

## **Chance, Indeterminacy and Control: Aleatoric Practices in Twentieth-Century and Contemporary Music Composition**

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### **Abstract**

This study examines the role of chance, indeterminacy, and control in twentieth-century and contemporary music composition through a narrative review of selected scholarly literature. While aleatoric have been widely discussed in relation to avant-garde music, existing studies often remain fragmented, focusing on individual composers or isolated techniques without providing an integrated conceptual framework. Addressing this gap, the present study synthesizes theoretical, historical, and compositional perspectives to clarify how aleatoric principles function within different musical contexts. The study adopts a narrative literature review methodology, drawing on academic sources from musicology, composition studies, and contemporary music research. The analysis focuses on three key areas which are conceptual definitions of aleatoric, the development of aleatoric practices in twentieth-century composition, and the role of non-traditional notation and performer agency. The findings suggest that aleatoric composition should be understood as a continuum of control rather than a complete rejection of structure. By dividing decision-making between composer and performer, aleatoric techniques create flexible frameworks that enable multiple realizations while maintaining coherence. The study contributes to existing literature by offering a more integrated understanding of aleatoric practices and highlighting their relevance to contemporary creative and practice-based music research.

*Keywords:* aleatoric, avant-garde, chance music, contemporary composition, graphic notation, indeterminacy

### **Abstrak**

Kajian ini meneliti peranan peluang, ketidaktentuan dan kawalan dalam komposisi muzik abad ke-20 dan kontemporari melalui pendekatan sorotan literatur naratif terhadap sumber-sumber akademik terpilih. Walaupun amalan aleatorik sering dibincangkan dalam konteks muzik avant-garde, kebanyakan kajian sedia ada bersifat terpisah dan memberi tumpuan kepada komposer atau teknik tertentu tanpa menyediakan kerangka konseptual yang menyeluruh. Bagi menangani jurang ini, kajian ini mensintesis perspektif teori, sejarah dan komposisi bagi memperjelaskan bagaimana prinsip aleatorik berfungsi dalam pelbagai konteks muzik. Kajian ini menggunakan kaedah sorotan literatur naratif dengan merujuk kepada sumber akademik dalam bidang muzikologi, kajian komposisi dan penyelidikan muzik kontemporari. Analisis memberi tumpuan kepada tiga aspek utama, iaitu definisi konseptual aleatorik, perkembangan amalan aleatorik dalam komposisi abad ke-20, serta peranan notasi non-tradisional dan agensi penghibur. Dapatan kajian menunjukkan bahawa komposisi aleatorik perlu difahami sebagai satu kontinum kawalan dan bukannya penolakan sepenuhnya terhadap struktur muzik.

Melalui pengagihan semula proses membuat keputusan antara komposer dan penghibur, teknik aleatorik mewujudkan kerangka fleksibel yang membolehkan pelbagai realisasi muzik sambil mengekalkan koheren. Kajian ini menyumbang kepada literatur sedia ada dengan menawarkan pemahaman yang lebih bersepadu mengenai amalan aleatorik serta menonjolkan kepentingannya dalam penyelidikan muzik kreatif dan berasaskan amalan kontemporari.

*Kata kunci:* aleatorik, ketidaktentuan, muzik peluang, avant-garde, komposisi kontemporari, muzik peluang, notasi non-tradisional

## Introduction

The twentieth century marked an extreme transformation in musical thought as a lot of composers increasingly questioned the structural and philosophical foundation that regulating Western art music for centuries. The development of twentieth-century music witnessed radical transformations in compositional thinking, driven by technological innovation, cultural change, and philosophical inquiry. Composers increasingly questioned inherited musical systems, particularly tonal harmony and formal determinism, which were perceived as restrictive to creative expression. Traditional systems based on tonal harmony, formal determinism and strict authorial control were gradually challenged by new method that emphasized uncertainty, openness in compositional process and experimentation. The method called aleatoric techniques in which elements of chance, indeterminacy and randomness become integral components of the creation of arts.

Aleatoric music challenges traditional assumptions about fixed outcome and predictability. It introduced a different understanding towards musical form allowing variability within defined compositional frameworks. Indeterminacy and randomness were the key elements in this method of techniques. This approach became particularly prominent in the works of composers such as John Cage, Karlheinz Stockhausen and Pierre Boulez. These composers who explored different degrees of control and freedom within their compositions. The uses of this method were not as to change the whole structure but as alternative systems in composing a work of arts.

