

CHORD LANGUAGE

(First name: Equal Temperament Logic and Equal Temperament Painting)

和弦语言

(首发名：平均律逻辑与平均律绘画)

(English and Chinese version)

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* Some chapters of this book are papers from the 24th and 25th World Congress of Philosophy.

Overview Of Chord Language;和弦语言综述

25 届世界哲学大会论文

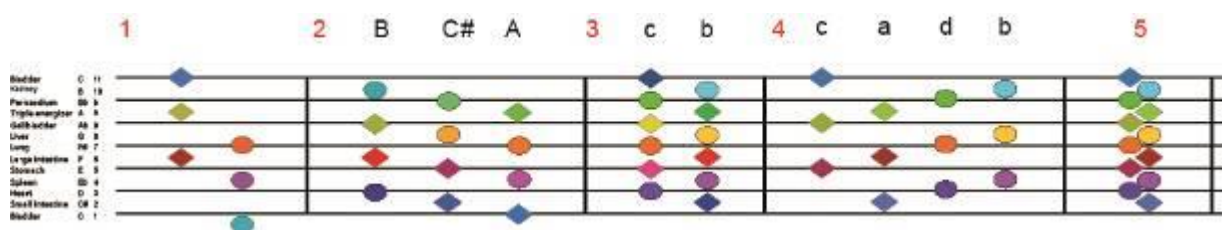
Papers of the XXV World Congress of Philosophy

和弦是一物理语言，其编码、语义形式为：和弦（量子化频谱），弦（开，闭，膜），和弦数学等，表达时间（音乐），空间（绘画），生命（经络）等，分布为和弦场（时空场，生命场）。

Chord is a physical language, its encoding and semantic forms are: chord (quantized spectrum), string (open, closed, membrane), chord mathematics, etc., expressing time (music), space (painting), life (meridians), etc., distributed as chord field (space-time field, life field).

和弦产生时空，生命，精神等，宇宙基于和弦。

Chords produce space-time, life, spirit, etc., and the universe is based on chords.



基本和弦表：1-1、大三和弦（闭弦），1-2、小三和弦（开弦）、2、减七和弦（膜弦）、3、全音阶和弦（膜弦），4、增三和弦（膜弦），5、半音阶和弦（膜弦）

*和弦频谱公式： $n*f$, H^n*f , $H=1.059463$, $n=1,2,3\cdots n$

*符号：◆=+音符，●=-音符，音符色=色荷

Basic chord table: 1-1, major triad (closed string), 1-2, minor triad (open string), 2, diminished 7th (membrane string), 3, diatonic chord (membrane string), 4, augmented Triads (membrane strings), 5. Chromatic Chord (membrane string)

* Chord spectrum formula: $n*f$, H^n*f , $H=1.059463$, $n=1,2,3\cdots n$

* Symbol: ◆=+ note, ●=- note, note color = color charge

关键词：和弦场，时空场，音乐，绘画，生命，量子，弦理论，经络

Key words: chord field, space-time field, music, painting, life, quantum, string theory, meridians

Chord Space And Painting;和弦空间与绘画

音乐、绘画是其最常见的和弦语言现象，具有相同的物理（量子化频谱），数学形式，分别表达时间、空间及其镜像关系，也是和弦场（时空场）的常见形式。

Music and painting are the most common chord language phenomena. They have the same physical (quantized spectrum) and mathematical forms, respectively expressing time, space and their mirror relationship. They are also common forms of chord fields (space-time fields).

弦是和弦的空间（几何）语义，和弦是弦的特征频谱：不同的和弦包含不同的空间语义：大三和弦=闭弦（轮廓线），小三和弦=开弦（分面线），等比数列和弦(Proportional sequence chords)=膜弦（非线空间），三种弦组成空间场（空间语言），产生所有空间状态与作用。

Strings are the spatial (geometric) semantics of chords, and chords are the characteristic spectrum of strings: Different chords contain different spatial semantics: Major triad = closed string (contour line), minor triad = open string (facet line), Proportional sequence chords = membrane string (non-linear space), the three kinds of strings constitute the space field (spatial language), generating all spatial states and effects.

和弦包含空间编码，语义与逻辑，分布为和弦场（空间场），绘画是和弦（量子）空间的常见形式。

Chords contain spatial coding, semantics and logic, distributed as chord fields (spatial fields), and painting is a common form of chord (quantum) space.

参阅：和弦空间与绘画：See also: Chord Space And Painting:

https://www.researchgate.net/publication/340492620_Chord_Painting

Chord Spacetime;和弦时空

人类常用到两种时空：和弦时空与非和弦时空，前者基于和弦（量子化频谱，弦），常用于音乐，绘画等；后者屏蔽了和弦，依赖外部参考系（时钟，尺子、参照物），常用于经典物理学等。前者是和弦场（时空场），后者是相对性经验与概念。

There are two kinds of spacetime commonly used by humans: chord spacetime and non-chord spacetime. The former is based on chords (quantized spectrum, strings) and is often used in music, painting, etc. The latter masks chords, relies on external reference frames (clocks, rulers, reference

objects), and is often used in classical physics, etc. The former is the chord field (space-time field), and the latter is the relative experience and concept.

和弦时空由和弦构成, 和弦频谱只能取特定离散值 ($n \cdot f$, $H^n \cdot f$, $H=1.059463$, $n=1,2,3,\dots$ n)。

Chord spacetime is composed of chords, and the chord spectrum can only take specific discrete values ($n \cdot f$, $H^n \cdot f$, $H=1.059463$, $n=1,2,3,\dots$ n).

和弦时间与和弦空间互为数学镜像, 互为反和弦, 可以相互转换, 空间具有定域性, 时间具有非定域性, 表现出: 时空二相性 (波粒二相性)。

Chord time and chord space are mathematical mirror images of each other and anti-chords of each other, and can be converted into each other. Space is local and time is non-local, showing: space-time duality (wave-particle duality).

和弦具有空间语义 (开, 闭, 膜弦), 表达空间的状态与作用, 并产生空间场。

Chords have spatial semantics (open, closed, membrane strings), express the state and function of space, and generate spatial fields.

音符, 和弦均有 \pm 属性, 是频率的物理属性, 也是场的属性。

Notes and chords all have \pm properties, which are physical properties of frequency and also properties of the field.

和弦包含时空编码, 语义与逻辑, 分布为和弦场 (时空场), 音乐、绘画是和弦 (量子) 时空的常见形式。

Chords contain space-time coding, semantics and logic, and are distributed as chord fields (space-time fields). Music and painting are common forms of chord (quantum) space-time.

Chord Biology;和弦生命

人类观察到两种生命形式: 和弦 (量子化频谱, 弦) 与生物体 (细胞, 分子等), 分别来自和弦观察者 (自观察者) 与非和弦观察者 (外观察者), 生命是和弦与生物体二层存在。

Humans observe two forms of life: chords (quantized spectrum, strings) and organisms (cells, molecules, etc.), which come from chord observers (self-observers) and non-chord observers (external observers), respectively, and life is a two-layer existence of chord and organisms.

和弦在人体上表现为经络 (脉轮) 系统, 来自和弦观察者的自观察; 十二经络具有受激反应特征

频率, 分布为: 十二平均律 (Equal Temperament), 与音乐, 绘画共同基于和弦数学模型, 表现为: 和弦编码, 和弦场 (生命场)。

Chords are manifested in the human body as a system of meridians (chakras) from the self-observation of chord observers; The twelve meridians have the characteristic frequency of stimulated response, and the distribution is: twelve Equal Temperament, which is based on the mathematical model of chord with music and painting, and is represented as chord field (life field).

经络 (脉轮) 是生命的和弦形式, 也是自我 (Atman) 的和弦形式, 自我 (Atman) 是生命本体, 相对独立于生物体, 服从和弦场的自然法则, 其生-死是移调 (Transpose) 事件, 其终极目的是永生。

Meridians (chakras) are the chord form of life and also the chord form of self (Atman). Self (Atman) is the life entity, relatively independent of the organism, and obeys the natural laws of the chord field. Its birth and death are transpose events, and its ultimate goal is immortality.

Natural Spirit; 自然精神

人类有两套语言系统: 符号语言 (后天语言) 与和弦语言 (先天语言); 前者是人工信息系统, 基于语音符号, 如: 自然语言; 后者是自然信息系统, 基于和弦 (量子化频谱, 弦), 如: 音乐、绘画, 经络等; 精神是符号与和弦二层存有。

Humans have two sets of language systems: sign language (acquired language) and chord language (innate language); The former is an artificial information system based on phonetic symbols, such as natural language; The latter is a natural information system, based on chords (quantized spectrum, strings), such as: music, painting, meridian, etc.; The spirit is a two-layer being of symbols and chords.

人的认识来自两种观察者: 和弦观察者 (自观察者) 与非和弦观察者 (外观察者), 由此产生两种认识体系: 和弦体系, 如: 音乐、绘画、经络、宗教等; 非和弦体系, 如: 科学、哲学等——前者服从和弦语义逻辑, 后者服从符号语义逻辑。

Human cognition comes from two kinds of observers: chord observers (self-observers) and non-chord observers (external observers), resulting in two systems of cognition: chord systems, such as music, painting, meridians, religion, etc., and non-chord systems, such as science, philosophy, etc., the former obeys chord semantic logic, and the latter obeys symbolic semantic logic.

和弦表现为物理事件（离散频谱，时空），生命事件（经络），精神事件（音乐，绘画），都基于和弦数学，和弦统一宇宙。

Chords are represented as physical events (discrete spectrum, space-time), life events (meridians), and spiritual events (music, painting), all based on chord mathematics, and chords unify the universe.

和弦语义来自和弦（量子）频谱，是自然精神与意志，音乐，绘画是其常见形式。

Chord semantics comes from the chord (quantum) spectrum, which is the natural spirit and will, and music and painting are its common forms.

**本文内容来自对音乐，绘画，经络等和弦现象的观察，实验。*

** The content of this article comes from the observation and experiment of music, painting, meridians and other chord phenomena.*

**和弦语言出版物有：《和弦语言》与《和弦绘画》，前者介绍和弦语言的语法、语义规则及数学模型，侧重和弦空间语言；后者是和弦绘画（和弦空间）的实验图例与教材。*

**The chord language publications are: "Chord Language" and "Chord Painting", the former introduces the grammar, semantic rules and mathematical models of chord language, focusing on the language of chord space; the latter is the experimental illustration and teaching material of chord painting (chord space).*

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1. Chord Mathematical; 和弦数学

和弦数学是表达和弦频谱的数学工具，基于和弦自然法则。

Chord mathematics is a mathematical tool for expressing the chord spectrum, based on the natural laws of chords.

和弦数学包括音乐数学，本文补充了在和弦绘画（和弦空间）与和弦生命（经络）中的观察数据，对系统有较大扩展。

Chord mathematics includes music mathematics. This paper adds the observed data in chord painting (chord space) and chord life (meridian), which greatly expands the system.

普朗克量子假设 ($n \cdot f \cdot h$) 包含泛音频谱 ($n \cdot f$)，它是和弦数学的取值基础。

Planck's quantum hypothesis ($n \cdot f \cdot h$) contains the overtone spectrum ($n \cdot f$), which is the basis for the value of chord mathematics.

关键词：和弦数学，十二进制，平均律色谱，正-负音符，镜像-对称

Key words: chord mathematics, duodecimal, equal temperament chromatography, positive - negative notes, mirror - symmetry

1-1. Temperament Systems; 律制

和弦语言由和弦频谱构成，其取值的数学方法称为：律制（Temperament systems），如：五度相生律（Circle-of-fifths system），纯律（Just intonation），十二平均律（Equal Temperament）等。

Chord language is composed of chord spectrum, and the mathematical method for its value is Temperament systems, such as: Circle fifths system, Just intonation, equal Temperament, etc.

律制（Temperament systems）基于三个数列：倍频数列 ($2^n \cdot f$)，平均律数列 ($H^n \cdot f$)，泛音数列 ($n \cdot f$)。

Temperament systems are based on three series: octave frequency series ($2^n \cdot f$), equal temperament series ($H^n \cdot f$), overtone series ($n \cdot f$).

Octave Sequence; 倍频数列

公式： $2^{n-1} \cdot f$ （ f =频率， n =项， $n \in \mathbb{N}$ ）。

Formula: $2^{n-1} \cdot f$ (f = frequency, n = term, $n \in \mathbb{N}$).

首项指数 $1-1=0$, 默认首项 $=0$, 可用: $f_n=2^{n.f}$ ($n \in \mathbb{Z}$)。

First exponent $1-1=0$, default first entry $=0$, available: $f_n=2^{n.f}$ ($n \in \mathbb{Z}$).

倍频音程属于等价类: 近似同一个音符, 在和弦中可互相替代; 12 音符-八度周期是音乐的经验性法则, 也是物理-数学特征。

Octave intervals belong to the equivalence class: similar to the same note, can be substituted in the chord; The 12-note octave cycle is an empirical law of music, as well as a physical-mathematical feature.

Equal Temperament Sequence; 平均律数列

公式: $H^{n-1} \cdot f$ ($H = \text{half-step} = 12 \sqrt[12]{2} = 1.059463$, $n = \text{序数}$, $f = \text{频率}$)

Formula: $H^{n-1} \cdot f$ ($H = \text{half-step} = 12 \sqrt[12]{2} = 1.059463$, $n = \text{ordinal}$, $f = \text{frequency}$)

首项指数 $1-1=0$, 默认首项 $=0$, 可用: $H^{n \cdot f}$

First term exponent $1-1=0$, default first term $=0$, available: $H^{n \cdot f}$

Geometric Series Chord; 等比数列和弦

平均律数列也是等比数列和弦: 半音阶和弦, 是无调性特征和弦。

The equal temperament series is also the geometric series chord: chromatic chord, which is atonal characteristic chord.

等比数列和弦还有:

Geometric series chords also include:

减七和弦、公比 $= 4 \sqrt[12]{2} = H^3 \approx 1.189207$; 小三度数列, 七声音阶 (Heptachord) 特征和弦。

Diminished 7th, common ratio $= 4 \sqrt[12]{2} = H^3 \approx 1.189207$; Minor third sequence, Heptachord characteristic chord.

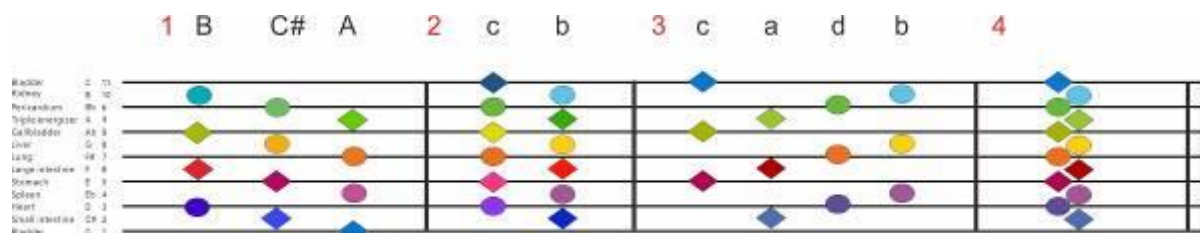
全音阶和弦、公比 $= 6 \sqrt[12]{2} = H^2 \approx 1.122462$; 全音阶数列, 爵士音阶特征和弦。

Diatonic chords, common ratio $= 6 \sqrt[12]{2} = H^2 \approx 1.122462$; diatonic sequence, characteristic chords of jazz scales.

增三和弦 (augmented triad)、公比 $= 3 \sqrt[12]{2} = H^4 \approx 1.259921$, 大三度 (Major third) 数列, 爵士音阶特征和弦。

Augmented triad, Common ratio $= 3 \sqrt[12]{2} = H^4 \approx 1.259921$, Major third sequence, characteristic CHORD LANGUSGE, Li Xiaohong, DOI: 10.13140/RG.2.2.25415.65440/3, ISBN:9781370273348, ASIN: B0919JJ3R7
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chords of jazz scales.



等比数列和弦表: 1、减七和弦 (膜弦)、2、全音阶和弦 (膜弦), 3、增三和弦 (膜弦), 4、半音阶和弦 (膜弦)

* ♢=正音符, ●=负音符, 色彩=色荷

Geometric sequence chord table: 1, diminished 7th chord (membrane chord), 2, diatonic chord (membrane chord), 3, augmented Triads (membrane chord), 4, chromatic chord (membrane chord)

* ♢=positive note, ●=negative note, color=color charge

三和弦; Triad

三和弦数列包含不同频率比, 如: 大三度 (H^3), 小三度 (H^4), 是倍频音程的非等分形式, $H^3 \cdot H^4 = H^7$ 为纯五度, 这是三和弦的特征音程。

The triad sequence contains different frequency ratios, such as major thirds (H^3) and minor thirds (H^4), which are non-equalized forms of octave intervals. $H^3 \cdot H^4 = H^7$ is Perfect fifth. It is the characteristic interval of a triad.

三和弦与泛音列的频谱相似, 不能排除与泛音列的相关性; 涉及的频率值与十二平均律近似, 仍然可用十二平均律取值。

The frequency spectrum of the triad and the Overtone spectrum is similar, and the correlation with the Overtone spectrum cannot be ruled out; the frequency value involved is similar to the equal temperament, and the equal temperament value can still be used.

大三和弦 (Major triad) = $H^{0,4,7,12} \cdot F_0$

Major triad = $H^{0,4,7,12} \cdot F_0$

小三和弦 (Minor triad) = $H^{0,3,7,12} \cdot F_0$

Minor triad = $H^{0,3,7,12} \cdot F_0$

三和弦数列与等比数列是基本的和弦形式, 包含基本的和弦时-空语义, 在后面部分会逐步介绍。

The triad series and the Geometric sequence are the basic chord forms, including the basic chord space-time semantics, which will be introduced step by step in the later part.

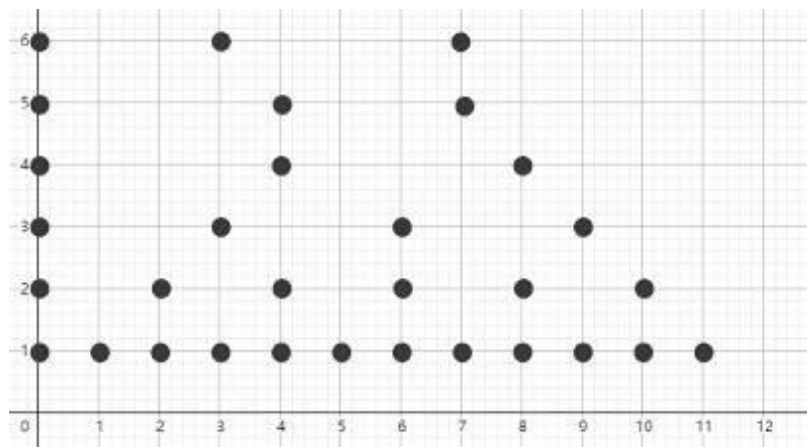


图 1-1、基本和弦表: y1、半音阶, y2、全音阶和弦, y3、减七和弦, y4、增三和弦, y5、大三和弦, y6、小三和弦, (x=指数)

Figure 1-1. Basic chord table: y1, Chromatic chords, y2, Diatonic chords, y3, Diminished 7th chords, y4, Augmented triads, y5, Major triads, y6, Minor triads, (x= exponent)

Common formula; 常用公式

1) Formula of chord; 和弦公式

$C = H^{n_1, n_2, n_3, n_x \cdot f_0}$; (C=和弦, H=半音=1.05946, n=序数)

$C = H^{n_1, n_2, n_3, n_x \cdot f_0}$; (C= chord, H= half-step =1.05946, n= ordinal)

大三和弦 (Major Chord) $= H^{0, 4, 7 \cdot f_0}$

小三和弦 (Minor chord) $= H^{0, 3, 7 \cdot f_0}$

减七和弦 (Diminished 7th) $= H^{0, 3, 6, 9 \cdot f_0}$ (Geometric sequence; 等比数列)

增三和弦 (Augmented triads) $= H^{0, 4, 8 \cdot f_0}$ ((Geometric sequence; 等比数列)

全音阶和弦 (Diatonic chord) $= H^{0, 2, 4, 6, 8, 10, 12 \cdot f_0}$ (Geometric sequence; 等比数列)

半音阶 (Chromatic chord) $= H^{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 \cdot f_0}$

2) Interval formula; 音程公式

纯一度 (Perfect unison) $= H^{0 \cdot f_0}$

小二度 (Minor second) $= H^{1 \cdot f_0}$

大二度 (Major second) $= H^{2 \cdot f_0}$

小三度 (Minor third) $= H^{3 \cdot f_0}$

大三度 (Major third) = $H^4.f_0$

纯四度 (Perfect fourth) = $H^5.f_0$

增四度 (Augmented fourth) = $H^6.f_0$

纯五度 (Perfect fifth) = $H^7.f$

小六度 (Minor sixth) = $H^8.f_0$

大六度 (Major sixth) = $H^9.f_0$

小七度 (Minor seventh) = $H^{10}.f_0$

大七度 (Major seventh) = $H^{11}.f_0$

八度 (Octave) = $H^{12}.f_0$

*音乐技术中还用到“音分”(Cent): $100 \sqrt{H} = 1.0005778 = 1$ 音分 (Cent), 和弦编码的最小离散值为: 半音 (Half-step) = HF, 音分 (Cent) 不是最小和弦值。

* "Cent" is also used in music technology: $100 \sqrt{H} = 1.0005778 = 1$ cent, the smallest discrete value of chord coding is: half-step = HF, cent Not the minimum membrane chords value.

1-2. Duodecimal Notation; 十二进制记谱

和弦数学的取值基于倍频数列, 倍频音程等分为平均律数列, 包含和弦数学的 12 个基数 (cardinality)。

The value of chord math is based on the octave sequence, and the octave interval is divided into equal temperament sequence,, including 12 cardinality of chord math.

