Combined Pitch-Rhythm Cycles in Beat Furrer's *Spur*

Analysis by Tyler Jordan

Austrian-based composer Beat Furrer began writing in a distinct piano style in 1995 with the work *Nuun* for two pianos and orchestra, having the piano play a small set of chromatic pitches while fully saturating each registral octave of the keyboard. Combining this with flurries of extremely short note durations, often 32nd notes in straight and various tuplet varieties, a chaotic stream of notes is unleashed, arpeggiating and leaping about without any audible regularity. To exacerbate the irregularities, the instrument, ensemble, or orchestra accompanying the piano moves through similar chromatic pitch sets at different, often at competing pacings. The pitch material projected across the different layers of motion often match, yet the rhythmic incongruence makes the listeners' desire to find regularity and alignment between instruments unfeasible, caused by complex ratios of cycles that never realign after launching into action. In a contrasting yet complimentary style, Furrer also writes grid-based music that sees the piano playing a single chord within a matrix of 16th notes and rests. With this piano writing, the accompanying instrument(s) take the role of pitch movement, seen in his 1997 work *Presto*, where the flute goes in and out of playing 32nd note runs and interlocking with the piano with an inverse 16th note grid; the flute plays on the piano's rests and vice versa.

A year after *Presto*, Furrer composed *spur* (1998, later revised 2007) for piano and string quartet, that combines these two approaches to piano writing. The work has 3 main materials defined by their piano writing. Material A, like *Nuun*, has the piano playing chains of 32nd notes, interrupted at various degrees by rests. Material B, like *Presto*, has unchanging 16th note chords. Material C transplants a specific motif in the string section, fragments of 32nd note stepwise runs that build into complete scales, onto the piano. These different piano materials do not ever overlap and are either entered through an immediate change or a fermata rest to separate them. This paper will analyze the compositional tools of numeric patterns and overlapping processes and discuss the perceptibility of cyclic material when factoring in speed, slowly mutating repetitions, and separation of piano and string trajectories. The strings' materials are more diverse, achieved by their extreme timbral variety and exploration. Their different types of material and levels of integration (both between each other and with the piano) change and will be further discussed as they become pertinent to analyzing the rhythmic processes and levels of rhythmic perceptibility.

Pitch and Rhythmic Cycles in Material A

Before looking closely at examples within the piece, it is important to first define what techniques Furrer employs to realize his unique piano composing style. First, within the A material, **pitch cycles** are a repeating grid of 32nd notes where the position of each pitch within the grid is unchanging in each repeat. Here, a pitch is defined by both its class and octave. A full grid is seldom completely realized; rests take the place of notes. The process of rests taking place of pitches within pitch cycles is realized through **rhythmic cycles**, or a repeating number of 32nd notes where the first note is always a rest. The note within the pitch cycle grid that aligns with the rest in the rhythmic cycle can be described as **forcibly turned into a rest**, with the word "force" being intentionally chosen to describe the rhythmic cycles' hierarchically imposing itself on top of the grid of the pitch cycle. Rhythmic cycles sometimes contain sub-cycles, or irregular subphrase divisions of the complete rhythmic cycle that follow the same rule of the first note of the division always being a rest. When comparing rhythmic cycles, the upper limits of **rest chains** and **note**

chains are helpful to describe the different density of combined cycles. The upper limit of a rest chain within a rhythmic cycle would be the maximum number of 32^{nd} note rests in a row before a note is played on the piano, and the upper limit of a note chain would be the maximum number of 32^{nd} notes in a row before a rest written in the piano part. The lower limit of rest chains and note chains of all combined cycles, both perfect and imperfect, is always 1.

In *spur*, pitch and rhythmic cycles combine in one of two ways. **Perfectly combined cycles** have the pitch cycle continue repeating without any change to the total grid length of the rhythmic cycle until the next pitch cycle. Both pitch and rhythmic cycles change together. **Imperfectly combined cycles** have a change to the total grid length of the rhythmic cycle before the pitch cycle changes. Pitch cycles never change without the rhythmic cycle changing as well (with the sole exception being pitch cycle 7), making them the primary cycle to observe when looking for larger sectional changes. The listeners' perception of the music follows that pitch cycles are easier to distinguish than rhythmic cycles, reinforcing the idea that pitch cycle changes are more jarring than the pattern of rests interrupting their flow.

