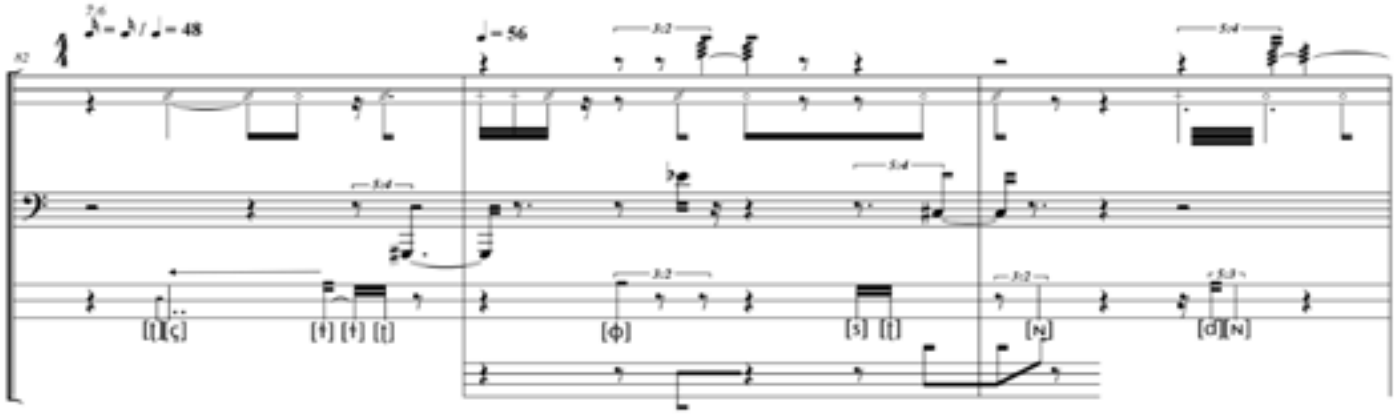


Andrew Greenwald: *A Thing is a Hole in a Thing it is Not (vi)* for solo euphonium (2015): p. 2
The multiple staves indicated valve action (for the four valves of the euphonium) and pitch material, including lip multiphonics



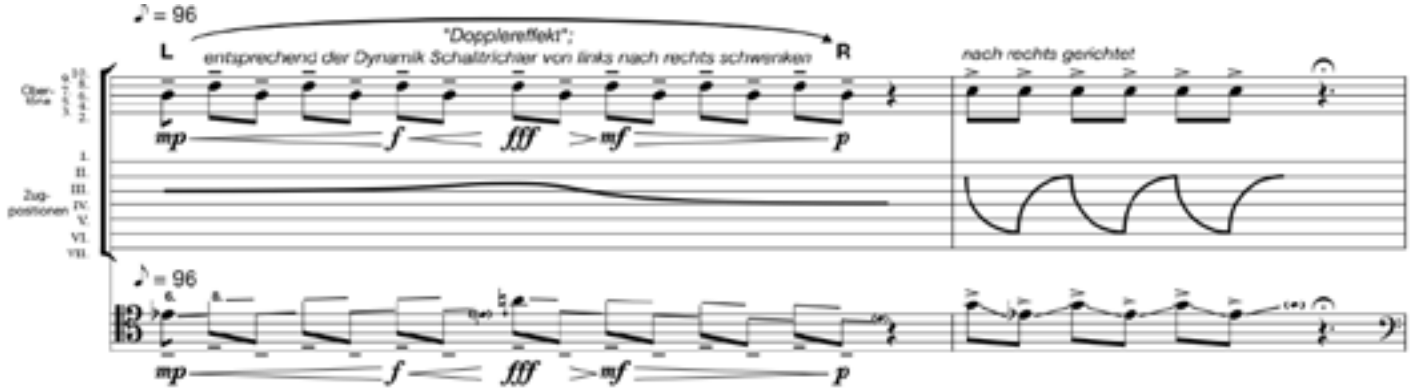
Yoshiaki Onishi: *Spargens* (2012): opening
As indicated in the score, the three systems indicate pitch material, valve activation (which disrupts pitch material), and slide position

16 see 2.2 Agential Realism and Michael Baldwin's *Erasure.*
17 see 2.3 Autopoiesis and Sehjung Kim's *Sijo_241015.*



