Virtuosity, Flow, and Re-Notating Modernism

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Introduction

In this paper I propose a new framework for the analysis of virtuosity, look at the musical implications of the psychological state of "flow", and use these ideas to analyze re-notations of Karlheinz Stockhausen's *Gruppen* and Brian Ferneyhough's *Bone Alphabet,* in which the works have been made easy enough for amateur performers to play.

In the first section, I propose a new framework for the analysis of virtuosity and its relationship to the physical, psychological and "theatrical" difficulties involved in the performance of a musical work.

The second section looks at the psychologist Mihaly Csikszentmihalyi's idea of "flow" and its relationship to, and implications for, musical performance and notation.

Finally, I apply the framework developed in the first part of the paper, along with the ideas of flow dealt with in the second, to the analysis of re-notated versions of two 20th Century works. In both instances, the work was re-notated in such a way that it could be played by amateurs. In arranging Karlheinz Stockhausen's *Gruppen* and Brian Ferneyhough's *Bone Alphabet* for amateur performers, ideas of difficulty and virtuosity are deconstructed, resulting in a re-problematizing of the relationships between composer, performer, and audience. In this destabilized environment, hidden fundaments of each piece are exposed and the important role of virtuosity, flow and pleasure in each is revealed.

Part I: Virtuosity

Defining Virtuosity

A dictionary is a manifesto of power. The definition of a word shores up and seeks to legitimate the power structures that make it possible, and elucidate the connection of meaning to its roots in the social. In typical definitions of *virtuosity*, and its companion *the virtuoso*, the word is normally taken to mean "a person highly skilled in music or another artistic pursuit"[1]. It has its origins in the Latin *virtus*, meaning "excellence" or "worth" and first came into use in English in the Seventeenth Century:

> "originally applied to what we should call an 'antiquarian', who interested himself in such antiquities as statues, inscriptions, coins. The word might be used for compliment or for disparagement, suggesting on the one hand a connoisseur, on the other a mere dabbler."[2]

The New Grove Dictionary of Music and Musicians defines it as follows:

> "In its original Italian usage (particularly in the 16th and 17th Centuries) *virtuoso* was a term of honour reserved for a person distinguished in any intellectual or artistic field; a poet architect, scholar etc. A virtuoso might be a skilled performer, but more importantly he was a composer, a theorist or at least a famous *maestro di capella*. In the late 17th and 18th centuries a great number of Italian musicians carried the term *virtuoso* to the courts and theatres of northern Europe, regularly applying it to themselves whether or not they merited such distinction in the traditional Italian sense."[3]

What is missing from all current definitions of viruosity is the key role it played in allowing music to transition out of the court system. *Virtuosity* is the manifestation of a highly evolved skill-set designed to transform difficulty into spectacle. This transformation allowed a previously secondary

1 "Virtuoso", Concise Oxford English Dictionary, 11th Edition (revised 2009), (Oxford, 2009), 1615
2 Thomas Shadwell *The Virtuoso* Ed. Marjorie Hope Nicholson & David Stuart Rodes (London, 1966), xvii
3 Owen Jander "Virtuoso", The New Grove Dictionary of Music and Musicians ed. S. Sadie and J. Tyrrell (London, 2001), Vol 26, pg 789, 789

aspect of musical performance to gain value by externalizing itself and projecting itself into the market-place.

Any evaluation of a performance of music is subjective. In order for music to survive in a marketplace there needs to be some objective way of assigning a price to it - *virtuosity* furnishes it with a value. The exhibitionist excesses of 19th Century performance created an ideal market environment in which price could be related to novelty of technique, speed, and an ability to successfully execute an increasingly specialized set of demanding repertoire. A contemporary review of Paganini's first concert in Milan, in 1813, elucidates this connection :

> "Herr P. is without a doubt, in a certain respect, the formost and greatest violinist in the world ... He performs certain runs, leaps, and double stops that have never been heard before from *any* violinist"[4]

Thus, a Paganini performance can have a price, and becomes a pseudo-supernatural flag on the Everest of technique, demanding a comparatively high fee.

It was the objective criteria of speed, aglity, and novelty of technique that defined the *virtuoso*, and allowed the commodification of musical performance and its movement from the court system into free market capitalism. *Virtuosity* became the process of monetizing musical performance, with the first virtuoso, Nicolai Paganini, providing an apt example for the way in which this was achieved.

Paganini, the epitome of the *virtuoso*, found himself bound to two very different evils: the dark winged-one, with whom he supposedly exchanged soul for skill, and the modern machinations of cultural economics. Over the winter of 1809-1810, Paganini changed from court musician to public performer[5]. This change coincided with the re-conceptualizing of the term *virtuoso* to mean "the

4 quoted in Paul Metzner *Crescendo of The Virtuoso* (California/London, 1998), 124
5 For more info see Paul Metzner *Crescendo of The Virtuoso* (California/London, 1998), 123

violinist, pianist, castrato, soprano etc. who pursued a career as a soloist."[6] This change in market created a rapid monetization of musical performance which Paganini exploited to the full. His connection with money became legendary: he opened his own casino, *Casino Paganini*, he was a careful book keeper, personally keeping accurate accounts of itineries and concert receipts, and ticket prices were usually doubled for his concerts (even causing protests in London)[7]. In Milan, the highest value coin in circulation was known as a "Paganini", as this was the admission price to his concerts.[8]

The reason why virtuosity was so successful at precipitating the commodification of musical performance was its foregrounding of music's measurable parameters (speed, agility, novelty of technique). This re-weighting of music from the subjective to the objective set in place a counter-philosophical current in musical thinking, that ran contrary to many of the early-Romantic ideas of transcendence and *will*-manifestation, popular at the time. Instead of the physical embodiment of spiritual ineffability that many Romantic composers strove to make manifest, the virtuosi instead highlighted the very earthly physicality of their playing, often compensating for the loss of a musically-manifested spirituality with a superficial theatrical one (as in the case of the rumours about Paganini's bargain with the devil). Instead of the presentation of the spiritual in reality, Paganini instead offered reality mediated through the spiritual; the end became the means, and the means the end. As Paul Metzner points out, "the virtuosos [of 19th Century Paris] thus pointed the way to a new transcendence, not to a heavenly eternity but to an earthly future of ever-expanding possibility in which there seemed to be no limit to what the human body, including the brain, could be trained to do."[9]

6 Owen Jander "Virtuoso", The New Grove Dictionary of Music and Musicians ed. S. Sadie and J. Tyrrell (London, 2001), Vol 26, pg 789, 789
7 Boris Schwarz, *Great Masters Of The Violin* (London, 1983), 181
8 ibid., 181
9 Paul Metzner *Crescendo of The Virtuoso* (California/London, 1998), 255

Virtuosity's spotlighting of the quantifiable aspects of musical performance, ideally fit the metric-driven world of the market. In any market-place there needs to be some way of assigning value to an object. The exchange of the immaterialism of romantic philosophy, whose subjective worth came from its mediation of an uncommodifiable divine, for the materialist nature of economics finally allowed musical performance to be allotted a monetary value.

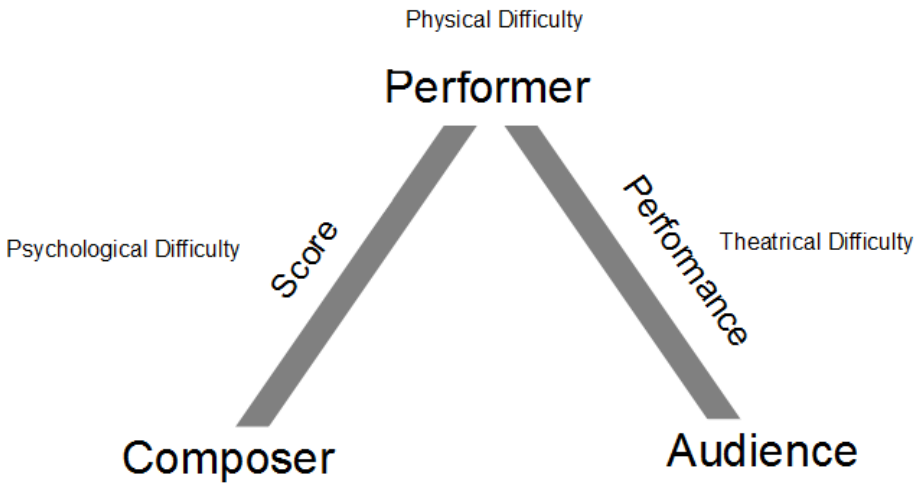
The idea of a "skilled performer", that musical dictionaries are wont to talk of when referring to the term *virtuoso*, hints at a level of difficulty which the player must overcome in order to become virtuosic. In fact, one might almost describe the term *virtuosity* as "the overcoming of musical difficulty". Due to the key role that virtuosity played in the court/free-market transition – a role that, I would claim, defines it - difficulties on their own cannot be considered the essence of virtuosity. They are important only in that they allow the economics of scarcity to inflate the value of the few performers who can overcome them. Unless the difficulty is externalized it cannot gain value, and it is this value that allows virtuosity to be the bridge between aristocratic patronage and the crowd-led commerce of the new, European bourgeoisie. Given the importance that I have assigned to the economic aspects of virtuosity, it seems logical to posit a new definition, one which draws on the work of Paul Metzner and his book *Crescendo Of The Virtuosi:* Virtuosity, from an economic perspective, becomes more than the overcoming of musical difficulty by a skilled artisan, but the transformation of that difficulty into a spectacle which can be monetized.

Virtuosity is the Transformation of Difficulty into Spectacle

It should be noted that this paper shall only engage with notated, not improvised music, although certain aspects of the following framework have some applicability to this genre. The hope is that the framework presented below can trace out some of the connections between the role of the performer, composer and audience and their relationship to both difficulty and virtuosity.

In order to further understand the nature of virtuosity, we must first comprehend the nature of musical difficulty and how it can be spectacalized. A performer is beset by a set of difficulties when performing a musical work. The diagram below seeks to outline the particular types of interactions the performer engages in during the preparation and performance of a work and the types of difficulty that can arise from these interactions:

Figure 1. Diagram of performer interactions and attendant difficulties.



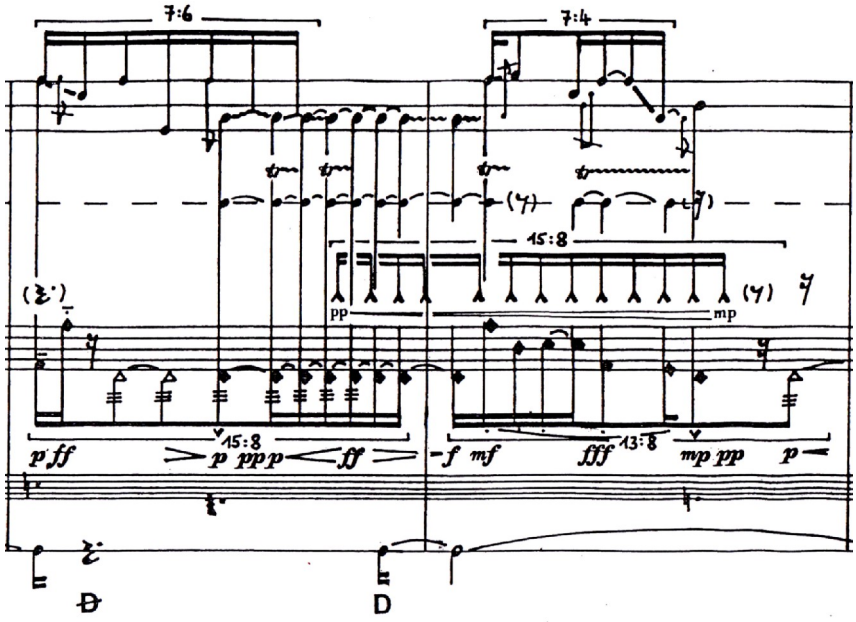
A performer has to deal with three different types of difficulty when performing and preparing a piece. I have termed these *psychological difficulty*, *physical difficulty* and *theatrical difficulty*. Each of these highlights one aspect of the performer's relationship to the three actors in the composer/performer/audience dynamic. The *psychological difficulty* of a piece arises from the relationship of the performer to the composer, manifested in the score. The *physical difficulty* comes out of the performer's struggle with themselves and their body: the problems of physiology and technique. The *theatrical difficulty* of a work occurs during a performance to an audience and is the audience's perception of the difficulties being grappled with.

Psychological Difficulty

The score is the mediator between composer and performer, and presents the performer with the first of the types of difficulty. *Psychological difficulty*, in my terminology, can be defined as *the difficulty in translating a notation into physical action*. This difficulty is typically caused by notation that contains complex information or a high density of information.

The density of information in a score is normally a factor of the amount of instructions given per action. A work such as Klaus K. Hübler's *Cercar* for solo trombone, in which the individual physical actions of trombone playing (slide position, overtones used, use of mutes) are de-constructed into four independent lines of notation, is an example of a work that has a high density of information. This amount of information per second must be mentally processed by the performer and transformed into actions.

Figure 2. Score extract from *Cercar* for solo trombone bars 37-38. The top line indicates slide position, the one below indicates valves, the middle staff shows the overtones played, the staff below shows pitches which will occur, and the lowest staff is the rhythm in which the mute should be applied.[10]



10 Klaus Hübler *Cercar* (Wiesbaden, 1986)

Notational density of information is not limited to scores which take traditional guido notation as their starting point, however exploded their approach might be. One can also see a large density of information per action in a work such as Robert Ashley's *The Entrance* in which a labyrinthine set of instructions must be translated into actions in order for a performance to occur.

Information complexity is something which can also be seen in the notation of the Hübler piece above, in which the de-coupling of playable parameters creates a complex situation of interacting rhythmic and physical forces which the performer must translate into action. Although one might immediately connect the idea of information complexity with the intricate scores of the so-called "new-complexity" composers, this type of difficulty could also be found in some seemingly simpler music. Verbal scores in which multiple clauses and subclauses render their meaning either obtuse, as in Paragraph 6 of Cornelis Cardew's *The Great Learning*, or an instruction that, by its abstraction, leads to difficulty – for instance, some of the parts of George Brecht's *Water Yam* (below) - are a good example of this.

Figure 3. one of the cards from George Brecht's *Water Yam* collection of verbal scores. Here, ambiguity creates the psychological difficulty.[11]

11 George Brecht, *Water Yam* (np, nd)

The latter of these types of difficulty can also be found in works which either have a non-existant performance practice – in which case the performer must start from scratch interpretively – or works in which the interpretational context is unclear. In these cases, the difference between a work proposing novel interpretive contexts and one deriving from conceptual or notational ineptitude are indistinguishable.