Combined cycle #1 starts at the beginning of the piece. Figure 1a shows the fully realized 23-note pitch cycle. Pitches Cb and Bb are used between Bb1 and Cb6. This 23-note pitch cycle is combined with a 30-note rhythmic cycle, creating a ratio of 23:30. Figure 1b shows the first few rhythmic cycles here, highlighting a 2-6-2-4-6-6-4 rhythmic sub-cycle pattern.. After 8 instances of this rhythmic cycle, a single instance of an 18-note rhythmic cycle occurs, with a sub-cycle pattern of 6-6-6. Immediately after, the rhythmic cycle returns to the same 30-note grid length for 8 more repeats, which afterwards, reintroduces another single 18-note rhythmic cycle containing another sub-cycle pattern of 6-6-6. With two momentary changes of the rhythmic cycle length from 30 to 18, this combined cycle cannot be defined as a perfectly combined cycle. This momentary shift to a different pitch cycle grid length falls into the category of imperfectly complete cycles.

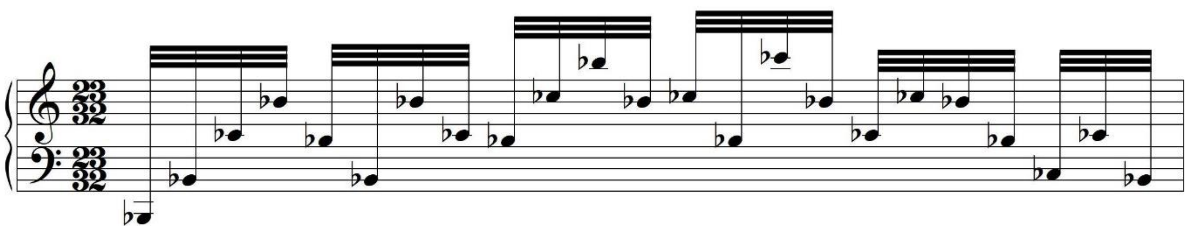

Figure 1a: Pitch cycle 1. Note that time signatures are not from score and only to show the length of each cycle.

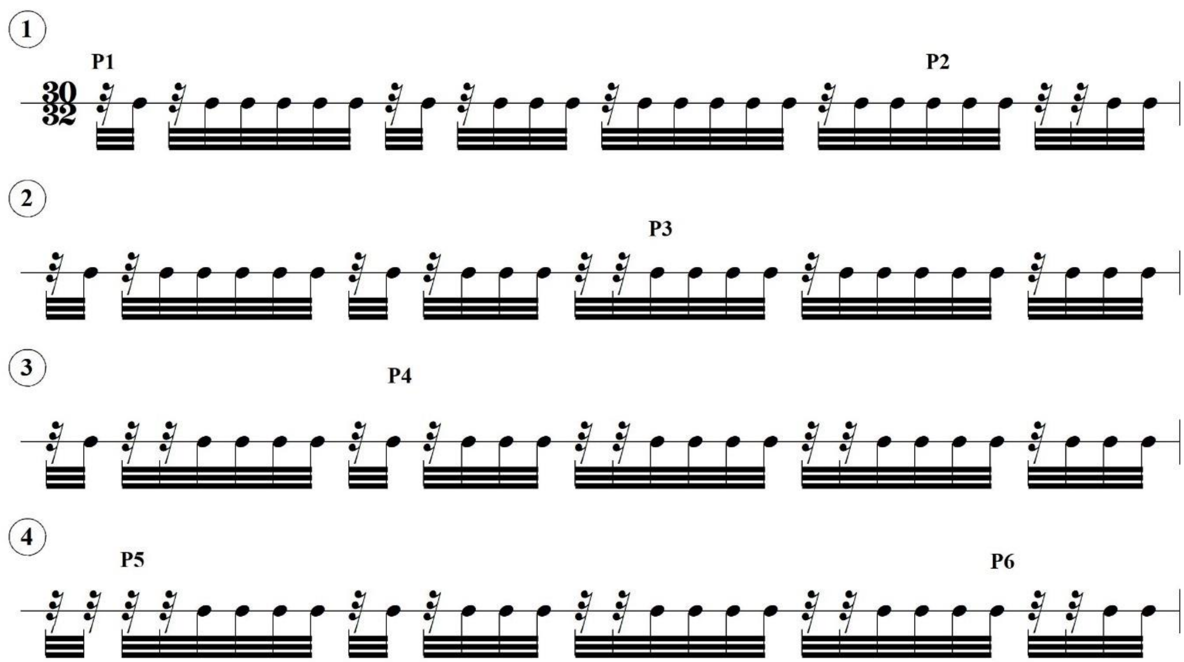

Figure 1b: First 4 instances of rhythmic cycle 1. Alignment with pitch cycles shown above line. Subdivisions shown with beaming.