音乐计数使用七声音阶的序数: 默认为 C 大调的音名, 坐标 (五线谱); 一个倍频周期包含七个音符, 表达 7 个频率值。

The music count uses the heptachord ordinal: the default is the pitch name, roll name, and coordinates (staff) in C major; one octave period contains seven notes, expressing seven frequency values.

音乐符号系统中, 倍频音符的字母与数字相同, 这提示了音乐最重要的物理-数学特征——倍频音符的等价性与周期性。

In the musical notation system, the letters and numbers of octave notes are the same, which suggests the most important physical-mathematical feature of music-the equivalence and periodicity of octave notes.



图 1-2.1、七声音阶 C 大调的音乐符号与坐标 (n 升八度=n')

Figure 1-2.1. The musical notation and coordinates of the heptachord in C major (n octave =n')

七声音阶的序数不是基数，需要依赖升号（Sharp）与降号（Flat）来改变默认值，这很繁琐；更重要的是：和弦语言包含很多逻辑形式：爵士音阶，无调性体系等，以及镜像-对称形式，12 个基数是表达所有和弦逻辑形式的必要条件。

The ordinal number of the heptatonic scale is not a cardinal number, and it is very cumbersome to rely on the Sharp and Flat to change the default value; more importantly: the chord language contains many logical forms: the jazz Scale, Atonal systems, etc., as well as mirror-symmetric forms, 12 cardinals are necessary to express all forms of chord logic.

七声音阶序数在插入升-降号后可转为半音阶（平均律数列），包含了全体基数，可以转换为数字格式。

Heptatonic ordinal numbers can be converted to chromatic scales (equal-tempered sequence) after inserting sharp-flats, including all base numbers, and can be converted to digital format.



图 1-2.2、七声音阶 C 大调的半音阶

Figure 1-2.2, Chromatic scale of the heptachord C major

平均律数列（半音阶）计数可以采用两种数字格式：平均律数列通项公式（ $F_n = H^n \cdot F$ ）的指数与十二进制（duodecimal）。

The equal temperament sequence (chromatic scale) count can adopt two number formats: the exponent of the equal temperament sequence general term formula ($F_n = H^n \cdot F$) and the duodecimal.

Pitch names	C	C#	D	Eb	E	F	F#	G	Ab	A	Bb	B	C2	C2#
Exponential	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Duodecimal	1	2	3	4	5	6	7	8	9	a	b	10	11	12

图 1-2.3、半音阶-数字转换表

Figure 1-2.3, Chromatic-digital conversion table

指数计数可以表达和弦的镜像-对称结构, 也便于计算, 可表达相对离散关系。在后面 1-5 节有专门的介绍。

The exponential count can express the mirror-symmetric structure of the chord, and it is also easy to calculate, and can express the relative discrete relationship. There are special introductions in the following sections 1-5.

十二进制数制 (Duodecimal number system) 与平均律数列 (Equal temperament sequence) 的周期吻合, 是更方便的数学方法: 用十二进制数字代替音名 (pitch names) 字母, 尾数相同的是倍频音符, 如: 1, 11, 21, 也能够体现倍频音符的等价性与周期性。

The Duodecimal number system coincides with the period of the Equal temperament sequence, which is a more convenient mathematical method: replace the letters of pitch names with duodecimal numbe, and the same mantissa is the octave note, Such as: 1, 11, 21, can also reflect the equivalence and periodicity of octave notes.

数字计数有时会涉及升高-降低八度, 可采用: $f \cdot 2^n$, $f \cdot 2^{-n}$ 表达。

Digital counting sometimes involves sharp-flat octaves, which can be expressed as: $F \cdot 2^n$, $F \cdot 2^{-n}$.

数字音乐软件中的卷帘窗编辑器用半音阶 (平均律数列) 坐标记谱, 包含了和弦语言的全部基数, 是更好的数学方法。

The rolling window editor in the digital music software uses the chromatic scale (equal temperament sequence) to mark the spectrum, which contains all the cardinal numbers of the chord language, which is a better mathematical method.



图 1-2.3、卷帘窗编辑器

Figure 1-2.3, Rolling Window Editor

为了便于书写, 可将卷帘窗坐标转换为线坐标, 相邻音符为小二度音程; 这也是本书使用的记谱

方法。

In order to facilitate writing, the coordinates of the rolling window can be converted to line coordinates, and the adjacent notes are minor second intervals; this is also the notation method used in this book.

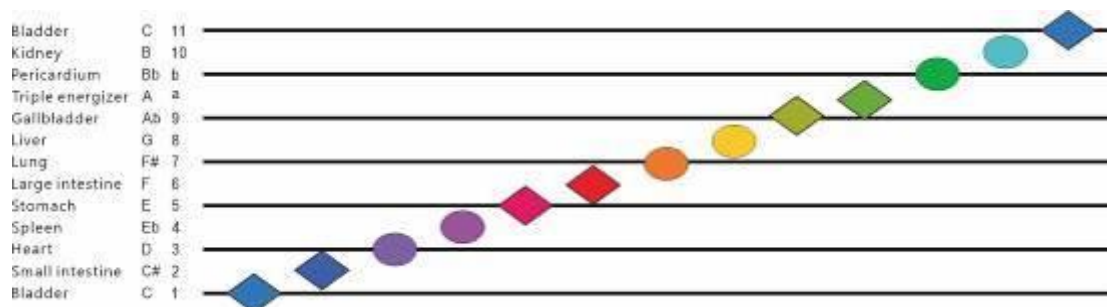


图 1-2.4、平均律（半音阶）线坐标，（菱形=+音符，圆形=-音符）

Figure 1-2.4, the line coordinate of the equal temperament (chromatic scale), (diamond=+note, circle=-note)

1、十二进制数字、音名标注于行首，也可根据不同学科需要，添加其它标注。

1. Duodecimal numbers and pitch names are marked at the beginning of the line, and other markings can also be added according to the needs of different disciplines.

2、谱表的频率范围可以根据需要自定义。

2. The frequency range of the spectrum table can be customized as needed.

3、除了频率坐标，可以完整继承五线谱的符号系统。

3. In addition to the frequency coordinates, the symbol system of the stave can be completely inherited.

*十二进制是数学中一种以 12 为底数的记数系统，通常使用数字 0~9 以及字母 A、B（或 X、E）来表示。其中，A（或 X）即数字 10，B（或 E）即数字 11。

* Duodecimal is a numbering system with 12 as the base in mathematics. It is usually represented by numbers 0-9 and letters A, B (or X, E). Among them, A (or X) is the number 10, and B (or E) is the number 11.

1-3. Equal Temperament Chromatography ;平均律色谱

平均律色谱（Equal Temperament Chromatography）包含 12 个色荷，是和弦空间语言与和弦绘画的基本定量，量纲。

Equal Temperament Chromatography contains 12 color charges and is the basic quantitative

and dimension of chord space language and chord painting.

可见光的波长与频率对照表

Visible light wavelength and frequency comparison table

色彩名称 (Color name), 波长 (Wavelength: nm), 频率 (frequency: MHz)

紫光 (Purple)、400~435; 790-680

蓝光 (Blue)、450~480; 680-620

青光 (Cyan-blue)、480~490; 600-620

绿光 (Green)、500~560; 600-530

黄光 (Yellow)、580~595; 530-510

橙光 (Orange)、595~605; 510-480

红光、(Red) 605~700; 480-405

采用: 红 ≈ 410 作为初始值, 用平均律 (Equal Temperament) 公式: $F_n = H^n \cdot F$ ($H = 1.05946$, n =序数, F =初始频率) 计算, 得出平均律 (Equal Temperament) 色谱。

Using red = 410 as the initial value, using the equal temperament formula: $F_n = H^n \cdot F$ ($H = 1.05946$, n = ordinal number, F = initial frequency) to calculate the equal temperament chromatogram:

红 (Red): 410

朱红 (Rot-orange) ≈ 434.3827

橙 (Orange) ≈ 460.1094922

橙-黄 (Orange-yellow) ≈ 487.472106

黄 (Yellow) ≈ 516.4620658

黄-绿 (Yellow-green) ≈ 547.1759951

绿 (Green) ≈ 579.7164508

绿兰 (Green blue) ≈ 614.1921343

兰 (Blue) ≈ 650.7181042

青紫 (Indigo) ≈ 691.5352454

紫 (Violet) ≈ 732.6607983

紫红 (Surplish red) ≈ 776.2320318

将平均律 (Equal Temperament) 色谱记入下表, 并与音符, 经络的频率关联。

Record the Equal Temperament chromatogram in the table below and associate it with the frequency of the notes and meridians.

指数 Exponential	12 进制 Duodecimal	音名 pitch names	色彩 Color	±	十二经络 Twelve Meridians
12	11	C	blue	+	Bladder channel;足太阳膀胱经
11	10	B	cyan	-	Kidney channel;足少阴肾经
10	b	Bb	Green	-	Pericardium channel;手厥阴心包经
9	a	A	yellowgreen	+	Triple burner channel;手少阳三焦经
8	9	Ab	yellow	+	Gallbladder channel;足少阳胆经
7	8	G	yelloworange	-	Liver channel;手厥阴肝经
6	7	F#	orange	-	Lung channel;手太阴肺经
5	6	F	Red-orange	+	Large intestine channel;手阳明大肠经
4	5	E	Red	+	Stomach channel;足阳明胃经
3	4	Eb	purplishred	-	Spleen channel;足太阴脾经
2	3	D	purplishred	-	Heart channel;手少阴心经
1	2	C#	indigo	+	Small-intestine channel;手太阳小肠经
0	1	C	blue	+	Bladderchannel;足太阳膀胱经

图 1-3：十二平均律（Equal Temperament）元素对应表

Figure 1-3: Equal Temperament element correspondence table

1 列：平均律数列的序数。

1 column: the ordinal of the equal temperament sequence.

2 列：平均律数列的十二进制（duodecimal）数字。

Column 2: The duodecimal number expression of the Equal Temperament number sequence.

3 列：音名（pitch names）。

Line 3: Pitch names.

4 列：色荷

Column 4: Color Charge

5 列，频率的±属性。

5 columns, ± attribute of frequency.

6 列：受激-反应经络。

Column 6: stimulated-response meridian.

注：经络具有正、负（阴-阳）属性，并会传递给同一行中的声、光频率，这是频率的物理属性；频率的正、负属性是最重要的和弦编码元素，涉及后面所有章节。

Note: Meridians have positive and negative (yin-yang) attributes, and will be transmitted to the sound and light frequencies in the same line. This is the physical attribute of frequency; the positive

and negative attributes of frequency are the most important chord coding elements, which are related to the following All chapters.

上面表中的对应关系基于经络的受激反应特征频率，在本书第 15 章有专门介绍。

The corresponding relationship in the above table is based on the characteristic frequency of the stimulated response of the meridian, which is specifically introduced in Chapter 15 of this book.

Overtone Sequence; 泛音数列

公式: $n \cdot f$ $n=1、2、3、4、5、6\cdots\cdots$, f =频率

Formula: $n \cdot f$ ($n=1, 2, 3, 4, 5, 6\cdots\cdots$, f = frequency)

泛音数列中包含了倍频数列 ($2^n \cdot f$ $n=Z$)。

The overtone sequence contains the octave sequence ($2^n \cdot f$ $n=Z$).

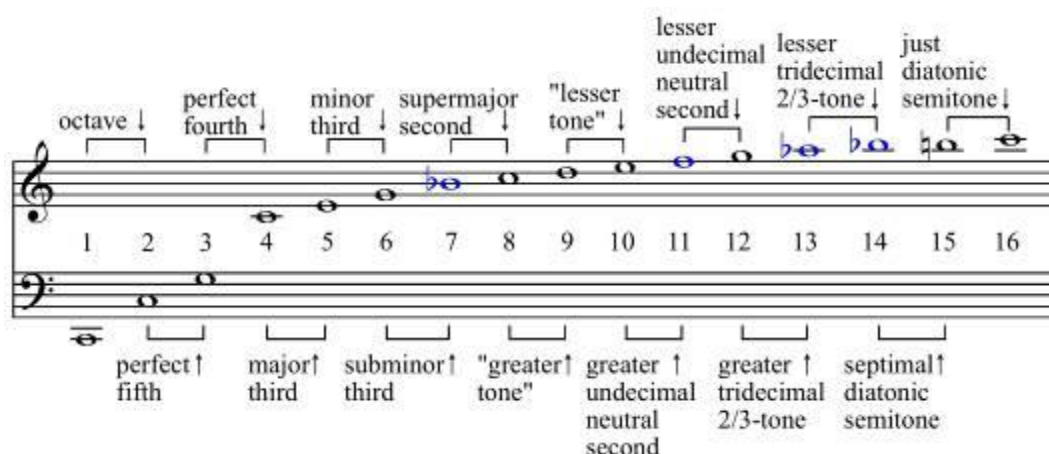


图 1-1.1、泛音频谱

Figure 1-1.1 Overtone spectrum

泛音频谱中，纯五度 ($3/2$) 可以循环生成 12 个音符，如：五度相生律 (Circle-of-fifths system)，纯律 (Just intonation)，但它们都不能符合泛音频谱中的八度数列 ($2^n \cdot f$)，这导致系统失去八度周期。

In the overtone spectrum, a pure fifth ($3/2$) can cycle into 12 notes, for example, the circular-of-fifths system and Just intonation, but neither of them matches the octave sequence ($2^n \cdot f$) in the overtone spectrum, causing the system to lose the octave cycle.

泛音频谱 ($n \cdot f$) 依赖八度周期 ($2^n \cdot f$)，一维媒介 (弦，管) 的泛音频谱包含大三和弦，如果切换为减七和弦或全音阶和弦 (等比数列和弦)，泛音数列 ($n \cdot f$) 会转换为平均律数列 ($H^n \cdot f$)，三和弦与减七和弦，全音阶和弦是相互依赖关系。

The overtone spectrum ($n*f$) depends on the octave cycle (2^n*f). The overtone spectrum of one-dimensional media (strings, pipes) contains major triads. If switched to a diminished seventh or diatonic chord (geometric sequence chord), the overtone sequence ($n*f$) will be converted to an equal temperament sequence (H^n*f). and the triads are interdependent with the diminished seventh chord and diatonic chord.

不同的泛音频谱应该能在不同的媒介上观察到。

Different overtone spectra should be observed in different media.

普朗克量子假设 ($n*h*f$) = 泛音频谱 ($n*f$) 乘以普朗克常数 ($h = 6.626*10^{-34}$), 也基于和弦数学模型, 在后面 1-6 节有专门的讨论。

Planck quantum hypothesis ($n*h*f$) = overtone spectrum ($n*f$) times Planck's constant ($h = 6.626*10^{-34}$), also based on a mathematical model of chords, is discussed in sections 1-6 later.

1-4.Positive-Negative Notes;正-负音符

和弦语言基于一系列频率值, 定量单位为“音符”, 这里需要扩充定义: 在本书中, 音符=频符 (Frequency note), 包括声-光等所有频率。

Chord language is based on a series of frequency values, and the unit of quantification is "notes". Here we need to expand the definition: in this book, note = frequency note, including all frequencies such as sound and light.

和弦语言中, 所有音符都具有正-负属性, 它是频率的物理属性, 不是数学中的正-负数。

In the chord language, all notes have a positive-negative attribute, which is a physical attribute of frequency, not a positive-negative number in mathematics.

音符的正-负属性继承自经络的正-负 (阴-阳) 属性, 由《黄帝内经》等医学经典记载。(见: 图 1-3, 1-4.1)。

The positive-negative attributes of the notes are inherited from the positive-negative (yin-yang) attributes of the meridian, and are recorded in medical classics such as Huangdi Neijing. (See: Figure 1-3, 1-4.1).

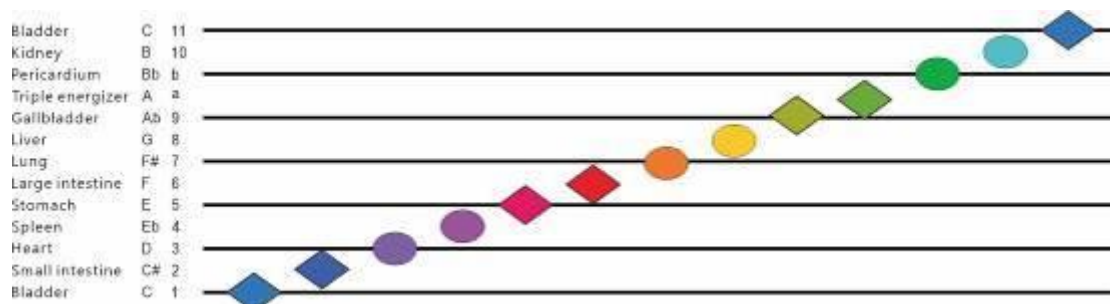


图 1-4.1、± 音符表：椭圆=负音符，菱形=正音符。

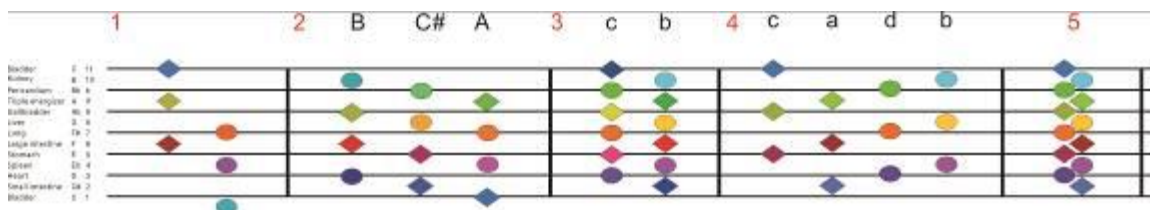
Figure 1-4.1, ± note table: oval = negative note, diamond = positive note.

平均律数列 (Equal Temperament sequence) 为±音符的集合 {+1 +2 -3 -4 +5 +6 -7 -8 +9 +a -b -10.....}。

The Equal Temperament sequence is a collection of ± notes {+1 +2 -3 -4 +5 +6 -7 -8 +9 +a -b -10.....}.

± 音符在和弦中产生±频率分布，这是重要的和弦编码元素，在和弦组织中表现为“对称性”法则。

The ± note produces ± frequency distribution in the chord, which is an important chord coding element, which is expressed as the law of "symmetry" in the chord organization.



基本和弦表：1-1、大三和弦（闭弦），1-2、小三和弦（开弦）、2、减七和弦（膜弦）、3、全音阶和弦（膜弦），4、增三和弦（膜弦），5、半音阶和弦（膜弦）

*和弦频谱公式： $n \cdot f$, $H^n \cdot f$, $H=1.059463$, $n=1,2,3 \dots n$

*符号：◆=+音符，●=-音符，音符色=色荷

Basic chord table: 1-1, major triad (closed string), 1-2, minor triad (open string), 2, diminished 7th (membrane string), 3, diatonic chord (membrane string), 4, augmented Triads (membrane strings), 5. Chromatic Chord (membrane string)

* Chord spectrum formula: $n \cdot f$, $H^n \cdot f$, $H=1.059463$, $n=1,2,3 \dots n$

* Symbol: ◆=+ note, ●=- note, note color = color charge

音符（频率）的正、负性是重要的和弦编码元素，影响着和弦的语法、语义，本书所有的和弦实验中都可以观察到它的作用，在后面的相关章节有更多介绍。

The positive and negative of notes (frequency) are important chord coding elements, which affect the grammar and semantics of chords. Its effect can be observed in all chord experiments in this book. There will be more introductions in related chapters later.

1-5.Mirror-Symmetry; 镜像-对称

在和弦语言中, 三和弦 (Triad) 有升序与降序两种组织方式, 数学形式为为镜像-对称, 分别表达时间与空间; 音乐 (时间表达) 采用升序方式, 绘画 (空间表达) 采用降序方式形式。

In chord language, Triad has two kinds of organization, ascending order and descending order, and the mathematical form is mirror-symmetric, expressing time and space respectively. Music (time expression) is in ascending order, painting (space expression) is in descending order.

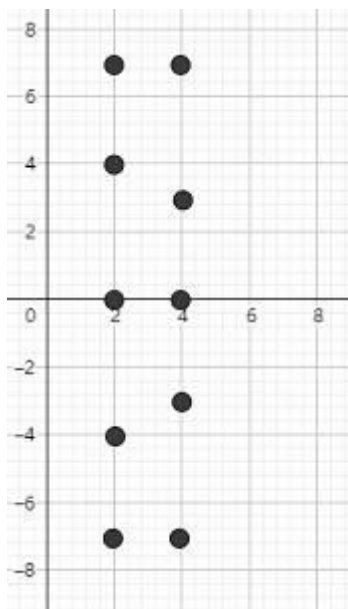


图 1-5、C 大三和弦-小三和弦的升序, 降序, 镜像-对称形式。Y=平均律数列的指数, X=和弦

Figure 1-5, C Major triad - minor triad ascending, descending, mirror-symmetric form. Y= exponents of the average temperament series, X= chords

三和弦的升序-降序, 镜像-对称形式产生了反和弦, 反和弦包, 反音阶。

The ascending - descending, mirror-symmetric form of the triad gives rise to antichords, antichord packages, antiscales.

下面以几个和弦为例; 和弦中的音符用平均律数列的指数表达。

Here are a few chords as examples; the notes in the chord are expressed by the exponent of the equal temperament sequence.