Emotional expression is a type of psychological difficulty, dealing as it does, with the translation of notation into physical action; although here the translation involves the implicit or explicit emotional content of the work, rather than note-to-note translation. Thus, in our model, the interpretive aspects of performance can all be subsumed under the heading of psychological difficulty, as they are all part of a psychological process of translation that happens *before* these emotions become articulated through the player's physiology, at which point they become physical difficulties.

It should be noted that, as with all of the types of difficulty, the challenges of a piece do not represent an objective measurement. Any measure of difficulty is related to the skills of the performer who engages with the challenge.

Physical Difficulty

Once the performer has worked out the meaning of the notation that they are dealing with, they must overcome the "physical difficulties" of the piece. In my definition, this represents *the physiological difficulties encountered in executing a set of notated actions*. A piece with high levels of this category of difficulty is typified by extreme physical gestures, large amounts of actions to be executed in a small amount of time, and the performer having to deal with actions that require advanced physical co-ordination or control.

Like psychological difficulty, the level of physical hardship experienced by a performer is largely subjective. Players possess markedly different skill-sets, and a two-bowed etude that appears simple for Frances Marie-Uitti, would doubtlessly rate highly in difficulty for any cello player unaccustomed to the technique of playing two bows with one hand that Ms. Uitti has mastered. As with psychological difficulty, however, the fact that most players have extremely similar technical training, both in terms of their approach to notational translation and the physiology of playing, means that there are some common limitations. Physical difficulty, which occurs in the moment of playing, as opposed to psychological difficulty which occurs (especially with complex works) during the preparation stage, leaves much more leeway in regards to the time available for the comprehension and translation of a work. Thus, whilst intelligence provides the only limit to psychological difficulty, which could infinitely increase density and complexity given a set of intelligent enough performers, physical difficulty will always be limited, to some extent, by the size of hands, breath capacity, instrumental restrictions and other aspects relating to the physicality of the instrument and body of the performer.

The physical difficulty of a piece is primarily defined by the physical speed and movements required to perform the work. The speed of a piece is not simply its tempo, as the tempo of a piece and its density of actions can be quite different from each other, but the amount of actions needed to be performed per second. The type of movements that the player needs to execute, along with their speed, contribute to the overall physical difficulty. Difficult movements are determined by their relationship to the extremes of human action: i.e. actions increase in difficulty as they move towards the extremely large or extremely small.

Theatrical Difficulty

“Theatrical difficulty” is defined by *the audience's perception of the difficulties encountered by the performer.* In the context of our previously outlined idea of virtuosity, this stage is extremely important, as it is the stage at which difficulty is most clearly externalized and, thus, can gain value.

As with physical difficulty, speed and movement are key factors in theatrical difficulty, although here it is the audience's perception of these that is the most important factor. This means that, whilst the size of movement of physical actions has a large impact upon the audience's perception of difficulty, it is common that only those actions which are nearer to the larger extreme of the scale of physical movement will be perceived by the audience as difficult. Those actions whose smallness presents the performer with physical hardship are likely to be perceived as less difficult, even though these two extremes might present to the performer an equally demanding task. Although an audience might marvel at the virtuoso jumps a pianist makes from one end of their instrument to the other, a similarly difficult passage of interweaving lines in the middle of the piano is likely to be perceived as less difficult.

The same principle stands for speed as well. Multiple instrumental tricks can be used to create extremely fast moving music with little physical problems for the player, whilst extremely slow moving music may demand a level of physical control from the player unapparent to the audience.

Large, fast jumps on a piano can have a high visual and aural level of theatrical difficulty, as well as being physically difficult for a performer to execute. They need not always be connected, though, as any perusal of Paganini's output will attest.

Liszt's piano re-arrangements of Paganini's *Capriccios* are a good example of the connection

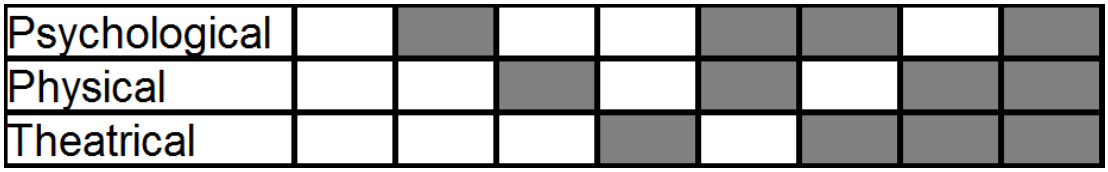
between physical and theatrical difficulty. Liszt's re-working kept the epidermal coating of theatrical difficulty, yet his re-writing engages with a fundamentally different type of physical difficulty, grounded in the physiological extremes of a performer's interaction with another instrument and its idiosyncracies.

The audience's perception of difficulty also differs from that of the player's experienced difficulty due to the aural aspects of the music, which undoubtedly help form the audience's perception of the difficulty of a piece but factor little in the player's own experience of difficulty unless a correlation occurs between the aural surface of a piece and the audience's cognizance of instrumental limitation.

The Interaction of Different Difficulty Types

Each of the types of difficulty outlined above can operate entirely independently of any other, e.g. a piece may be extremely physically difficult to perform, but have extremely simple notation and appear very easy to the audience. Although there is some overlap between each of the difficulties (an inevitability, since they are all made manifest in a single performer), each exhibits very specific characteristics which allow them to present entirely independent levels of challenges. Therefore, one can draw up a chart showing all eight possible combinations of the ways in which the extremes from the spectrum of each difficulty type may interact with each other:

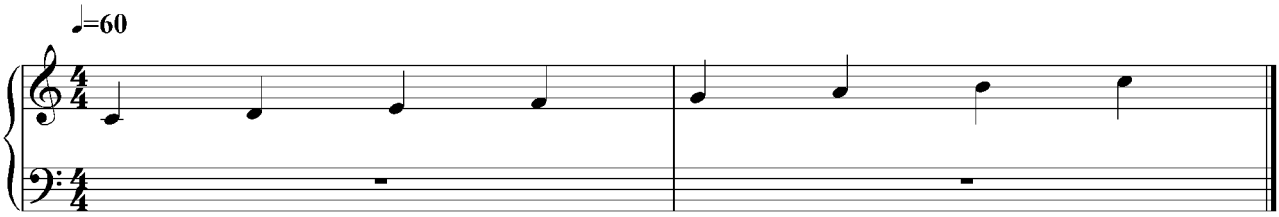
Figure 4. Table showing all possible combinations of the extremes of the three types of difficulty. Coloured squares equal a high level of difficulty, white squares represent a low level of difficulty.



An example of the way in which each of these types of difficulty can be manifested independently

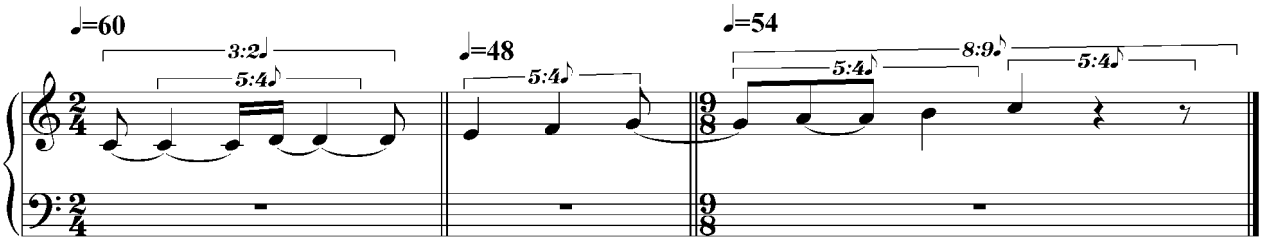
of the others can be seen in the figure, below. Here the first column represented in the table above is manifested as a musical example for piano. It is psychologically easy, with only a small amount of instructions per beat and an easily understandable pitch and rhythmic structure. It is physically easy as it occurs at a slow speed and is a scale, much like the ones pianists spend much of their time practicing. It is theatrically easy, as the audience is unlikely to percieve such simple material performed at such a slow speed to be difficult.

Figure 5. A musical example representing the level of difficulty shown by the first column of the previous figure



However, the above material can also be represented like this:

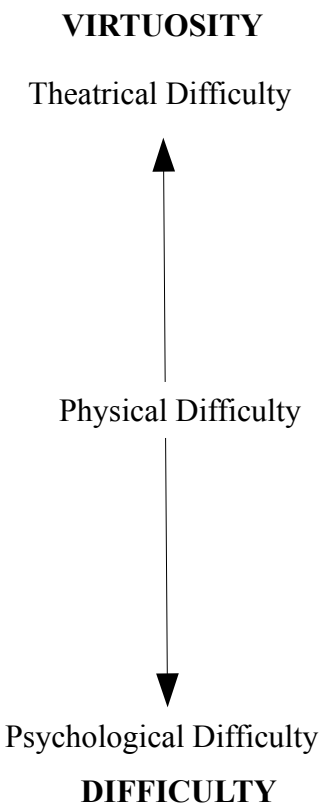
Fig 6. Re-notation of the above passage to increase the level of psychological difficulty



In the example above, the pitch and sounding durational values are identical, (ending rests in the second example excluded) but the difficulty of the notation has been deliberately increased. This is an example of the same material being realised as the second column in the table above. The theatrical and physical difficulty of the extract has not increased – the notes do not come faster and the leaps are not wider or more dramatic. However, an added layer of complication means that the performer's relationship with the score has been problematized.

The relationship of all three difficulties

Figure 7. Axes of virtuosity and difficulty.



What becomes clear, when looking at each type of difficulty and their relationships, is that a heirarchy of difficulties exists, mediating between difficulty and virtuosity. This relationship can be seen in the diagram to the left. Theatrical difficulty is the most virtuosic of these types, due to the fact that it is only through the theatrical manifestation of a difficulty that it can be externalized and transformed into spectacle. The least virtuosic of these types is psychological difficulty, which occurs only in the player's mind. It is only through changes in physicality that psychological difficulty can be made manifest theatrically, and it is only through the theatricalization of physical difficulty that it can achieve its own transformation into spectacle. One can imagine the tortured visage of the ever-straining virtuoso physically manifesting an otherwise hidden set of psychological and physical difficulties, or the dramatic jumps and lightning fast runs externalizing those difficulties otherwise confined to bodily or mental discomfort.

The psychological difficulty of a piece, manifested in its notation, and the theatrical difficulty perceived by an audience are the most disconnected of this set of difficulties, lying as they do at opposite ends of the spectrum; psychological difficulty only being able to transform itself into theatricality either through some type of physical manifestation perceivable to the audience – bodily tension, sweating etc. - or through the audience's knowledge of the notational difficulties encountered by the player. One could make a case that in the current musical climate any well-educated audience at a performance of a work by Brian Ferneyhough projects an element of

theatrical difficulty onto the performance through their knowledge of the complex nature of his scores.

Ferneyhough himself, provides one of the most succinct examples of the disconnect that can occur between the theatrical reception of a work and its notational difficulty in his seven movement guitar work, *Kurze Schatten II*:

> "The second movement's 'topic' is the potential distinction between performance tempo and perceived density of material. The marked tempo at the outset is extremely high and decreases by regular steps throughout, while the tendency in terms of material density is the opposite... As the piece progresses, notated rhythmic values become ever shorter, thus compressing ever more impulses in the increasingly expansive time frame of each section...The result of this overlapping of tempo and density vectors is a tendency, towards the middle of the movement, for the ear to confuse the two, even though, from the point of view of the performer, they imply quite diverse interpretational challenges."[12]

This sense of speed (one of the defining characteristics of theatrical difficulty, along with movement) finds itself running contrary to the psychological difficulty encountered by the performer, highlighting the independence of these difficulty types.

Theatrical difficulty, although seemingly a frivolous result of a shallow appreciation of surface-level athletic, rather than musical, performance features, nevertheless has a large impact on an audience's perception of quality.

Research has shown how the physical movements of a performer can affect the audience's perception of their playing. Jane W. Davidson's research involved the recording of the audio and video of short performances of musical extracts in three different performance modes (an

12 Brian Ferneyhough "Kurze Schatten II for solo guitar" *Brian Ferneyhough: Collected Writings* Ed. James Boros and Richard Toop (Amsterdam, 1998), 140-152, 141-142

exaggeratedly expressive version, a deadpan expressive version, and a version representing the performer's normal performing proclivities "projected"). These recordings were then played back to observers as sound with no visuals, sound and visuals, or visuals with no sound. Her results suggested that: "vision can be more informative than sound in the perceiver's understanding of the performer's expressive intentions. Indeed, in one experiment it was only the vision mode that enabled the perceiver to discriminate between the three performance manners of deadpan, projected and exaggerated".[13] Here we have an example of how the psychological processes determining the emotional expression of a work find themselves articulated outwards and projected into the realm of the physical and the theatrical.

In a meta-analysis of existing literature on the effect of visual factors upon musical performance, Friedrich Platz and Reinhard Kopiez concluded that: "the visual component is not a marginal phenomenon in music perception, but an important factor in the communication of meaning"[14].

Even the attractiveness of a performer, something which has no bearing upon musical performance, has been shown to affect an audience's perception of performance quality. Wapnick, Mazza, & Darrow's paper *Effects of Performer Attractiveness, Stage Behaviour and Dress on Violin Performance Evaluation* looked at the way in which performer appearance defines the audience's perception of quality of performance.[15] Observers rated a set of performer's attractiveness on a 9 point scale (according to appropriateness of dress, stage behavior, and physical attractiveness) and then evaluated the performance quality of recordings of the rated performers as audio recordings, video with audio recordings, or video without audio recordings[16]. They concluded that:

13 Jane W. Davidson "Visual Perception of Performance Manner in the Movements of Solo Musicians" *Psychology of Music, 1993, 21* pgs 103-113, pg 112

14 Friedrich Platz and Reinhard Kopiez "When the Eye Listens: A Meta-analysis of How Audio-visual Presentation Enhances the Appreciation of Music Performance" *Music Perception: An Interdisciplinary Journal, Vol. 30, No. 1 (September 2012)*, pp.71-83 , 75

15 J. Wapnick, J. K. & A. A. Darrow "Effects of Performer Attractiveness, Stage Behaviour and Dress on Violin Performance Evaluation", *Journal of Research in Music Education* Vol. 46, No.4 (Winter, 1998), pgs 510-521

16 ibid., 513

> "dress and stage behavior affected musical evaluation. Particularly, it seems that violinists who were rated high on these attributes benefitted from being rated via videotape rather than via audiotape. However, violinists rated low on dress and stage behavior were not penalized on their audiovisual evaluations."[17]

The idea that a performer's appearance can alter the audience's perception of their performance has profound consequences for our ideas about theatrical difficulty. The importance of the visual in a musical performance is clearly important and helps to explain how theatrical difficulty is able to function almost autonomously of the other types of difficulty.