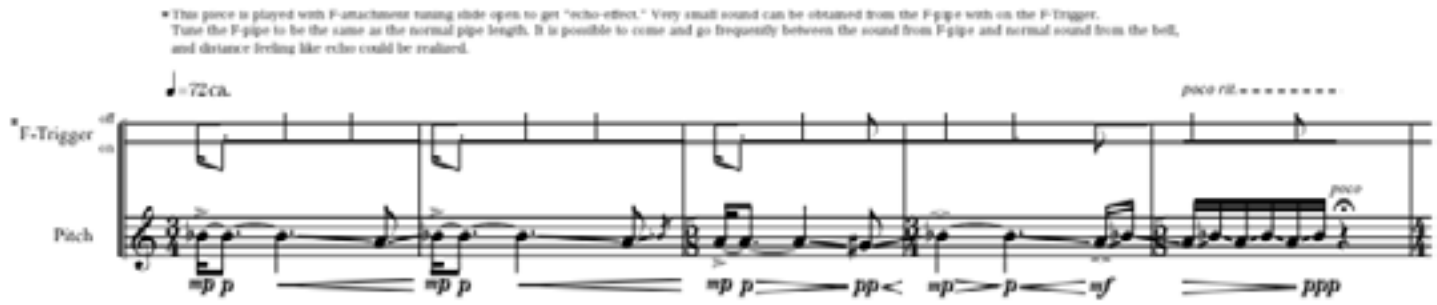
Paul Hübner: *diktatorinnengattinen* (2015): mm. 82-84
The four systems show, respectively: flutter tongue and left hand action, pitch material, voice, and embouchure / multiphonics (lip)

In and among these pieces, though, are also a handful of heavily tablaturized notations that do not, in fact, contain any physical polyphony. The consistently coupled activity in pieces like Robin Hoffman's *Straßenmusik* (2015), makes use of decoupled staves as more of a compositional tool than a reimagination of technique, as evidenced by the lower staff which gives a transcription of the action notation in traditional form.

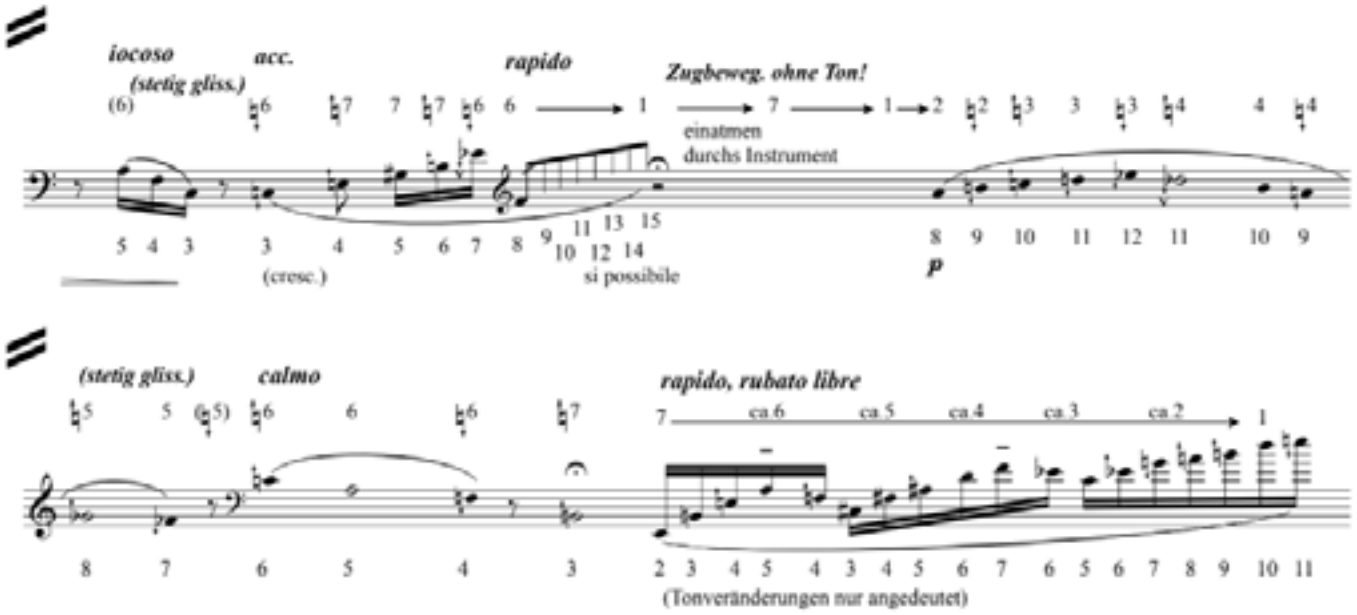


Robin Hoffmann: *Straßenmusik* (2015): mm. 1-2
The top system indicates partial and the middle system indicates slide position; the bottom system the notates a transcription of the resultant pitch material as derived from the upper two systems.