C 大三和弦（升序）= $H^0, 4, 7.C$

C major chord, (ascending)= $H^0, 4, 7.C$

E_b 小三和弦（升序）= $H^0, 3, 7.E_b$

E_b minor triad (ascending)= $H^0, 3, 7.E_b$

C 大三和弦（降序）= $H^0, -4, -7.C$

C major chord(descending)= $H^0, -4, -7.C$

E_b 小三和弦（降序）= $H^0, -3, -7.E_b$

E_b minor triad (descending)= $H^0, -3, -7.E_b$

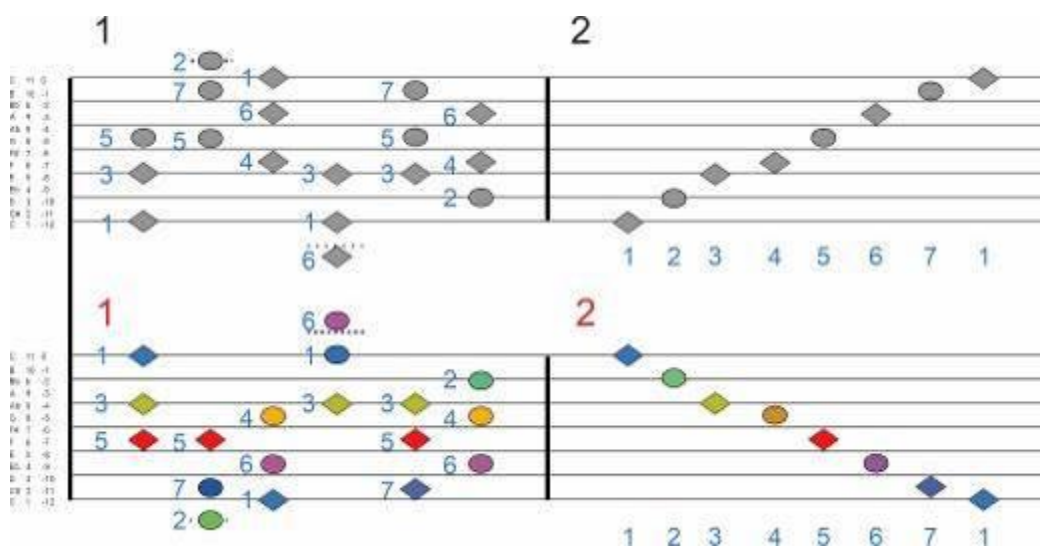


图 1-5.2、镜像对称：七声音阶（Heptachord），C 大调的三和弦与音阶

Figure 1-5.2 Mirror symmetry: Heptachord, triad and scale in C major

和弦时间与和弦空间的数学关系是：镜像-对称，互为反和弦：时间是反空间，空间是反时间。

The mathematical relationship Coincident chord time and chord space is: mirror-symmetry, mutual anti-chord: time is anti-space, space is anti-time.

1-6. Quantum And Chord; 量子与和弦

音乐，绘画都是和弦现象，基于和弦数学模型：八度频谱（ $2^n \cdot f$, n =序数, f =频率），泛音频谱（ $n \cdot f$, $n=1,2,3,4,5,6, \dots$ ）与平均律频谱（ $H^n \cdot f$, $H=1.059463$ ）；普朗克量子假设（ $n \cdot h \cdot f$, h =普朗克常数）=泛音频谱（ $n \cdot f$ ）乘以普朗克常数（ $h=6.626 \cdot 10^{-34}$ ），也基于和弦数学模型。

Music and painting are chord phenomena, based on mathematical models of chords: octave spectrum ($2^n \cdot f$, n = ordinal number, f = frequency), overtone spectrum ($n \cdot f$, $n=1,2,3,4,5,6, \dots$) And the

equal temperament spectrum ($H^n \cdot f$, $H=1.059463$); The Planck quantum hypothesis ($n \cdot h \cdot f$) = overtone spectrum ($n \cdot f$) times Planck's constant ($h= 6.626 \cdot 10^{-34}$) is also based on a mathematical model of chords.

物理学家已在物理实验中观察到泛音频谱。

Physicists have observed the overtone spectrum in physics experiments.

[The Nobel Prize in Physics 2023 - Popular science background](#)



图 1-6、巴赫手稿; Figure 1-6, Bach manuscript

1-6.1、泛音频谱=普朗克频谱= $n \cdot f$, $n=1,2,3,4,5,6,.....$

1-6.1. Overtone spectrum= Planck spectrum = $n \cdot f$, $n=1,2,3,4,5,6...$

音符 C 的普朗克频谱=音符 C 的泛音列频谱= $n \cdot 65.4$, $n=1,2,3,4,5,6,.....$

Planck spectrum of note C = Overtone spectrum of note C = $n \cdot 65.4$, $n=1, 2, 3, 4, 5, 6...$

$n \rightarrow$	1 ^o	2 ^o	3 ^o	4 ^o	5 ^o	6 ^o	7 ^o	8 ^o	9 ^o	10 ^o	11 ^o	12 ^o	13 ^o	14 ^o	15 ^o	16 ^o
$f \rightarrow$	65.4 ^o	130.8 ^o	196.2 ^o	261.6 ^o	327 ^o	392.4 ^o	457.8 ^o	523.2 ^o	588.6 ^o	654 ^o	719.4 ^o	784.8 ^o	850.2 ^o	915.6 ^o	981 ^o	1046.4 ^o

1-6.2.; Figure 1-6.2

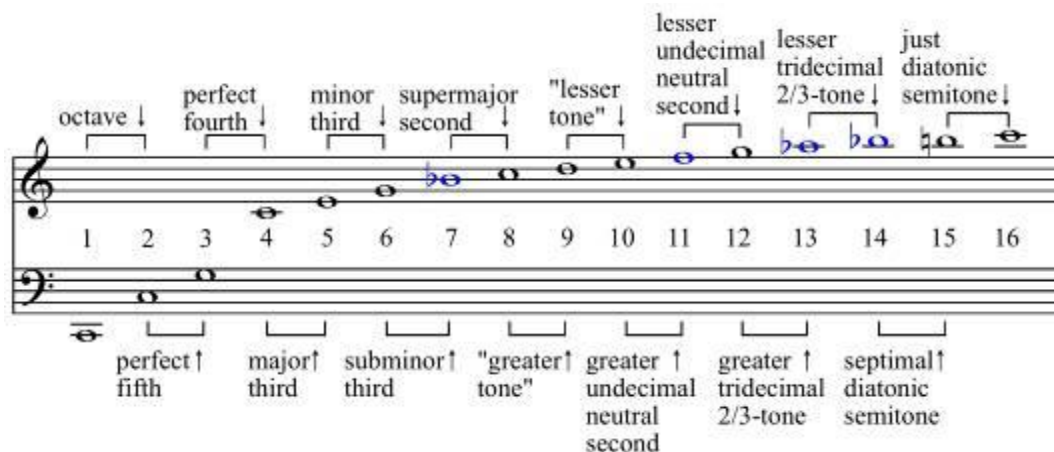


图 1-6.3、泛音-普朗克频谱，前面 6 项构成大三和弦。

Figure 1-6.3. The overtone-Planck spectrum, with the first six terms forming the major triad.

1-6.2. 八度频谱 ($2^n f$), 平均律频谱 ($H^n f$) 是泛音-普朗克频谱 ($n f$) 的特殊形式。

1-6.2. The octave spectrum ($2^n f$), the equal temperament spectrum ($H^n f$) is a special form of the overtone-Planck spectrum ($n f$).

$$2^n f = H^n f \quad (n=0,12,24,36,48,60,\dots,n+12) = n f \quad (n=1,2,4,8,16,32,\dots,2^n)$$

分别乘以普朗克常数 h (6.626×10^{-34}), 仍然相等。

Multiply each by Planck's constant h 6.626×10^{-34} , which is still equal.

$$2^n f h = H^n f h \quad (n=0,12,24,36,48,60,\dots,n+12) = n h f \quad (n=1,2,4,8,16,32,\dots,2^n)$$

1-6.3. 泛音-普朗克频谱 ($n f$) 与平均律 ($H^n f$, $H=1.059463$) 的转换, 以音符 C 为例。

1-6.3. The conversion of the overtone-Planck spectrum ($n f$) to the equal temperament ($H^n f$, $H=1.059463$), using the note C as an example.

$$1 \times 65.4 \approx H^0 \times 65.4$$

$$2 \times 65.4 \approx H^{12} \times 65.4$$

$$3 \times 65.4 \approx H^{19} \times 65.4$$

$$4 \times 65.4 \approx H^{24} \times 65.4$$

$$5 \times 65.4 \approx H^{28} \times 65.4$$

$$6 \times 65.4 \approx H^{31} \times 65.4$$

$$7 \times 65.4 \approx H^{34} \times 65.4$$

$$8 \times 65.4 \approx H^{36} \times 65.4$$

$$n f \approx H^n f$$

$$n h f \approx H^n h f, \quad (h=6.626 \times 10^{-34}, H=1.059463)$$

普朗克量子假设 (n.h.f) 基于和弦数学模型。

The Planck quantum hypothesis (n.h.f) is based on a mathematical model of chords.

和弦可以表达空间 (定域性) 与时间 (非定域性), 表现为时空二相性 (波粒二相性)。

Chords can express space (locality) and time (non-locality), and manifest as space-time duality (wave-particle duality).

*Bibliography; *参考书目

Basic music theory; 基础音乐理论

Harmony; 和声学

Chord Painting; 和弦绘画

General Physics Textbooks: 普通物理学教材

Textbook of Meridian Studies; 经络学教材

《黄帝内经》、佚名, 中国古代医学著作。

[The Nobel Prize in Physics 2023 - Popular science background](#)

2. Chord Coding;和弦编码

平均律数列 (Equal temperament series) 是和弦的取值范围, 其中的每个音符都具有频率值与正-负值, 两者是和弦的基本编码元素, 前者构成离散频率值分布, 后者构成正、负值分布, 所有和弦都包含这两种分布, 并由此决定和弦的时空语义以及其它属性。

The Equal temperament series is the value range of chords, in which each note has a frequency value and a positive-negative value. The two are the basic coding elements of a chord. The former constitutes a discrete frequency value distribution, and the latter constitutes a positive-negative value distribution, all chords contain these two distributions, and thus determine the spatiotemporal semantics and other properties of the chord.

和弦语言的基本编码形式是“和弦”, 它含有三个以上的特定离散频率值, 现有的相关学科是“和声学”(Harmony), 本文增加了绘画(和弦空间), 经络(和弦生命)中的观察数据, 进行了必要的扩充。

The basic coding form of chord language is "chord", which contains more than three specific discrete frequency values. The existing related discipline is "Harmony". This paper adds the observation data in painting (chord space) and meridian (Chord Life), and makes necessary expansion.

和弦是一种离散能量编码, 是构成和弦时间、空间的“单词”, 和弦编码的形式非常多, 但可以归入两个基本类型: 三和弦与等比数列和弦 (Geometric sequence chord), 两者的结合产生和弦语句(和弦包), 表达所有的和弦语义, 如: 时间, 空间, 生命等。

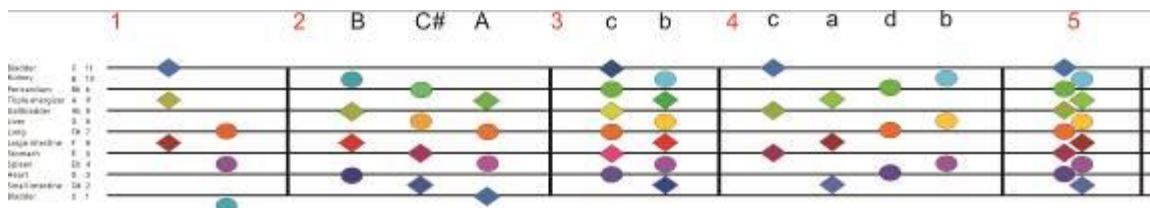
A chord is a discrete energy encoding, which is the "word" that constitutes the time and space of a chord. There are many forms of chord encoding, but they can be classified into two basic types: triads and Geometric sequence chords, a combination of the two. Generate chord sentences (Chord package) to express all chord semantics, such as: time, space, life, etc.

音符具有正-负值, 在和弦上表现为正-负值分布, 使和弦产生不同的语义变化。

The notes have positive-negative values and are represented in a positive-negative distribution on the chord, which makes the chord produce different semantic changes.

理解和弦编码需要和弦语言经验, 推荐在阅读本书时结合音乐, 绘画训练。

Understanding chord coding requires chord language experience. It is recommended to combine music and painting training when reading this book.



基本和弦表: 1-1、大三和弦 (闭弦), 1-2、小三和弦 (开弦)、2、减七和弦 (膜弦)、3、全音阶和弦 (膜弦), 4、增三和弦 (膜弦), 5、半音阶和弦 (膜弦)

*和弦频谱公式: $n*f$, H^n*f , $H=1.059463$, $n=1,2,3\cdots n$

*符号: \blacklozenge =+音符, \bullet =-音符, 音符色=色荷

Basic chord table: 1-1, major triad (closed string), 1-2, minor triad (open string), 2, diminished 7th (membrane string), 3, diatonic chord (membrane string), 4, augmented Triads (membrane strings), 5. Chromatic Chord (membrane string)

* Chord spectrum formula: $n*f$, H^n*f , $H=1.059463$, $n=1,2,3\cdots n$

* Symbol: \blacklozenge =+ note, \bullet =- note, note color = color charge

*和弦取值的计算方法见: 1、和弦数学模型

*For the calculation method of chord value, please refer to: 1. Chord Mathematical Model

2-1.Triad;三和弦

三和弦 (triad) 由三个离散频率值组成, 在七声音阶 (Heptachord) 计数制中分别称为: 根音 (Root), 三度 (Third), 五度 (Fifth), 和弦绘画中仍沿用音乐中的术语。

Triad is composed of three discrete frequency values, which are called Root, Third and Fifth respectively in the Heptachord counting system. They are still used in chord painting. A term in music.

三和弦 (triad) 分为升序 (根音在和弦下方), 降序 (根音在和弦上方) 两种组织方式, 升序方式用于时间 (音乐) 表达, 降序方式用于空间 (绘画) 表达, 两者的数学形式为: 镜像-对称。

The triad is divided into two organizational methods: ascending (the root note is below the chord) and descending (the root note is above the chord), the ascending method is used for temporal (musical) expression, and the descending method is used for spatial (painting) expression, and the mathematical form of the two is: mirror-symmetry.

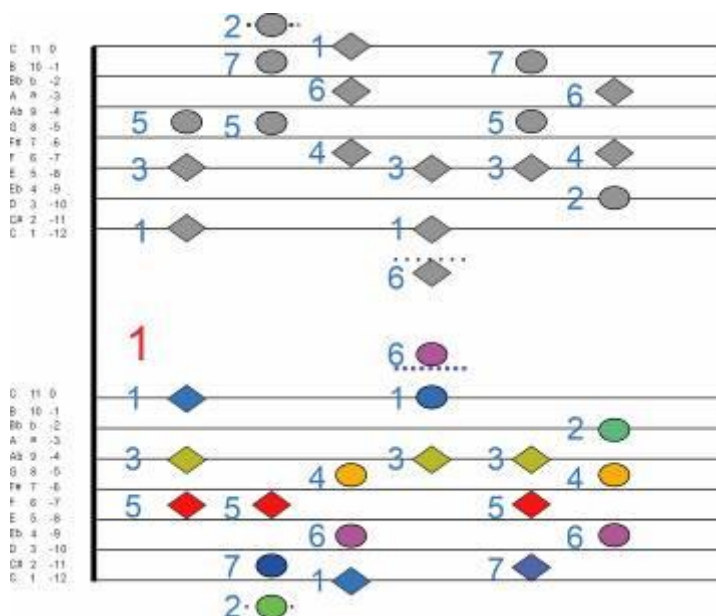


图 2-1: 1、三和弦的镜像对称

Figure 2-1:1, the mirror symmetry of the triad

*和弦取值的计算方法见: 1、和弦数学模型

*For the calculation method of chord value, please refer to: 1. Chord Mathematical Model

本书主要内容为: 和弦绘画 (和弦空间), 后面涉及到的和弦默认为降序。

The main content of this book is: chord painting (chord space), and the following chords are defaulted to descending order.

降序三和弦 (triad) 的离散频率分布由上到下, 仍然采用音乐中的术语, 分别称作: 根色 (Root of chord), 三度 (Third), 纯五度 (Perfect fifth)。

The discrete frequency distribution of the descending triad, from top to bottom, still uses musical terms: Root of chord, Third, and Perfect fifth.

三和弦又可分为大三和弦 (Major triad) 和小三和弦 (Minor triad), 这两种和弦的区别取决于它们的根色与三度 (Third) 的音程, 如根色与三色之间为大三度 (major third), 该和弦为大三和弦, 如根色与三色之间为小三度 (minor third), 该和弦则为小三和弦。上图中的 C 和弦为大三和弦、#F 和弦为小三和弦, 这两种和弦在空间语义上有着重要的区别, 在和弦空间部分有详细的介绍。

Triads can be divided into major triads and minor triads. The difference between these two chords depends on their root color and third interval, such as between root color and third color. It is a major third, and the chord is a major chord. For example, if the root color and third color are minor thirds, the chord is a minor chord. The C chord in the picture above is a major third chord, and the

#F chord is a minor third chord. These two chords have important differences in spatial semantics, and are described in detail in the chord space section.

2-2. Geometric Sequence Chord; 等比数列和弦

等比数列和弦 (Geometric sequence chord) 的离散频率分布为等比数列 (Geometric sequence), 这类和弦在音乐中称作: 不协和弦 (Dissonant chords)。(参见: 1-1、律制; Temperament systems)。

The discrete frequency distribution of Geometric sequence chord is Geometric sequence. This type of chord is called Dissonant chords in music. (See: 1-1, Temperament systems).

常见等比数列和弦 (Geometric sequence chord) 有:

Common Geometric sequence chord are:

1、减七和弦 (Diminished 7th), 由连续小三度数列组成; 七声音阶 (Heptachord) 特征和弦。

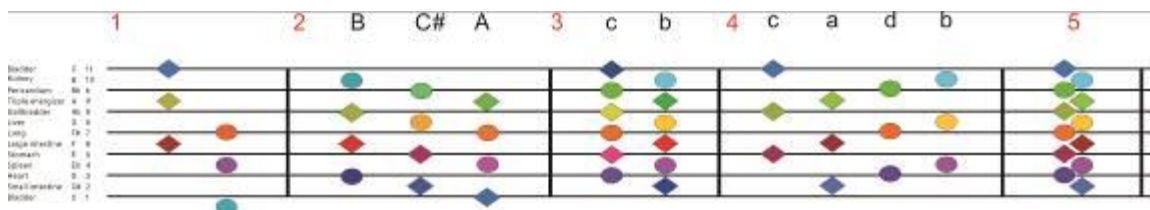
1. Diminished 7th, which consists of a series of consecutive minor thirds; Heptachord characteristic chords.

2、全音阶和弦 (Diatonic chord), 由连续大二度数列组成; 爵士音阶特征和弦。

2. Diatonics, which consists of a series of consecutive major second degrees; six-tone system (Weak Tonal System) characteristic chord

3、增三和弦 (Augmented triad), 由连续大三度数列组成; 它是全音阶和弦的分解形式。

3. Augmented triad, which consists of a series of consecutive major thirds; it is a decomposed form of a diatonic chord.



基本和弦表: 1-1、大三和弦 (闭弦), 1-2、小三和弦 (开弦)、2、减七和弦 (膜弦)、3、全音阶和弦 (膜弦), 4、增三和弦 (膜弦), 5、半音阶和弦 (膜弦)

*和弦频谱公式: $n \cdot f$, $H^n \cdot f$, $H=1.059463$, $n=1,2,3 \dots n$

*符号: ◆=+音符, ●=-音符, 音符色=色荷

Basic chord table: 1-1, major triad (closed string), 1-2, minor triad (open string), 2, diminished 7th (membrane string), 3, diatonic chord (membrane string), 4, augmented Triads (membrane

strings), 5. Chromatic Chord (membrane string)

* Chord spectrum formula: $n \cdot f$, $H^n \cdot f$, $H = 1.059463$, $n = 1, 2, 3 \dots n$

* Symbol: $\blacklozenge = +$ note, $\bullet = -$ note, note color = color charge

*和弦取值的计算方法见: 1、和弦数学模型

*For the calculation method of chord value, please refer to: 1. Chord Mathematical Model

等比数列和弦 (Geometric sequence chord) 的递增, 递减形式相同, 两者没有差别。

Increase and Decrease of Geometric sequence chord are the same, and there is no difference between the two.

等比数列和弦 (Geometric sequence chord) 用于区别七声音阶 (Heptachord), 爵士音阶, 无调性体系 (Atonal system), 它是音阶系统的特征和弦, 和弦语言的灵魂。

Geometric sequence chord is used to distinguish the Heptachord, Weak Tonal System, tonality, atonal, and the layer of space and life. It is the characteristic chord and chord language of the scale system. soul.

2-3. Coincident Chord;重合和弦

重合和弦由同调中的不同和弦重合构成, 最常见形式是: 三和弦+等比数列和弦 (Geometric sequence chord); 三和弦的某些音符常被替换, 这类和弦在音乐中被称为: 附加音和弦 (Added-Tone Chord), 挂留和弦 (suspended chord), 7 和弦 (seventh chord), 9 和弦 (ninth chord) 等。

Coincident chord are composed of different chords in the same tune. The most common form is: triad + Geometric sequence chord ; certain notes of triads are often replaced, this type of chord is called in music : Added-Tone Chord, suspended chord, seventh chord, ninth chord, etc.