Due to the separation and independence of the three different types of difficulty, when a high level of theatrical difficulty is manifested, the performer becomes one of two types of player: *The Athlete* or *The Magician.* *The Athlete's* physical and psychological strength leaves its scars upon the moment of performance and the audience regards and appreciates them with the same awe as that which greets the super-human olympian, revelling in the refinement of technical skill and mental endurance. *The Magician* projects merely the illusion of difficulties overcome: a gurning face and convulsing figure masking an ease of execution with the veneer of spectacle.

When *The Athlete* performs, the audience, as in a sporting event, experiences the performer overcoming real physical and psychological difficulties whilst *The Magician* uses stage-craft to amplify the physical or psychological difficulty of a piece, transforming it into spectacle, often even theatrically creating non-existant difficulties.

It is *The Magician* who is the real virtuoso, both showman and conman, manifested not in the technical innovations that still remained servile to the musical imagination, but in the gaunt supernatural theatricalism of Paganini. The difference between *The Magician* and *The Athlete*

17 ibid., 519

seems summed up in no better manner than Heine's comparison between Chopin and Liszt; one "much more a composer than a virtuoso. In Chopin's case I completely forget the mastery of his piano playing and sink into the sweet abysses [*Abgründe*] of his music"[18], the other whose technique obscures its lack of spiritual musicality; one whose quiet solemnity aimed to transform his music, the other whose *claquers* rained deified praise upon his achievements, elevating them through consensus.

Running with our initial thesis that "virtuosity" is an economic term, and given the clear division between *The Athlete* and *The Magician*; *The Athlete's* performance being the externalization and spectacalization of an underlying set of physical and psychological difficulties and *The Magician's* being one in which a projected and spectacalized difficulty masks a lack of them; it then seems sensible to conclude that virtuosity, based as it is upon the transformation of difficulty into spectacle, resides solely in the realm of theatrical difficulty (the audience's perception of difficulty being the point at which the monetization of a performance can occur). Regardless of the nature of that projected difficulty, be it athletic or magical, the physical and psychological difficulties of a performance are only difficulties, and are not virtuosic by themselves. It is only theatrical difficulty that can be termed virtuosic.

What use then is the inclusion of physical or psychological difficulty into a score, if the tension and drama that arises from them can be falsified? This question lies at the heart of many of the criticisms that have been brought against complex or difficult music over the last century. One needs only to think of the oft-repeated criticism that the music of the "New Complexity" composers could be improvised much more easily, preserving the surface of stylistic virtuosity yet removing the need for complex and labyrinthine musical notation[19]. This would be a valid criticism, were it

18 Susan Bernstein, *Virtuosity of the Nineteenth Century* (Stanford, 1998), 61

19 The best rebuttal to this accusation was by the composer Jeremiah Runnels, who countered an argument that Brian Ferneyhough's *Time and Motion Study I* for bass clarinet just sounded like somebody improvising with the riposte

not for the fact that the chaining together of multiple types of difficulty, in a manner such as *The Athlete* practices, induces a psychological state that has the ability to increase the performance of a player to an optimal level. This state lies somewhere between boredom and anxiety and was termed "flow" by the psychologist Mihaly Csziksentmihalyi.

that it didn't sound like *somebody* improvising, it sounded like an *Eric Dolphy* improvising.

Part II: Flow

"Flow" is a concept developed by the psychologist Mihaly Csikszentmihalyi, first concretely set forth in his book *Beyond Boredom and Anxiety* (1975), and later elaborated in his books *Flow* (1990) and Creativity (1996). The state of "flow" has many connections to previous ideas about changes in states of consciousness, studied by psychologists in the mid-20th Century, he points out that:

> "...experiences analogous to flow have been reported in contexts usually called "transcendental" or "religious". Maslow's (1962, 1965, 1971) peak experiences and De Charm's (1968) "origin" state share many distinctive features with the flow process. The same is true of accounts of collective ritual (Deren, 1953; Worsley, 1968; Turner, 1969); of the practice of Zen, Yoga, and other forms of meditation (Herrigel, 1953, 1960; Eliade, 1969; Naranjo and Ornstein, 1971); or of practically any other form of religious experience (Laski, 1962, Rahner, 1967; Moltmann, 1972)."[20]

The idea was specifically influenced by Maslow's work on peak experience, which was described as:

> "moments when [individuals] felt at their very best, moments of great awe, intense happiness, rapture bliss or ecstacy ... a peak experience is a moment in the individual's life when he is funcioning fully, feels strong sure of himself and in complete control. A comparison might be made with an engine that suddenly hits on all cylinders and performs perfectly, producing a real surge of power."[21]

Csikszentmihalyi refined Maslow's ideas, with the addition of scientific rigour, in attempt to break-down, analyze and categorize the causes and effects of engrossment in an enjoyable activity: "We have called this state the *flow experience*, because this is the term many of the people we interviewed had used in their descriptions of how it felt to be in top form: "It was like floating", "I was carried on by the flow" ".[22]

20 Mihaly Csikszentmihalyi *Beyond Boredom and Anxiety* (San Fransisco, 1975), 37
21 Frank G. Goble *The Third Force: The Psychology of Abraham Maslow* (New York, 1970), 56
22 Mihaly Csikszentmihalyi *Flow* (New York, 1992, 2008), 42

Due to the many different attempts to study aspects of these extremely similar, and often overlapping, types of psychological states, the terminology about it tends to get quite confused. In a useful analysis of the differences between these approaches and the terminology applied, Marotto et al. distinguish between the idea of peak experience and peak performance as follows:

> "By definition all peak performances are peak experiences. The converse, however, does not hold true; not all peak experiences are peak performances. For instance, Maslow (1970) includes the bliss and joy associated with communion with nature or the use of psychadelic drugs as examples of peak experiences. Peak performance, on the other hand, is by definition action-oriented. Rather than being passively absorbed in contemplation of an object or person, in peak performance, one is absorbed in performing a task or activity. During a peak performance, one transcends his/her normal level of performance and experiences the joy and rapture associated with the peak experience".[23]

It is the "peak performance" that is most of interest to us in this discussion. The transformational power of flow on the level of performance will highlight the important role of psychological and physical difficulty in musical composition.

The Phenomenology of Enjoyment

> "In our studies, we found that every flow activity, whether it involved competition, chance, or any other dimension of experience had this in common: It provided a sense of discovery, a creative feeling of transporting the person into a new reality. It pushed the *person to higher levels of performance*, and led to previously undreamed-of states of consciousness."[24] [my emphasis]

Csikszentmihalyi describes the "phenomenology of enjoyment" - the elements that comprise the flow experience – as consisting of nine components[25]:

23 Mark Marotto, Johan Roos & Bart Victor "Collective Virtuosity in Organizations: A Study of Peak Performance in an Orchestra", *Journal of Management Studies* 44:3 May 2007, 388-413, pg 390
24 Csikszentmihalyi, Mihaly *Flow* (New York, 1992, 2008), 74
25 ibid., 49

1. There are clear goals every step of the way.

2. There is immediate feedback to one's actions.

3. There is a balance between challenges and skills.

4. Action and awareness are merged.

5. Distractions are excluded from consciousness.

6. There is no worry of failure.

7. Self-consciousness disappears.

8. The sense of time becomes distorted.

9. The activity becomes autotelic.[26]

The first of these three elements are conditions that are conducive to the occurence of flow, the last six being components of the flow state. An analysis of the first of these three and their relation to musical notation and performance will hopefully show how the intelligent use of psychological and physical difficulty can be used to induce flow states and, thus, increase the player's enjoyment and, most importantly, performance, of a piece.

1. There are Clear Goals Every Step of the Way

For a musical performer, the clear goals that are needed to facilitate a flow state are to be found in the score. Traditionally, the score has been seen as descriptive – symbolically describing the sounding result of a piece, an idea which can be found in Richard Wagner's writing on virtuosity:

> "What you have written down in notes, is now to sound aloud; you want to hear it, and let others hear it. Very good: the weightiest, nay, the ineluctable concern for you, is to get your tone-piece brought to

26 Meaning "an end in itself", from the Greek.

> hearing exactly as you felt it in you when you wrote it down: that is to say, the composer's intentions are to be conscientiously reproduced, so that the thoughts of his spirit may be transmitted unalloyed and undisfigured to the organs of perception. The highest merit of the executant artist, the Virtuoso, would accordingly consist in a pure and perfect reproduction of that thought of the composer's; a reproduction only to be ensured by genuine fathering of his intentions, and consequently by total abstinence from all inventions of one's own. "[27]

This 1:1 relationship between the ideas of the composer, the symbols of the score, the performance of the player and the appreciation of the audience later develops into what Franklin Cox refers to as a "High-Modernist Model of Performance Practice" a model which developed out of a more "objective" performance style demanded by Neo-Classical and Second Viennese School compositions:

> "Under this model, if the notation is realized accurately, leading to an "audible projection" of all musical domains, then an "ideal" perception results. In other words, the listener comprehends the compositional system employed by the composer via the "accurate" realization of the performer".[28]

Following this mode of thinking, the goals that the performer is aiming for are the "pure and perfect reproduction of that thought of the composer's", in other words, the accurate physical manifestation of the sounds described by the score.

This idea becomes less straight-forward when applied to works in which the notation is not descriptive but prescriptive. Pieces in which indeterminacy is a large factor in regards to their performance often provide no precise goals about the sounding result – does this mean that they inhibit flow? I would argue not, but it requires the re-conceptualization of the role of the score. To transform these types of score back into flow-creating activities one must re-locate the theatre of

27 Richard Wagner *The Virtuoso and the Artist* trans. William Ahston Ellis http://users.belgacom.net/wagnerlibrary/prose/wagvirtu.htm#pag113 accessed 24/09/2012

28 Stuart Paul Duncan "Re-complexifying the Function(s) of Notation in the Music of Brian Ferneyhough and the "New Complexity" *Perspectives of New Music*, Vol 48 No. 1 Winter 2010 pgs 136-171, pg 151

action from the aural result to the body of the performer.

Indeterminate pieces are only a problem, in terms of goal orientation, if those goals are fixed in relation to a set of undefined aural results. A performer can, however, re-calibrate their goals to be in relation to the completion of the set of physical actions prescribed for them. In this case, the accurate articulation of the actions becomes the goal, rather than an undescribed sounding result. An example of a piece in which this happens would be Aaron Casssidy's *The Crutch of Memory* for indeterminate solo string instrument, in which not even the instrument or its tuning are specified (factors which would drastically affect its final sounding result), whilst the notation presents a complex set of highly prescriptive actions to perform. Here the action takes precedence over the sounding result so, as long as the performer is able to re-orient their goals away from the descriptive aspects of the piece and towards the success that occurs from the accurate execution of actions, flow can still occur.

2. There is Immediate Feedback to One's Actions

Having "immediate feedback to one's actions" is one of the elements of a flow state. Csikszentmihalyi, in his discussion of this category in *Creativity*, even uses the musical performer as an example:

> "... in contrast to the usual state of affairs, in a flow experience we know how well we are doing. *The musician hears right away whether the note played is the one*. The rock climber finds out immediately whether the move was correct because he or she is still hanging in there and hasn't fallen to the bottom of the valley"[29] [my emphasis]

As discussed above, although this seems to imply that indeterminate music would be a flow-

29 Csikszentmihalyi, Mihaly *Creativity* (New York, 1996), 112

inhibiting activity (as often there is no "right note") all pieces of music have similar indeterincaies built into them, and it simply takes the performer to re-frame the nature of their goals in relationship to the demands of the specific work, rather than unthinkingly applying a set of goals taken from another set of works or performance practice. The goals that are a necessary orientation point for the performence can be found by re-conceptualizing the nature of the goal to be focused more upon the physical aspect of playing. In his analysis of the problems encountered in the realization of the *Evryali* by Xenakis, the pianist Marc Couroux, despite describing the work as containing "passages that can never and will never be realized perfectly be any human performer"[30], gives a good example of a how a task can be re-oriented to produce clear goals, rather than a simple dismissal of the impossible:

> "Constraints and solutions imposed on the work, whatever they might be, can aid in harnessing the monster. The key word remains "lucidity", accepting the impossible and dealing rationally with it, without resorting to subterfugal improvisation. Most of all, keeping in mind the extraordinary aesthetic beauty of the piece...can I believe, inspire a performer to never give up striving for perfection."[31]

The same goes for a work such as Evan Johnson's *Apostrophe 2 (pressing down on my sternum)* which gives the following instructions in the score: "In absolutely no case should the performer ignore the presence of material on the page even if it is not literally playable – it must be "communicated". "Improvisation" on the given materials is not permissable"[32]

Even in an impossible work, such as *Evryali* or *Apostrophe 2*, we see the performer able to allow the opportunity to move into flow states by re-framing the problem. This re-framing of normally unrewarding tasks (such as attempting the impossible, as in the case of the two pieces mentioned above) into flow-creating activities is described as one of the things practiced by people with what

30 Marc Couroux, "*Evryali* and the Exploding of the Interface: from Virtuosity to Anti-virtuosity and Beyond", Contemporary Music Review, 2002, Vol. 21, Nos 2/3, 53-67, pg 54
31 ibid., pg 65-66
32 Evan Johnson, *Apostrophe 2: (pressing down on my sternum)* (np, 2009) general notation.