Combined cycle #2 begins on the downbeat of measure 46. The pitch cycle, shown in Figure 2, diminishes to a 17-note grid. The same pitches are used from pitch cycle #1, but the gestural shape differs. This is paired with a 10-note rhythmic cycle to create the first perfectly combined cycle at a ratio of 17:10. It is of numeric interest to note that the difference of the ratio numbers between combined cycles #1 and #2 is 7. Rhythmic cycle #2 does not perfectly divide into repeating sub-cycles. Although most instances of this rhythmic cycle can be divided into either 2-8, 4-6, 6-4, or 8-2, no pattern exists.

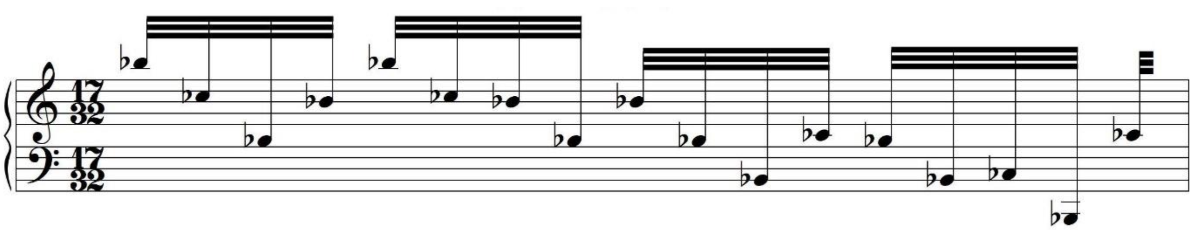

Figure 2: Pitch cycle 2.

One aspect of similarity between pitch cycles #1 and #2 is the eighth note distance between the two pitches in the highest register. In pitch cycle #1, there is near perfect symmetry of the distance between the low Bb1 and its distance forward in the cycle to the high Bb5 (nine 32^{nd} notes) and backward in the cycle to the high Cb6 (eight 32^{nd} notes). Pitch cycle two is made audibly distinct with a distance of only two 32^{nd} notes between the low Bb1 forward in the cycle to the first high Bb5 and an eleven 32^{nd} note distance backward from the Bb1 to the second Bb5.

After a short break from the existence of regular combined cycles (m. 68), combined cycle #3 begins on beat 2 of measure 92. This cycle continues using Cb and Bb pitch classes. The total grid length of the pitch cycle is further reduced to be only 12-notes long, seen in Figure 3a. The rhythmic cycle here is unique since this combined cycle does not begin with a rest. It can be interpreted that the first four notes are a “pickup measure” to the rhythmic cycle, which then begins to establish an 18-note grid, seen in Figure 3b.

Pitch cycle 3’s registral range is significantly different, adding one octave to the lower end and removing the top 2 octaves present in pitch cycles one and two. Additionally, the presence of the lowest register of each cycle throughout the duration of the combined cycles increases across the first three complete cycles. In combined cycle 1, 13 out of the 23 pitch cycles contain the Bb1. In combined cycle 2, 10 out of the 15 pitch cycles contain the Bb1. In combined cycle 3, 20 out of the 21 Bb1's across the 7 pitch cycle instances are present, and every Bb0 is present. Combined cycle 3's less complex ratio of 12:18, simplified as 2:3, allows for the Bb1's, which do not sit on the eighth-note pulse, to never be one of the pitches that are forcibly turned into rests by the 18-note grid of the pitch cycle. This supports the idea that the ratios of the combined cycles and the chosen pitches within the pitch cycles are carefully curated by Furrer to generate a directional flow towards an increased density of the lower register. Furthermore, the lengthened rhythmic cycle grid length allows for an increase in maximum note chain lengths across the first three complete cycles, going from 6 to 9 to 14.

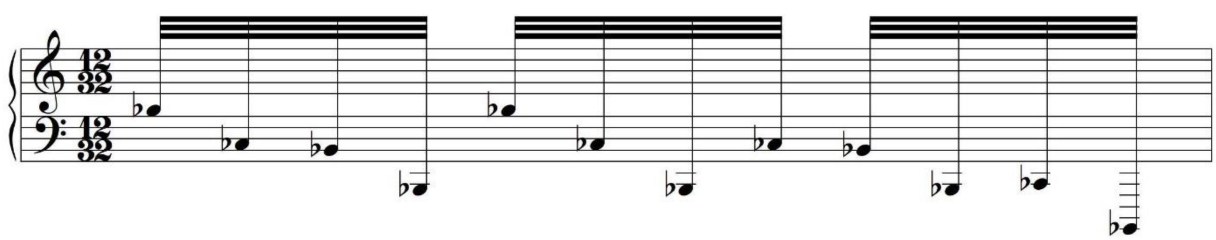

Figure 3a: Pitch Cycle 3.