Although aleatoric music has been widely discussed in relation to the avant-garde genre, existing literature often treats the subject in a fragmented manner. Some studies focused on philosophical aspects of indeterminacy, while others examine individual composers without preparing a wide conceptual framework that connects historical, theoretical and practical perspectives. Rather than analytical, many discussions remain descriptive. It offers general overviews of aleatoric without clearly addressing how concepts of indeterminacy, chance, random and performer interact within different compositional contexts. The lack of integrated discussion creates a gap in the literature, especially for studies that aim to relate aleatoric to contemporary creative composition and practice-based research.

Furthermore, aleatoric music frequently differ in terminology and scope on the previous writing using the terms aleatoric, indeterminate, chance music, and open form in inconsistent ways. This becomes difficult to evaluate how these approaches function within both twentieth-century experimental music and contemporary compositional practice. A critical review that synthesizes these perspectives is therefore necessary in order to clarify the theoretical foundation of aleatoric and to situate it within current artistic and academic discourse.

This study aims to examine the role of chance, indeterminacy and random in twentieth-century and contemporary music composition through a narrative review of selected scholarly literature. This study also covers on three main areas which are the conceptual definition of aleatoric, the historical development of it and the use of alternative notation that enable indeterminate outcome. These three main areas will shows a clearer understanding of how aleatoric function not as a rejection of compositional structure, but as a reconfiguration of control in creative process.

## Methodology

This study employs a narrative literature review to examine the development and application of aleatoric in twentieth-century and contemporary music composition. Narrative review approach was chosen because the aim of this study is not to provide a systematic or quantitative evaluation of all available sources but rather to

synthesize and critically interpret selected scholarly writings that discuss the concepts of aleatoric itself. This allows the researcher to integrate historical, theoretical and compositional perspectives in order to construct a coherent conceptual framework.

The literature review used in this study was collected through academic databases including Google Scholar, JSTOR, Scopus-indexed journals, and university library catalogues. Other sources were obtained from academic books, peer-reviewed journal articles and any publication in musicology including composition studies and contemporary music research. Non-reviewed online articles and any other non-academic materials were excluded unless they were used solely for historical reference and supported by scholarly discussion.

The searching process was conducted using keywords related to the main focus of the study, including aleatoric music, indeterminacy and chance composition. These keywords were used individually and in combination to determine relevant literature. Sources were selected based on three criteria. First, the material had to discuss aleatoric or indeterminate techniques in musicological, theoretical or compositional context. Second, the source published in an academic or scholarly format such as journal articles, books or conference proceedings. Third, the content needed to contribute to one of the main themes of the study, namely conceptual definition, historical development or compositional application.

After the sources were collected, the literature was analysed using a thematic approach. The selected writings were categorized into several categories including definitions of aleatoric, avant-garde and aleatoric elements in modern and classical music and the development of non-traditional notation. These categories were then compared in order to identify similarities, differences and recurring ideas across different authors and historical periods. The purpose of this analysis is to clarify how different interpretations of chance and control have shaped compositional practice.

## **Literature Review**

### **Concept and Definition of Aleatoric Music**

The term aleatoric is derived from the Latin word *alea*, meaning dice, and broadly refers to the incorporation of chance or probability within a compositional system. Meyer-Eppler (1957) described aleatoric processes as systems that are generally defined but depend on chance for their detailed realization. This definition emphasizes that aleatoric operates within boundaries rather than through complete randomness.

Jacobs (1966) further clarified that aleatoric exists along a continuum of control, ranging from composer-controlled chance procedures to open-form compositions shaped by performer choices. This perspective highlights the diversity of aleatoric practices and distinguishes them from improvisation, where structural constraints may be less explicitly defined. Scholars have also noted that aleatoric reflects broader philosophical concerns of the twentieth century, including uncertainty, multiplicity, and the rejection of absolute meaning. As such, aleatoric music should be understood not merely as a technical method but as an aesthetic and conceptual stance within modern artistic practice.