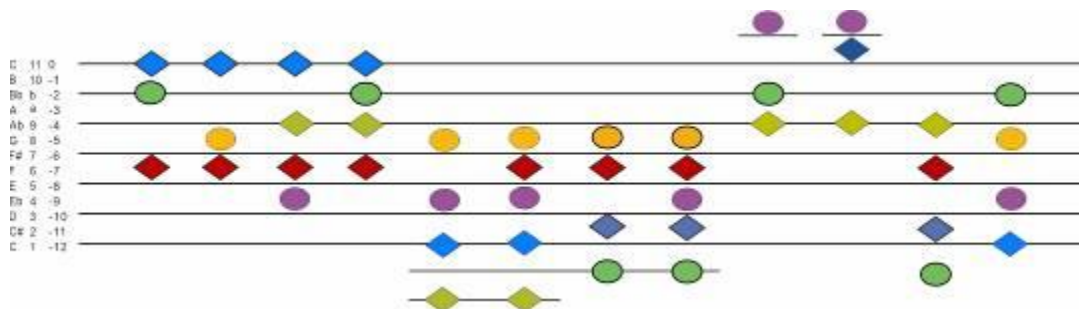


图 2-3、常见重合和弦: Csus2, Csus4, C6, Cadd9, G7, G9, F7, F9, bEmsus4, bEmsus2, bAm7, bBm7

Figure 2-3. Common Coincident chord: Csus2, Csus4, C6, Cadd9, G7, G9, F7, F9, bEmsus4, bEmsus2, bAm7, bBm7

重合和弦既不是三和弦，也不是等比数列和弦，它的和弦空间语义不确定，但能够兼容两种和弦语义，在和弦空间基础章节有专门介绍。

Coincident chord are neither triads nor Geometric sequence chords. Its chord space semantics are uncertain, but it can be compatible with two chord semantics. There is a special introduction in the chapter on chord space basics.

重合和弦涉及同调内的和弦叠加，变化形式非常多，实际上无法全部命名，我们只能理解它的构成原理与语义特征。

Coincident chords involve superposition of chords within the same key. There are so many variations that we can't actually name them all. We can only understand its composition principle and semantic features.

在本书后面的内容中还会大量涉及重合和弦。

There will be a lot of superposition chords (S-chord) involved in the rest of this book.

2-4.The \pm Note Rule In Chord;和弦中的 \pm 音符规则

和弦语言中的音符（频率）具有 \pm 属性，它是重要的和弦编码元素，在和弦的语法、语句构成中有着重要作用。

The note (frequency) in the chord language has the \pm attribute. It is an important chord coding element and plays an important role in the grammar and sentence structure of the chord.

本节对 \pm 音符的语法作用做一般介绍、更多细节放在后面相关部分。

This section gives a general introduction to the grammatical function of the \pm note, and more details are placed in the relevant part later.

2-4.1. \pm Note Distribution In Triads;三和弦中的 \pm 音符分布

分别以 12 个色做根色（Root color），构成 24 个三和弦，12 个大三和弦，12 个小三和弦，包含了所有三和弦的 \pm 音符分布形式。（菱形= $+$ 音符，圆形= $-$ 音符）

Use 12 colors as the root color, respectively, to form 24 triads, 12 major triads, and 12 minor triads, including the \pm note distribution of all triads. (Diamond= $+$ note, circle= $-$ note)

Mixed triad, such as: $+\pm\pm$ major triads; $-\pm\pm$ minor triads.

弱三和弦 (Weak triad), 如: $+\pm\pm$ 小三和弦, $-\pm\pm$ 大三和弦。

Weak triad, such as: $+\pm\pm$ minor triad, $-\pm\pm$ major triad.

三种三和弦的使用规则是:

The rules for using the three triads are:

纯三和弦+膜和弦生成纯大调与纯小调, 分别充当背景空间-图形空间的主调。

The pure triad+Membrane chords generates pure major and pure minor, respectively serving as the first key of the background space-figure space.

混合三和弦+膜和弦生成混合大调-小调, 分别充当背景空间-图形空间的副调。

The mixed triad+Membrane chords generates a mixed major-minor key, which respectively serve as the Secondary-key of the background space and the figure space.

弱三和弦只能用于属和弦, 下属和弦系。

Weak triads can only be used for dominant chords and subordinate chords.

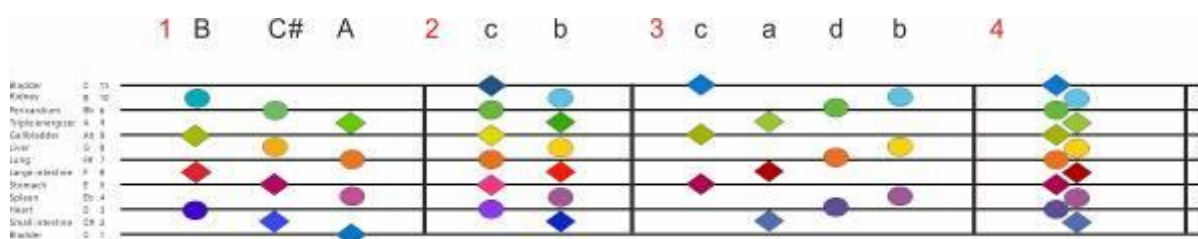
在本书后面将做专门介绍。

A special introduction will be made later in this book.

2-4.2. \pm Note Distribution In Geometric sequence chord; 等比数列和弦中的 \pm 音符分布

下图是等比数列和弦表, 请注意各和弦中的 \pm 音符比例。

The figure below is a Geometric sequence chord table, please pay attention to the proportion of \pm notes in each chord.



等比数列 0 和弦表: 1、减七和弦 (膜弦)、2、全音阶和弦 (膜弦), 3、增三和弦 (膜弦), 4、半音阶和弦 (膜弦)

*◆=正音符, ●=负音符, 色彩=色荷

Geometric sequence chord table: 1, diminished 7th chord (membrane chord), 2, diatonic chord

(membrane chord), 3, augmented Triads (membrane chord), 4, chromatic chord (membrane chord)

* ◆=positive note, ●=negative note, color=color charge

Basic chord table: 1-1, major triad (closed string), 1-2, minor triad (open string), 2, diminished seventh chord (membrane string), 3, diatonic chord (membrane string), 4, augmented Triads (membrane strings), 5. Chromatic Chord (membrane string)

* ◆=positive note, ●=negative note, color=color charge

Figure 2-2.Geometric sequence chord table:1, Diminished 7th, 2, Diatonic chord, 3, Augmented triad, (◆=positive note, ●=negative note)

等比数列和弦中，±音符的分布有两种形式：对称形式与非对称形式。

In aGeometric sequence chord, the distribution of ± notes has two forms: symmetrical and asymmetrical.

对称形式：等比数列和弦（Geometric sequence chords）中，±音符相等，称：±对称等比数列和弦（symmetry Geometric sequence chords）。

Symmetrical form: In Geometric sequence chords, ± notes are equal, called: symmetry Geometric sequence chords.

非对称形式：膜和弦中只有正音符或负音符，称为：非对称等比数列和弦（asymmetric Geometric sequence chords），如：增三和弦（Augmented triads）。（见图 2-3.3: 3）。

Asymmetrical form: There are only positive or negative notes in the Membrane chords, called: asymmetric Geometric sequence chords,such as: Augmented triads. (See Figure 2-2: 3).

参考; Reference

本书常用和弦标记

C, Major triad; 大三和弦

Cm, Minor triad; 小三和弦

Cdim, Diminished triad; 减三和弦

Caug, Augmented Triads; 增三和弦

Cdim7, Diminished Seventh; 减七和弦

C-diatonic, Diatonic chord; 全音阶和弦

Chromatic, Chromatic chord; 半音阶

Cmaj7, Major Seventh; 大七和弦

Cm7, Minor Seventh; 小七和弦

Cmaj9, Major Ninth Chord; 大九和弦

Cm9, Minor Ninth Chord; 小九和弦

Csus2, Suspended; 挂留和弦

Csus4, Suspended; 挂留和弦

Bibliography; 参考书目

Basic Theory Of Music; 音乐基础理论

Harmony; 和声学

Chord Painting; 和弦绘画

3. Chord And Strings;和弦与弦

和弦语言含时-空语义逻辑, 其中的空间表达及数学模型称为: “和弦空间”; 和弦绘画是和弦空间的主要观察基础与应用领域, 也是本书的主要内容。

The chord language contains space-time semantic logic, and its spatial expression and mathematical model are called "chord space"; chord painting is the main observational basis and application field of chord space, and it is also the main content of this book.

音乐中的基本频率单位是“音符”, 由于和弦语言涉及色彩频率, 这里需要扩充定义: 音符=频符 (Frequency note), 音符包含色彩频率, 也可称: 色荷。

The basic frequency unit in music is "note". Since the chord language involves color frequency, the definition needs to be expanded here: Note = Frequency note, note contains color frequency, also known as: color charge.

本文涉及到两个术语: “和弦”与“弦”, 和弦是三个以上离散频率构成的和弦编码, “弦”是和弦编码包含的空间语义 (线, 膜等); 和弦是编码形式 (和弦频谱), 弦是和弦的几何语义 (开、闭、膜弦), 两者是一个硬币的两面。

This paper involves two terms: "chord" and "string". Chord is a chord code composed of more than three discrete frequencies, and "string" is the spatial semantics (line, membrane, etc.) contained in chord code. Chords are coded forms (chord spectrum), strings are geometric semantics of chords (open, closed, brane strings), and they are two sides of the same coin.

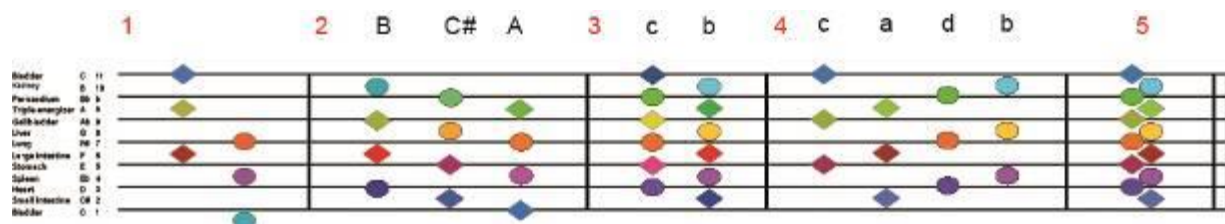
和弦空间与弦理论在空间表达上具有相似性, 但和弦空间来自和弦绘画观察, 以视觉实验为主要方法。

Chord space is similar to string theory in terms of spatial expression, but chord space comes from the observation of chord paintings, with visual experiments as the main method.

3-1.Space Semantics Of Chord;和弦的空间语义

和弦以和弦频谱作为编码形式, 三个以上的离散频率组成和弦, 不同的和弦编码包含不同的几何语义。

The chord uses the chord spectrum as the coding form, and three or more discrete frequencies form a chord. Different chord codes contain different geometric semantics.



基本和弦表: 1-1、大三和弦 (闭弦), 1-2、小三和弦 (开弦)、2、减七和弦 (膜弦)、3、全音阶和弦 (膜弦), 4、增三和弦 (膜弦), 5、半音阶和弦 (膜弦)

*和弦频谱公式: $n*f$, H^n*f , $H=1.059463$, $n=1,2,3,\dots,n$

*符号: \blacklozenge = + 音符, \bullet = - 音符, 音符色 = 色荷

Basic chord table: 1-1, major triad (closed string), 1-2, minor triad (open string), 2, diminished 7th (membrane string), 3, diatonic chord (membrane string), 4, augmented Triads (membrane strings), 5. Chromatic Chord (membrane string)

* Chord spectrum formula: $n*f$, H^n*f , $H=1.059463$, $n=1,2,3,\dots,n$

* Symbol: \blacklozenge = + note, \bullet = - note, note color = color charge

基本和弦表中的和弦按照几何语义可分为: 1、线和弦与膜和弦; 2、开和弦与闭和弦。

The chords in the basic chord table can be divided into: 1. line chords and membrane chords; 2. open chords and closed chords.

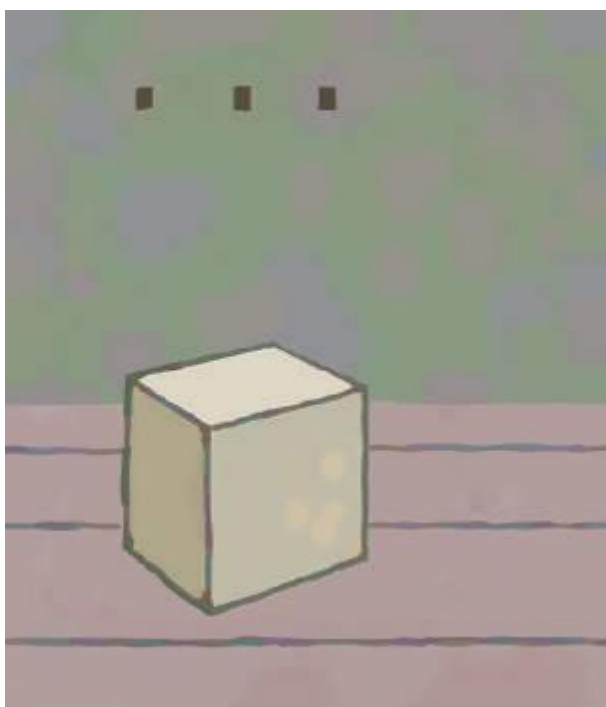


图: 3.2: 和弦空间语义图例, 开和弦, 闭和弦, 膜和弦, 点空间 (线图)

Figure: 3.2: Semantic legend of chord space, open chord, closed chord, membrane chord, point space

说明: 上面几何图形中的线有几种作用: 1、用于构成图形边界 (轮廓线), 产生图形-背景关系; 2、用于分面, 如: 分面线 (绘画中称为: 明暗交界线), 4、点空间。

The line in the above geometric figure has several functions: 1. It is used to form the figure boundary (contour line) and produce the figure-ground relationship; 2, used for faceted, such as: intersection line (painting called: light and dark intersection line), 4, point space.



图: 3.2: 和弦空间语义图例, 开和弦, 闭和弦, 膜和弦, 点空间 (详细图例)

Figure: 3.2: Semantic legend of chord space, open chord, closed chord, membrane chord, point space (detailed legend)

上图中出现的和弦及空间语义:

The chords and spatial semantics that appear in the picture above:

闭和弦具有闭合 (完形) 倾向, 用于构成图形空间的轮廓线, 产生图-底关系 (Figure-ground relation)。

Closed chords have a tendency to close (Gestalt) and are used to form the contours of the figure space, resulting in a figure-ground relation.

2、开和弦没有闭合 (完形) 倾向, 用于非轮廓弦, 如: 分面线, 独立线等。

2. Open chords have no tendency to close (gestalt), and are used for non-contour string, such as: Facet lines, independent lines, etc.

3、点空间：点空间包括端点，角点，独立点空间，用线和弦中的音符表达，它是线和弦的特殊形式。

3. Point space: Point space includes end points, corner points, and independent point space, expressed by the notes in the line chord, which is a special form of the line chord.

4、膜和弦充满所有非线（点）空间。

4. Membrane chords fill all non-linear (point) spaces.

3-2.Line And Membrane Chords; 线和弦与膜和弦

和弦按空间语义分为两类：线和弦与膜和弦，分别表达两种空间状态“线”与“非线膜”；非线膜没有边限定，无法用“维”进行描述，它是和弦空间特有的空间状态。

Chord are divided into two categories according to spatial semantics: line chords and membrane chords, which express two spatial states "line" and "non-line membrane" respectively; non-line membrane has no boundary limit and cannot be described by "dimensions", it is a chord space unique spatial state.

三和弦（大三和弦，小三和弦）的空间语义是“线”，表达“线空间”，称作：线和弦。见图 3-1。

The spatial semantics of triads (major triads, minor triads) is "line", which expresses "line space" and is called: line chord,. See Figure 3-1.

等比数列和弦（减七和弦、全音阶和弦，增三和弦）的空间语义为：非线膜，称作“膜和弦”。

The spatial semantics of Geometric sequence chords (diminished 7th, diatonic chords, augmented triads,) are: non-linear membrane, called "membrane chord".

见图 3-1、和弦空间图例：膜和弦充满所有非线空间，线和弦（轮廓线、分面线）之外的空间都由膜和弦占据。

See Figure 3-1, chord space legend: membrane chords fill all non-linear spaces, and the space outside of linear chords (contours, Facet lines) is occupied by membrane chords.

非线膜和弦只有在被线和弦限定边界后，才能形成二维，三维空间；膜和弦与线和弦相互依赖，孤立的线和弦与膜和弦都处于不稳定状态。

The Membrane chords can form a two-dimensional and three-dimensional space only after it is defined by the line chords; the Membrane chords and the line chords are interdependent, and the isolated L and Membrane chords are in an unstable state.

和弦空间由线和弦+膜和弦构成: 线和弦定义膜和弦, 产生轮廓线与分面线, 形成二维面与三维体积, 和弦空间是线和弦定义膜和弦的结果, 未经定义的膜和弦处于任意维度。

The chord space is composed of line chords + membrane chords: line chords define membrane chords, generate contour lines and Facet lines, and form two-dimensional surfaces and three-dimensional volumes. Chord space is the result of line chords defining membrane chords, undefined membrane chords are in arbitrary dimensions.

3-3.Closed And Open Chords;闭和弦与开和弦

线和弦分为两种: 大三和弦与小三和弦, 其空间语义分别为: 闭和弦(闭弦)与开和弦(开弦), (见图 3.1)。

line chords are divided into two types: major triads and minor triads. Their space semantics are: closed chords (closed strings) and open chords (opened strings), (see Figure 3.1).

大三和弦具有闭合性(完形性), 都是闭和弦(闭弦), 用于构成图形与背景交界处的轮廓线, 产生图-底关系(Figure-ground relation)。

Major triads are closed (Gestalt), and they are all closed chords (closed string), which are used to form the contour line at the junction of the figure and the background, resulting in a figure-ground relation.

小三和弦没有闭合性(完形性), 都是开和弦(开弦), 表达“分面线”, 产生分面关系。

Minor triads do not have closure (gestalt), are open chords (open strings), express the "Facet lines", resulting in a faceted relationship.

两者的基本区别是: 闭和弦(闭弦)表达轮廓线, 开和弦(开弦)表达分面线。

The basic difference between the two is: closed chords (closed string) express contour lines, and open chords (open string) express Facet lines.

开和弦(开弦)与闭和弦(闭弦)的区别在和弦的三度(大三度与小三度), 如果省略和弦三度, 两者的区别便消失, 产生不确定的线空间。

The difference between an open chord (open string) and a closed chord (closed string) is in the

third of the chord (major and minor third), and if the chord third is omitted, the difference between the two disappears, creating an uncertain line space.

3-4. Point Space;点空间

所有音符都可以知觉为点空间，但是有图形意义的点空间是三和弦（线和弦）的省略、收缩形式。

All notes can be perceived as point spaces, but the figure meaningful point spaces are the omitted, contracted forms of triads (line chords).

将三和弦省略，只剩下一色，三和弦的线空间（1 维）便会收缩为“点空间”（0 维），点空间是线和弦的省略引起线空间收缩的结果。见图 3.2，图 3.3

Omit the triad, and only one color is left. The line space (1 dimension) of the triad will shrink to "point space" (0 dimension). The point space is the result of line space contraction caused by the omission of line chords. See Figure 3.2, Figure 3.3

在图 3.2 中、墙上的挂钩为点状空间，使用小三和弦（开弦）的根色；正方体的分面线为小三和弦，根色出现在各个转角的点上。

In Figure 3.2, the hook on the wall is a point-like space, the root color of the minor triad (open chord) is used; the Facet lines of the cube is the minor triad, and the root color appears on the points of each corner.

3-5、Coincident Chords;重合和弦

上节介绍了重合和弦的构成形式，这里只补充补充一点：重合和弦是一种特殊的膜和弦，用于表达某些特殊的和弦语义，由于涉及不同音阶系统，放在后面相关章节专门介绍。

The previous section introduced the formation of coincident chords, and here is only a supplement: coincident chords are a special membrane chord used to express some special chord semantics. Since they involve different scale systems, they will be introduced in the relevant chapters later.



图 3-5、系统的背景上使用了重合和弦。

Figure 3-5. Coincident chords are used on the background of the system.

3-6. \pm Note And Chord space; \pm 音符与和弦空间

\pm 音符的和弦空间意义主要有以下两点:

The geometric meaning of the chord of \pm note mainly has the following two points:

1、开弦，闭弦规则:

1. Rules for opening and closing strings:

正和弦生成大三和弦，闭弦。

A sine chord generates a major triad, closed chord.

负和弦生成小三和弦，开弦。

Negative chords generate minor triads, open chords.

(注：上面规则只用于主和弦，不适用属和弦，下属和弦)

(Note: The above rules only apply to tonics, do not apply to dominant chords, subordinate chords)

2、图-底关系规则:

2. Figure-ground relation rules:

图-底关系 (figure-ground relation) 与 \pm 音符有关; 在视觉经验上表现为: 正音符倾向于背景 (远), 负音符倾向于图形 (近)。

The figure-ground relation is related to \pm notes; in visual experience, positive notes tend to be background (far), and negative notes tend to be figure (near).