Csikszentmihalyi describes as an “autotelic personality” - somebody who does things for the sake of doing them and gets enjoyment from them through their restructuring of the activity into a flow-creating one. This transformation of activities into flow-creating ones is acheived by “recognizing opportunities for actions where others did not, by developing skills, by focusing on the activity at hand, and allowing themselves to be lost in the interaction so that their selves could emerge stronger afterward. Thus transformed, work becomes enjoyable and as the result of a personal investment of psychic energy, it feels as if it were freely chosen, as well.”[33]

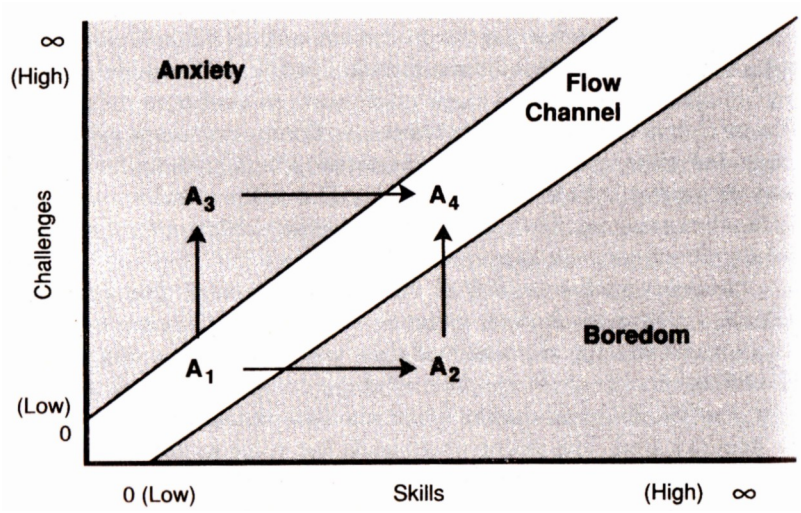
One might even argue that the unwillingness of some performers to tackle works which either involve indeterminacy or impossibility is due to an inability to transform these processes into flow-creating activities. This could be acheived by abandoning the paradigmatic frameworks that treat the score as a symbolic object representing a sounding ideal for a more flexible conception of notation.

33 Csikszentmihalyi, Mihaly *Flow* (New York, 1992, 2008), 152

3. There is a Balance Between Challenges and Skills

Csikszentmihalyi sees flow as lying between bordeom and anxiety, at the point at which the challenges presented are equally matched by the skills of the participant. The relationship between boredom, anxiety, and the state of flow can be seen in the diagram below.

Figure 8. Diagram showing the relationship between boredom, anxiety, challenges, skills and flow. The figures labelled "A" represent a single person moving between different states and the unidirectional way in which people move in and out of flow states.[34]



As can be seen above, a lack of challenges, in relation to skills, results in boredom; challenges which exceed a person's skills result in anxiety. It is only when skills and challenges are matched that flow can occur. This diagram also shows the unidirectional ways of moving in and out of flow. If a performer is bored, the only way of moving back into flow is by increasing the challenges but, if a performer is suffering from anxiety, the only way they can move back into flow is by increasing their skills.

From this analysis we can see why physical and psychological difficulty can play such an important

34 ibid., 74

part in a performance. It is only when a performer is engaged in an activity in which the challenges/difficulties match their skills that they can move into flow. By carefully weighting the challenges/difficulties contained in a score with each performer's skill-set, it is more likely that a peak performance will occur.

Boredom

The importance of the weighting between challenges and skills helps explain the lacklustre performances of many professional musical ensembles. Firstly, they have swapped their intrinsic motivation for an extrinsic one: money, an act which transforms the activity from being an autotelic one and inhibits flow by undermining the ninth aspect of the "phenomenology of enjoyment". Secondly, the removal of autonomy (which along with mastery and purpose, Dan Pink identifies as three important factors in creating intrinsic motivation)[35] created by the top-down management system of most ensembles, can reduce the chance of flow states occuring. Finally, the music played often does not match the skills of the players, thus also inhibiting the occurrence of flow states.

Perhaps one might posit, then, that "new complexity" was a performer-led rather than composer-led movement. The increase in the skills of specialized new music performers in the mid-part of the 20th Century demanded a new set of repertoire which matched their skills and alleviated the boredom created by a lack of pieces suited to their abilities. All of the older pieces which had previously represented the limits of performative possibility had been surpassed and a new set of psychological and physical challenges were needed to help these performers reach a flow state which not only increased their performance, but also generated an enjoyable, engrossing, transformative and transcendental state to which they wanted to return.

35 Dan Pink, *Drive* (New York, 2009)

Anxiety

Csikszentmihalyi's analysis of flow as lying between boredom and anxiety correlates with other research into the role of anxiety as a factor in levels of performance. Specifically related to our discussion here is the research on musical and athletic performance anxiety.

At the furthest extreme of any musical performance anxiety is "stage fright". As Glenn D. Wilson points out "...the symptoms of stage fright are much the same as any those of any other phobia or fear reaction".[36] The literature in musical performance anxiety (as well as atheletic performance anxiety) shows that levels of performance can be directly correlated to the level of anxiety experienced by a performer. This level of performance does not exist in a linear relationship to anxiety, but an inverted-U function relationship known as the Yerkes-Dodson curve.[37] This curve indicates that there is an optimal level of anxiety which will induce the best level of performance and that it lies between the extremes of the anxiety scale. As one can see, this correlates perfectly with Csikszentmihalyi's findings about the role of anxiety. The Yerkes-Dodson Law also states that that "complex tasks show deterioration at lower levels of anxiety than simple tasks".[38] The diagram below extends this model to encompass three independent elements which have a factor on performance:

> "(1) the *trait anxiety* of the performer – and indeed other relevant personality traits such as introversion and social phobia;
>
> (2) the degree of *task mastery* that has been attained, ranging from simple, well-rehearsed pieces to complex, under-prepared material;
>
> (3) the degree of *situational stress* prevailing, i.e. environmental pressures such as public performance, audition, or competition."[39]

36 Glenn D. Wilson, "Performance Anxiety" *The Social Psychology of Music* Ed. David J. Hargreaves & Adrian C. North (Oxford, 1997) 229-245, pg 229
37 ibid., 233
38 ibid., 233
39 ibid., 233

Figure 9. Glenn D Wilson's three dimensional extension of the Yerkes-Dodson curve.[40]

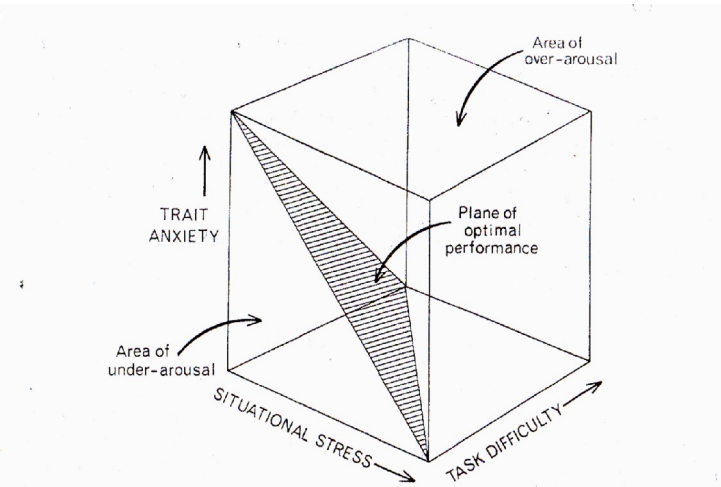


Fig 12.1 A three-dimensional extension of the Yerkes-Dodson Law, in which optimal performance is seen as a function of the interplay among personality-based proneness, task difficulty, and situational stress (Wilson 1994).

The conceptualizing of anxiety as a result of the three factors outlined above, has clear implications for our discussion of the role of physical and psychological difficulty in the facilitation of peak performance. Any discussion of the difficulty of a piece intending to create conditions most fertile for peak performance needs to consider a number of factors. One must not only take into account the psychological and physical difficulty embodied in the score and its relationship to the player's own skill-set and preparation (what is referred to above as *task mastery*), but also the situational stress and trait anxiety of the performer:

> "Certain practical inferences can be drawn from [the model shown above]. For example, highly anxious individuals will perform best when the work is easy and the situation relaxed, while performers low in anxiety will perform better when they are more challenged by the work and have a more exacting audience. Performers who are particularly prone to anxiety would be advised to chose pieces or works with which they are very familiar, at least for audition purposes or important public occasions. If the choice of work is outside the control of the performer then hard rehearsal may turn a complex, difficult work into a familiar (hence relatively easy) one."[41]

In our analysis, we can typically presume a high situational stress level, as we have been solely

40 ibid., 233
41 ibid., 234

discussing works publically performed in front of an audience. In terms of the *trait anxiety* of the performer, it may be enlightening to look at some of the research done into the trait levels of anxiety in musicians as a social group, and in particular, the differences in *trait anxiety* that may occur between different types of instrumental performer.

The Trait Anxiety of the Musician

Musicians do not represent a homogenous group, displaying across-the-board levels of trait anxiety, but differ in their personality make-up not only in relationship to other types of performing artists, but between levels of experience, different instrumental groups, and even between instruments. In his comprehensive review and synthesis of existing literature on musician psychology, Anthony E. Kemp highlights some psychological differences between types of musician that have a bearing on our discussion of trait anxiety.[42] Although, too wide-ranging to detail here, it must nevertheless be mentioned that research has shown that musicians exhibit higher levels of trait anxiety in comparison to actors, dancers, and singers – something that should be borne in mind, should one be interested in inducing flow in a multi-disciplinary setting.[43] Within musicians, the level of musical experience has a bearing of the amount of trait anxiety experienced by a musician:

> "Musicians' anxiety appears to manifest itself particularly in emotional instability and a form of frustrated tension, but suspiciousness and low self-sentiment also feature as important components. These traits are revealed as an inherent part of the psychological makeup of most musicians and tend to become first manifest during higher education and, thereafter continue to be apparent in professional life. There is some evidence, however, that high levels of anxiety also emerge in younger, particularly talented musicians attending special music schools."[44]

Differences in trait anxiety can also be found between instrumental groups and even between instruments. In relation to the aforementioned Yerkes-Dodson curve, Kemp notes that "introverts

42 Anthony E. Kemp, *The Musical Temperament* (Oxford, 1996)
43 ibid., 94
44 ibid., 106

who are characterized by greater levels of arousal than extraverts, will perform a moderately difficult task better than extraverts in a low-stress situation. However, introverts will perform less well under high-stress situations."[45] Brass players' higher levels of extraversion, as compared to string players' high levels of introversion may indicate that brass players' are "able to perform more efficiently under stressful situations".[46] However, brass players may reach higher levels of state anxiety in relation to psychologically difficult notation, as research has shown they possess comparatively lower intelligence[47]. Kemp also highlights inter-instrument trait anxiety differences between the sexes and markedly different ones between experience-levels: As an example, secondary school oboe players have been shown to have higher levels of anxiety than other woodwind instruments, yet this trend towards anxiety is not present in undergraduate-level players.[48]

The implication of the research on musicans' trait anxiety is that the conscientious composer, interested in inducing flow states in his performers, should weight the physical and psychological difficulty of the part according not only to the level of *task mastery* of the musician, but also taking into account the levels of trait anxiety displayed by musicians of specific instruments, sex and levels of experience.

Summary – Parts I & II

Thus far we have been able to see the relationship between the different types of physical, psychological, and theatrical difficulty and how these relate to a re-conceptualized idea of virtuosity. In this new definition, its role as an economic mediator between the court and free-market systems is emphasized. Virtuosity re-focused existing conceptions of musicianship to be

45 ibid., 48
46 ibid., 161
47 ibid., 159
48 ibid., 155

centred around the objective, quantifiable, and thus commodifiable, aspects of musical performance, creating a market-place for the virtuosi. Virtuosity thus became the transformation of difficulty into spectacle; a process which privileged the audience/buyer's perception over the actuality of the player's actions, causing a rupture between the physical and psychological difficulties experienced by the player, and the commodifiable theatrical difficulty experienced by the audience. Theatrical difficulty then became interchangeable with virtuosity itself. This schism between difficulty types created two different types of player: *The Athlete*, whose outward projection of theatrical difficulty was a manifestation of an internal struggle with the psychological and physical aspects of a piece, and *The Magician*, whose externalized theatrical difficulty bore little connection to any psychological or physical difficulties they were experiencing.

Mihalyi Csikszentmihalyi's conception of “flow” furnishes the composer with a framework by which to understand, and hopefully create, ideal situations in which peak performance can be achieved by a performer. By carefully weighting the physical and psychological difficulty, enshrined in the notation of a piece, with the performer's skills, taking into account the performer's trait anxiety (partly defined by their instrument, level of experience and sex), and the situational stress induced by the situation in which the piece will be performed, the ideal level of anxiety, as represented by the Yerkes-Dodson Law, can be reached, and the likelihood of flow, and thus a peak performance, taking place will be greatly increased.

Part III: Re-Notating Modernism

This section looks at the way in which two Modernist works have been subjected to re-notation procedures, and the way in which this has changed the implicit difficulty (and thus, virtuosity) of the work. In concluding, I ask whether the re-notation of these existing works, and the problematization of the role of notation that ensues, tells us anything about the nature of the original works, their notation, and their approach to performance.

In common with both of these re-notations is an approach which conceives of their musical material as free-floating events, abstracted from the grid of the score. Western musical notation is based upon the quantization of continuous information into discrete data, in which the continous nature of sound is placed within a set of grids encompassing multiple parameters of musical performance. The re-notation techniques used take, as their general premise, the liberation of sound from a single temporal grid, and its re-instatement as atomized events. The re-gridding that then occurs attempts to reconstruct the pieces using an exploded view of the work, in which multiple temporal centres of temporal gravity can autonomously function. This notational distortion shares some similarities with Mauricio Kagel's ideas of Translation-Rotation, in which geometrical constellations of a gesture can be abstracted from its notation and transformed in ungridded free-space.[49]

The partial re-notation of *Gruppen* by Karlheinz Stockhausen and *Bone Alphabet* by Brian Ferneyhough, aim to re-articulate embedded compositional concepts that technology or performance have obscured, increase the accuracy of performance, and bring into question the nature of the original notation used.

49 Mauricio Kagel, “Translation-Rotation” trans. Cornelis Cardew *Die Reihe* Ed. Herbert Eimert, Karlheinz Stockhausen (London , 1960, translation from 1965), 32-60, 32-33

The Re-Notation Of Karlheinz Stockhausen's *Gruppen*

Gruppen by Karlheinz Stockhausen is a work for 3 orchestras, written between 1955 and 1957. In the work, 109 players are divided into 3 "orchestras" which are spatially arranged around the audience. The orchestras frequently play in different tempi, facilitating the need for a conductor for each orchestra. The conductors co-ordinate between themselves, conducting in tempi that lie in simple proportions to each other. The piece is based upon the composer's ideas about the relationship between rhythm and pitch, which he outlined in the article "...How Time Passes..." from issue 3 of *Die Reihe*:[50]

> "Our sense-perception divides acoustically-perceptible phases into two groups; we speak of *durations* and *pitches*. This becomes clear is we steadily shorten the length of a phase (e.g. that between two impulses) from 1" to 1/2", to 1/4" 1/8", 1/16", 1/32", 1/64", etc. Until a phase-duration of approx. 1/16", we can still just hear the impulses separately; until then, we speak of 'duration', if of one that becomes extremely short. Shorten the phase-duration gradually to 1/32", and the impulses are no longer separately perceptible ... Thus the transition from one time-area to another causes a change in our perception of phases. This observation could form the basis for a new morphology of musical time."[51]

This relationship between pulse and pitch finds its musical embodiement in the piece *Gruppen*, which applies this principle to the organization of the entire piece at the macro and micro level.

