

Gesture as Score: A Hybrid Notation System for Guzheng and Electroacoustic Music

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ABSTRACT

This paper presents a hybrid notation system developed for *Immemorial/Flux*, a composition for prepared guzheng and fixed media requiring continuous slide techniques and coordination with electronic sound. Traditional guzheng notation offers limited tools for representing such action-based techniques or aligning performance with fixed-media timelines. The proposed system combines three components: an adapted staff for temporal orientation, a graphic layer that specifies left-hand slide gestures, and an embedded sonogram that visualizes the temporal-spectral structure of the electronic track. The notation was refined through rehearsal with professional performers, whose feedback informed adjustments to symbol clarity and the sonogram's practical function in rehearsal. The findings indicate that this selectively detailed, performer-oriented framework can support extended techniques within mixed electroacoustic contexts while remaining compatible with established reading practices.

1. INTRODUCTION

Immemorial/Flux, a composition for prepared guzheng and fixed media, examines how musical notation can support extended techniques that rely on continuous gesture, spatial motion and coordination with electronic sound. Traditional guzheng notation, whether character based, numbered or adapted from the five-line staff, provides effective pitch and rhythmic representation but offers limited means for describing these action-based techniques. Although contemporary guzheng performance increasingly incorporates timbral exploration, physical objects and electroacoustic elements, notational approaches that address these developments remain relatively underexplored. A notation that reflects performers' embodied actions is therefore needed.

This paper proposes a hybrid notation system developed for *Immemorial/Flux*. The system integrates three complementary components: an adapted staff that provides temporal orientation and string reference, a graphic layer that represents left-hand slide gestures with spatial clarity, and a sonogram that offers a temporal and spectral overview of the fixed-media track. Rather than replacing

established notational practices, the framework aims to balance familiarity and precision with the flexibility required to support continuous gesture-based techniques. The remainder of the paper outlines the motivations for this approach, presents the structure and design principles of the hybrid system, and discusses how it was refined in collaboration with performers. The paper concludes by considering the broader implications of performer-oriented notation for works that combine extended techniques with fixed media.

2. CONTEXT AND MOTIVATION

Traditional guzheng notation has evolved from early character-based and orally transmitted methods to twentieth-century numbered (cipher) and staff notations. Across these traditions, notation has primarily represented discrete pitch and rhythm, effectively serving modal and melody-based repertoires but offering limited means to convey continuous motion and timbral nuance. In recent decades, some contemporary guzheng works have explored cross-tuning, prepared materials, and interaction with electronics, expanding the instrument's sonic palette. While these works have developed their own notational approaches for extended techniques, such approaches remain highly piece-specific and therefore lack broader applicability.

The focus on performer action as a primary notational concern has been explored by several composers since the late twentieth century. As Santini explains [1], gesture-based notation has developed along several distinct trajectories [1]. In Helmut Lachenmann's *Pression* (1969), the score specifies sequences of instrumental gestures while leaving pitch and sonic outcome partly indeterminate. Aaron Cassidy's *Second String Quartet* (2010) separates notation into independent layers for finger, bow and pressure actions, allowing sound to emerge from the interaction of these physical processes. Pierluigi Billone's *Mani.Mono* (2007), by contrast, employs a gesture-based system in which each prescribed motion produces a single, consistent sonic result. A comparable approach appears in Simon Steen-Andersen's *AMID* (2015), which, as Stene observes, prescribes performers' movements rather than their sonic results, effectively reversing the hierarchy between gesture

and sound; the score isolates and values specific motions as compositional material and as a choreography of performance [2]. Together these examples illustrate how action-centred notation can encompass both indeterminate and highly controlled sound relationships.

A related line of exploration can be found in approaches that separate performance parameters across multiple staves, aiming to clarify complex instrumental actions. During my graduate study with Panayiotis Kokoras, I was influenced by his notational approach to instrumental and electroacoustic writing, which frequently distributes different aspects of performance behaviour across separate staves; for example, in *Mutation* (2015) for clarinet and electronics, three staves respectively indicate embouchure, fingering, and the electronic part as a sonogram. A comparable principle underlies Aaron Cassidy's notation, which assigns distinct parameters such as finger motion, bow direction, and pressure to separate staves in order to map sound construction through physical process. Yet, as several authors observe in relation to Cassidy's system, this highly detailed approach may result in visual density and a steep learning curve that challenge practical readability [3]–[6]. My engagement with this multi-layered, parameter-specific notation reflects an awareness of the need to balance detailed representation with interpretive accessibility, underscoring the challenge of maintaining precision without adding unnecessary cognitive complexity.