3-7、Time Chord;时间和弦

时间和弦与空间和弦互为反和弦，两者在数学形式上表现为：镜像对称——这表明两者相互依存，联系。（参见：1-5. Mirror-Symmetry; 镜像-对称）

Time chord and space chord are opposite to each other. The two are shown in mathematical form: mirror symmetry-which shows that the two are interdependent and connected. (Refer to: 1-5. Mirror-Symmetry)

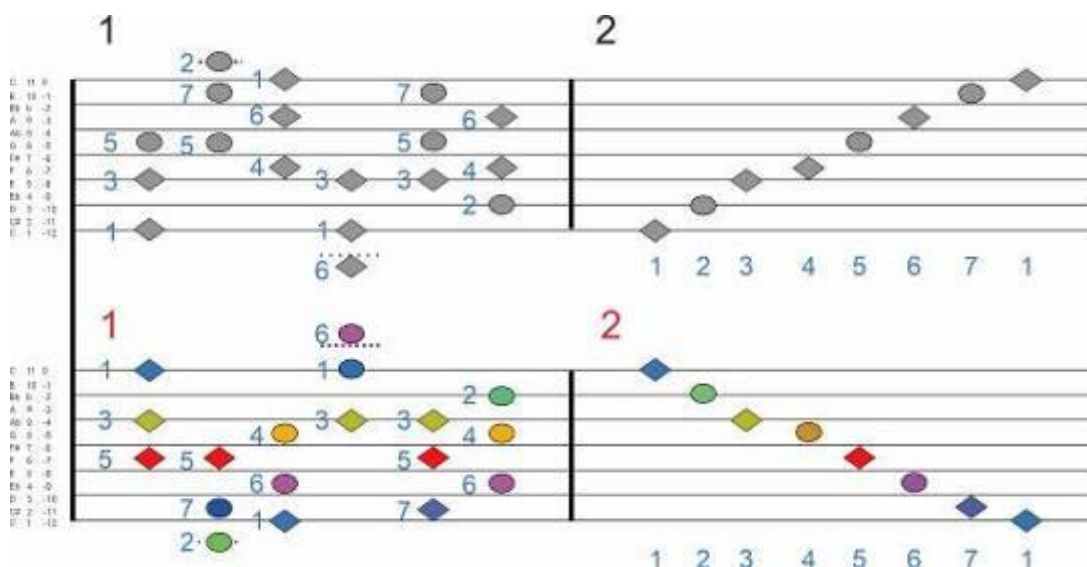


图 1-6.2、平均律镜像坐标，七声音阶（Heptachord），C 大调的三和弦与音阶

Figure 1-6.2, the equal temperament mirror coordinates, Heptachord, C major triad and scale and chord time use frequency and amplitude energy changes to produce time expression.

Chord time is expressed in terms of time generated by energy changes such as frequency and amplitude.

和弦时间包的基本单元是“时段”，主和弦构成时段边界，等比数列和弦填充主和弦之外的时间。

The basic unit of the chord time Packet is the "period", the tonic forms the boundary of the period, and the Geometric sequence chord fills the time outside the tonic.

时间与空间的边界都需要由三和弦定义，没有三和弦定义的和弦没有确定的时-空状态。

The boundaries of time and space need to be defined by triads, and membrane chords without

triads have no definite space-time state.

时间和弦不含空间语义，没有空间状态，可以处于任意空间位置的叠加态（非定域性）；反之，空间和弦不含时间语义，没有时间状态，只能表达静止的空间（定域性）；定域性与非定域性产生了“时空二相性”（波粒二相性）。

Time chord does not contain spatial semantics, no space state, can be in any space position superposition state (non-locality); On the contrary, spatial chord has no time meaning, no time state, can only express the static space (locality); Locality and non-locality produce "space-time duality" (wave-particle duality).

4. Chord Packet; 和弦包

在和弦时空中, 孤立的三和弦与等比数列和弦都处于不稳定状态, 必须通过三和弦+等比数列和弦的形式产生和弦包, 在和弦包中达成稳定状态。

In the chord space-time, isolated triads and Geometric sequence chords are in an unstable state, and a chord packet must be generated in the form of triad + Geometric sequence chord to achieve a stable state in the chord packet.

和弦包分为: 和弦时间包与和弦空间包, 两者中的三和弦互为反和弦 (镜像-对称), 分别表达和弦时间与和弦空间。(参见: 1-5.镜像-对称)

The chord packet is divided into: chord time packet and chord space packet. The triads in the two are anti-chords (mirror-symmetrical), respectively expressing chord time and chord space. (See: 1-5. Mirror - Symmetry)

在一个和弦包中, 三和弦用于构成时段边界与空间边界, 等比数列和弦充满边界之外的时空。

In a chord packet, triads are used to form time-bound and space-boundary, and Geometric sequence chords fill space-time beyond the boundary.

在音乐理论中, 和弦包又称为: 调, 包括各种大调, 小调, 及七声音阶, 爵士音阶等, 在后面章节将有专门的介绍。

In music theory, the chord packet is also known as: key, including various major keys, minor keys, and heptachord scales, jazz scales, etc., which will be specially introduced in later chapters.

4-1.Chord Space Packet; 和弦空间包

一个和弦空间包必须包含两种和弦: 线和弦 (三和弦) 与等比数列和弦 (膜和弦), 和弦空间包=线和弦+导音膜和弦, 线和弦构成轮廓线、分面线, 产生空间定义 (图-底关系等), 膜和弦充满所有非线性空间, 类似“以太”, 和弦空间包是和弦空间的基本单元。

A chord space packet must contain two kinds of chords: line chords (triads) and Geometric sequence chords (membrane chords), chord space packet = line chords + membrane chords, line chords form contour lines, Facet lines, and produce space definitions (Figure-ground relationship, etc.), membrane chords fill all non-linear spaces, similar to "ether", chord space packet is the basic unit of chord space.

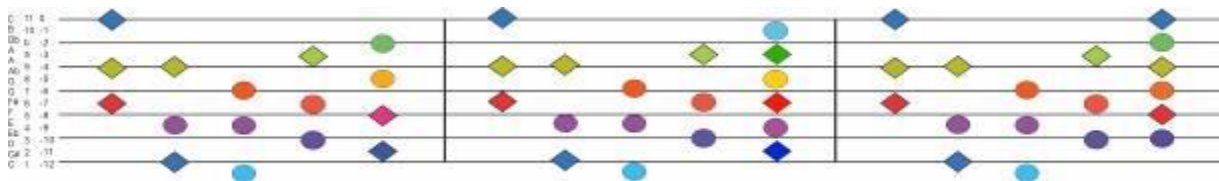


图 4.1、1、七声音阶和弦空间包；2-3、爵士音阶和弦空间包

Figure 4.1, 1. Heptachord scale chord space packet; 2-3. Jazz scale chord space packet

三和弦的空间语义是：线（开弦，闭弦），等比数列和弦（Geometric sequence chord）的空间语义是：非线膜，线和弦对膜和弦作边界定义（轮廓线，分面线），产生和弦空间包。

The spatial semantics of triads are: lines (open string, closed string), and the spatial semantics of Geometric sequence chords are: non-linear membranes, line chords define boundaries (contours, Facet lines) to membrane chords, resulting in Chord Space Packet.

一个完整的和弦空间包只含一个膜和弦，但通常需要两个线和弦：大三和弦（闭弦）与小三和弦（开弦），分别构成轮廓线与分面（分形）线。

A complete chord space packet contains only one membrane chord, but usually requires two line chords: a major triad (closed string) and a minor triad (open string), which form the contour line and the facet (fractal) line respectively.



图 4.2、七声音阶 C 大调-升 f 小调, 大三和弦生成图形轮廓线, 小三和弦生成分面线, 减七和弦填充所有 M 维空间。

Figure 4.2. heptachord C major f-sharp, major triads generate figure contour lines, minor triads generate Facet lines lines, and diminished 7th fill all M-dimensional spaces.

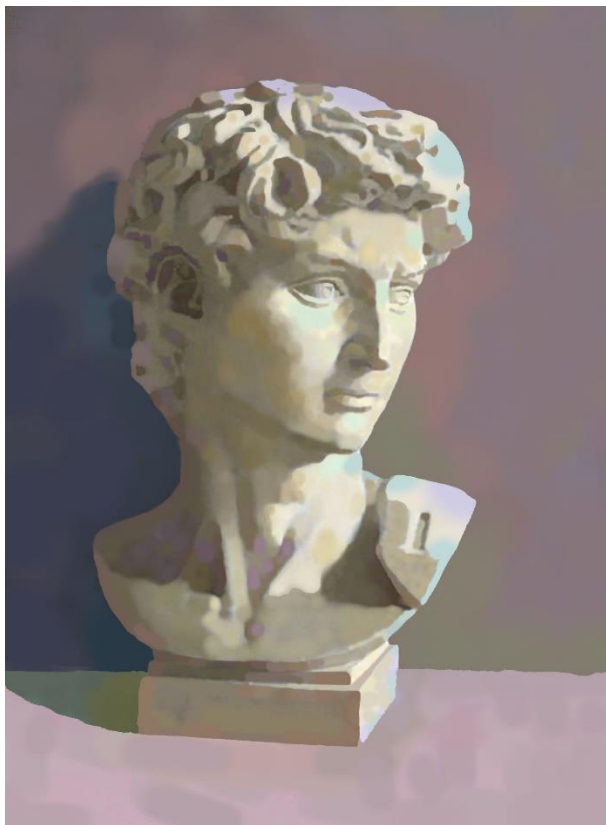


图 4.3、爵士音阶, 升 f 小调, 大三和弦生成图形轮廓线, 小三和弦生成分面线, 全音阶和弦填充所有非线空间。

Figure 4.3. Jazz scale f-sharp minor, major triads generate figure outlines, minor triads generate Facet lines line, and diatonic chords fill all non-linear spaces.

4-1. 2. Figure-Ground Relation;图-底关系

图-底关系 (figure-ground relation) 是空间知觉的基本模式, “背景空间” 与 “图形空间” 是产生空间知觉的必要条件; 两种空间都与音符-和弦的正-负属性相关, 正音符-和弦具有背景 (远) 倾向, 负音符-和弦具有图形 (近) 倾向, 图-底关系与 “景深” 相关。

The figure-ground relation is the basic mode of spatial perception, and "background space" and "figure space" are necessary conditions for spatial perception; both spaces are related to the positive-negative properties of note-chords, and the positive Note-chords have background (far)

tendencies, negative note-chords have figure (near) tendencies, and the figure-ground relationship is related to "depth of field".



图 4-2、七声音阶，升 f 小调-C 大调图-底关系

Figure 4-2. Heptachord scale f-sharp minor,C major figure-ground relationship

图-底关系包括：线和弦图-底关系与膜和弦图-底关系。

Figure-ground relationship includes: line chords figure-ground relationship and Membrane chords figure-ground relationship.

线和弦图-底关系、图-底关系与三和弦相关，表现为：纯小调的图形（近）倾向，纯大调的背景（远）倾向，（参见：2-4、和弦中的±音符规则）。

The line chords figure-ground relationship and figufe-ground relationship are related to triads, manifested as: figure (near) tendencies in pure minor, background (far) tendencies in pure majors, (see: 2-4, ± notes in chords rule).

膜和弦图-底关系：膜和弦中的负音符具有图形（近）倾向，正音符具有背景（远）倾向。

Membrane chords figure-ground relationship: Negative notes in an Membrane chords have a figrue (near) tendency, and positive notes have a background (far) tendency.

下面例图中包含两种图-底关系。

The following example diagram contains two figure-ground relationships.

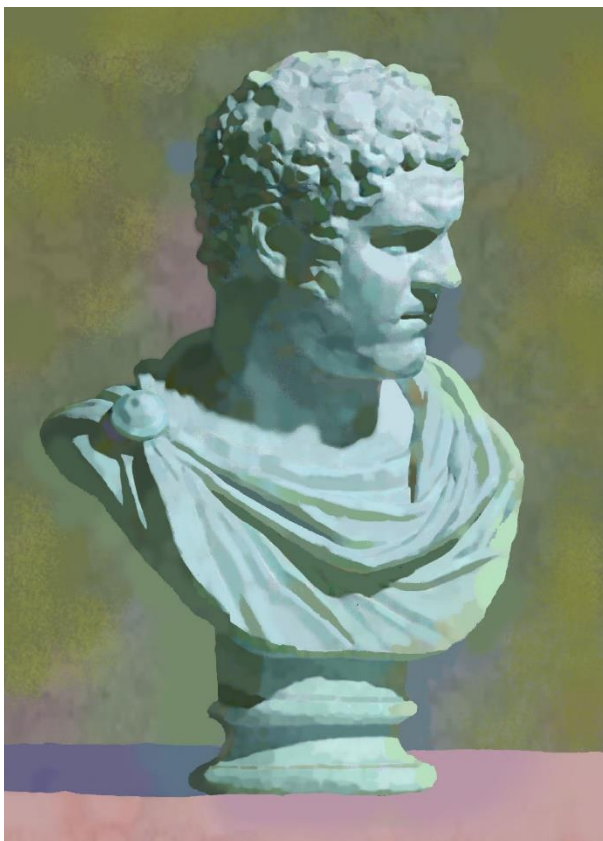


图 4-2.2、七声音阶 E 大调，降 b 小调

Figure 4-2.2, Heptachord scale E major, b-flat minor

4-2. Chord Time Packet; 和弦时间包

和弦时间包与和弦空间包的区别在于其中的三和弦，两者互为反和弦（镜像-对称）。（参见：1-5.Mirror-Symmetry; 镜像-对称）

The difference between the chord time packet and the chord space packet is the triads in them, which are antichords (mirror-symmetrical) of each other. (See: 1-5.Mirror-Symmetry)

和弦时间的进行由音符-和弦及强度（振幅）的变化产生，和弦时间的基本单位是时间包。

The progression of chord time is produced by changes in note-chord and intensity (amplitude), and the basic unit of chord time is the time packet.

和弦时间包构成“时段”，主和弦构成时段边界（开始与结束），等比数列和弦充满边界之外的时间。

The chord time packets make up the "periods", the tonic chords form the period boundaries (start and end), and the Geometric sequence chords fill the time outside the boundaries.

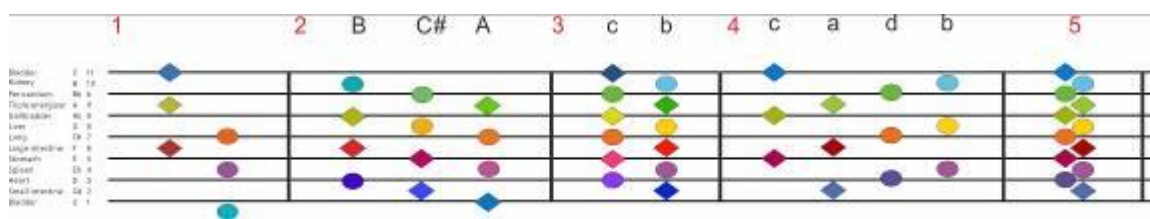
人类对时间的观察比对空间的观察少很多，和弦时间（音乐）是一个还需要更多关注的部分。

Humans observe a lot less of time than space, and chord time (music) is an area that needs more attention.

4-3.Scale System; 音阶系统

和弦语言中有四种基本的等比数列和弦：减七和弦，全音阶和弦，增三和弦，全音阶和弦，等比数列和弦是不同音阶系统的特征和弦。

There are four basic geometric progression chords in the chord language: diminished seventh chords, diatonic chords, augmented triads, and diatonic chords. Geometric progression chords are the characteristic chords of different scale systems.



基本和弦表：1-1、大三和弦（闭弦），1-2、小三和弦（开弦）、2、减七和弦（膜弦）、3、全音

阶和弦（膜弦），4、增三和弦（膜弦），5、半音阶和弦（膜弦）

*和弦频谱公式: $n*f$, H^n*f , $H=1.059463$, $n=1,2,3\cdots n$

*符号: ◆=+音符, ●=-音符, 音符色=色荷

Basic chord table: 1-1, major triad (closed string), 1-2, minor triad (open string), 2, diminished 7th (membrane string), 3, diatonic chord (membrane string), 4, augmented Triads (membrane strings), 5. Chromatic Chord (membrane string)

* Chord spectrum formula: $n*f$, H^n*f , $H=1.059463$, $n=1,2,3\cdots n$

* Symbol: ◆=+ note, ●=- note, note color = color charge

减七和弦向三和弦解决, 产生七声音阶; 全音阶和弦与增三和弦向三和弦解决, 产生爵士音阶, 半音阶和弦向无彩色（噪音）解决, 产生无调性系统。三种音阶系统有着重要的和弦语义差别, 也是后面章节的主要内容。

Diminished seventh chords resolve to triads, producing the heptachord scale; diatonic chords and augmented triads resolve to triads, producing jazz scales, and chromatic chords resolve to achromatic (noise), producing an atonal system. The three scale systems have important differences in chord semantics, which are also the main content of the following chapters.

Reference, Prompt;参考、提示

*本书的 1-4 章是和弦语言的基础部分, 请在完全熟悉之后再进入后面的内容。

*Tip: Chapters 1-4 of this book are the basic part of the chord language. Please enter the following content after you are fully familiar with it.

Bibliography; 参考书目

Basic Theory Of Music; 音乐基础理论

Harmony; 和声学

Chord Painting; 和弦绘画

General Physics; 普通物理学

5. Heptachord; 七声音阶

和弦语言包含三种和弦包: 七声音阶 (Heptachord), 爵士音阶, 无调性体系, 七声音阶是其中的主系统, 也是典型的调性体系。

The chord language contains three chord packet: Heptachord, jazz scale, and Atonal system, of which the heptatonic scale is the main system and a typical tonal system.

减七和弦 (Diminished 7th) 是七声音阶 (Heptachord) 的特征膜和弦, 它是产生七声音阶系统的必须条件。

Gestalt: gestalt is related to closed string, Diminished 7th, space packet interaction is related to gestalt, the higher the gestalt, the greater the binding force (gravity), which can produce cosmic order, such as: galaxies, stars, etc. See also: 8.Gestalt; Gestalt, 13.Multi-Layer Key Group; Multilayer tone group.

七声音阶 (Heptachord) 和弦包的基本语句形式是: 三和弦 (主和弦) + 导音减七和弦 (Leading note diminished 7th), 在音乐中被称为: 和声小音阶与和声大音阶。

The basic sentence form of the Heptachord is: triad (main chord) + leading note diminished 7th to form a heptachord chord packet, which is called in music: harmonic minor scale and Harmonic major scale.

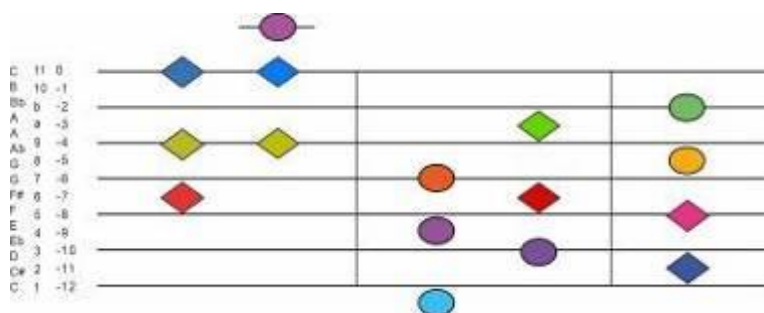


图 5.1、七声音阶基本型 (和声大-小音阶), 1、C 大三和弦、2、降 e 小三和弦, 3、升 f 小三和弦, 4、A 大三和弦, 5、导音减七和弦 (Leading note diminished 7th)。

Figure 5.1. Basic type of heptachord (harmonic major-minor scale), 1, C major triad, 2, e flat-minor triad, 3, f-sharp minor triad, 4, A major triad, 5, Leading note diminished 7th.

图 6.1 中, 1、2、3、4 是主和弦 (线和弦), 用于定义减七和弦 (膜弦)。

In the figure, 1, 2, 3, 4 are the tonics (line chords), used to define the Diminished 7th (membrane chords).

减七和弦中的四个色分别充当导音, 可产生四个调, 称为: 同导音减七和弦调群 (same leading note diminished 7th keys group), 四个调具有相同的完型性。(参见: 8、完型性)

Each of the four colors in the diminished 7th chord acts as a leading note, resulting in four tones, known as the same leading note diminished 7th keys group, all of which have the same gestalt. (See: 8, Gestalt)

只有纯大调 (主和弦为纯大三和弦), 纯小调 (主和弦为纯小三和弦) 才能充当七声音阶系统的主调。参见: 2-4、和弦中的 \pm 音符规则。

Only pure major (the tonic is a pure major triad) and pure minor (the tonic is a pure minor triad) can act as the tonic of the heptachord system. See: 2-4, \pm note rule in chords.

七声音阶服从和弦中的 \pm 音符规则。参见: 2-4、和弦中的 \pm 音符规则。

The heptachord obeys the \pm note rule of the chord, see: 2-4, The \pm Note Rule In Chord.

5-1. Figure-Ground Relation 图-底关系

图-底关系由图形与背景构成, 是空间知觉的基本元素。

The figure-ground relation is composed of figure and background, which is the basic element of spatial perception.

图-底关系 (figure-ground relation) 包括两种类型: 绝对图-底关系与相对图-底关系; 前者的图形与背景均具有确定性, 绝对性; 后者的图形与背景具有相对性。

There are two types of figure-ground relation: absolute figure-ground relation and relative figure-ground relation. In the former, both the figure and the ground are definite and absolute; in the latter, the figure and the ground are relative.

下面例图中, 石膏模型是绝对图形, 墙面是绝对背景, 两者构成绝对图-底关系。

In the example picture below, the plaster model is the absolute figure and the wall is the absolute background, and the two form an absolute figure-ground relationship.



图 5-1.绝对图-底关系

Figure 5-1. Absolute Figure – Ground Relationship

下面例图中，部分图形与背景具有相对性，为相对图-底关系。

In the following example figure, some figures and background are relative, which is a relative figure-ground relationship.