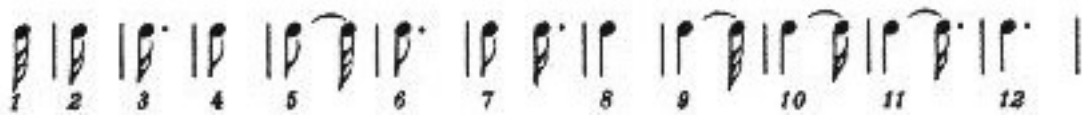
The score is split into 174 overlapping "groups" in which a serialist tempo series is elaborated. In previous serial compositions, both by Stockhausen and others, the rhythmic series of a piece was created through the multiplication of the smallest unit e.g. the additive process of taking a small duration and multiplying it by all integers between 1 and 12. This process of deriving a rhythmic series can be seen in pieces such as Messaien's *Mode de Valeurs et d'Intensités* (a seies later used in

50 Karlheinz Stockhausen, "...How Time Passes...", trans. Cornelis Cardew *Die Reihe Vol. 3 (Musical Craftsmanship)* Ed. Herbert Eimert and Karlheinz Stockhausen (Pennsylvania, German edition: 1947, English Edition, 1959 copyright 1975), pgs 10-40

51 ibid., 10-11

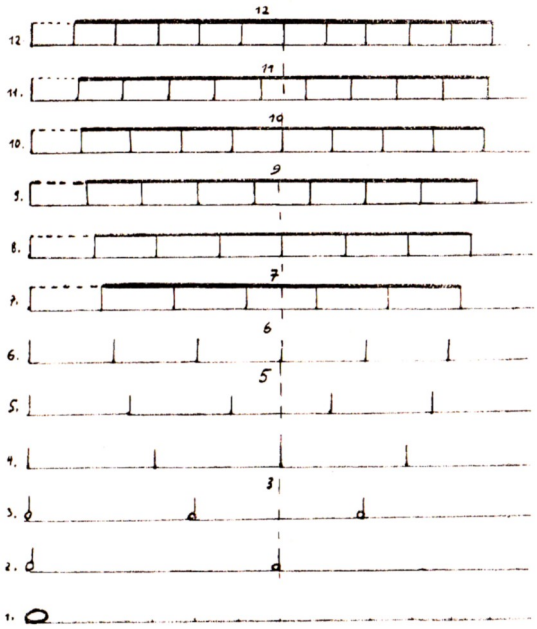
Boulez's *Structures*).

Figure 10 Rhythmic series from Messaien's *Mode de Valeurs et d'Intensités.*[52]



Stockhausen claims that this method of creating a rhythmic series creates a *sub-harmonic* rather than harmonic series of relationships[53] and that, if one wanted to accurately create a rhythmic scale based upon the same relationships as those that govern pitch (a concept that lies behind much mid-century serialist thinking), then one should use a scale created through the "process of *dividing a largest time-quantum*".[54] This process involves the division of a large pulse into 12, equal sized pulses, as can be seen in the diagram below. This division allows the rhythmic series to better mirror the equal-tempered system of tuning that is used for pitch

Figure 11 Dividing a largest time-quantum.[55]



52 Olivier Messaien *Mode de valeurs et d'intensités* (Paris, 1949), 2
53 Karlheinz Stockhausen, "...How Time Passes...", trans. Cornelis Cardew *Die Reihe Vol. 3 (Musical Craftsmanship)* Ed. Herbert Eimert and Karlheinz Stockhausen (Pennsylvania, German edition: 1947, English Edition, 1959 copyright 1975), pgs 10-40, 12-13
54 ibid., 16
55 ibid., 17

Difficulties

The re-notation of *Gruppen* attempted to preserve, inchanged, its musical information yet re-work the notation to remove what this author sees as unnecessary notational complications. This re-notation procedure reduces the physical and psychological difficulties of the piece to such an extent that amateur players can perform it, in contrast to the original, whose difficulty means that it is only playable by highly-skilled perforemers. In order to understand this procedurem the difficulties inherent in the original must ne analyzed. The physical and psychological difficulties that occur in the piece are as follows:

Psychological:

1. The problems in maintaining rhythmic accuracy when performing tuplets with high-order ratios. (e.g. 11:16).
2. The difficulties in conductors maintaining an accurate tempo, due to the fine gradations of the tempi used (e.g. the difference between quarter note = 107 and quarter note = 113.5).
3. The difficulties in accurate synchrony and time keeping between all three conductors. The number of conductors involved increases the margin of error, especially as they all take tempi in reference to each other.

Physical:

1. Occasional fast passages of notes.
2. Occasional large jumps

As can be seen, the difficulties of this piece are mainly psychological ones, relating to the accurate performance of temporal aspects of the piece. Many of the psychological difficulties arise from the problems that conventional, score-and-conductor-based, Western musical notation has in

representing the overlaying of multiple pulses. Our current system of notation is based on the idea that all events that occur in a work happen in reference to a single temporal unit. The traditional approach to dealing with the problem of multiple tempi has been to re-notate one of the tempi in relation to the other, as can often be seen in Charles Ives' work. This process of notation frequently complicates matters by relying on tuplet subdivisions of the beat which notationally obscure the musical pulse and phrasing of the material.

"The most general remarks that can be made concerning the make-up of the average group are that *pitch-wise* it is often limited to fixed pitches i.e. notes stick in the same octave disposition, giving a more or less static feeling"[56]. The reduced set of pitches used for each group, helps to keep the physical difficulty low, especially, as in the first group where the only notes used (G#, A, A#, B, C#, and D) lie within the same octave. Much of the material in the work has a low level of physical difficulty.

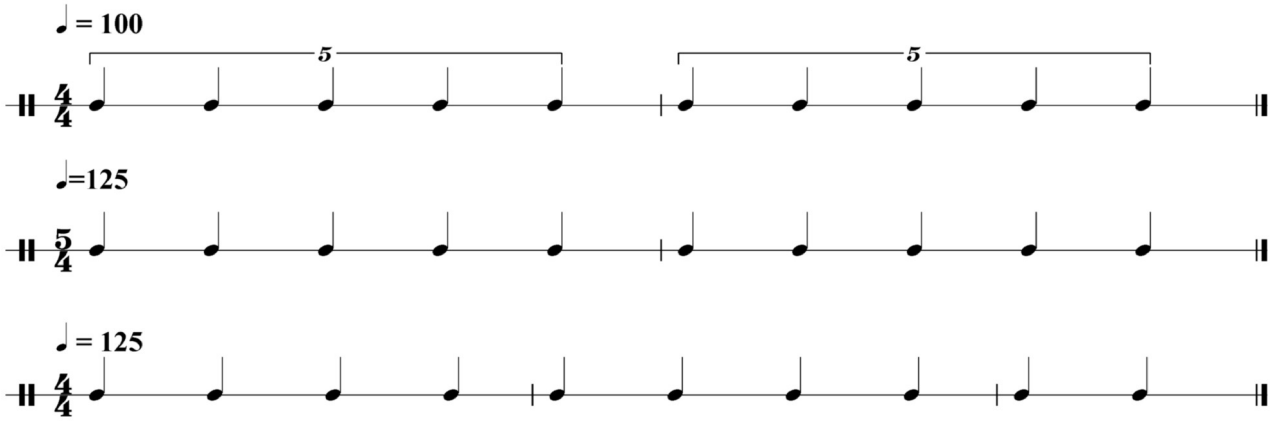
The Principles Of Re-Notating Gruppen

The first 6 "groups" (amounting to just over one minute of music) were re-arranged and re-notated by the author and Jeremiah Runnels in the beginning months of 2011. Although never performed in public, these groups were played in a re-orchestrated version during rehearsals of the CREA amateur orchestra of Amsterdam University on the 31 May 2011. Whilst the original piece used 109 players, this version was arranged for 60 orchestral performers. All of the parts were performed, although some re-orchestration was needed. Recordings of this rehearsal are available from the author on request. The arrangers are currently searching for funding and amateur orchestras to create and perform a fully re-notated version of the entire piece for three amateur orchestras.

56 Jonathon Harvey, *The Music Of Stockhausen* (London, 1975), 63

The re-notation of this work proceded from a simple concept: in conventional Western musical notation, any group of equally-spaced pulses can be represented in a number of ways. In the example below, this principle can be seen in action. The top line shows a set of equally spaced pulses in 4/4, their rhythmic ratios lying in 5:4 relationship to the pulse of the tempo (quarter note = 100). The second line of the example shows the same temporal proportions, but with the tuplets multiplied out through the use of a tempo change, created using the equation shown below. This process preserves the temporal relationships of the piece, whilst decreasing its difficulty. Notice how this change in psychological difficulty through rhythmic re-notation mirrors the example given in figure 7 of this paper. In the final line of the figure below, the set of pulses is again re-notated, but this time into 4/4, rather than 5/4; again, further decreasing the psychological difficulty.

Figure 12. Two examples of the multiplying out of beat subdivisions into tempi. The first line represents the original beat division in tempo quarter note = 100. The second and third staves are a multiplying out into two 5/4 bars and two and a half 4/4 bars at tempo quarter note = 125. All examples below have the same temporal proportions.



This process is acheived by using the following equation:

$$\left(\frac{a}{c}\right)\times t$$

a = Tuplet ratio antecedent e.g. the **5** in a 5:4 tuplet

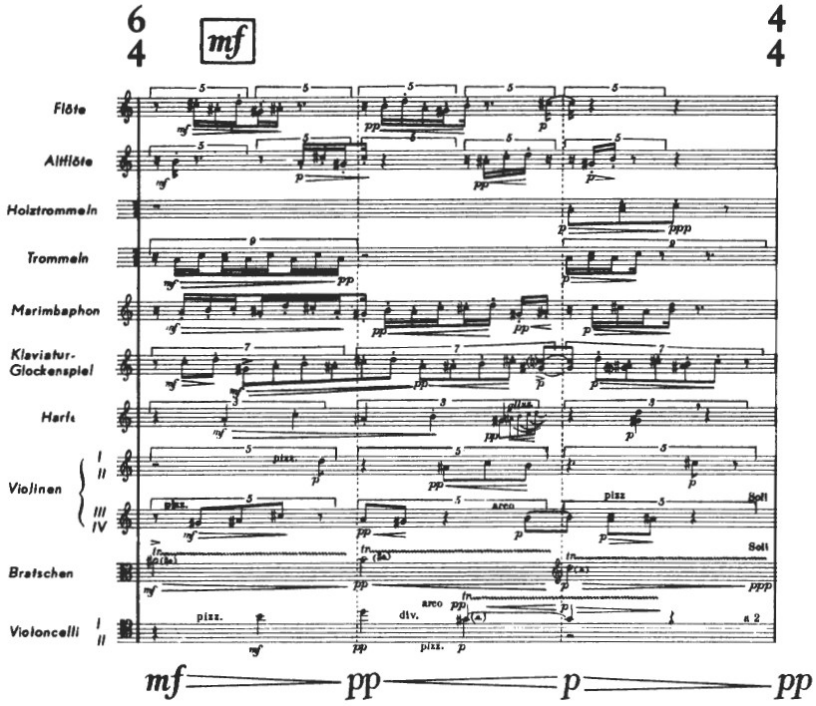
c = Tuplet ratio consequent e.g. the **4** in a 5:4 tuplet

t = Original tempo in quarter notes per minute e.g. 100

The usefulness of this process in the re-notation of *Gruppen* can be seen most clearly if one refers back to figure 12 and the rhythmic division of the largest time quantum, used as the basis for the piece. Essentially, this diagram shows a series of equally spaced pulses, written as tuplets. This rhythmic subdivision can be seen in action in the example below, taken from Stockhausen's original score. Notice how each rhythmic subdivision stays constant in each instrument and its relationship to the ideas in figure 12.

Using the procedure of tuplet "multiplying out", outlined above, it is possible to remove these tuplets via tempo changes to create psychologically easier notation without fundamentally changing the rhythmic proportions of the work.

Figure 13. Extract from the original score of *Gruppen,* group 1.



Taking this extract as an example, one clear problem of multiplying out the tuplets is that, due to the changes in tempo, a different conductor would be needed for each type of tuplet. Obviously, this would be an impractical solution, further increasing the inaccuracy of performance through added conductors.

However, a conductor is not the only way in which tempi can be communicated to a player. There have been many developments in technology that have occurred since *Gruppen*'s composition and one of these is the ability to accurately create and send multiple, synchronized click-tracks to performers via headphones. It was this process that was used in the re-notation, with the creation of 60 unique click tracks, one for each performer.

Improvements

Gruppen is based upon a tempo scale derived from the logarithmic relationships of equal tempered tuning, partly as a response to what Stockhausen saw as a conceptual dissonance inherent in serial composition up until this point: "For a *scale of durations*, whose dissimilarities shall be perceived as equally large, one must use logarithmic relationships."[57]

In the introduction to the score of Gruppen, he lays out this tempo scale calculated using the $\log^{12}$ relationship (although he noticably leaves out its octave transpositions, which occur during the piece). These tempi are shown in the left column of the table below. Stockhausen rounded each of the tempi to one decimal place, however, due to the fact that each of these tempi no longer have to remain in the proportional relationships needed for the conductors to stay in synchrony, we can increase the number of decimal places, to achieve a greater level of accuracy than is even present in the score! Thus, this re-notation is not only able to increase the accuracy of the piece, in terms of its performance, by decreasing the psychological difficulty of the score and using click-tracks to better articulate the fine gradations of the tempo scale, but the re-notation comes closer to Stockhausen's original conception of the piece than he was able to embody in the score.

57 Karlheinz Stockhausen, "...How Time Passes...", trans. Cornelis Cardew *Die Reihe Vol. 3 (Musical Craftsmanship)* Ed. Herbert Eimert and Karlheinz Stockhausen (Pennsylvania, German edition: 1947, English Edition, 1959 copyright 1975), pgs 10-40, pg 11

Figure 14. Comparison of $\log^{12}$ tempo scale used by Stockhausen (rounded to 1 decimal place), and the scale rounded to 13 decimal places.