The terminology surrounding aleatoric remains inconsistent. Terms such as chance music, indeterminacy often extends to the performance stage, allowing variability in execution. Open form on the other hand, specifically relates to structural flexibility within a compositional. The lack terminological clarity in the literature reflects broader conceptual ambiguities, which necessitate careful differentiation when analyzing aleatoric practices.

### **Aleatoric and the Avant-Garde Aesthetic**

Aleatoric music is closely associated with avant-garde movements that sought to redefine artistic values and challenge established conventions. In music, the avant-garde emphasized experimentation with sound, form, and performance practice, often prioritizing process over product. John Cage stands as the most influential figure in the development of musical indeterminacy.

His use of chance operations, particularly through the I Ching in works such as *Music of Changes* (1951), represented a deliberate attempt to remove personal taste and intention from the compositional process. Cage argued that sounds should be allowed to exist for themselves, free from hierarchical organization. Cage's

ideas had a profound impact on subsequent generations of composers and artists, encouraging the exploration of silence, environmental sound, and non-intentional musical structures. The aesthetic implications of these practices continue to inform contemporary experimental music.

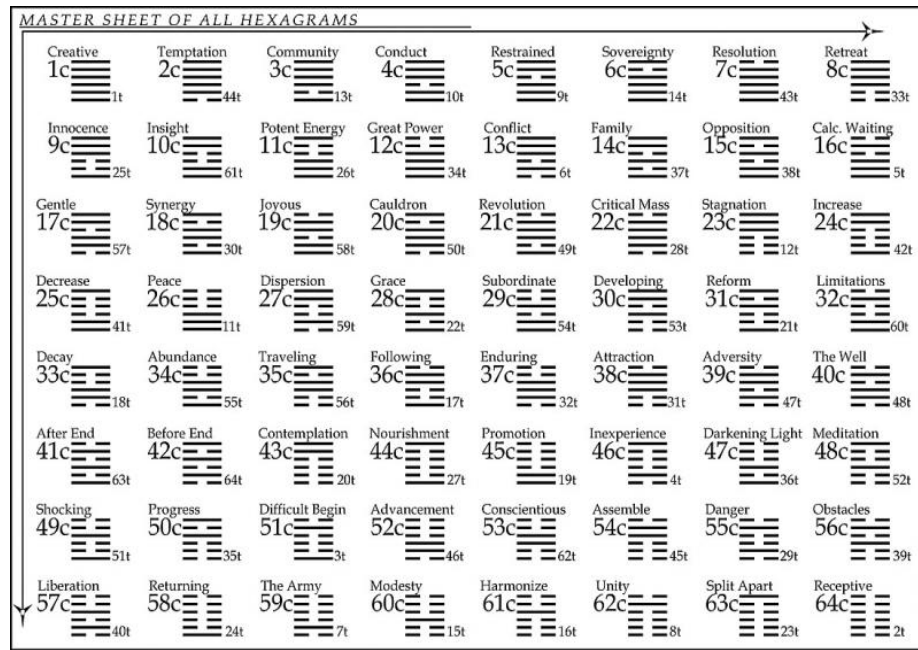


Figure 1. The image above shown an I-Ching Hexagram that were used by Cage to compose Music of Change (Source: ichingguy.com)

In contrast, European composers such as Pierre Boulez and Karlheinz Stockhausen engaged with aleatoric in a more controlled manner. Boulez, for instance, advocated for what he termed “controlled chance,” where indeterminacy is carefully limited within a structured framework. Similarly, Stockhausen’s works including *Klavierstück XI* (1956), introduce performer choice within predetermined parameters rather than abandoning compositional authority altogether.

**Aleatoric Elements in Modern Music Practices**

Beyond its connection with experimental art music, aleatoric has influenced a wide range of modern and contemporary musical practices. In jazz, for example, improvisation operates as a form of controlled indeterminacy, where performers generate spontaneous musical improvisation material within established harmonic and formal frameworks. As Hancock (2022) suggests, improvisation involves a continuous negotiation between structure and freedom, a principle that closely aligns with aleatoric concepts. In contemporary popular and electronic music, aleatoric elements are often embedded within technological systems. Algorithmic composition, generative music, and modular synthesis all incorporate forms of unpredictability, enabling composers to design processes rather than fixed outcomes. These practices extend the logic of aleatoric into digital environments, where chance can be systematically programmed and manipulated.