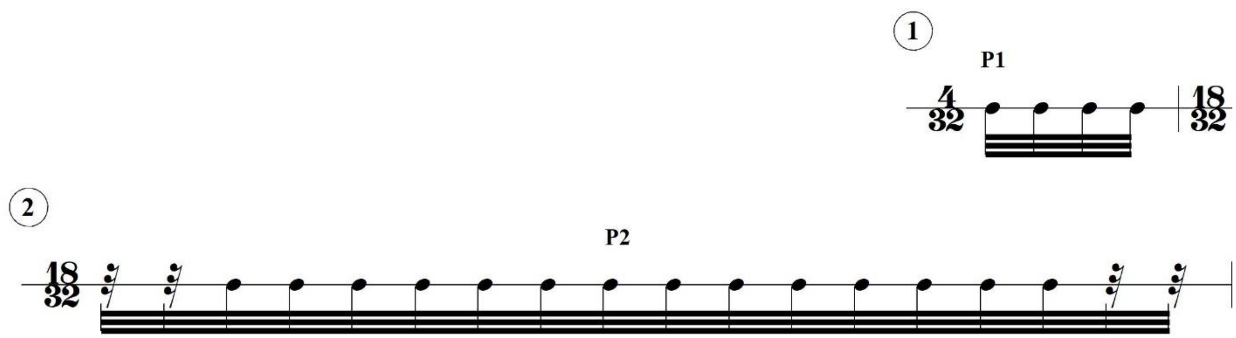

Figure 3b: Beginning of rhythmic cycle 3 with 4-note pickup

Combined cycle 4 is immediately entered into with a crescendo (m. 99, b. 3). This cycle has the first change in pitch class with a modulation up a half step to B and C. In a perfectly transposed manner, pitch cycle 4 is the same as pitch cycle 3 transposed up an augmented octave, seen in Figure 4a. Similarly to combined cycle 3, this cycle includes a pickup of 8 notes before entering a 22-note rhythmic cycle. Since the pitch cycle length is still on a 12-note grid, every other 32nd note cannot be forcibly turned into a rest. Most notably, the low B1 is present in all 12 full pitch cycles. Since the 2 high B4 pitches land on a 16th note pulse, they are projected to be turned into rests, and is realized on the 4th instance of the rhythmic cycle landing on the second B4 of the pitch cycle. It should then be expected that the 6th instance of the rhythmic cycle should land on the first B4 of the pitch cycle. However, Furrer evades this by changing the 5th instance of the pitch cycle to temporarily be a 20-note grid instead of a 22-note grid. This effectively means that the forced rest is pushed back a 16th note in the pitch cycle, seen in Figure 4b. To maintain the presence of this first note in the pitch cycle, an imperfectly combined cycle is formed.

Combined cycle 5 (m. 180) occurs after the first instance of B material (which will be discussed later). Pitch cycle 5, shown in Figure 5a, is 20 notes long and contains C, C#, and D pitch classes. Starting on C0, it weaves upward through the pitches, reaching a D6 on the second to last note. Figure 5b shows the symmetrical distribution of pitch classes across each octave, with the lowest octave containing only C, second lowest octave containing C and C#, the middle three octaves containing all 3 pitches, the second highest octave containing C# and D, and the highest octave containing only D. The rhythmic cycle here is less strict and can be divided into several different ways. There is no way to create a perfectly combined cycle based on the placement of the rests, and multiple ways to create an imperfectly combined cycle, such as a 20-note rhythmic cycle grid that changes into a 22-note rhythmic cycle grid, or a grid that changes back and forth between

Figure 4a: Pitch cycle 4, perfectly transposed an augmented octave up from pitch cycle 3.