Tempo Scale used by Stockhausen	Tempi Scale Used in the re-notation
60	60.0000000000000
63.5	63.5677856615577
67	67.3477228985624
71	71.3524269001633
75.5	75.5952629936924
80	80.0903912502021
85	84.8528137423857
90	89.8984246126009
95	95.2440631180920
101	100.9075698304460
107	106.9078461768410
113.5	113.2649175218030
120	120.0000000000000

These more accurate tempi are used for the base tempo of each group. Within the group, the process of multiplying-out tuplets uses these new tempi as the starting tempo, instead of the ones written in the score.

The Process of Re-Notating Gruppen

The re-notation of the piece occurred in a set of stages:

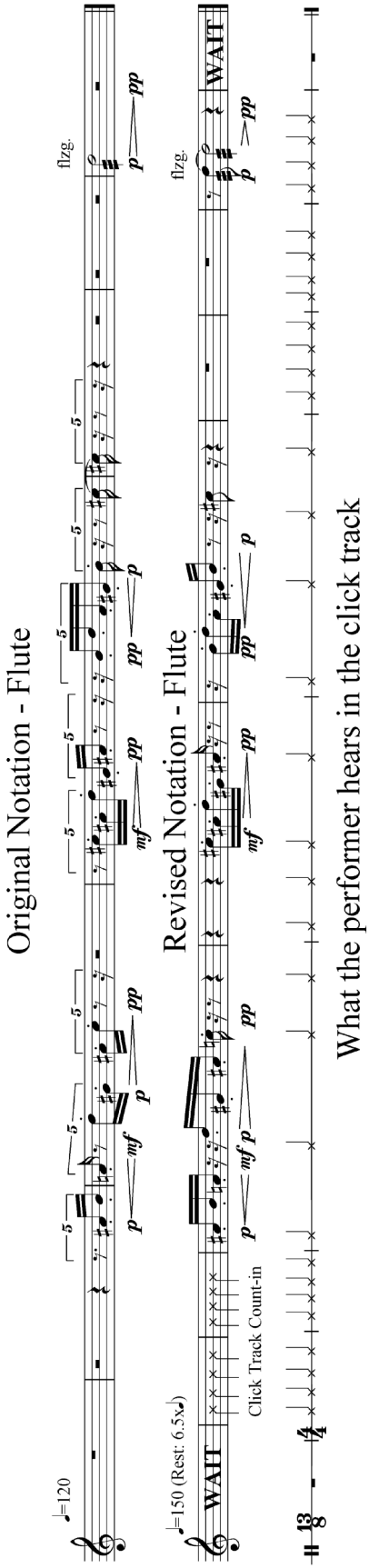
1. The splitting of the score into groups (each group starts at a numbered rehearsal mark).
2. The multiplying out of tuplets in each instrumental part into 4/4 in a different tempo.
3. The creation of the new parts in 4/4 using sibelius.
4. The creation of click-tracks, using a version of João Pais's *Click Tracker* pd patch[58] modified by this author to utilize count-in commands, rests, and batch processing capabilities.
5. The collaging together of all click tracks. A max/msp patch was then used to re-orchestrate the piece according to the line-up of the CREA Orchestra (60 people, limited percussion), distributing material according to an instrument's availability. If there was no

58 João Pais, Click Tracker, pd~, http://puredata.info/downloads/click-tracker accessed: 8 October 2012

instrument available to play a particular set of material, it was distributed to the instrument with the closest range and timbral similarity. e.g. in our re-arrangement, much of the wood-drum parts ended up being played by the double basses.

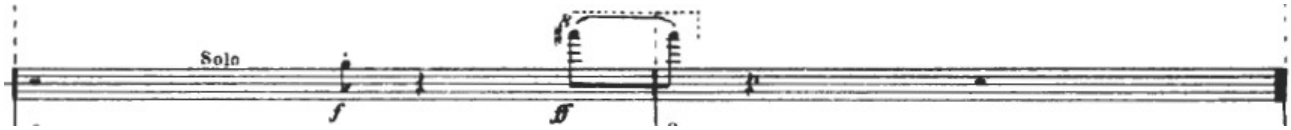
In the example over the page, the opening flute line of the piece has been worked out using the procedure outlined above. Notice how the re-notation has been designed to ensure that the entrance of the flute occurs on a down beat of the first bar of the click track after the count-in, thus increasing accuracy. This is done for every instrument (where possible) at the start of each group.

Figure 15. Comparison of original and revised notation along with the click track heard by the performer for Flute No. 1, Orchestra 1 in Group 1 of the score.



At parts in which physical difficulty was of a high level, lines were fragmented and distributed amongst a group of instruments. This was easy to do, due to the fact that the increased accuracy of the performers, created by playing to the highly accurate click tracks, allowed an almost inaudible transfer between instruments to take place. One example of this can be seen in the figure below which, in the original notation, was played by a single violin and in our re-notation was played by two (one for each note) giving the second violin plenty of time to prepare their high note.

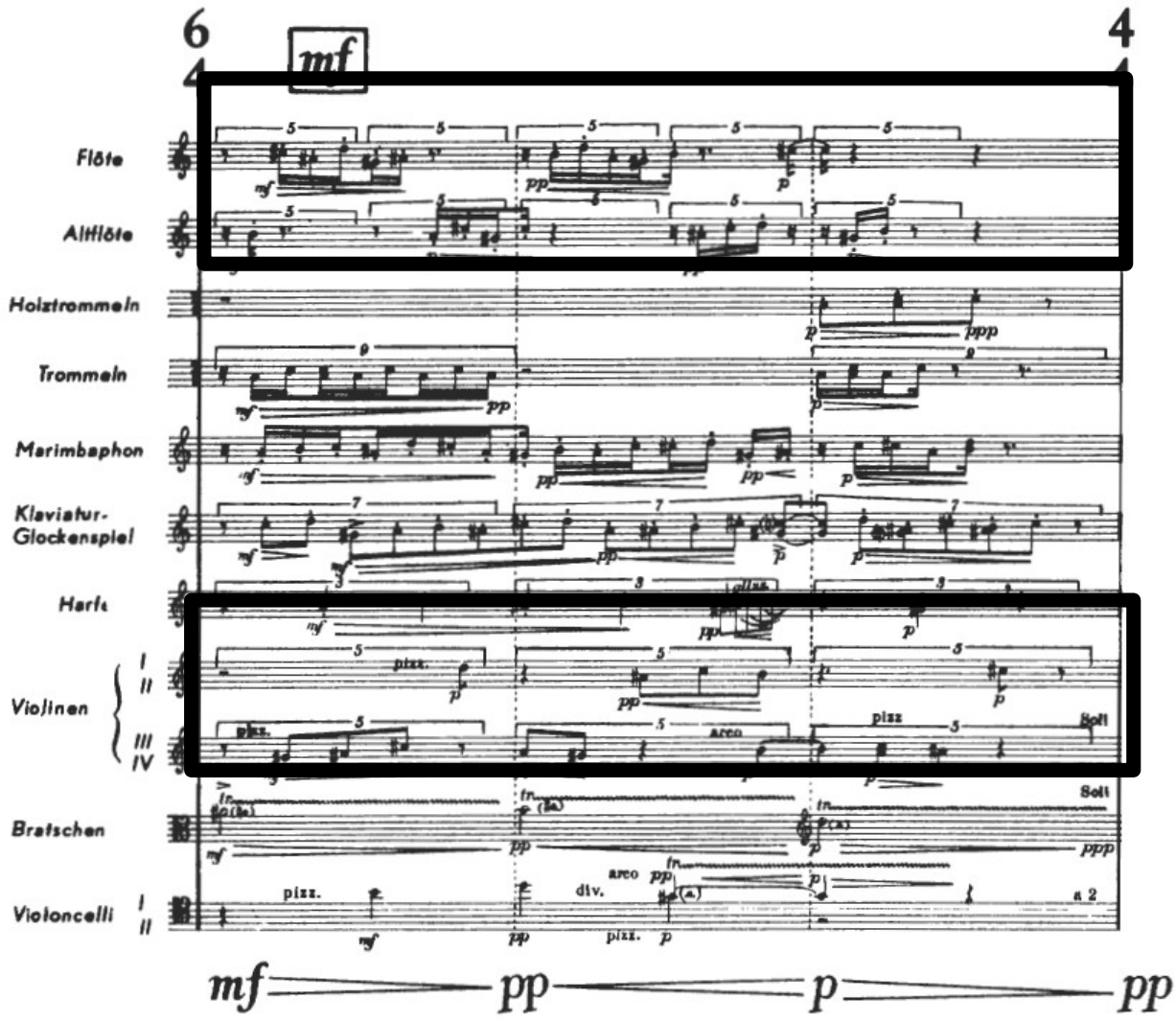
Fig 16 Large jump in Violin 1, Orchestra 3 Group 3 (original notation).[59]



Although one might argue that this fragmentation breaks up the melodic lines of the piece, we can see that Stockhausen himself was already using a fragmentatary hocket-like procedure extensively, as can be seen in the figure below, in which single flute and violin lines are spread between two instruments.

59 Karlheinz Stockhausen, *Gruppen* (London, 1963)

Figure 17 taken from group 1 (score in C) – notice how the flute and alto flute lines share a single melody between them in the same tempo and how this also occurs for the violins



Experience-Oriented and Action-Oriented Difficulty

The difficulties that occur in *Gruppen* arise out of the problems attendant with translating Stockhausen's abstracted idea of the pitch/rhythm relationship into playable music. This is a very specific type of difficulty, in which the hardships, be they physical or psychological, come not out of any particular wish to test the boundaries of performability, but as a side-effect of an attempt to make manifest a particular set of material. In this respect, it shares similarities with some of Xenakis' solo work, in which the desire to present a particular set of material relationships is seen to trump a piece's difficulty, or even playability (as in the case of the "impossible" *Evryali*).

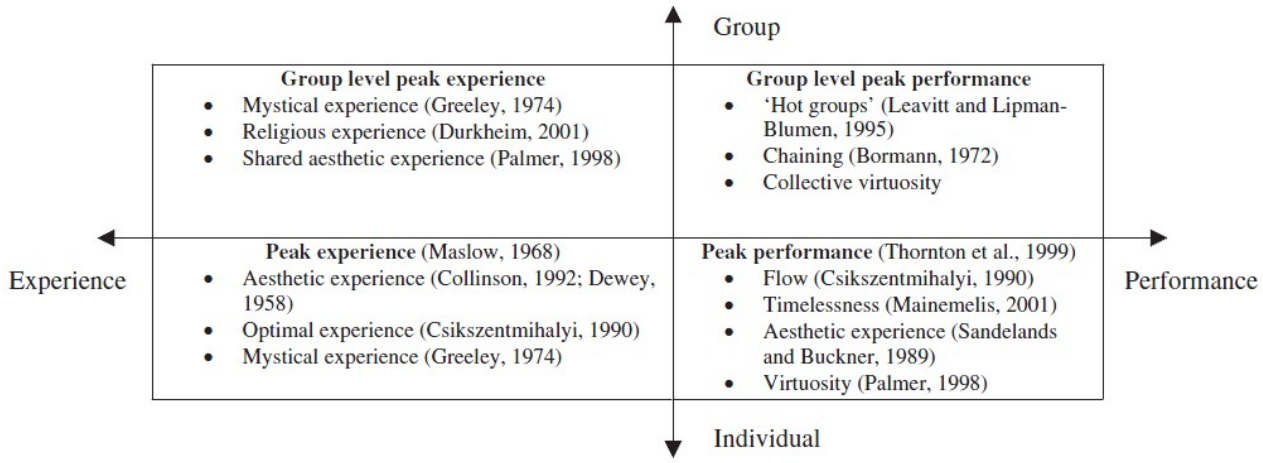
This type of relationship between difficulty and material, might be described as being *experience-oriented*, as opposed to being *action-oriented*. An *experience-oriented* type of virtuosity will often find itself manifested in *descriptive*, rather than *prescriptive,* notation in which the score is seen as describing a set of sonic phenomena which the player is encouraged to bring into being, and whose fidelity is judged by the similarity of their sounding result to that suggested by the score.

These terms were chosen to correlate with Marotto et al.'s dissection of the elements of peak experience/performance and its relationship to group and individual peak experience (see figure, below). They describe peak performance as "action-oriented", involving an individual engaged in performing a task or activity "rather than being passively absorbed in contemplation of an object or person"[60]. From this it seems logical to conclude that whilst a performer may undergo a peak experience whilst listening to a piece of music, it is unlikely that they will have a peak performance unless they were able to transform listening into an active, task-based activity. Thus, it seems plausible to suggest that, whilst a performer can achieve a peak *experience* based on the aesthetic beauty of a work that they are performing, regardless of how it relates to their challenges or skills, it

60 Mark Marotto, Johan Roos & Bart Victor, "Collective Virtuosity in Organizations: A Study of Peak Performance in an Orchestra", *Journal of Management Studies* 44:3 May 2007, 388-413, pg 390

is only when they interact with a piece that matches their performance skills with an optimal level of challenges that they can achieve a peak *performance*.

Figure 18 Marotto et al.'s diagram of Peak Experience/Performance [61]



An *experience-oriented* piece of work can seek to induce a peak experience in those listening or playing it, but it is only the *action-oriented* work which will create the peak performance – of course, the best works combine both of these approaches to a sublime degree.