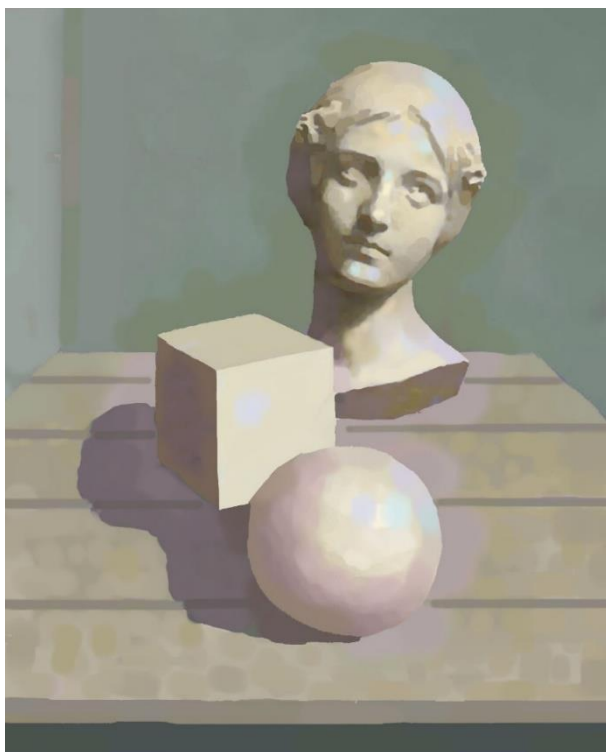


图 5-1.2.相对图-底关系

Figure 5-1.2. Relative figure-ground relationship

5-1. 1. Augmented Fourth Major-Minor;增四度大-小调

七声音阶中的绝对图-底关系（figure-ground relation）由纯大调与纯小调构成，两调的主音为增四度（Augmented fourth）关系，拥有相同的导音减七和弦（Leading note diminished 7th），纯大调表达绝对背景，纯小调表达绝对图形。

The absolute figure-ground relation in the heptachord is composed of pure major and pure minor, and the principal of the two keys is an Augmented fourth, with the same Leading note diminished 7th. Pure major expresses absolute background, pure minor expresses absolute figure.

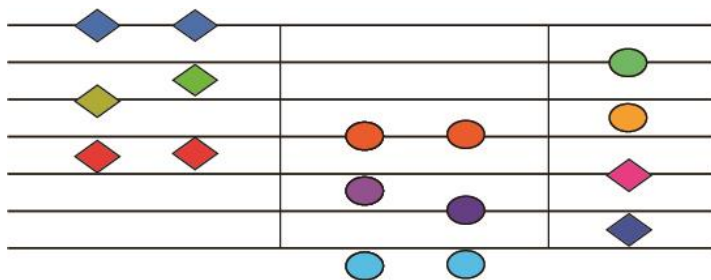


图 5-1.1、七声音阶（Heptachord）中的±纯三和弦（和弦 1、3）构成图-底大小调。

Figure 5-1.1.The ± Pure triads (chords 1, 3) in the Heptachord constitute a figure-ground

relational key.

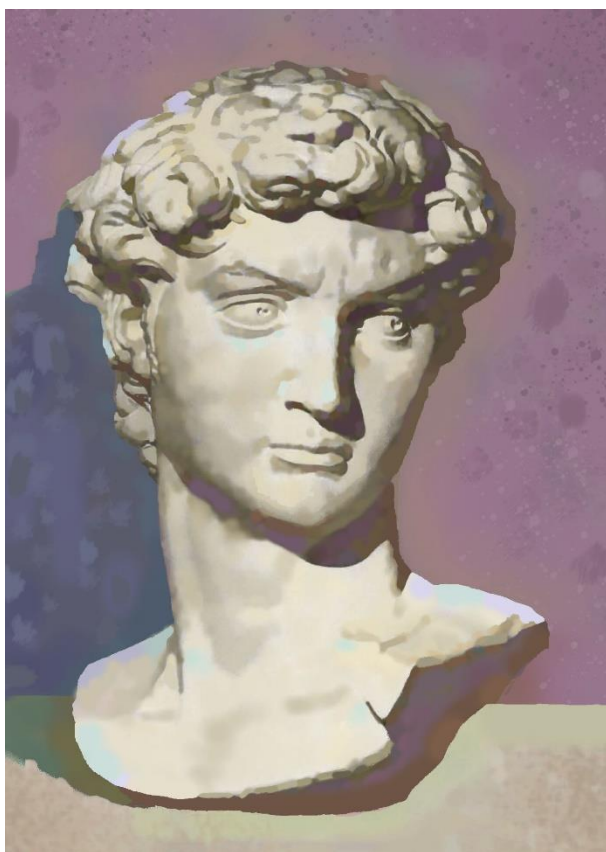


图 5-1.2、七声音阶，增四度大-小调

Figure 5-1.2, Heptatonic scale, Augmented fourth major-minor



图 5-1.2、七声音阶，增四度大-小调

Figure 5-1.2, Heptatonic scale, Augmented fourth major-minor

5-1.2. Parallel Major-Minor; 平行大-小调

七声音阶中的平行大-小调 (Parallel Major-Minor) 用于表达相对图-底关系。

Parallel Major-Minor in the heptachord used to express the relative figure-ground relationship.

平行大小调 (Parallel Major-Minor) 中的两个调分为: 主调 (first key) 与副调 (Second key), 主调 (First key) 的主和弦 (Tonic) 是纯三和弦, 副调 (Second key) 的主和弦 (Tonic) 是混合三和弦, 两调的主音为小三度关系, 拥有相同的导音减七和弦 (Leading note diminished 7th)。

The two keys in Parallel Major-Minor are divided into: The first key and the Second key, the Tonic of the First key is a pure triad, the Tonic of the Second key is a mixed triad, and the tonic of the two keys is a minor third. It has the same Leading note diminished 7th.

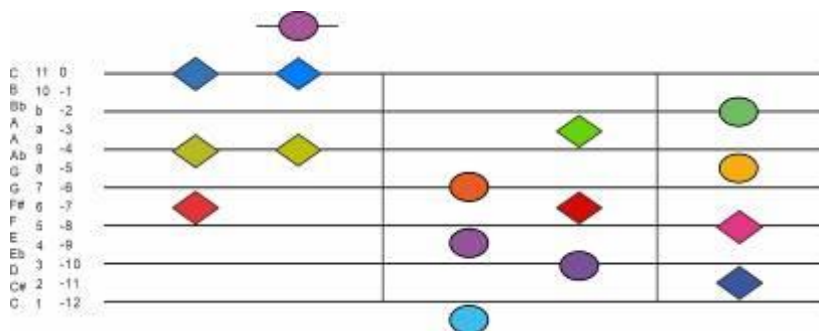


图 5-2.1、上图中, 和弦 1、3 为纯三和弦; 和弦 2、4 为混合三和弦。(菱形=+音符, 圆形=-音符)

In Figure 5-2.1 and above, chords 1 and 3 are pure triads; Chords 2 and 4 are mixed triads.
(Diamond = + note, circle = -note)

下图中的部分图-底关系具有相对性, 采用平行大-小调。

Some of the figure-ground relationships in the figure below are relative, using parallel major-minor scale.



图 5-2.2、七声音阶，平行大小调；C 大调，降 e 小调。

Figure 5-2.2, heptachore scale, parallel major and minor keys: C major, E flat minor.



图 5-2.3、七声音阶，平行大小调；A 大调，升 f 小调。

Figure 5-2.2, heptachore scale, parallel major and minor keys: A major, f-sharp minor.

平行大小调具有一些爵士音阶兼容性, 参见: 9、爵士音阶。

Parallel major-minor keys have some jazz scale compatibility. See also: 9. Jazz Scales

5-2. Same Root Major Minor; 同根大-小调

根音符相同的大-小三和弦构成同根大-小调 (Same Root Major Minor), 同根大-小调只用于在同调中产生轮廓线与分面线, 不产生图-底关系, 其中的大三和弦生成轮廓线 (闭弦), 小三和弦生成分面线 (开弦)。

Major-minor triads with the Same Root note form the Same Root Major Minor, which is only used to produce contours and Facet lines in the homology, and does not produce a figure-ground relationship, where the major triads generate contours (closed strings) and the minor triads generate Facet lines (open strings).

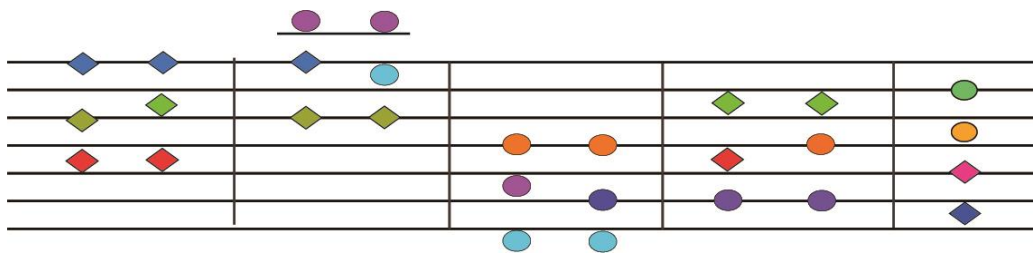


图 9-2.1、同根大-小三和弦, 大-小调。

Figure 9-2.1, same root major - minor triad, major - minor.



图 9-2.1、同根音符大-小三和弦, 大-小调。

same root major - minor triad, major - minor.

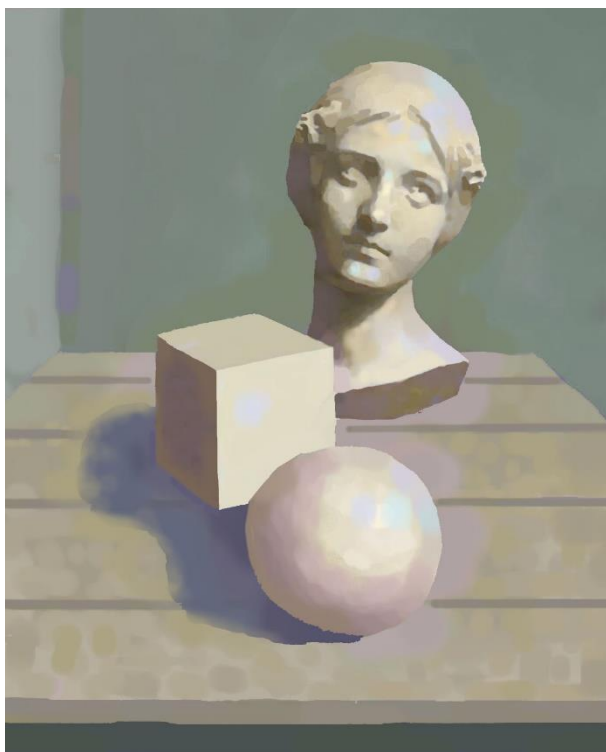


图 9-2.1、同根音符大-小三和弦，大-小调。

Figure 9-2.1, same root major - minor triad, major - minor.

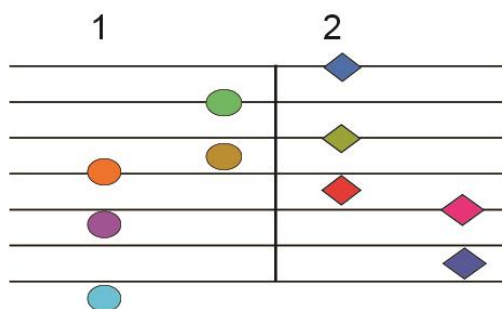
5-3. One-Key System;独调系统

独调系统中只含一个调，不含图-底大-小调，形式为：三和弦+导音减七和弦省略形式。

A one-key system contains only one key, does not include the figure-ground major-minor key, and its form is: triad + leading tone diminished 7th chord abbreviated form.

导音减七和弦的省略形式为：两个正-负属性相同的音符，并包含该调的导音。

The abbreviated form of a leading note diminished 7th chord is two notes with the same positive-negative properties, containing the leading tone of the key.



5-3.1、七声音阶独调系统

5-3.1, heptachord one-key system



5-3.2、七声音阶独调系统

5-3.2, heptachord one-key system



5-3.3、七声音阶独调系统

5-3.3, heptachord one-key system

独调系统模糊了调的完型性特征，具有多种完型状态的兼容性。参见：8-完型性。

The one-key system has the compatibility of various gestalt states by blurring the gestalt characteristics of the key. See also: 8- Gestalt.

6. Heptachord T-D-S Triad; 七声音阶 T-D-S 三和弦

前面介绍的七声音阶和弦包（调）只含有主和弦（tonic），在 5 度音符上生成属和弦（dominant chord），4 度音符上生成下属和弦（subordinate chord），系统中便有了三个三和弦，称作：T-D-S 三和弦，音乐理论中称为：正三和弦（Primary triad），用于表达调内不同的图形与分面的亮度关系。

The heptachord chord packet (key) introduced earlier only contains the tonic, the dominant chord is generated on the 5th note, and the subordinate chord is generated on the 4th note. There are three triads in the system, called: T-D-S triads, In music theory, it is called: Primary triad, it is used to express the brightness relationship between different figure and facet in the key.

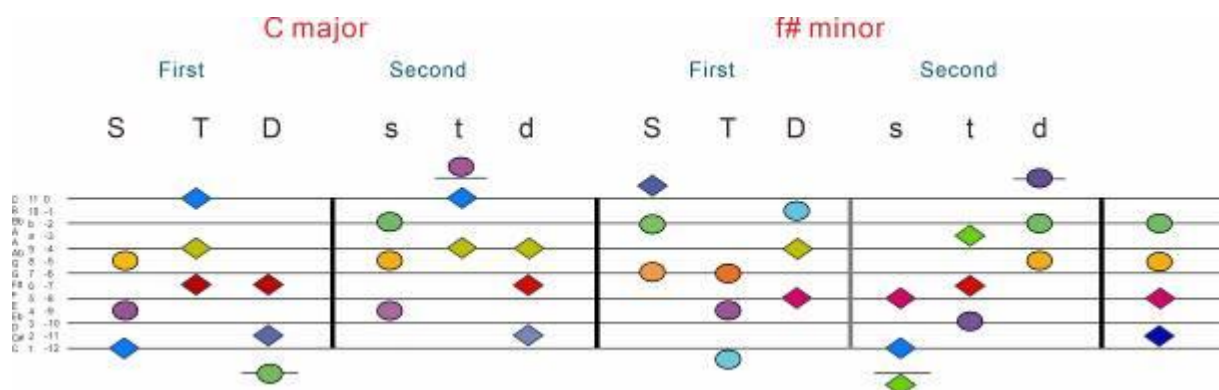


图 6.1、T-D-S 三和弦

Figure 7.1, T-D-S triad

T-D-S 三和弦中，主和弦（Tonic），属和弦，下属和弦具有不同的亮度（亮，暗，中），由此产生 T-D-S 亮度关系，大调，小调具有不同的 T-D-S 亮度关系。

Among the T-D-S triads, the Tonic, the dominant chord, and the subordinate chords have different brightness (bright, dark, medium), resulting in the T-D-S brightness relationship, and the major and minor keys have different T-D-S brightness relationships.

T-D-S 和弦亮度分为：暗，亮，中三级，对应的和弦如下：

The brightness of the T-D-S chord is divided into three levels: dark, light, and medium. The corresponding chords are as follows:

大调 T-D-S 三和弦：属和弦（D）=暗，下属和弦（S）=亮，主和弦（T）=中。

Major T-D-S triad: dominant chord (D) = dark, subordinate chord (S) = bright, tonic (T) =

middle.

小调 T-D-S 三和弦: 属和弦 (D) = 亮, 下属和弦 (S) = 暗, 主和弦 (T) = 中。

Minor T-D-S triad: dominant chord (D) = bright, subordinate chord (S) = dark, tonic (T) = middle.

大调的 T-D-S 亮度关系表达不同亮度的图形; 小调的 T-D-S 亮度关系表达同一图形上不同亮度的分面。

The T-D-S brightness relationship of major keys expresses figure of different brightness; the T-D-S brightness relationship of minor keys expresses facet of different brightness on the same figure.

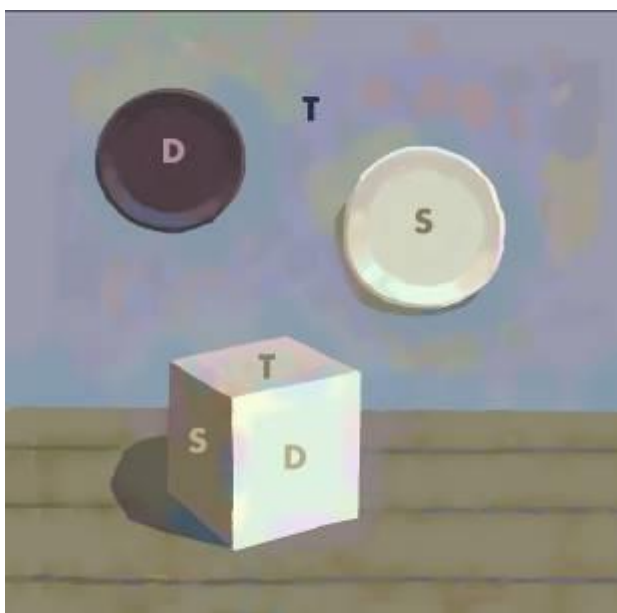


图 6.2、C 大调、#F 小调的 T-D-S 三和弦

Figure 6.2, T-D-S triad in C major, #F minor

C 大调 (背景)、暗色挂盘=C 大调属和弦, 亮色挂盘=C 大调下属和弦, 中间色背景=C 大调主和弦。

C major (background), dark hanging plate = C major dominant chord, bright hanging plate = C major subordinate chord, mid-color background = C major tonic.

纯大调的属和弦与下属和弦可以构成背景上的相对图形。

The dominant and subordinate chords in the pure major scale can form relative figures on the background.

#F 小调 (石膏正方体)、正方体上有三个不同亮度的分面, 亮面=#F 小调属和弦, 暗面=#F 小调下属和弦, 中间色=#F 小调主和弦。

#F minor (plaster squareness), there are three facet of different brightness on the cube, bright side = #F minor dominant chord, dark side = #F minor subdominant chord, middle color = #F minor tonic.

背景上的挂盘与墙面产生调内图-底关系: 主和弦构成背景, 属和弦, 下属和弦构成图形。

The hanging plate on the background and the wall produce an figure-ground relationship within the key: the main chord forms the background, the dominant chord, and the subordinate chord form the figure.

同根音符大-小调转换, 可以产生不同图形, 不同分面的转换, 但服从主调的 T-D-S 亮度级关系。

The same root note major to minor conversion, can produce different figures, different facets of conversion, but obey the main key T-D-S brightness level relationship.

Reference; 参考

Bibliography: 参考书目

Basic Theory Of Music: 音乐基础理论

Harmony: 和声学

Chord Painting: 和弦绘画

7. Special Chords In The Heptachord; 七声音阶中的特殊和弦

七声音阶中的基本和弦是三和弦与减七和弦, 在此之外还有一些特殊的和弦, 用于一些特殊的用途; 如: 重合和弦, 省略和弦等。

The basic chords in the heptachord are triads and diminished 7th chords, in addition to some special line chords for some special purposes; such as: coincident chords, elliptical line chords, etc.

7-1. Coincident Chord; 重合和弦

七声音阶 (heptachord) 中存在多种重合和弦, 主要特征是: 三和弦 (线性和弦) 与调内的导音和弦 (膜和弦) 有重合的音符, 这类和弦线性空间语义不确定, 并允许超出三个音符, 如: 七和弦, 九和弦。

There are a variety of overlapping chords in the heptachord scale, and the main characteristics are: the triad (line chord) and the leading note chord (membrane chord) in the key have overlapping notes, such chords have uncertain linear spatial semantics, and allow more than three notes, such as: seventh chord, ninth chord.

七声音阶 (heptachord) 中的重合和弦不包括主和弦 (tonic), 但在爵士音阶中, 主和弦也是重合和弦。

The heptachord does not include tonic chords, but in the jazz scale, the tonic chords also coincide.

重合和弦可以是: 三和弦+三和弦, 三和弦+膜和弦, 和弦空间语义具有线-膜不确定性。

Coincident chords can be: triad + triad, triad + membrane chord, and chord spatial semantics have line-membrane uncertainty.

最常见的重合和弦是: T-D-S 系统中的属和弦与下属和弦的扩展。

The most common overlapping chords are extensions of dominant and subordinate chords in the T-D-S system.

7-2.Omit Chord;省略和弦

省略减七和弦主要用于产生空间景深变化与跨音阶兼容性，常见的省略形式如下：

The omission of diminished 7th is mainly used to generate spatial depth of field changes and trans-scale compatibility. Common omission forms are:

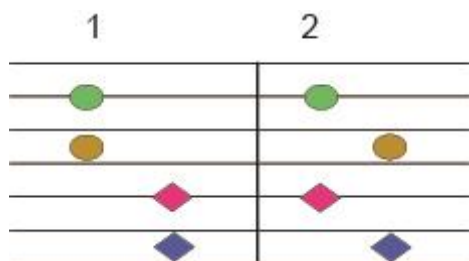


图 7-2，减七和弦的常见省略形式

Figure 7-2, common ellipsis of the diminished 7th

1) 省略正或负音符、减七和弦被省略正或负音符后，空间景深会发生改变——正音符具有背景（远）倾向，负音符具有图形（近）倾向。

1) Positive or negative notes omitted: After a diminished 7th is omitted positive or negative notes, the spatial depth of field changes - positive notes have a background (far) tendency, negative notes have a graphic (near) tendency.

下图中的减七和弦省略了正音符，空间系统系统表现出向前靠近的倾向。

The diminished 7th in the image below omits positive notes, and the spatial system system shows a tendency to approach forward.