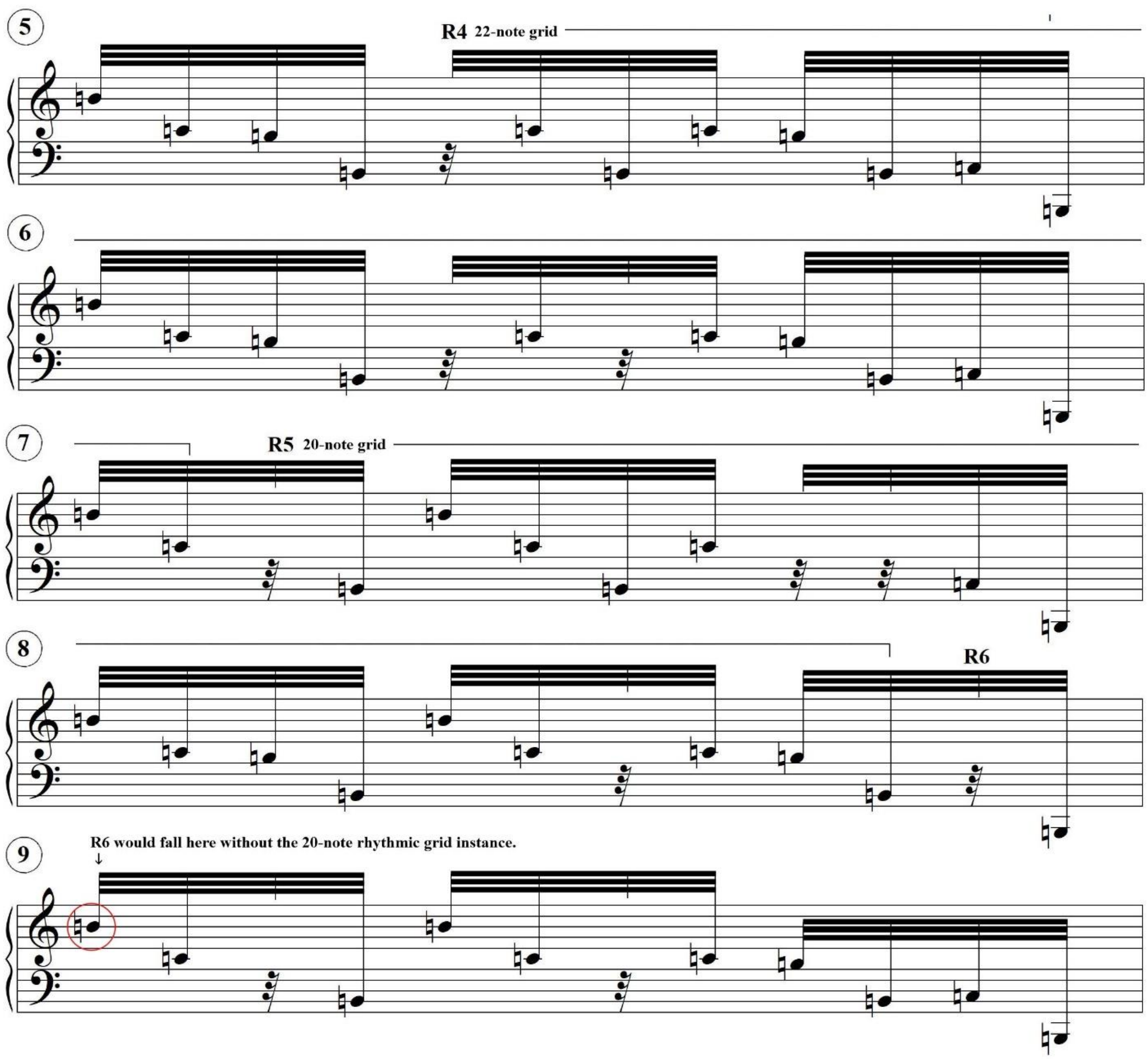

Figure 4b: Pitch cycle 4 instances 5-9, highlighting the effect of the 20-note grid of rhythmic cycle instance 5.

a 12-note and 16-note rhythmic cycle. In any possible rhythmic cycle grid length where only two different grid lengths are used, they must be even numbers. Therefore, since the grid begins with a rest where the low C0 should be, notes within the pitch cycle falling on the 16th note pulse are less common to appear since they are the only notes able to be forcibly turned into rests by the rhythmic cycle that, despite having an unclear grid length, is undoubtedly a multiple of 2. The longest maximum note chain so far is present in this rhythmic cycle at 15 notes in a row.

Figure 5a: Pitch cycle 5.

Octaves	0	1	2	3	4	5	6
D							
C#							
C							

Figure 5b: Symmetric pitch presence across seven octaves in pitch cycle 5.