It has already been suggested that Xenakis provides a good example of an *Experience-oriented* approach to difficulty and works such as Klaus K Hübler's aforementioned *Cercar* (for solo trombone) or Aaron Cassidy's *The Crutch Of Memory* (for solo indeterminate string instrument) provide good examples of *Action-Oriented* difficulty, which present a tablature-based approach to performance, in which the individual actions of the performer are "de-coupled" and independently re-constructed.[62]

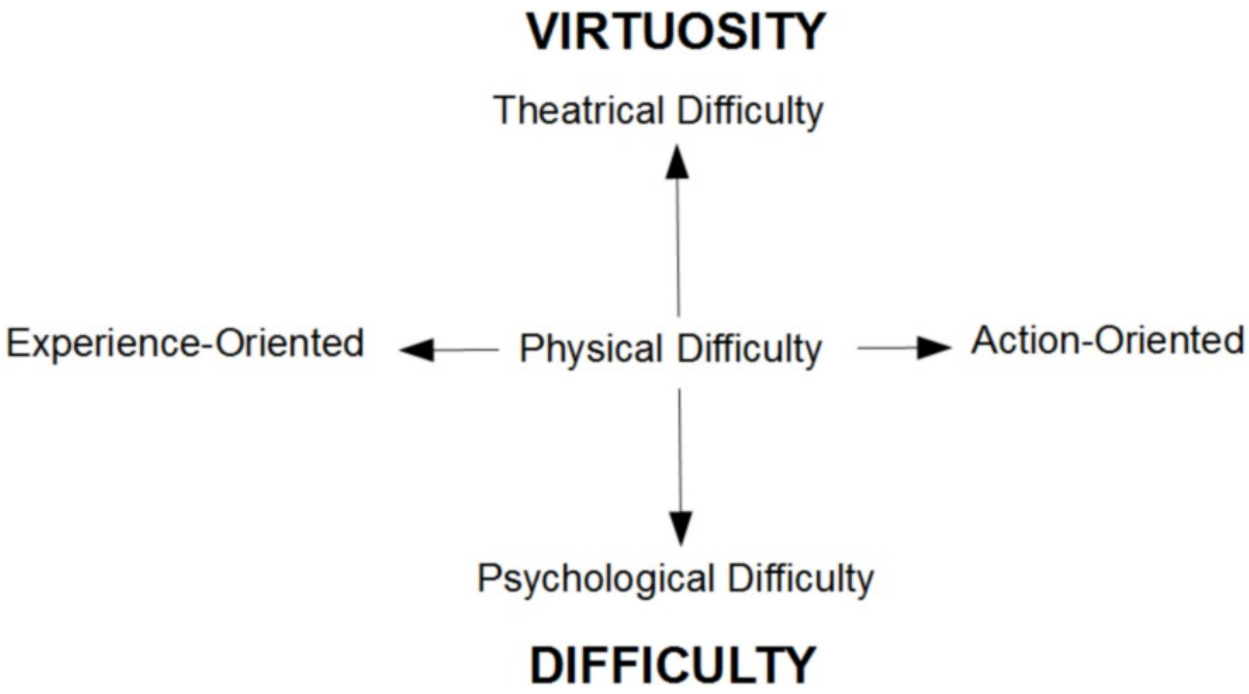
Defining these two types of approaches towards the score, allows the addition of an extra axis to the virtuosity/difficulty diagram proposed in section 1 of this paper. This distinction between the two

61 ibid., pg 392

62 Evan Johnson, "Works by Aaron Cassidy", liner notes to *Aaron Cassidy - The Crutch Of Memory,* Elision Ensemble, NEOS Music GmbH, 2012, NEOS 11201

modes of action- and experience- orientation, and their interaction with the three categories of difficulty, will become important when we discuss the differences between *Gruppen* and the re-notation of Brian Ferneyhough's *Bone Alphabet*.

Figure 19. Extended version of the virtuosity/difficulty axis



The Re-Notation Of Brian Ferneyhough's *Bone Alphabet*

Brian Ferneyhough's *Bone Alphabet* is one of the most difficult pieces of percussion music written in the twentieth century. In it a performer must realize several independent strata of rhythms, in complex relationships to each other, as they move between a group of seven percussion instruments.

Bone Alphabet was re-notated by the author and is based upon a simple idea: the division of labour decreases difficulty. What is difficult for one person is easier for more people. At the time of writing only the first four bars of the score have been realized, although an entire re-notation of the piece is currently underway.

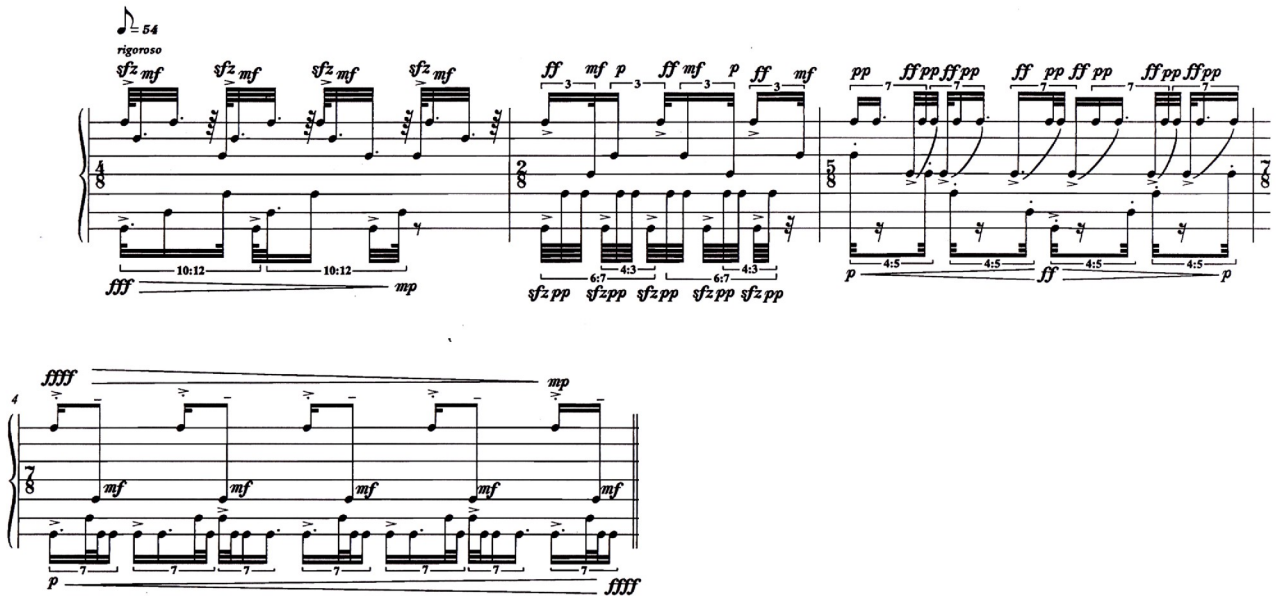
Difficulties

The difficulties of *Bone Alphabet* are both psychological and physical. The complex nature of the rhythmic notation is one of the main factors that gives this piece a high level of psychological difficulty, with many rhythms occuring in complex relationships to each other. Below are the first four lines of the piece. Each line represents a different percussion instrument. Although there are no instructions as to what precise instruments they should be, there are some rules:

> "Seven sound sources are to be selected, each being located on a separate single-line stave in the score. These instruments may be of different types (wood, metal, stone, skin etc.) but must share closely similar envelope characteristics i.e. sharp attack, rapid decay and a broadly similar dynamic spectrum (***pppp*** **–** ***ffff*****).** In addition, no adjacent instruments may belong to the same family. The descending order of stave lines represents a series of sonorities becoming progressively lower in pitch and/or darker in timbre."[63]

63 Brian Ferneyhough *Bone Alphabet* (London, 1995)

Figure 20. First four bars of *Bone Alphabet*.[64]

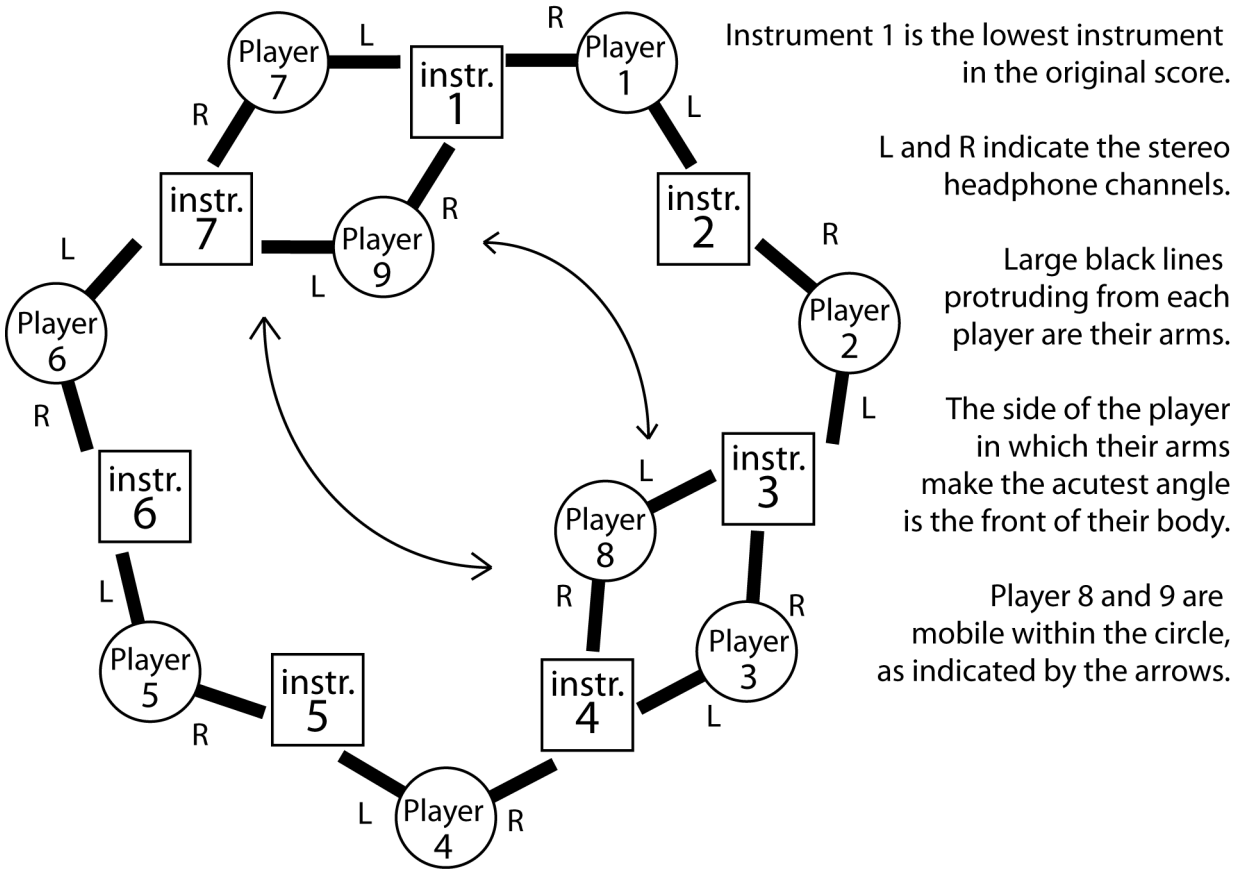


The physical difficulty in the piece is related to the co-ordination needed to quickly and independently move around the instruments, as well as the control needed to hit them with the force required to produce the correct dynamics.

The physical difficulties were overcome by increasing the amount of performers from one to nine, arranged in the formation outlined below. The layout of the performers meant that fast passages can be accomplished through the splitting of a line between one to nine players. Due to the fact that each player has only two instruments to play, the difficulty in moving in complex patterns over seven instruments is no longer a problem.

64 Brian Ferneyhough *Bone Alphabet* (London, 1995) bars 1-4

Figure 21. Diagram showing layout of the *Bone Alphabet* re-notation.

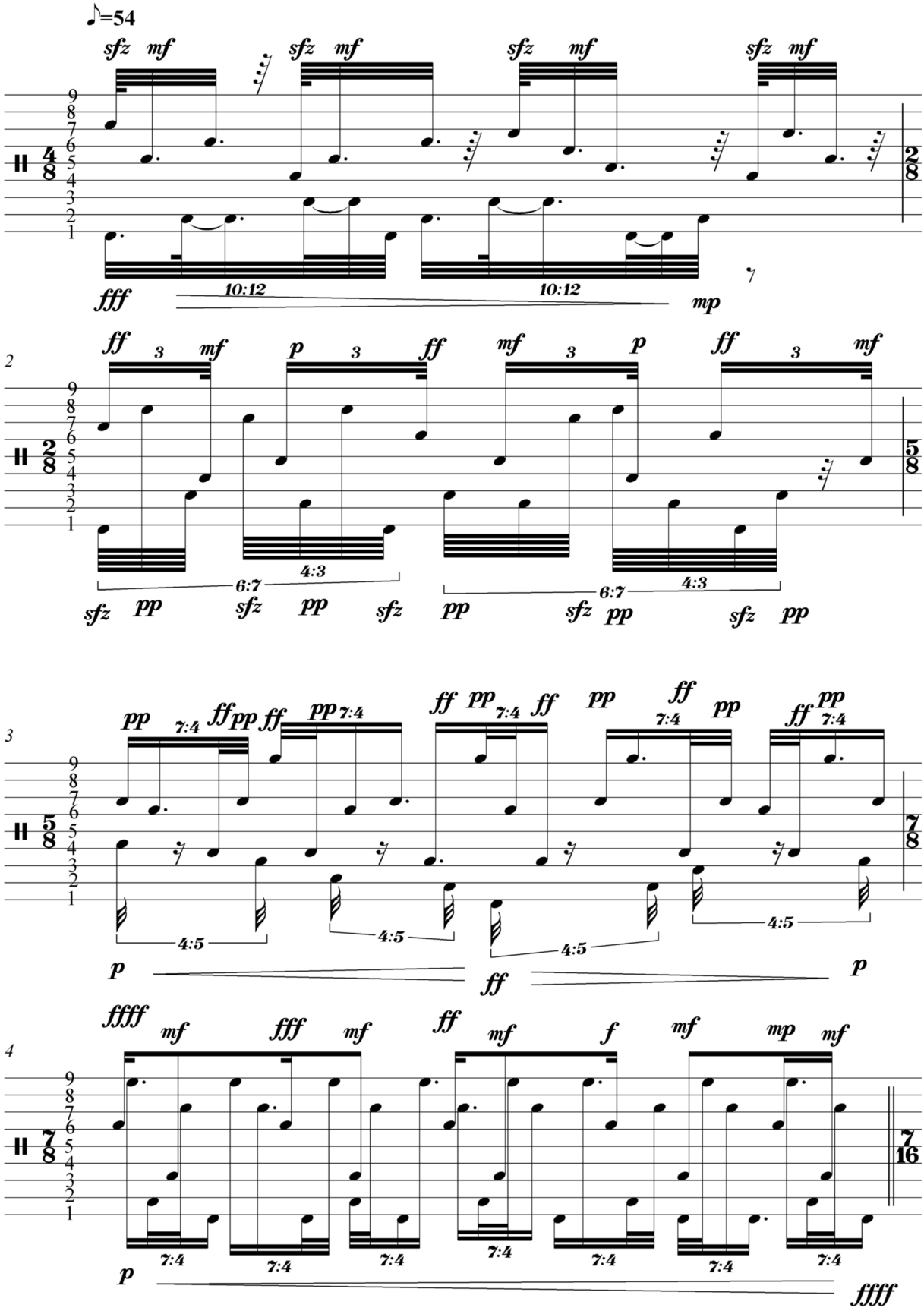


The psychological difficulties of the original version have been alleviated by replacing the existing, complex notation with aural instructions, delivered over headphones, telling the player when to hit, what to hit, and how hard they should hit it. This information is encoded into only two words, meaning that each performer must be in a state of extreme alertness in order to be able to successfully decode and execute the instructions in time. Rhythm is given by the instruction "and. PLAY." in which "and" is an upbeat, leading to a downbeat on "PLAY", at which point the performer must exectue the action.