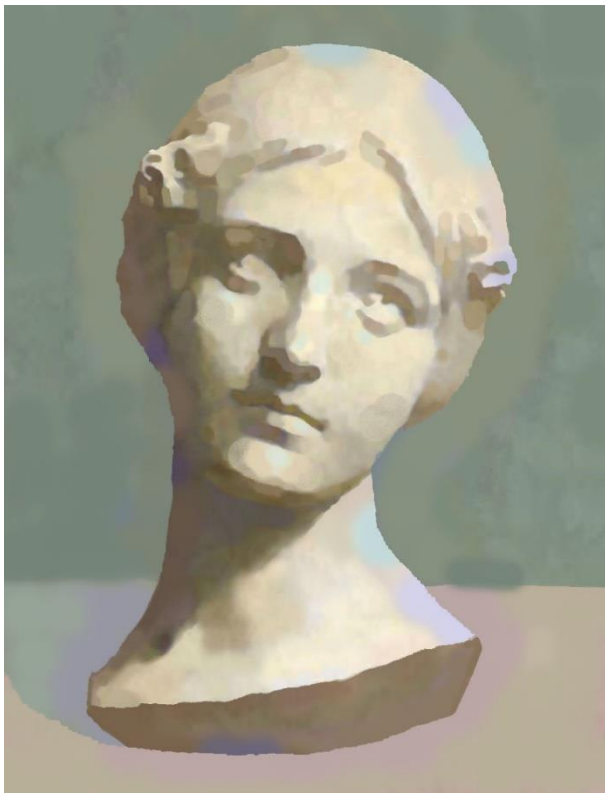


图 7-3、省略了正音符的减七和弦

2) 导音增四度 (leading note augmented fourth) 是减七和弦，全音阶和弦共同省略形式，减七和弦省略为导音增四度 (leading note augmented fourth) 音程时，七声音阶-爵士音阶的膜和弦没有区别。

下图中的减七和弦 (Diminished 7th) 省略为增四度 (augmented fourth) 音程，七声音阶音阶的确定性消失。



图 7-4、减七和弦的省略形式：导音增四度（leading note augmented fourth）

Figure 7-4. The omitted form of the Diminished 7th: leading note augmented fourth

3) 省略三和弦、当七声音阶中的三和弦省略 1-2 音符后，其和弦语义的确定性降低，可以兼容更多的空间状态。

When 1-2 notes are omitted for triads in the heptachord scale, the certainty of the chord semantics is reduced and more spatial states are compatible.

8. Gestalt; 完形性

七声音阶中，和弦空间包具有完形倾向，即：图形轮廓线的闭合性，这种属性主要来自和弦包的导音减七和弦（Leading note diminished 7th）。

In the heptachord, the chord space Packet has a gestalt tendency, that is, the closedness of the figure outline. This attribute comes from the leading note diminished 7th of the Chord packet .

减七和弦是七声音阶特征膜和弦，三个减七和弦各有不同的完形状态，由此产生了七声音阶和弦空间包的完形差异，语义差异与空间秩序。

The Diminishedus 7th is the characteristic Membrane chords of the heptachord. The three diminished 7th have different gestalt states, which results in the gestalt difference, semantic difference and spatial order of the heptachord chord space Packet.

不同减七和弦包含不同完形状态与和弦语义，如：空间语义，生命语义，自然道德语义；这是和弦语言中最难理解之处。

Different diminished 7th include different gestalt states and chord semantics, such as space semantics, life semantics, and natural moral semantics; this is the most difficult point in the chord language to understand.

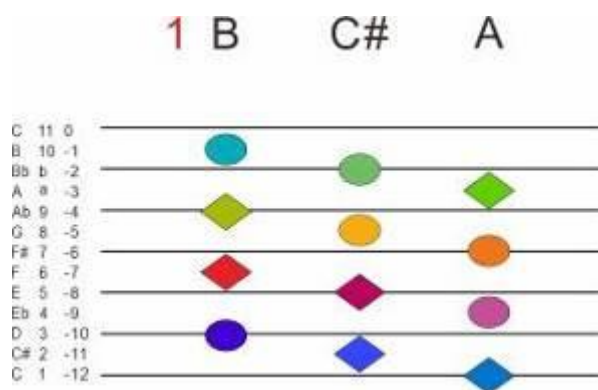


图 8.1、减七和弦表： 1、Bdim7， 2、C#dim7， 3、Adim7

Figure 8.1. diminished 7th table, 1.Bdim7,2.C#dim7, 3,Adim7.

也可使用缩写形式：B， C#， A。

Abbreviations can also be used: B, C#, A.

8-1.Gestalt level;完形级别

三个减七和弦的数学表达相同 ($\text{Dim7}=\text{H}^{0,3,6,9}\text{F0}$), 但是它们有着不同的完形状态及空间规则, 请看下面例图。

The mathematical expressions of the three diminished 7th are the same ($\text{Dim7}=\text{H}^{0,3,6,9}\text{F0}$), but they have different gestalt states and space rules. Please see the following examples.



图 8.2: Bdim7, 闭合图形

Figure 8-2: Bdim7, closed figure

Bdim7 只能表现轮廓弦闭合的图形, 我们将这种空间特征称作: 完形性。

Bdim7 can only express figures with closed contour. We call this space feature: Gestalt.



图 8.3、Adim7、开放图形

Figure 8-3. Adim7, Open figure

Adim7 只能表现轮廓线开放的图形, 但是轮廓线仍有闭合倾向, 我们将这种空间属性称作: 弱完形性。

Adim7 can only express figure with open contours, but the contours still have a tendency to close. We call this space attribute: weak Gestalt.

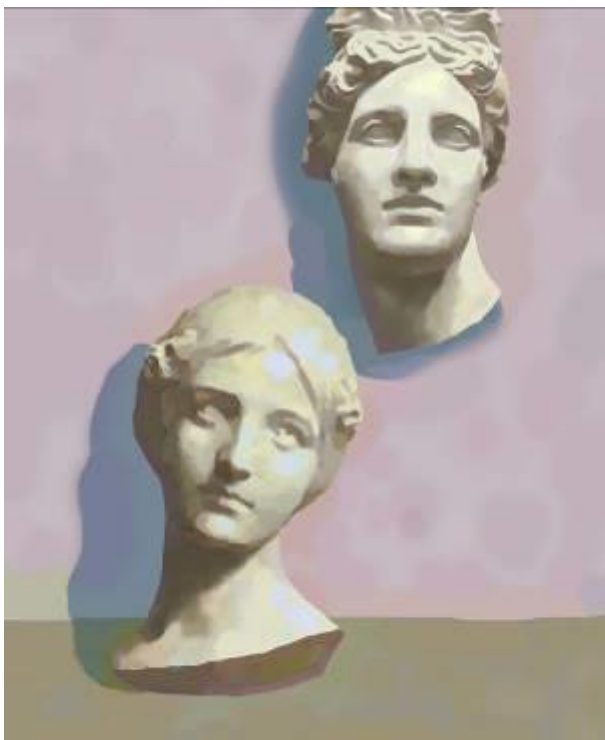


图 8.4、C#dim7，闭合-开放兼容图形

Figure 8.4, C#dim7, closed-open compatible figure

C#dim7 可表达轮廓线闭合图形，也可表达轮廓线开放图形，兼容两种完形状态，我们将这种空间特征称作：次完形性。

C#dim7 can express contour closed figure and contour open figure, and is compatible with two gestalt states. We call this spatial feature: sub gestalt.

综合以上观察，对三个减七和弦的完形规则总结如下：

Based on the above observations, the Gestalt rules for the three diminished 7th are summarized as follows:

- 1、Bdim7，闭合，完形。
1. Bdim7, closed, gestalt.
- 2、C#dim7，闭合-非闭合兼容，次完形。
2. C#dim7, closed-non-closed compatibility, sub-Gestalt
- 3、Adim7，非闭合，弱完形。
3. Adim7, non-closed, weak-Gestalt.

具有不同完形状态的三个减七和弦产生了和弦空间的完形差异，称为：完形级别（Gestalt level），它在和弦空间中具有重要意义。

The three diminished 7th with different Gestalt states produce the Gestalt difference in the chord space, which is called Gestalt level, which is of great significance in the chord space .

三个减七和弦不能出现在同一个调中，但可以构成 Bdim7-C#dim7-Adim7 调群，产生平行空间，详情在后面的第 13 章介绍。

The three diminished 7th cannot appear in the same key, but they can form a Bdim7-C#dim7-Adim7 key group and generate parallel spaces. The details are introduced in Chapter 13 below.

8-2.Semantics Of Diminished 7th;减七和弦的语义

三个减七和弦分别含有不同的和弦语义：完形状态，生命（自我）状态，天体状态等，这是本书最难，也最重要的部分。

The three diminished 7th chord contain different chord semantics: Gestalt state, life (self) state, celestial body state, etc. This is the hardest and most important part of this book.

七声音阶中, 纯大调表达天体状态, 纯小调表达生命(自我)状态, 三个导音减七和弦分别表达不同的完形状态的生命(自我)。

In the heptatonic scale, the pure major expresses the state of the celestial body, the pure minor expresses the state of life (self), and the three leading diminished 7th chords express the life (self) of different gestalt states respectively.

1) Bdim7: 完形; 纯小调: 神性, 神, 永生, 爱; 纯大调: 星系。

1) Bdim7: Gestalt; pure minor: divinity, god, immortality, love; pure major: galaxy.

2) C#dim7, 次完形, 纯小调: 人性, 健康, 今生; 纯大调: 恒星系。

2) C#dim7, sub-Gestalt, pure minor: human nature, health, this life; pure major: star system.

3) Adim7: 弱完形; 纯小调: 魔性, 植物性, 仇恨, 暴力, 堕落; 纯大调: 星云。

3) Adim7: Weak Gestalt; Pure Minor: Demonic, Vegetative, Hatred, Violence, Fallen; Pure Major: Nebula.

*全音阶和弦是减七和弦的弱调性形式。

*The diatonic chord is the weak form of the diminished 7th chord.

在含多个减七和弦的调群中, 完形性较低的调向完形性较高的调解决, 称为: 完形解决倾向, 这与生命的终极需要有关, 在后面 13-2、B-C#-A keys group 部分专门介绍。

Among the key groups with multiple diminished 7th, the key with lower gestalt toward higher gestalt is called: Gestalt resolved tendency, which is related to the ultimate needs of life, in the following 13-2, B-C#-A keys group part is dedicated to introduction.

认识和弦语义依赖自观察以及编译能力, 这需要专门训练, 包括: 经络, 音乐, 绘画等和弦语言经验。

Understanding chord semantics relies on self-observation and compilation ability, which requires special training, including experience in chord language such as meridians, music, and painting.

8-3. The Gestalt level of T-D-S; T-D-S 的完形级别

T-D-S 三和弦也包含完形状态: 主和弦 (Tonic); 属和弦 (Dominant), 下属和弦 (Sub-dominant), 都存在完形状态差异, 这种差异来自三和弦隐含的导音减七和弦。

T-D-S triads also contain gestalt states: tonic chords; dominant chords (Dominant), sub-

dominant chords (Sub-dominant), there is a gestalt state difference, this difference comes from the triad's implied leading tone diminished 7th.

T-D-S 三和弦所在的和弦包中, 完形性较高的图形处于主体地位, 完形性较低的图形处于从属地位。

There are differences in gestalt between T-D-S triads, the figure with higher gestalt is in the dominant position, and the figure with lower gestalt is in the subordinate position.

T-D-S 三和弦的完形状态差异, 以及由此产生的主体-从属关系与恒星, 行星的秩序相关。

Gestalt state differences of the T-D-S triad, and the resulting subject-subordination relationship is related to the order of stars, planets.

8-4.Main Part;主体

在多空间包的七声音阶系统中, 有一个空间包充当系统主体, 称为: 主体空间包, 其余空间包有着向主体空间包接近的倾向。

In the heptachord system with multiple space packet, there is a space packet that acts as the main part of the system, called the main space packet, and the rest of the space packet have a tendency to approach the main space packet.

主体空间包按完形状态产生, 系统中完形状态最高的空间包充当主体空间包。

The main space packet is generated according to the gestalt state, and the space packet with the highest gestalt state in the system acts as the main space packet.

Reference; 参考

Bibliography; 参考书目

Basic Theory Of Music; 音乐基础理论

Harmony; 和声学

Chord Painting; 和弦绘画

General Physics; 普通物理学

9. Jazz Scale;爵士音阶

爵士音阶是弱调性系统, 它屏蔽了七声音阶的部分和弦语义, 并具有无调性兼容性, 常见于一些现代音乐形式。

The jazz scale is a weak tonality system, which shields part of the chord semantics of the heptachord scale and has atonal compatibility. It is common in some modern forms of music.

爵士音阶有两个特征膜和弦(等比数列和弦): 全音阶和弦(Diatonic chord)与增三和弦(Augmented triad), 三和弦+全音阶和弦构成爵士音阶和弦包, 三和弦+增三和弦构成爵士五声音阶和弦包。

The jazz scale has two characteristic membrane chords (geometric progression chords): diatonic chords and augmented triads. Triads + diatonic chords constitute the jazz scale chord package, and triads + augmented triads constitute the jazz pentatonic scale chord package.

全音阶和弦包含±增三和弦, 也可看作是全音阶和弦的组成部分。

The diatonic chords include the ± augmented triads, which can also be considered as components of the diatonic chords.

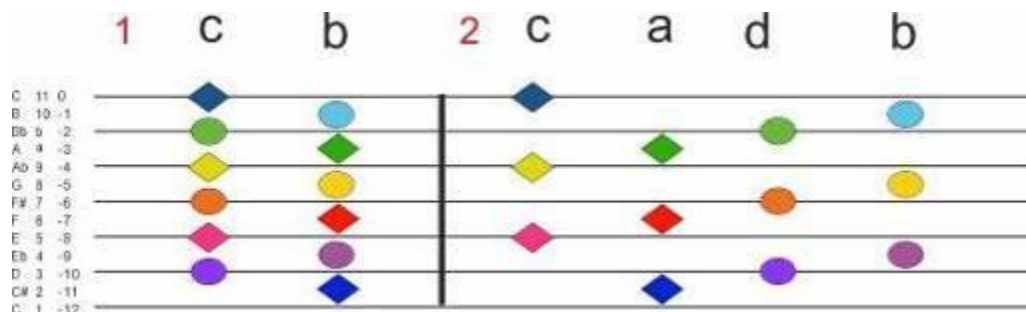


图 9-1、爵士音阶特征和弦, 1、全音阶和弦(Diatonic chord), 2、增三和弦(Augmented triad)(◆=正音符, ●=负音符, 色彩=色荷)

Figure 9-1. Characteristic chords of the jazz Scale, 1. Diatonic chord, 2. Augmented triad (◆=+note, ●=-note)

爵士音阶的主要特征如下:

The main features of the jazz Scale are as follows:

1) 爵士音阶由主和弦+导音全音阶和弦构成, 导音与主音(Tonic)为小二度(Minor second)关系, 与七声音阶(heptachord)不同的是: 爵士音阶含有两个导音(Leading note), 两个导音与爵士音阶的完整性密切相关, 在平行调集团中, 导音是主调(Tonic key)的特征。

1) The jazz scale is composed of major + leading diatonic chords, the leading and Tonic are Minor second relations, and heptachord is different from: The jazz scale contains two Leading notes that are closely related to the integrity of the jazz scale, and in parallel tone groups, the Leading note is characteristic of the Tonic key.

2) 爵士音阶是弱调性体系, 既可作调性解决 (resolve), 也可作无调性解决。(参见: 10、无调性体系)

2) The jazz scale is a weak tonal system, which can be solved as both tonal and atonal solutions. (See: 10, Atonal system)

3) 独立的爵士音阶空间包没有完型性倾向, 可以表达任意图形。(参见: 8、完型性)

3) The independent jazz scale space package has no gestalt tendency and can express any figure. (See: 8. gestalt)

4) 爵士音阶常在多层调群 (Multi-Layer Key Group) 中充当从属调 (参见: 13、多层调群); 七声音阶调集团中的爵士音阶可以保留完形语义, 这来自三和弦隐含的导音减七和弦。

4) The jazz Scale often acts as a sub-key in the Multi-Layer Key Group (see: 13, Multi-Layer Key Group); the jazz Scale in the heptatonic key group can retain the Gestalt semantics, which comes from Triads implicitly leading note diminished 7th chords.

9-1.图底关系

图-底关系 (figure-ground relation) 由图形与背景构成, 是空间知觉的基本元素, 图底关系包括两种类型: 绝对图底关系与相对图底关系, 分别由不同调群表达。

figure-ground relation is a basic element of space perception and is composed of figures and backgrounds. There are two types of figure-ground relation: absolute figure-ground relation and relative figure-ground relation, expressed by different tone groups.

关于图底关系, 在前面内容中已有较多介绍, 不再重复, 可参阅: 5-1. Figure-Ground Relation 图-底关系。

As for the Figure-Ground Relation, it has been introduced more in the previous content and will not be repeated, see: 5-1. Figure-ground relation.

9-1.1. Augmented Fourth Major-Minor;增四度大-小调

爵士音阶中的绝对图-底关系（figure-ground relation）由纯大调与纯小调构成，两调的主音为增四度（Augmented fourth）关系，拥有相同的导音减七和弦（Leading note diminished 7th），纯大调表达绝对背景，纯小调表达绝对图形。

The absolute figure-ground relation in the jazz is composed of pure major and pure minor, and the principal of the two keys is an Augmented fourth, with the same Leading note diminished 7th. Pure major expresses absolute background, pure minor expresses absolute figure.

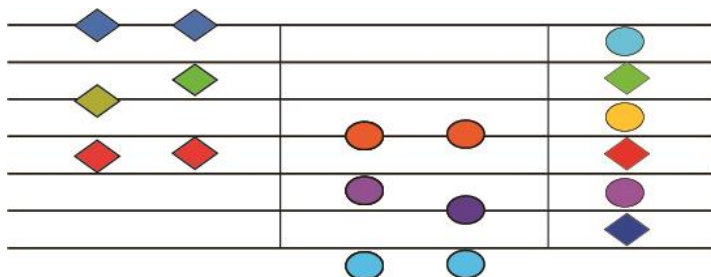


图 9-1.1、爵士音阶中的±纯三和弦（1、3）构成图-底大小调。

Figure 5-1.1.The ± Pure triads (1, 3) in the jazz constitute a figure-ground relational key.

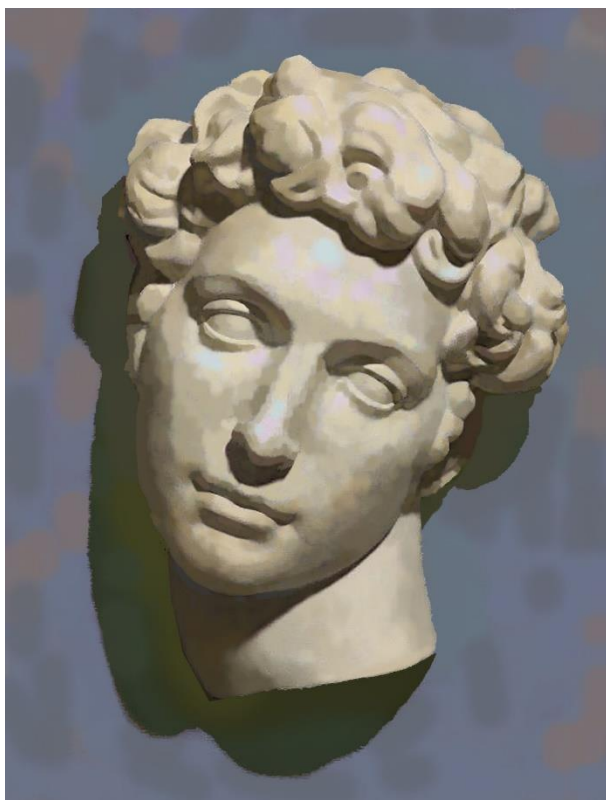


图 9-1.2、爵士音阶中的绝对图-底关系。

Figure 9-1.2 The absolute figure-ground relationship in the jazz scale.

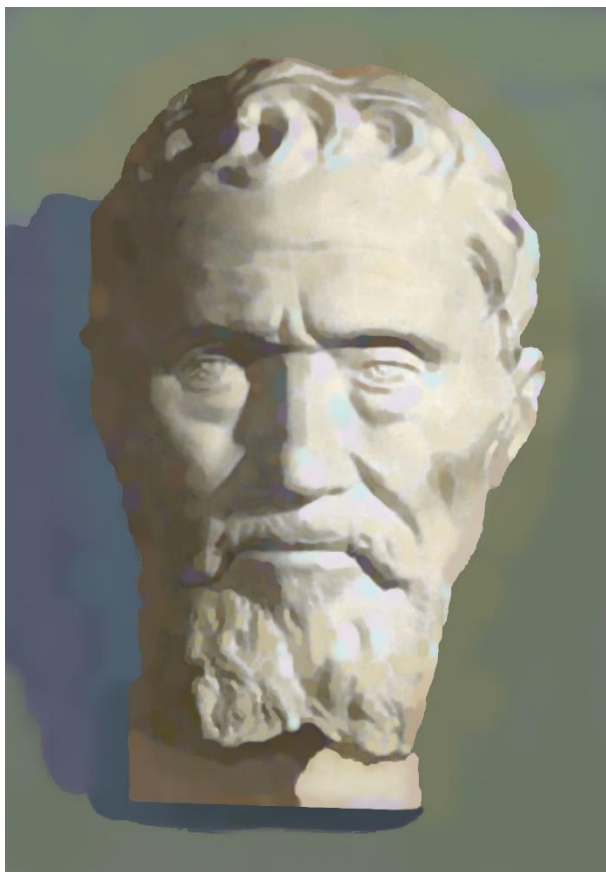


图 9-1.3、爵士音阶中的绝对图-底关系。

Figure 9-1.3 The absolute figure-ground relationship in the jazz scale.

9-1. 2. Parallel Major-Minor; 平行大-小调

爵士音阶的平行大小调（Parallel Major-Minor）包含一个正调，一个副调，两调的主音为小三度关系，含有同一个全音阶和弦。见图：9-1

The Parallel Major-Minor of the jazz scale consists of a positive key and a sub-key, and the tonic of the two keys is a minor third relationship and contains the same diatonic chord.