Yu Kuwabara's *Rattling Darkness* (2017) and Manfred Stahnke's *Tom's Twin* (2006/2012) also incorporate elements of tablaturization, but in both cases use it as a tool to access idiomatic qualities of the trombone's physicality without mining any broader potential of physical polyphony. In Yu's case, the tablaturization allows for greater inflections of half-valve technique, whereas Stahnke isolates the microtonal inflections made available by the trombone slide and the natural overtone series.

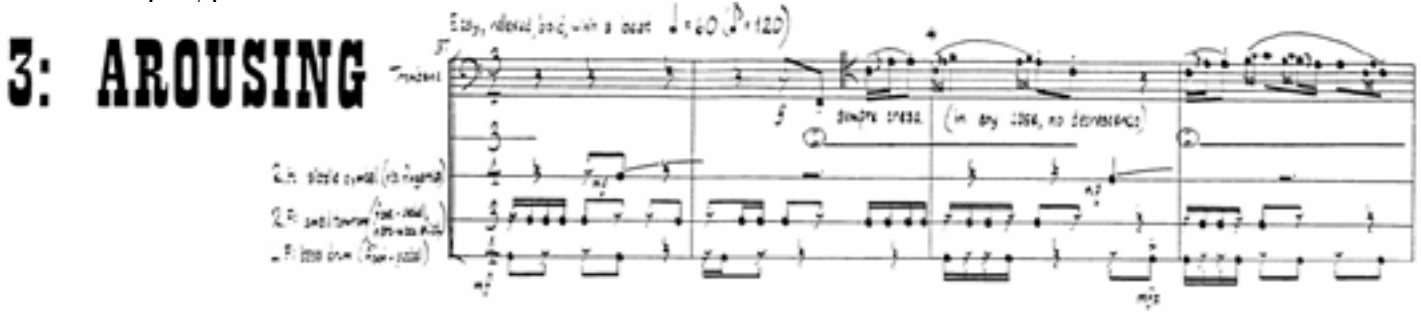


Yu Kuwabara: *Rattling Darkness* (2017): opening
As indicated, the pitch material is affected by the valve motion notated in the upper staff, wherein an echo effect is produced by the sound coming out of the removed F-valve slide



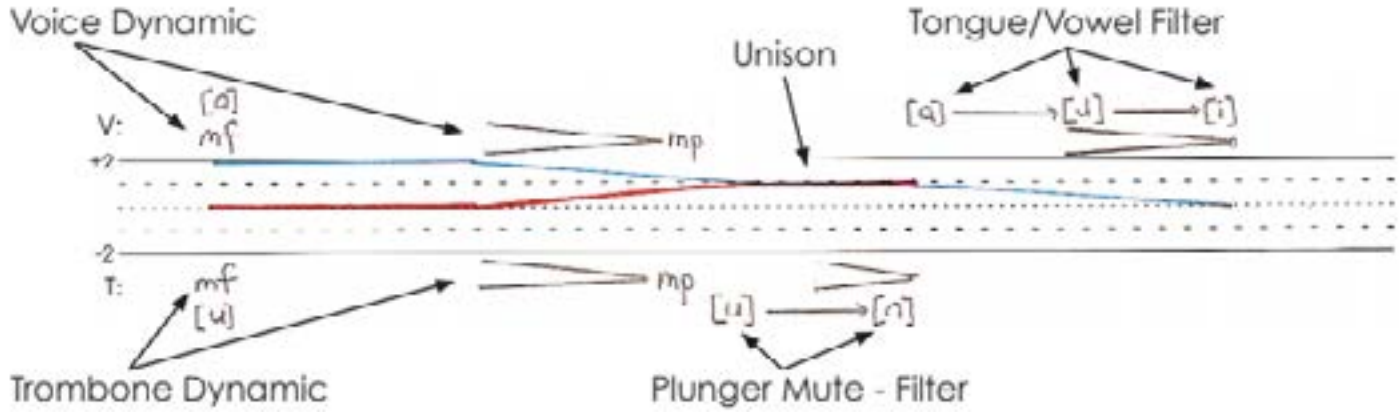
Manfred Stahnke: *Tom's Twin* (2006/2012)
The numbers above the staff indicate slide position (with microtonal inflections given by accidentals and markings to glissando more or less smoothly) and the numbers below the staff indicate harmonic partial.