The volume of the instruction, ranging from a whisper to a shout, occurs at 11 volume levels corellated to the ***pppp-fffff*** dynamic levels of the piece (there is an ***fffff*** indication, not alluded to by Ferneyhough in the introductory text). The volume of the instruction and its place on the whisper-

shout scale, indicates the dynamic level that an instrument should be played at. Left and right stereo panning indicates whether the performer should hit the instrument to their right or to their left. The distance between two attacks by a single player is limited to approximately 0.5 seconds, due to the length of the “and. PLAY.” command, meaning that fast iterations of notes are distributed amongst multiple players.

Figure 22. The re-orchestration of the piece. Each line represents one of the nine players. Whether the notehead is above or below the line indicates which headphone channel the command should be sent to, with left being above the line, and right below.



Performers 1-7 stay static throughout the piece, but Performers 8 and 9 are mobile, moving between instruments where rhythmic re-iterations occur at a speed too fast for the two static players either side of it to accomplish.

A future planned feature that will help to increase the accuracy of the performance, is the use of a Max/MSP patch which would meausure the delay times between the audio instruction for a performer being sent to their headphones, and their striking of the required instrument. It would then use this information to subtly adjust the playback times of the performers' tracks to ensure the sounding of their attacks appear as proportionally correct as possible to the audience.

The reduction in difficulty, both psychological and physical, results in a piece that is easy enough for amateur musicians to perform. Although it takes some time for a player to familiarize themselves with the headphone-delivered system of commands, and a small amount of practice to improve the accurate striking of percussion instruments, the work is significantly easier.

Discussion

Those with knowledge of Ferneyhough's theoretical writing on the role of notation will realise that this re-notation is much more conceptually problematic than that of the *Gruppen* re-notation. However, it is not just conceptual problems that are encountered through this re-notation, but a re-problematizing of the interprative, theatrical, political and encoded aspects of the work.

Conceptual Problems

One of the problems that may be inherent in the re-notation of *Bone Alpabet* is that the concepts embodied in the re-notation fundamentally go against those of the original score. Ferneyhough has written extensively on the subject and role of notation, often rejecting the descriptive ideals of the high modenist model of performance practice for a score which engages in an active 'dialogue' with the performer.

In re-notating the work, this dialogue is fundamentally changed, the descriptive function of notation being priveleged and imposed upon the original's prescriptive ideals. This is in marked contrast to the *Gruppen* re-notation, in which the score seems to suggest a descriptive function, through which Stockhausen's ideas about the relationship between pitch and rhythm are articulated. The re-notation treats the score as engaging in an experience-oriented, rather than action-oriented, virtuosity.

Interprative Problems

The re-notation of *Bone Alphabet* presents interpretational problems. Any interpretation is driven by the performer's interaction with a score and is encoded, primarily, in durational and dynamic variations from that which is written. Re-notating the score fundamentally changes the way in

which the performer can interpret it.

One of the main changes that occurs in the performance of the score, is phrasing. Whilst Stockhausen's comparatively "dry" musical language seems to imply an interpretation that seeks to realise the temporal relationships as accurately as possible, Ferneyhough's work, with its phrase markings and sudden dynamic contrasts, suggests a more traditional set of interprative concerns. In atomizing the score between nine performers, the players can no longer make the dynamic and durational changes to clarify phrasing and dynamic balance that a single performer is able to, through their holistic view of the piece.

Ferneyhough is not averse to the use of click tracks to clarify rhythmic patterns in a work, as can be seen from his piece *Morte Subite* from 1990, in which a stereophonic click track was created "for the purpose of coordinating two groups of live performers"[65], as well as *Mnemosyne* for bass flute and prerecorded tape (1986) in which click tracks are again used. In relation to this piece, Ferneyhough seems extremely positive about the interprative results created by the use of the click track, and its effect upon the nature of performance:

> "It was suggested to me by a number of performers that, ultimately, they would be sufficiently familiar with the temporal proportioning (its 'contextual naturalness') to be able to dispense with the click altogether; I am not in favor of this, though, since the mental interference patterns set up by (say) attempting to weave 'x' number of regular impulses into a measure broken up in the performer's ear into 'y' clicks contributes a lot, I think, to the moment-to-moment flow of expressive tension. The clicks, in such cases, provide 'micro-measures' serving to divide up the material in a way analagous to the role of measures in a given section. If the flautist were to abandon the click track, it seems likely that he would expend significantly more energy in 'phrasing' the material more traditionally, weakening the interaction

65 Brian Ferneyhough *Duration and Rhythm As Compositional Resources* from 'Brian Ferneyhough: Collected Writings' Ed. James Boros and Richard Toop pg. 51-65 (Amsterdam, 1998), 56

of the specifics of rhythmic detailing and larger aspects of temporal organization"[66]

From the quotation above, it is clear that Ferneyhough perceives the click track as presenting a different set of interpretational concerns. One must conclude that *Bone Alphabet*, written after both *Morte Subite* and *Mnemosyne*, was intended not to be performed with click tracks, and their resulting change in interpative concerns. Ferneyhough clearly counts on the interprative challenges of the score, as written, as being the impetus for the performer's interpretation.

However, a closer inspection of the *Gruppen* re-notation also shows significant notational changes that may have an affect upon performance. One objection that has been frequently directed towards this project is that re-alignment of musical pulses to different positions in relation to beats and bars will elicit a different interpretational. For much of the work, however, this is somewhat of a moot point, as the construction of each group often involves the obscuring of individual lines in a statistical mass texture. In these masses, such as can be seen in the example from the first group, shown in figure 14, most of the impulses occur off of the beat, and their irregular, pulse-like character would seem to suggest an interprative approach which minimized the accenting of conventional markers, such as the first beat of a bar. However, this mass texture is not always present and in our re-notation, we have attempted to be as intelligent as possible about preserving bar and beat groupings where a solo or distinctive rhythmic phrase appears out of the texture. This balance between ease of playing and preserving the musical integrity of specific notational elements of the original was an ever-present concern during the re-notation process.

Another objection that has been raised in relation to both projects is that the click-track based approach to performance is less "musical", a statement I would strongly disagree with. Instead of a loss of "musicality", the re-notation, instead, presents the imposition of another performance

66 Brian Ferneyhough *The Tactility of Time* from 'Brian Ferneyhough: Collected Writings' Ed. James Boros and Richard Toop pg. 42-50 (Amsterdam, 1998), 46-47

practice. Thus, what one hears and sees is not a lack of "musicality", but the stylistic dissonance between two styles of interpretation, much like if one imposed a New York School-style of performance onto a rendition of Rachmaninov work.

It should be noted, however, that the current re-notation of *Bone Alphabet* is only the first part in a two-stage process. In this version, the re-notation is created to create a sounding result as close to that implied by the score as possible. In the second stage, the interpretational problems are further problematized by encoding an interpretation into the score itself. A recording of Steve Schick performing the piece will be analyzed by a computer and all of his timings and dynamics used in the performance will be atomized between nine performers, using the same process as in the first version. This creates a work in which the interpretation is already built into the score. If one still sees this as "un-musical" then our conceptions of "musicality" are revealed as solely theatrical if the aural result is the same.

Theatrical / Political Problems

The re-notation of *Bone Alphabet* changes the theatre of the work; an action which has political implications. By changing the work from presenting one person struggling with the notation and its demands to nine people relatively untaxed by their performance the personal becomes social. The replacement of personal responsibility with a dictatorial set of headphone-delivered instructions to low-skilled, interchangeable performers could be seen as mirroring either the state mindset of mid-20th Century Russia, or the McJob culture of late monopoly capitalism.

The change from the virtuoso to the low-skilled performer could also be seen as a way of de-commodifying the avant-garde. As has been seen in the first section of this paper, virtuosity arose from the commodification of musical performance. The virtuoso provides a way of valorizing not only the act of performance, but the piece performed. The relative scarcity of the virtuoso instills

value upon a work and its performance (supply and demand). This is not only a monetary value, but a cultural value, as late capitalism treats us to equate beauty as being directly proportional to the amount of Marxian "labour-hours" embodied in a commodity. By decreasing the theatrical difficulty of the work, and having it performed by low-skilled workers, the labour-hours embodied in the performance decrease, leading to a loss in cultural and monetary value; a devalorization process that seeks to de-commodify the avant-garde.

Encoding Problems

One of the problems of *Bone Alphabet*'s re-notation is the possibility that audible but non-notated subsidiary aspects of performance that come out of interaction with the score, may be intentionally, but obliquely, encoded within the original notation. This oblique encoding could be related to Latour's metaphor of the speed-bump in *Pandora's Hope*, or Grotowski's peripheral approach to acting.[67]

For a more prosaic example, one might explore the idea of "nudge psychology". In the men's urinals at Schipol Airport, small images of flies are etched onto the bowl. These are intentionally put there in order to get men to unconsciously aim their urine at them, thus reducing mess in the toilets. This is an oblique way of encoding information, as a direct approach to solving this problem would be to install signs saying "Please Do Not Urinate Everywhere" but, as one can imagine, due to the fickleness of human nature, this may not precipitate the desired outcome.

I posit that one of the things obliquely encoded into Ferneyhough's original score is an approach designed to put the performer into a state of flow. I have written about the relationship between notation of the New Complexity and its relationship with flow in a previous paper (*Some Further Sadomasochistic Aspects Of Musical Pleasure*, 2012). In this paper, the idea that the transcendental

67 Bruno Latour *Pandora's Hope: Essays on the Reality of Science Studies* (Harvard, 1999), 186

modes of peak/optimal experience seem to be an important aspects of a highly-skilled performer engaging with this type of notation. I would direct the reader towards this as a supplementary material to support the following arguments.

As has been seen in the second section of this paper, flow arises when a performer has their skills optimally matched by the challenges presented. It was also explained that the relationship between skills and challenges was dependent upon the skill levels of individual performers, and that this, in turn, was influenced by other external factors (propensity for introversion/extroversion etc.). In this context, it seems possible to read the psychological and physical difficulties in Ferneyhough's work as an attempt to match the skills of virtuoso performers with an optimal set of challenges, thus pushing them towards a peak performance. One could then see the New Complexity movement as a performer, rather than composer-led movement, in which the rapid increase in the technical abilities of performers during the 20th Century, fostered by the development of the "new music specialist" and the institutionalization and codification of instrumental teaching, led to a position in which these virtuosos' skills far outstripped the challenges (pieces) they were presented with. The desire to perform music that would move them back into a flow state from that of boredom, then fuelled the creation of new, much more complex works designed to fulfil this desire.

If the original notation of *Bone Alphabet* is designed to move performers into flow via its oblique encoding into the work, then does the re-notation fail to achieve this? Here it must be remembered that flow is dependent upon the skill levels of individual performers. In the re-notation, amateurs are used instead of a single virtuoso, therefore, it might be argued that because the challenges of the piece have been decreased *as well as* the skill level then, providing they are kept in the same relationship to each other flow states may still occur.

But what might be the audible changes created by the flow state? An increase in performance will have audible results upon the piece, although given the changes in interpretational concerns created by the altering of notation and performance practise, a peak performance of the original notation and the re-notation may have audible differences. One other aspect, far too large to cover here, but which is the subject of a future paper, is the nature of time distortion that occurs when a performer moves into flow. It might be argued that the disjunction between the distorted time experienced by the performer in a state of flow and that experienced by an audience may result in audible distortions in musical material which may have been obliquely encoded by the composer into the score.

Conclusions

The two re-notations discussed present two approaches to the re-notation of modernism and two possible ideas about what notation represents. The re-notation *Gruppen* approaches the score as a descriptive object. It presumes that the score attempts to describe an idealized sonic object or embody an abstracted concept that the process of re-notation attempts to render with higher fidelity. Recent technologies are used as a way of improving metrical precision and removing unwanted difficulties which may be responsible for a clouding of the original vision, preventing the accurate manifestation of a reality petrified in the score. Improvements in technology have meant that the old notational compromizes of the original idea need not happen, and the re-notation attempts to increase the fidelity of its sonic manifestation to a concept existant before the score, and enshrined in the article "...how time passes...".

The Ferneyhough work provides a different set of problems, representing as it does, not a descriptive set of sonic events which its realization must be compared to, but the start of a dialogue between score and performer. It is not a descriptive notation but, as Philip Thomas calls it, "a

prescription for action". The prescriptive nature of the score is further amplified by its unwillingness to stipulate even the type of instruments used beyond a few general categories.

The use of click tracks, in each of the re-notations, pose questions about the nature of difficulty and virtuosity. In each of these pieces, an original difficulty, or set of difficulties has been removed, illuminating the nature of the score itself as a vehicle for instruction, and frequently revealing the elements implied by its cultural baggage, but left unsaid. The use of amateur ensembles, in the case of the Stockhausen and Ferneyhough arrangements, highlights the transient nature of "Flow" and its relationship to the skill of the performer, occuring somewhere between boredom and anxiety.

These two types of notations present two very different types of beauty. In the Stockhausen re-notation this beauty comes from an increasing of accuracy through modern technology and the removal of unnecessary notational complications which arise from Western musical notation's difficulties in representing the occurence of multiple tempi simultaneously. The re-notation clarifies Stockhausen's original concept of the piece through its re-rendering of the tempo scale and the attempt to use a notation that better presents to the players the layering of pulse streams at the heart of the piece. Also, the reduction of the physical and psychological difficulty in the piece allows it to be played by amateur musicians, thus opening up the work to new audiences and players who would otherwise not have the opportunity to experience it. An idea which has political implications for our conceptions of the avant-garde.

The re-notation of Ferneyhough's piece, however, presents a different sort of difficulty, one that arises not from clarification, but from a re-problematization of the role of the score and its notation. It increases accuracy but at the cost of undermining our conceptions of "musicality" and seemingly going against the creation of flow, which is at the heart of the New Complexity movement. Its use

of unskilled labour seems to attempt the de-commodification of an avant-garde seemingly already de-commodified. It is this destabilization that makes its re-notation beautiful, as it performs the function of all interesting music: to thicken the plot...

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