Alongside these gesture-oriented and parameter-separated approaches, composers have also explored graphic and animated notations, which broaden the visual representation of timbre and process and often privilege interpretive openness, real-time visualization, and improvisatory flexibility [7]. While such approaches offer valuable insights, they are less suited to the specific temporal and performative requirements of *Immemorial/Flux*.

These observations collectively underline the need for a notation capable of mediating between physical action, sonic result, and performer readability. The hybrid framework developed for *Immemorial/Flux* responds to this need by integrating gestural clarity with the structural familiarity of the five-line staff, providing a balanced means of representing both instrumental and electroacoustic elements. The following section outlines the design principles that informed the development of this system.

3. HYBRID NOTATION SYSTEM

This section presents the hybrid notation system for *Immemorial/Flux*. It outlines the structure of the three-layer score, articulates the design principles behind it, details the graphic encoding of left-hand slide gestures, and explains the role of the sonogram as a visual guide to the electronic layer.

3.1. Design Principles

This framework is based on three interrelated design principles that guided the development of the hybrid notation system.

3.1.1. Embodied Clarity

Notation is designed to reflect physical action. By depicting gesture directly rather than relying on abstract symbols, the score specifies the movement through which the intended timbral and sound-based effects are produced. Making the required actions visually explicit reduces interpretive ambiguity and allows performers to engage more naturally with the music through bodily intuition during performance.

3.1.2. Cultural Continuity

Retaining the five-line staff builds on performers' existing notational literacy and aligns the system with contemporary guzheng pedagogical practice. This continuity preserves accessibility and also provides a familiar structural anchor through which new gestural elements can be integrated without creating an entirely new notational language.

3.1.3. Notational Integration

The hybrid score integrates three complementary layers, each addressing a different performance need. The adapted staff offers temporal orientation and string references; the gesture layer depicts left-hand slide motions in a direct visual form; and the sonogram provides a temporal–spectral view of the fixed media. Designed to work together rather than to function independently, these layers form a coherent notational environment in which each component supports and reinforces the others.

3.2. Score System Overview

Immemorial/Flux employs a three-stave hybrid notation (Fig. 1). Each stave serves a distinct but integrated function.

3.2.1. Guzheng-Strings (first stave)

As shown in Fig. 1, a conventional five-line staff is employed, but its pitch notation refers to string reference rather than fixed pitch, since the actual intonation is continuously modified by left-hand motion. Square noteheads indicate plucked strings, providing a simplified temporal–string framework rather than a prescriptive pitch notation. The notation in this stave is deliberately economical: symbols are restricted to those that support performance clarity, avoiding unnecessary detail while maintaining efficiency and interpretive precision.

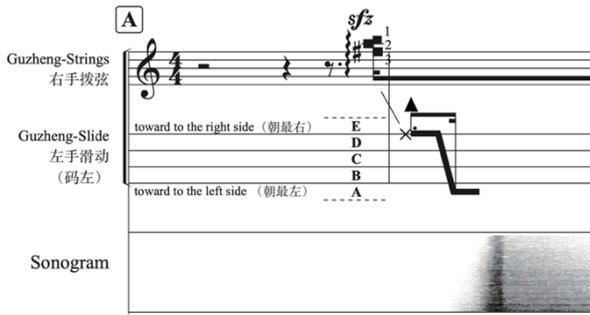


Fig. 1. Hybrid three-stave notation: right-hand strings, left-hand slide gestures, and fixed-media sonogram.

3.2.2. Guzheng-Slide (second stave)

Graphic symbols map left-hand slide gestures onto five spatial zones (A–E), as shown in Fig. 2. Lines, arrows, and icons directly represent four motion types: horizontal sliding, rubbing, scraping, and muted glissando. These visual elements provide clear cues and strong gestural correspondence, as shown in Figs. 3(a)–3(d).