Perhaps the ultimate extreme of synchronous tablaturization is Ben Johnston's solo *One Man* (1988), in which the trombonist also plays a series of percussion instruments, producing a one-man-band effect both musically and theatrically. Although the level of coordination can be quite intense at times, and the technical demands of also learning non-trombonistic instruments provides a unique and intimidating challenge, with respect to the physical gestures required, they remain homophonic rather than polyphonic.



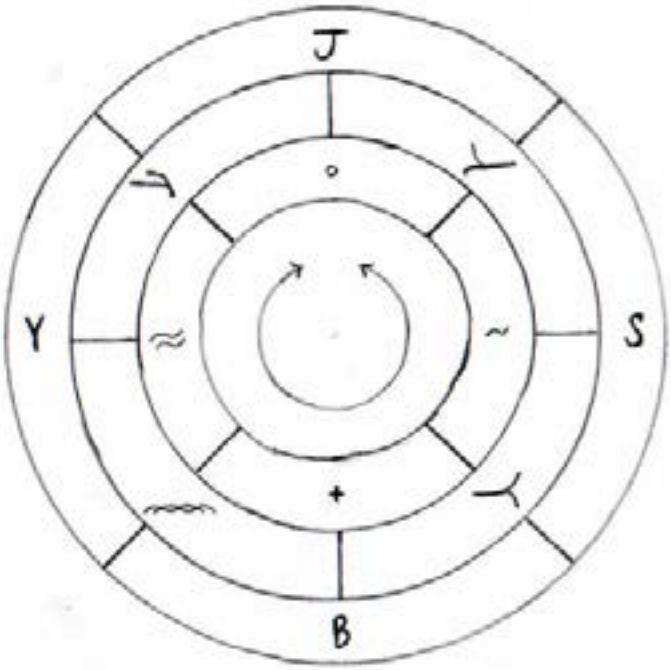
Ben Johnston: *One Man* (1988): opening, mvt. 3
The right hand, right foot, and left foot are indicated to play sizzle cymbal, small tamtam, and bass drum (respectively), accompanying the trombone material notated in the upper staff. Each movement uses a different set of percussion instruments notated in similar fashion.

In contrast to these pieces which demonstrate complex treatments of the trombone and its physicality without engaging elements of physical polyphony, there are also works from this century by composers who have eschewed complexity and tablaturization, but have still taken advantage of physical polyphony to problematize and explore alternative characters of the trombone. Kenn Kumpf's *_they mix above there* (2008)[18] employs an extremely minimalist texture which ultimately exposes an arresting sonic vocabulary unique to the piece, made possible by the permutations of physical polyphony inherent in his notational approach.



Kenn Kumpf: *_they mix above there* (2008): excerpt from performance instructions (Kumpf, 2008, p. 2)
As indicated, the single staff incorporates dissynchonous actions including played and sung material (red and blue lines), alongside plunger mute and oral cavity actions that manipulate that material (indicated below and above the staff, respectively)

My own compositional work (primarily under the name Juna Toksöz Winston) has also taken advantage of physical polyphony to explore less complex but equally experimental corners of the idiomatic possibilities of the instrument, as in *the old connubial men of the sea* (2015) and *ay neden şeftali gibi kokuyor?* (2016).



Juna Toksöz Winston: *the old connubial men of the sea* (2015): excerpt
Each concentric circle indicates four types of material for one performative parameter; at any point in time, four actions are notated, each parameter changing to another action within its circle irrespective of changes within other circles

18 See 3.4.3 Non-representational timbre and Kenn Kumpf's *_they mix above there.*

Juna Toksöz Winston: *ay neden şeftali gibi kokuyor?* (2016): excerpt
Four lines are overlaid indeterminately; four parameters of action within the oral cavity are then determined by the respective distances of the four lines from each other, changing as the lines converge or diverge within the performer-determined direction of reading

This brief exploration of the physically polyphonic and otherwise tablaturized notations for solo trombone is not intended to pedantically draw a line between strict physical polyphony and works that only toe the line. Rather, the discussion of which works truly cross that line is intended to underscore the relevance these scores carry for a performative and learning-based discussion. As previously stated, from this perspective, the aesthetic priorities or similarities in these notations are irrelevant from a performer's standpoint. On the contrary, the barriers to entry that physical polyphony can pose in works as diverse as Globokar's *Echanges*, Klaus K. Hübler's *Cercar*, and Kenn Kumpf's *_they mix above there* demonstrate how relevant this categorization is from the perspective of the learning process. The combination of challenges posed by truly *asynchronous* physical polyphony alongside the extreme *variability* of notations from composer to composer and piece to piece distinguish this repertoire with respect to the concerns of learning. To overcome these challenges, new learning strategies are required, and developing these strategies demands tool-building in a poietic sense. Such tools need to be created in order to entrain adaptable methodologies for building new performance practices both accurately and efficiently.