Paired with a stark and sudden textural change in the string parts, pitch cycle 6 (m. 198) begins with a length of 13 notes. It is unique as a pitch cycle due to the attribute of having two 32nd notes within the cycle that never have a pitch attached to them, shown in Figure 6a. The rhythmic cycle can be analyzed as a 42-note grid to create a perfectly combined cycle, seen in Figure 6b. There are subdivisions of 6, 7, and 8 within this grid. Due to these constantly present small subdivisions, the longest maximum note chain is only 4, creating a sharply defined contrast with the previous combined cycle at a maximum note chain of 15. Additionally, a perfect rhythmic repetition of notes and rests occurs, with the first 64 notes being repeated with the insertion of one additional 32nd note rest, seen in Figure 6c. To realign the pitch material with this rhythmic repetition, a single 12-note grid is assigned to the pitch cycle so that the sixth instance of the pitch cycle begins at the start of the repetition. This shows another instance of imperfectly complete cycles being used by Furrer to fine tune the landing point of material.

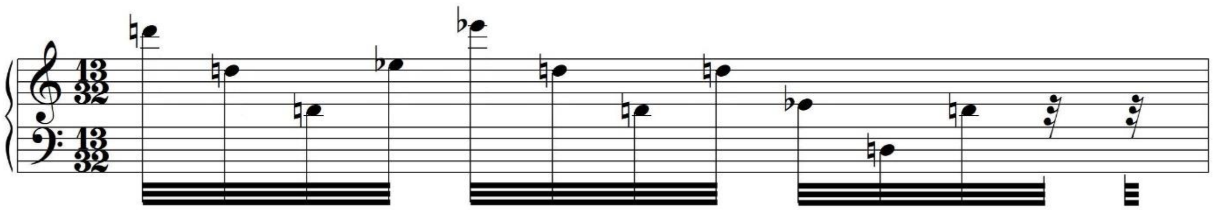

Figure 6a: Pitch Cycle 6.

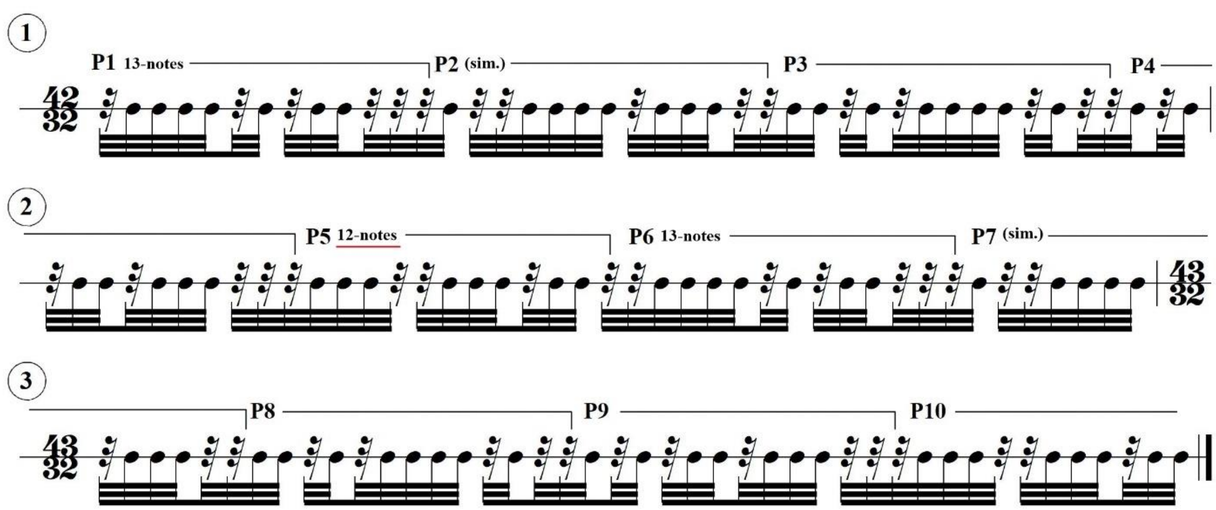

Figure 6b: Complete rhythmic cycle 6 analyzed on a 42-note grid. Subdivisions of 6, 7, and 8 shown with beaming. Pitch cycle 6 instance 5 is shortened by one 32nd note so that instance 6 lands on the repeat of 64-note pattern seen below.

Notes		**4**		**1**		**2**		**1**		**4**		**3**		**2**		**1**		**4**		**1**		**1**		**1**		**2**		**3**		**3**		**3**		**2**	
Rests	**1**		**1**		**1**		**3**		**2**		**1**		**2**		**1**		**1**		**1**		**2**		**1**		**1**		**1**		**3**		**2**		**1**		**2**

Figure 6c: 64-note pattern that exhibits perfect repetition in complete cycle 6.

Complete cycle 7 begins at measure 210, with a pitch cycle on a 20-note grid, shown in Figure 7. Compared to pitch cycle 5, it is perfectly transposed up a whole step and maintains the same symmetrical pitch presence across octaves. The pitch cycle, starting with a 26-note grid and then shifting to a 22-note grid, holds a new record for the longest maximum note chain in the piece at 18 notes in a row.