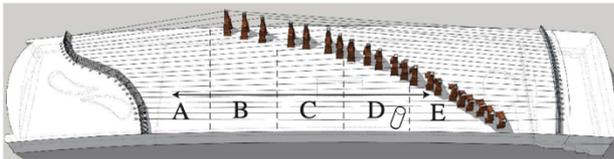


Fig. 2. Division of the guzheng's left side into five spatial zones (A–E) for slide gestures.

3.2.3. Sonogram (third stave)

A spectrogram of the fixed-media track functions as a visual timeline, showing the spectral density of the electronic layer and helping performers synchronize live gestures with its temporal structure.

3.3. Slide Techniques for Guzheng

Four primary slide techniques, performed with a metal guitar slide, are represented through graphic symbols that reflect the physical actions of performance, as shown in Figs. 3 and Fig. 4.

3.3.1. Horizontal Sliding (Fig. 3)

A solid line with arrowheads indicates lateral motion and directional intent.

3.3.2. Rubbing (Fig. 3)

A zigzag line conveys rhythmic tremolo gestures, with icon placement specifying hand orientation.

3.3.3. Scraping (Fig. 3)

A slanted line denotes angled edge contact; accompanying annotations specify speed and pressure.

3.3.4. Muted Glissando (Fig. 4)

Dashed versus squiggly lines differentiate overtone-like muting from damped scraping, annotated with hand-icon cues.

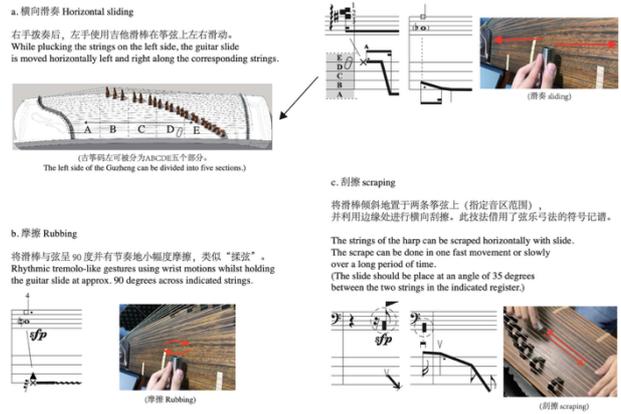


Fig. 3. Performance notes of Horizontal Sliding (a), Rubbing (b), and Scraping (c) on the Guzheng.

3.3.4. Muted Glissando

分为以下两种:
Muted Glissando can be classified as follows:

(1) 虚线: 码右, 左手掌侧轻止弦, 右手持滑棒刮奏, 声音类似于泛音, 左右手距离近, 且靠上下同步。
The dashed line indicates muting techniques that sounds like overtones, requiring a close proximity between the left and right hands. In order to make a long muted glissando, the muting hand (left) need to slide along the strings, following the right hand holding the slide.



(2) 锯齿线: 码左, 右手持滑棒刮奏时, 左手于琴左侧指弦, 左右手有一定的距离。
The squiggly line indicates damping techniques, requiring the left hand to be placed at a certain distance from the right hand, approximately on the left side of the Guzheng.

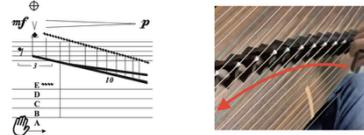


Fig. 4. Performance notes of muted glissando on the Guzheng.

3.4. Sonogram as Listening Aid

The sonogram embedded in the score represents the spectral structure of the fixed-media track, functioning as a visual aid rather than a performative notation. Because the electronic part lacks defined pitch or rhythmic material, conventional notation fails to convey its structure effectively. Instead, the sonogram visualizes temporal and spectral organization across time, frequency, and intensity. As Landy suggests [8], in many electroacoustic contexts, representation tends to shift from symbolic notation toward visual tools that aid listening and coordination. Within this framework, the sonogram offers performers a visual guide to the electronic part, enabling temporal and expressive coordination with the live guzheng. Though it does not provide precise rhythmic or pitch cues, it enhances temporal awareness and ensemble cohesion. Its effective use relies on brief orientation and collaborative rehearsal, especially for performers new to such hybrid scores. Nevertheless, the system is learnable and adaptable across similar works, illustrating notation as an interface that mediates perception rather than dictates execution.