However, it is important to note that not all forms of improvisation or generative music can be classified as aleatoric. The defining feature of aleatoric lies in the deliberate integration of indeterminacy as a compositional strategy. While improvisation may involve spontaneity, it does not necessarily rely on structured chance procedures. This distinction underscores the need for conceptual precision when applying the term across different musical contexts.

## Aleatoric in Classical and Twentieth-Century Composition

Although aleatoric music is commonly associated with twentieth-century experimentation, its conceptual roots can be traced to earlier classical traditions. The *Musikalisches Würfelspiel*, attributed to Wolfgang Amadeus Mozart, employed dice games to assemble precomposed musical fragments into variable structures.

Hedges (1978) documented numerous dice music compositions published in Europe during the eighteenth and nineteenth centuries, suggesting that chance-based methods were not foreign to classical compositional thought. These early examples demonstrate an interest in variability and combinatorial possibilities within established stylistic frameworks.

In the twentieth century, composers such as Karlheinz Stockhausen extended these ideas through indeterminate formal structures. Works like *Klavierstück XI* (1956) invite performers to determine the sequence of musical events during performance, thereby integrating chance into the formal organization of the piece.



Figure 2. The figure above shown the score for Stockhausen's composition, *Klavierstück XI* (1956)

## Non-Traditional Notation and Performer Agency

The emergence of aleatoric music formed a new approaches to musical notation. Traditional staff notation, designed for precise representation of pitch and rhythm, proved inadequate for conveying indeterminate processes. As a result, composers developed alternative notational systems, including graphic notation, text instructions, and proportional notation.

According to Joe (2002), graphic notation functions as a conceptual framework rather than a prescriptive system, allowing performers to interpret visual symbols in various ways. This approach shifts the focus from exact reproduction to creative realization, thereby expanding the role of the performer as an active participant in the compositional process. The use of non-traditional notation also reflects a broader redefinition of the musical score. Instead of serving as a fixed representation of sound, the score becomes a set of possibilities, guiding but not determining the final outcome. This transformation aligns with the central principles of aleatoric, in which control is distributed rather than centralized.

## Synthesis of Literature

The literature reviewed shows that aleatoric is not a singular or uniform practice but a diverse set of approaches that explore the relationship between chance, control and musical structure. Composers have employed aleatoric

techniques to varying level, reflecting the philosophical positions regarding authorship and creativity. A key insight emerging from this review is that aleatoric functions as a reconfiguration of control rather than its absence. Whether through Cage's radical indeterminacy or Stockhausen's structured variability, the use of chance serves to expand the possibilities of musical expression while maintaining a coherent framework.

A key insight emerging from this review is that aleatoric functions as a reconfiguration of control rather than its absence. Whether through Cage's radical indeterminacy or Stockhausen's structured variability, the use of chance serves to expand the possibilities of musical expression while maintaining a coherent framework. However, the literature also reveals several gaps. Many studies focus on individual composers or isolated techniques without providing a comprehensive framework that connects conceptual, historical, and practical dimensions. Furthermore, the relationship between aleatoric practices and contemporary creative composition remains underexplored, particularly within the context of practice-based research. These gaps highlight the need for further critical analysis, particularly in examining how aleatoric principles can be applied and reinterpreted in current compositional practice.

### Discussion

The literature reviewed in this study reveals that aleatoric practices are best known as a reconfiguration of control across different stages of the musical process and not as an eliminating structure, aleatoric redistributes decision-making between composer, performer, and system. This redistribution creates a dynamic framework in which variability is not only permitted but structurally embedded within the composition.

A central tension identified across the literature is the relationship between chance and control. While early interpretations of aleatoric music was particularly those associated with John Cage, emphasize the removal of composer intention, subsequent approaches demonstrate that complete indeterminacy is rarely achieved in practice. Cage's use of chance operations through systems such as the I Ching represents an attempt to bypass subjective choice, yet the design of the system itself remains a form of compositional control. In this sense, chance is not truly external to the compositional process, but rather constructed and mediated by the composer.

In contrast, composers such as Karlheinz Stockhausen and Pierre Boulez adopt a more balanced position, in which indeterminacy is integrated within clearly defined structural boundaries. These approaches, often described as "controlled aleatoricism," highlight the importance of maintaining coherence while allowing flexibility in performance. The comparison between these two positions suggests that aleatoric operates along a spectrum rather than as a fixed category, with different composers negotiating the balance between freedom and control according to their aesthetic priorities.