Figure 7: Pitch cycle 7.

The 8th and final complete cycle begins in measure 296 on a 22-note pitch cycle grid, shown in Figure 8. The return of upper octave notes an eighth note apart, as well as the inclusion of a single low note, brings back audible memories of the first section of the work. This pitch cycle is also distinct due to each note being separated by an octave, minor 9th, or major 7th, creating strings of notes in the same octave separated by a 16th note pulse, such as the string of E4/F4 pitches on the second note, or the string of E3/F3 pitches starting on the seventh note. There are several ways to create a rhythm cycle grid containing 2 grid lengths, since in the score there are subdivisions of rest separation from 2 through 9 that can be combined in various ways.

Figure 8: Pitch cycle 8.

Throughout these 8 complete cycles, pitch class and maximum note chain lengths are the primary driving force for a linear, directional progression of A material. Figure 9 shows the pitch classes and Figure 10 shows the maximum note chain lengths in each complete cycle.

	1 - 3	4	5	6	7	8
F						X
E					X	X
Eb				X	X	
D			X	X	X	
Db			X			
C		X	X			
B	X	X				
Bb	X					
	m. 1 - 99	m. 99-112	m. 139-143 m. 180-197	m. 198-209	m. 210-228	m.296-318

Figure 9: Pitch classes in each pitch cycle.

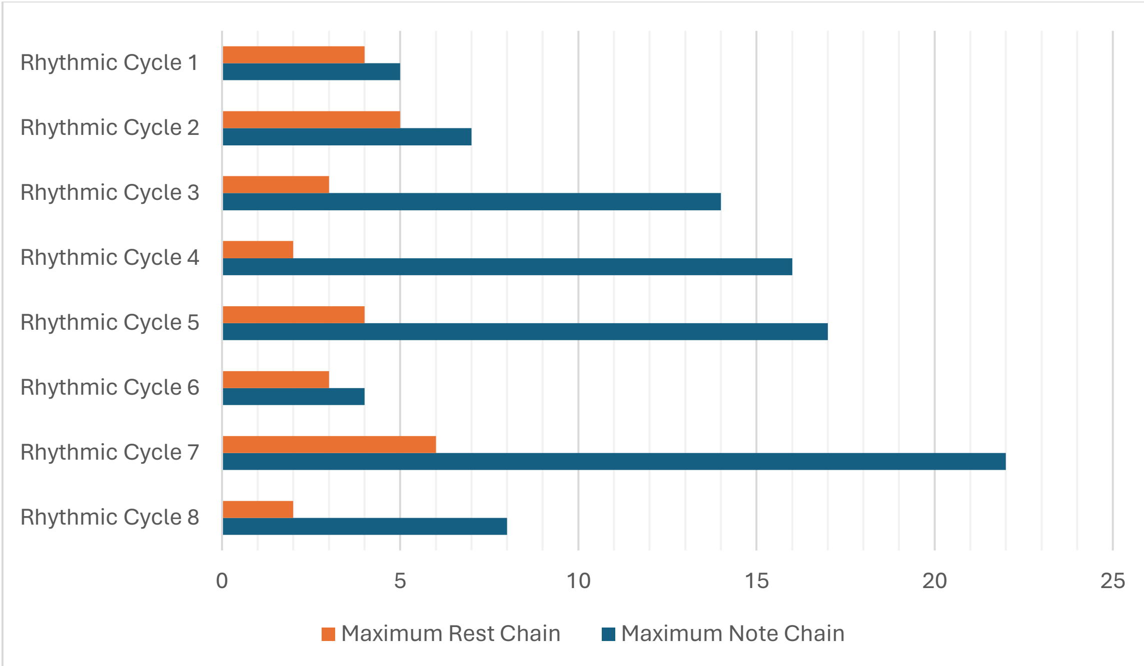

Figure 10: Maximum note chain length in each complete cycle.

Pitch cycles can possibly be further compared using a similar analytical tool to Robert Morris's **ordered segments**, or grouping a series of pitches together and ordering them from highest to lowest. Pitch cycles in *spur* often contain near-identical ordered segments when assembled into groups of four notes. For instance, pitch cycle #2 contains four ordered segments when divided into groups of four: < 3 2 0 1 >, < 3 2 1 0 >, < 3 1 0 2 >, and < 3 1 2 0 >. Although similar, a question of perceptibility arises when considering the speed of notes and the fact that these ordered groupings rarely appear in the work in full due to the inclusion of rests through rhythmic cycles' forcible rests.