These pieces all pose unique but related challenges to the performer tasked with reassembling their bodies and techniques, since all of these pieces must, eventually, be embodied holistically by a single performer. Interestingly, although the early proponents of serialization and parameterization are often viewed as prioritizing a computational, rigorously stratified approach to these elements, they were not unaware of the eventual holism that these methods entail. Stockhausen himself, at the end of an essay detailing the potential of parameterization in electronic music, writes: "There is a very subtle relationship nowadays between form and material. I would even go so far as to say that form and material have to be be considered as one and the same … a given material determines its own best form according to its inner nature. The old dialectic based on the antinomy—or dichotomy—of form and matter has really vanished" (Stockhausen, 1971, p. 111). In addressing the almost spiritual holism of these elements he had directly previously elucidated as separately articulable parameters (as with the holism of rhythm and pitch), Stockhausen explicitly acknowledges the role of parameterization as a compositional tool that must eventually be subsumed into a more holistic framework in its ultimate expression.

Despite polyphonic asynchrony, the unifying performative demands of these pieces are the learning strategies necessary to accomplish this eventual *re*assembly of instrumental practice within a single, performing body. The following chapters will explore the physically polyphonic repertoire of the trombone specifically as a laboratory for problematizing this poietic approach to the learning process.

In order to reflect the focus of my present research on the learning process relevant to these unique notations, the following chapters will not be analyses focused on the compositions themselves, but will examine the works in question as they pertain specifically to the situated challenges of learning, enskilment, and practice-building.

In the spirit of Globokar and Pàmies, who designed notations requesting an embodied and enactive approach to discovering the poietic tool-building process, the subchapters in part 2 will explore not the physical anatomy of these tasks' execution, but will instead offer a series of theoretical templates that have proven useful in my own artistic practice. These approaches are not prescriptive of successful learning strategies, but taken together, suggest the outlines of a methodology that embraces the entanglement of conflicting strands of physically polyphonic actions as a means to rediscovering the unity of the body with the instrument and its environment, undergirding learning strategies that help the performer to holistically learn and execute notations that seem, at first glance, to demand the opposite. The first theoretical template (2.1) traces the notion of *haecceitas* from its coinage by John Duns Scotus in the scholastic era to its appropriation by Gilles Deleuze and Félix Guattari in the 20th century, using it as a diffraction grating for learning the superposed technical demands of Aaron Cassidy's *Because they mark the zone where the force is in the process of striking*. The second theoretical template (2.2) mines Karen Barad's agential realism for learning strategies that help the performer to access Michael Baldwin's *Erasure* (2011); Barad's scientific realism will be used to highlight the non-metaphorical implications for the holistic embodiment of these notations. The third theoretical template (2.3) traces the process of learning Sehyung Kim's *Sijo_241015* (2015) alongside Humberto Maturana's and Francisco J. Varela's concept of autopoiesis, which explicates the organic processes by which complex, interdependent unities can be formed, revealing the nature of the learning process as a form of growth and symbiosis.

Part 3 takes a closer look at the real-world implications for the holistic execution of decoupled actions. By exploring the history of embodied cognition and enactive learning (3.1), the experiences of learning Klaus K. Hübler's *Cercar* and Richard Barrett's *basalt* will be examined through the lenses of shared performance (3.2) and radical embodied cognition (3.3). In contrast to chapter 2, which addresses the theoretical side of constructing learning strategies, these subchapters will incorporate focussed discussion of specific practice strategies alongside musical examples. Together, these two studies will help to explain the cognitive and physical tasks that cohere in the learning of these dissociated practices, thereby also examining the nature of emergent enskilment and the role of situated knowledges in crafting the variable identities necessary to adapt to different pieces and situations fluidly and efficiently. This discussion will inevitably point towards the political implications that radical embodied cognition and variable, situated learning strategies pose to the traditional performance practice of the Western classical conservatory tradition. The final subchapter (3.4) will examine the role that the anti-representational strategies central to many of these theories play in the notational process itself, contained in a brief diversion from performance practice into a closer examination of notations by Timothy McCormack, Joan Arnau Pàmies, and Kenn Kumpf.

The conclusion will return to Hannah Arendt's poiesis as a unifying concept for these disparate learning strategies. In so doing, her own extrapolation from poiesis to the broader domains of political action and social interaction will be used to contextualize these learning strategies in a broader musical environment.