Another key issue concerns the role of the performer in aleatoric music. The literature consistently indicates that aleatoric techniques expand performer agency, transforming performers from interpreters into co-creators. However, this shift also introduces new challenges. Increased interpretative freedom can lead to inconsistency, ambiguity, and variability in performance quality, raising questions about authorship and artistic identity. While some scholars view this as a positive expansion of creative possibilities, others argue that excessive indeterminacy may undermine the structural integrity of a composition.

The relationship between aleatoric and improvisation further complicates this discussion. Although both involve elements of unpredictability, they are not conceptually identical. Improvisation typically occurs within a performance context and is guided by stylistic conventions, whereas aleatoric often involves pre-designed systems that generate variability. The conflation of these concepts in existing literature reflects a broader lack of terminological precision, reinforcing the need for clearer conceptual distinctions in future research.

In contemporary music practice, aleatoric principles continue to evolve through technological developments. Digital tools, algorithmic composition, and generative systems extend the logic of aleatoric by enabling composers to design processes that produce variable outcomes in real time. These developments suggest that aleatoric is not limited to historical avant-garde practices, but remains relevant in current compositional contexts. However, the literature has yet to fully address how these technological approaches reshape traditional notions of control, authorship, and performance.

The findings of this study indicate that much of the existing literature remains fragmented, with limited integration between theoretical discussion and compositional practice. While individual composers and techniques are frequently analysed, there is a lack of comprehensive frameworks that connect conceptual definitions, historical developments, and practical applications. This gap is particularly evident in relation to practice-based research, where the role of aleatoric techniques in contemporary creative workflows is not sufficiently examined.

Therefore, this study contributes to the field by synthesizing these perspectives and emphasizing the conceptual relationship between chance, indeterminacy, and control as a unified framework. By positioning aleatoricism as a continuum rather than a fixed category, the discussion provides a more nuanced understanding of how variability functions within music composition. This perspective not only clarifies existing debates but also offers a foundation for future research that seeks to integrate aleatoric principles into contemporary creative practice.

### Conclusion

This article has presented a review of literature related to aleatoric music, examining its conceptual foundations, historical development, and applications across diverse musical contexts. The findings also demonstrate that aleatoric practices should not be understood as the absence of structure, but rather as a reconfiguration of compositional control across different stages of the creative process. By integrating elements of unpredictability within defined frameworks, aleatoric expands the range of possible musical outcomes while maintaining conceptual coherence. A key contribution of this study lies in its synthesis of diverse perspectives on aleatoric music. By comparing approaches associated with figures such as John Cage, Karlheinz Stockhausen, and Pierre Boulez, the paper highlights the existence of a continuum between radical indeterminacy and controlled variability. This perspective challenges simplified interpretations of aleatoric and clarifies the conceptual distinctions between related terms such as chance music, indeterminacy, and open form. Furthermore, the discussion demonstrates that the role of the performer is significantly transformed within aleatoric systems, shifting from passive interpretation to active participation in the realization of musical works.

The study also emphasizes the continued relevance of aleatoric principles in contemporary music practice, particularly in relation to digital and generative approaches to composition. However, the literature reveals a lack of integration between theoretical discussions and practical applications, especially within the context of practice-based research. By addressing this gap, the article provides a conceptual framework that can support further exploration of aleatoric techniques in current creative work. Despite these contributions, several limitations must be acknowledged. As a narrative literature review, this study does not claim to be exhaustive, and the selection of sources is necessarily limited by the scope and availability of relevant academic materials. In addition, the study focuses primarily on Western art music traditions, which may not fully represent the global diversity of aleatoric practices. Future research could expand this scope by incorporating non-Western perspectives, as well as empirical or practice-based studies that examine how aleatoric techniques are applied in contemporary compositional contexts.

In conclusion, aleatoric remains a significant and evolving approach within music composition, offering a flexible framework that redefines the relationship between structure and unpredictability. By understanding aleatoric practices as a continuum of control rather than a binary opposition between order and randomness, this study contributes to a more nuanced and critically informed perspective on contemporary music composition. Such an understanding is essential for advancing both scholarly discourse and creative experimentation in the field.

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