String Material Accompanying Complete Cycles in Piano A Material

When playing quintuplets, the string material is completely rhythmically separate to the piano part. Duplets, however, are strictly interlocked with the piano part, only articulated on moments when the piano is resting. An example of this can be seen in measure 4 (Figure 11), with the complete 32nd note grid within the measure being occupied across the ensemble by the string parts playing on every rest in the piano part. As the work progresses, completely saturated 32nd note grid measures become increasingly rarer. Quintuplet textures create a competing flurry of notes at a quiet (written at a *ppp* or *pp* dynamic) to further disorient the listener, making the 32nd note grid of the piano less tangible. Duplet textures work oppositely, reinforcing the 32nd note grid at a louder dynamic and with distinct timbres, including pizzicato, col legno, left hand slaps, and more.

Another emerging texture is the upward chains of arco 16th notes at a relatively louder dynamic dispersed across the string quartet (Figure 12). The first note of these chains always aligns with a rest in the piano part. These groupings grow in length until measure 88, where multiple instances occur consecutively without break.

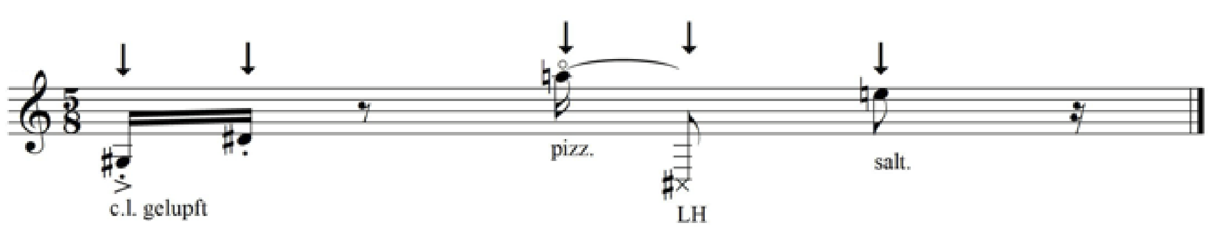

Figure 11: Reduction of string parts in measure 4. Arrows show alignment with a piano rest.

Figure 12: Three examples of upward arpeggios across all string parts condensed into a single staff. Arrows show alignment with piano rests.

Rhythmic Patterns in B Material

After complete cycle 4, the piano instantly shifts to B material, defined by unchanging chords fitting within a grid of 16^{th} notes and 16^{th} rests. The primary pattern of notes and rests begins in measure 113 (Figure 13), which repeats 15 times in this instance before incorporating minor variance to the pattern. The string parts accompany this material in 3 ways. First, and most common, is short bursts of 32^{nd} notes. These chains of notes become fully expanded at the penultimate section of the piece to be expanded into full synthetic scales. The string part at times also plays in unison, inverting the piano rests to notes and notes to rests, filling in an entire 16^{th} note grid across the ensemble, such as at measure 144. Lastly, often as only one or two string parts, quintuplet 16^{th} can emerge to recall the A material accompaniment and works similarly as the note placement has no correlation to the piano rhythm.

𝅘𝅥𝅰		2		1		2		2		1
𝅀	2		2		1		1		1	

Figure 13: Primary rhythmic motif of repeating grid of notes and rests in piano.

Conclusion

According to the Collins German to English Dictionary, “spur” can be translated to “track” or “trace”. In Furrer’s *spur*, the string parts often trace the piano part by playing in its gaps. Rhythmic cycles occur, tracking a hidden pitch cycle that is realized in a fragmented and incomplete form. At a micro-tactus of 32nd notes played at eighth-note M.M. 144, these rhythmic cycles and their subdivisions fly by the listener at a pace that is impossible to keep up with and track audibly. Instead, Furrer uses this technique in a relative approach by varying the maximum note chain length across cycles to create less and more dense sections and carefully composes pitch cycles that include recognizable cells in the upper and lower registers, even breaking the rigidity of the rhythmic cycles to favor making these cells more present.

Furrer’s 21st century works for piano, such as *Phasma* (2004), *Konzert für Klavier und Orchestra* (2007), and *Studie für Klavier* (2011) continue to use techniques seen in this piece, such as pitch cycles, rhythmic cycles, grid-based note placements, and harsh sectional changes between materials, while developing and expanding on them through overlapping cycles, more complex tuplet relationships, and larger ensembles paired with the piano. *Spur* seems to be his work most clearly defined by combined cycles and the trajectory of the piece is felt through the upward ascent of pitch class and growing density through an increase in note chain lengths.