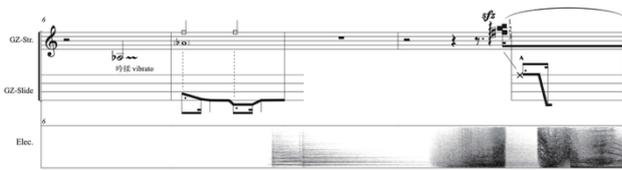


Fig. 5. Sonogram excerpt illustrating temporal coordination between guzheng slide gestures and the fixed-media track

4. PERFORMER ADAPTATION AND COLLABORATION

4.1. Collaboration Process

In 2023, the piece was prepared and performed through two separate rehearsal–performance processes: first with Yuxin Lu for the International Computer Music Conference (ICMC 2023, Shenzhen), and later with Runyitong Zhang for Musicacoustica–Hangzhou 2023. Because both collaborations faced significant time and geographical constraints, early preparation was carried out remotely. Performers practiced from the score and sent rehearsal videos for feedback, allowing small notational refinements before brief in-person rehearsals shortly prior to each performance. This remote exchange made it clear which notational elements communicated effectively and which benefited from refinement during rehearsal. Performer comments on symbol clarity, spacing, and synchronization guided refinements to the score layout. Practical considerations also surfaced, such as how different string tensions influenced the resonance and stability of slide-based techniques. While not intended for notation, this finding highlighted how instrument setup affects the practical realization of the score.

4.2. Performer Feedback

Two professional guzheng players, one with traditional conservatory training and the other more experienced with Western staff notation, reported consistent advantages.

4.2.1. Spatial Zones

The five labeled zones (A–E) provided clear reference points, reducing hand-placement errors and rehearsal time.

4.2.2. Graphic Cues

Direct representational symbols for sliding, rubbing, scraping and muting were immediately intelligible, allowing performers to focus on musical expression rather than decoding notation.

4.2.3. Staff Familiarity

The adapted five-line staff anchored timing and pitch expectations, offering assurance in sections where graphic notation dominated.

4.2.4. Sonogram Alignment

Embedding the spectrogram into the score enhanced real-time synchronization with electronics, reducing reliance on external click tracks.

4.2.5. Instrument Setup

Both performers noted that string tension influenced the ease and resonance of slide-based techniques: looser strings risking bridge instability (as observed by Yuxin Lu), and tighter strings limiting vibrational richness (as reported by Runyitong Zhang). This feedback clarified the practical conditions under which the notated gestures are most effectively realized.

Overall, performer feedback suggests that the hybrid notation functioned as intended in rehearsal, particularly in coordinating actions with the fixed media.

4.3. Using the Sonogram in Rehearsal

In rehearsal, performers confirmed that the sonogram served as a temporal–spectral guide rather than a prescriptive cue. Brief introductions on reading spectral activity and event onsets helped them grasp the display quickly. As performers became familiar with the sonogram, they aligned their performance timing with the fixed media by following spectral developments, gradually reducing their reliance on the click track in certain passages.

5. Conclusions

This paper has presented a hybrid notation system for *Immemorial/Flux*, combining gesture-based symbols, adapted staff notation and an embedded sonogram to support extended guzheng techniques and coordination with fixed media. Collaboration with performers indicated that the system functioned reliably in rehearsal and aligned well with established reading habits. More broadly, the work suggests that the notation reflects how its sounds are generated, through continuous physical gestures rather than discrete pitches. The compositional and rehearsal process also emphasized the value of selective notation: some continuous actions were understood more intuitively through brief video demonstrations, not because the notation was inadequate, but because certain gestures are more directly grasped through visual motion. This reinforced the importance of providing essential notational information while avoiding unnecessary detail, allowing room for performers to interpret movement through embodied experience. While developed for a single composition, these considerations may offer a useful point of reference for works that engage extended techniques, sound-based materials or fixed-media environments.

6. REFERENCES

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