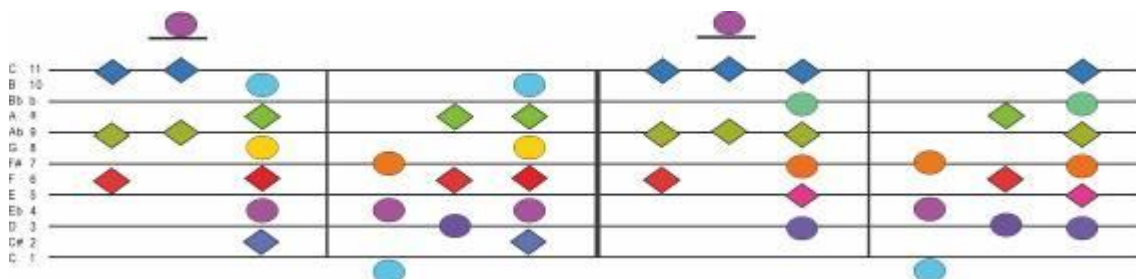


图 9-1.4、爵士音阶和弦包：1、C 大调，2、F#小调，3、Eb 小调，4、A 大调（◆=正音符，●=负音符，色彩=色荷）

Figure 9-1. Jazz scale chord packet: 1, C major, 2, F# minor, 3, Eb minor, 4, A major (◆=positive CHORD LANGUSGE, Li Xiaohong, DOI: 10.13140/RG.2.2.25415.65440/3, ISBN:9781370273348, ASIN: B0919JJ3R7
Email: lixiaohonggg@outlook.com; <https://orcid.org/0000-0001-6461-1239>

note, ●=negative note, color=color charge)

爵士音阶中的平行大-小调 (Parallel Major-Minor) 用于表达相对图-底关系 (figure-ground relationship), 大调表达背景, 小调表达图形。

The Parallel major-minor key in the jazz scale is used to express the relative figure-ground relationship, with the Major expressing the background and the Minor expressing the figure.



图 9-1.5、爵士音阶平行大-小调, 升 f 小调, A 大调

Figure 9-2. Jazz Scale parallel major-minor, f-sharp minor, A major

主调 (tonic key) 与副调 (sub key): 平行大-小调中, 其中一调包含导音全音阶和弦, 该调为系统主调, 另一的主音与全音阶和弦中音符重复, 该调为副调, 主调与副调可以通过改变导音全音阶和弦进行切换。

Tonic key and sub key: In the parallel major-minor scale, one of the keys contains the leading tone diatonic chord, which is the tonic key of the system, and the other key has repeated notes in the tonic and diatonic chord, which is the sub key. The tonic and sub keys can be switched by changing the leading tone diatonic chord.

下面为主调-副调的切换。

The following two legends illustrate the tonic key-sub key switching.



图 9-1.6、平行大-小调，升 f 小调，A 大调

Figure 9-3. Parallel major-minor, f-sharp minor, A major



图 9-1.7、平行大-小调，A 大调，升 f 小调

Figure 9-4. Parallel major-minor, A major, f-sharp minor

爵士音阶中，主和弦与导音全音和弦（Leading note diatonic chord）有 1-2 个音符重合，调性较

弱。

In the jazz Scale, the tonic and the leading note diatonic chord have 1-2 notes overlapping, and the tonal is weak.

9-2、Same Root Major Minor; 同根大-小调

根音符相同的大-小三和弦构成同根大-小调 (Same Root Major Minor), 同根大-小调只用于在同调中产生轮廓线与分面线, 不产生图-底关系, 其中的大三和弦生成轮廓线 (闭弦), 小三和弦生成分面线 (开弦)。

Major-minor triads with the Same Root note form the Same Root Major Minor, which is only used to produce contours and Facet lines in the homology, and does not produce a figure-ground relationship, where the major triads generate contours (closed strings) and the minor triads generate Facet lines (open strings).

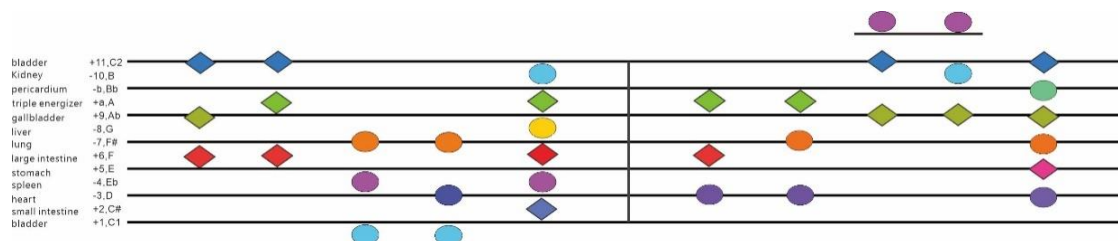


图 9-2.1、同根大-小三和弦, 大-小调。

Figure 9-2.1, same root major - minor triad, major - minor.

爵士音阶中的同根大-小调可以单独构成空间系统, 结合无调性解决构成图-底关系。

The same major-minor key in the jazz scale can be used alone to form a spatial system, and combined with the atonal solved, the figure-ground relationship can be formed.



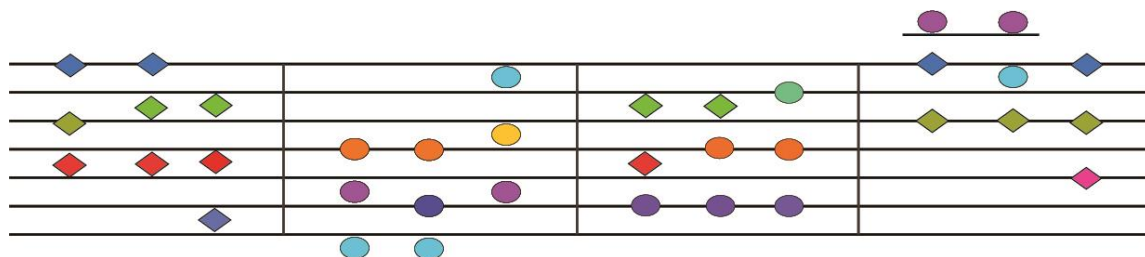
图 9-2.2.、同根大-小三和弦，大-小调。

Figure 9-2.2, same root major - minor triad, major - minor.

9-3. One-Key System;独调系统

独调系统中只含一个调，不含图-底大-小调，形式为：导音增三和弦+三和弦。

The one-tone system contains only one key, excluding the figure-ground major- minor keys, in the form of: leading note augmented triad + triad.



9-2.1、爵士音阶独调系统

9-2.1, Jazz scale one-key system

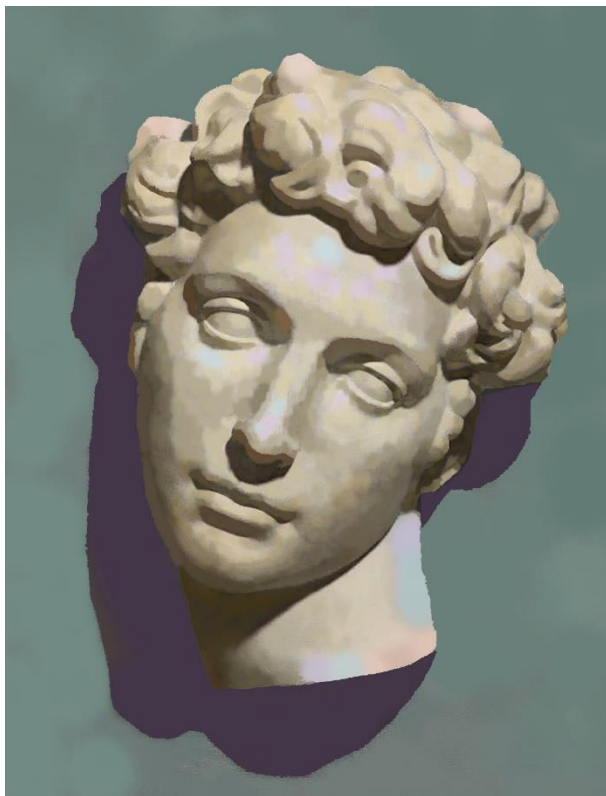


图 9-3.2、负增三和弦

Figure 9-3.2. Negative augmented triad



图 9-3.3、正增三和弦

Figure 9-3.3. Positive augmented triad

增三和弦+三和弦构成爵士五声音阶系统，系统具有明显的空间景深（近-远）特征，负增三和弦具有近的倾向，正增三和弦具有远的倾向。

The augmented triad + triad forms the jazz pentatonic scale system, which has obvious spatial depth of field (near-far) characteristics, the negative augmented triad has a tendency to be near, and the positive augmented triad has a tendency to be far.

增三和弦也可看作全音阶和弦的组成部分, 全音阶和弦包含两个增三和弦, 分别为正增三和弦与负增三和弦, 正增三和弦具有背景(远)倾向, 负增三和弦具有图形(近)倾向。

An augmented triad can also be seen as a component of a diatonic chord. A diatonic chord consists of two augmented triads, namely a positive augmented triad and a negative augmented triad. The positive augmented triad has a background (far) tendency and the negative augmented triad has a figure (near) tendency.

下图的图形使用负增三和弦, 背景使用正增三和弦, 正-负增三和弦产生图-底景深。

The figure in the image below uses a negative augmented triad, and the background uses a positive augmented triad. The positive-negative augmented triad creates a figure-background depth of field.



图 9-3.1、正-负增三和弦

Figure 9-3.1. Positive-Negative Augmented Triad

全音阶和弦与减七和弦都含有增四度音程, 其省略形式同构, 七声音阶与爵士音阶可互相转换,

增三和弦与减七和弦没有这种联系, 不能与七声音阶互相转换。

Both diatonic chords and diminished seventh chords contain augmented fourth intervals, and their omitted forms are isomorphic. The heptatonic scale and jazz scale can be converted into each other. However, augmented triads and diminished seventh chords do not have this connection and cannot be converted into each other with the heptatonic scale.

9-4、Coincident Chord;重合和弦

爵士音阶的主和弦与导音 (leading note) 全音阶和弦含有重复音符, 因此, 爵士音阶的主和弦是重合和弦, 也允许主七和弦, 主九和弦等, 用于和弦空间语义不确定的场合。

The major and leading note diatonic chords of the jazz scale contain repeated notes, so the major chords of the jazz scale are coincident chords, which also allow the major seventh chord, the major ninth chord, etc., to be used in situations where the spatial semantics of the chord are uncertain.

9-5、Atonal Compatibility;无调性兼容性

爵士音阶是弱调性系统, 具有无调性兼容性, 爵士音阶中的线和弦, 膜和弦可以部分被无彩色替代, 产生无调性倾向。

The jazz scale is a weak tonal system with atonal compatibility. The line chords and membrane chords in the jazz scale can be partially replaced by achromatic colors, resulting in an atonal tendency.

下图中的部分线和弦, 膜和弦被无彩色 (Achromatic colour) 替代, 产生无调性倾向。

In the image below, some of the line chords and membrane chords are replaced by Achromatic colour, resulting in atonal tendencies.



图 9-5、爵士音阶的无调性兼容性

Figure 9-5. Atonal compatibility of jazz scales

爵士音阶中的无调性解决通常出现在最暗与最亮的区域，或出现在完整性较低的一调上。

Atonal resolution in the jazz scale usually occurs in the darkest and brightest areas, or in the key with lower integrity.

10. Atonal System; 无调性体系

无调性体系由半音阶构成, 半音阶具有 M 和弦的等比数列特征, 但它不是典型的 M 和弦; 半音阶向无彩色 (achromatic color) 解决, 也可被无彩色 (achromatic color) 替代, 构成无调性体系。

The atonal system is composed of the chromatic scale, which has the geometric progression characteristics of the M chord, but it is not a typical M chord; the chromatic scale is resolved into achromatic color and can also be replaced by achromatic color, forming an atonal system.

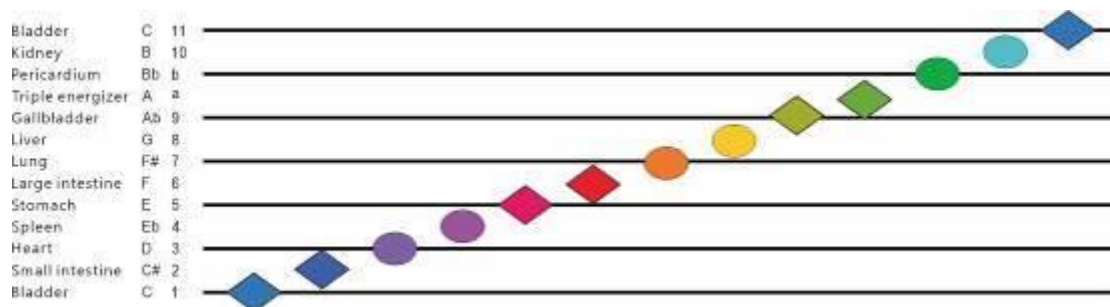


图 10.1、半音阶, (菱形=+ 音符, 圆形=- 音符)

Figure 10.1 Chromatic scale, (diamond = + note, circle = -note)

一个无调性体系通常不超过六个音符, 相邻音符之间不能超过小二度音程。

An atonal system usually has no more than six notes, and the interval between adjacent notes cannot exceed a minor second.

10-2. Figure-Ground Space; 图-底空间

在半音阶中, 正音符具有背景 (远) 知觉倾向, 负音符具有图形 (近) 知觉倾向, 两种音符可分别产生背景空间 (正空间) 与图形空间 (负空间), 形成无调性图-底关系, 产生景深变化。

In the chromatic scale, positive notes have background (far) perception tendency, while negative notes have figure (near) perception tendency. The two notes can respectively generate background space (positive space) and figure space (negative space), forming an atonal figure-ground relationship and producing depth of field changes.

无调性图-底关系用于无调性系统, 但也可以出现在爵士音阶系统中。

The atonal figure-ground relationship is used in atonal systems, but can also occur in jazz scale

systems.



图 10.2、半音阶体系，无调性体系

Figure 10.2. Chromatic system, atonal system

下图中，负音符（色）构成图形，正音符（色）构成背景，产生±音符（色）图-底关系。

In the figure below, negative notes (color) form the figure and positive notes (color) form the background, resulting in a \pm note (color) figure -ground relationship.

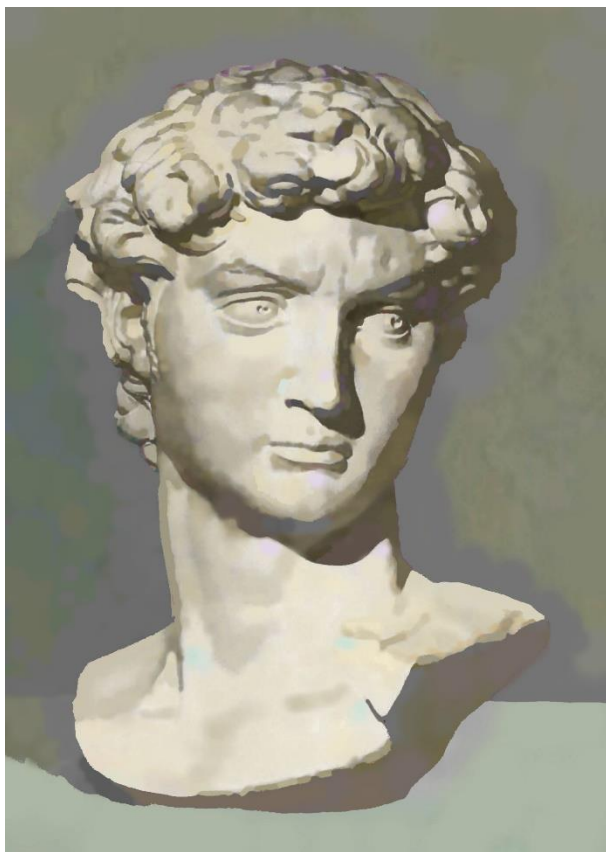


图 10.3、半音阶体系

Figure 10.3.Chromatic system, atonal system

半音阶与全音阶和弦也可以通过变化和省略相互转换。

Chromatic and diatonic chords can also be transformed into each other by changes and omissions.

10-3、Achromatic Color; 无彩色

半音阶和弦可以被无彩色（噪音）替换，产生非和弦系统。

Chromatic chords can be replaced by achromatic (noise) to produce a non-chord system.

下图的系统背景部分被无彩色替代，形成非和弦空间。

The system background in the figure below is replaced by achromatic color to form a non-chordal space.

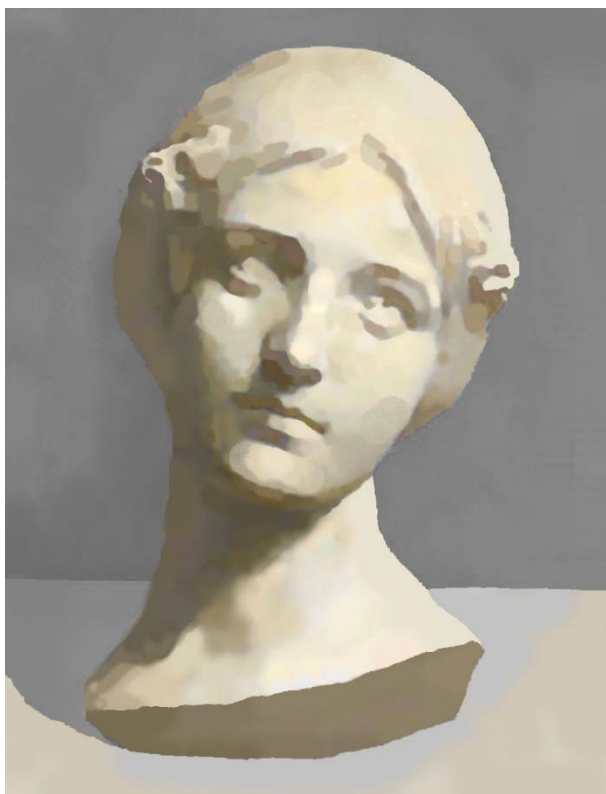


图 10.4、系统背景为非和弦空间

Figure 10.4, the system background is the non-chord space

下图中的图形与背景都被无彩色替代，形成完全的非和弦空间。

The figure and background in the picture below are replaced by achromatic colors, forming a complete non-chordal space.



图 10.5、非和弦空间

Figure 10.5, non-chord space

非和弦（无调性）信息在人类的知识构成中占有重要地位。

Non-chord (atonal) information plays an important role in human knowledge.

Reference; 参考

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11. Melody Of Color; 色彩旋律

前面的讨论和弦语句是以“和弦”为单位，本章讨论的旋律语句则以音符（色）为单位，两者既有联系，又有相对独立性。

The chord statement discussed above is in the unit of "chord", while the melodic statement discussed in this chapter is in the unit of note (color), which are both related and relatively independent.

旋律在音乐中表现为非同时组织，而在和弦绘画中则表现为同时性组织。

Melody is not synchronic organization in music, but synchronic organization in chord painting. 色彩旋律发生在一个空间包之内，不同空间包则视作不同的旋律段落。

Color melody occurs within a space packet, and different space packets are treated as different melodic paragraphs.

按旋律的语义作用，色彩旋律可分为三种形式：M-L 旋律，分面旋律，点旋律。

According to the semantic function of melody, color melody can be divided into three forms: M-L melody, faceted melody and dot melody.

11-1. M-L Melody; M-L 旋律

M-L 旋律是膜和弦+线和弦语句的省略形式，语句中的和弦被省略为音符，产生 M-L 旋律进行（melodic progression）。

The M-L melody is an abbreviated form of the Membrane chords + line chord sentence. The chords in the sentence are omitted as notes, resulting in an M-L melody progression.

M-L 旋律发生在膜和弦与线和弦之间，膜和弦具有寻找线和弦形成空间包的倾向，这种倾向称为：膜和弦解决（solve）。

The M-L melody occurs between the Membrane chords and the line chord. The Membrane chords has a tendency to find the line chord to form a space packet. This tendency is called: Membrane chords solve.

在七声音阶（Heptachord）中，减七和弦（Diminished 7th）向主和弦解决（solve）。

In the Heptachord, the Diminished 7th is resolved to the tonic.

在爵士音阶系统中，全音阶和弦向主和弦解决。

In the Weak Tonal System, the Diatonic is resolved toward the tonic.

主和弦为大三和弦（闭和弦）时，膜和弦向着轮廓线解决。

When the tonic is a major triad (closed chord), the Membrane chords is resolved toward the contour line.

主和弦为小三和弦（开和弦）时，膜和弦向着分面线解决。

When the tonic is a minor triad (open chord), the Membrane chords is resolved toward the Facet lines.

和弦解决语句中，和弦省略为音符（色）时，表现为色彩旋律，产生色相知觉。

In the chord resolved sentence, when the chord is omitted as a note (color), it is expressed as a color melody and produces a sense of hue.

膜和弦各音符（色）都可以向线和弦各音符（色）解决，但以下形式比较常见：

Each note (color) of the Membrane chords can be solved by the note (color) of the line chord, but the following forms are more common:

导音（leading note）-主音（key-note）语句：导音（leading note）是与主音（key-note）相邻的膜和弦音符（色），具有最强的解决（solve）倾向。

Leading note-key-note sentence: Leading note is the Membrane chords note (color) adjacent to the key-note, which has the strongest tendency to solve.

与主和弦的三度，五度相邻的膜和弦音符（色），可向着主和弦三度，五度解决，见下图：

The Membrane chords note (color) adjacent to the third and fifth degrees of the tonic can be solve toward the third and fifth of the tonic, as shown in the figure below:

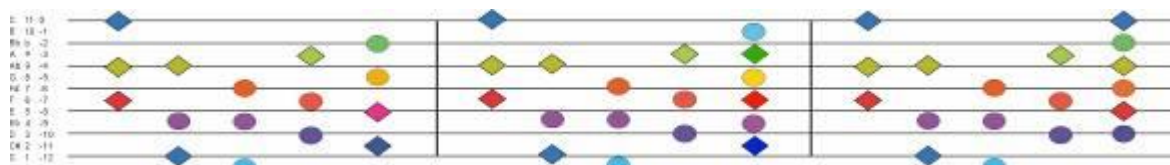


图 11.1、M-L 解决语句

Figure 11.1, M-L resolved statement



图 11.2、系统背景上，减七和弦（Diminished 7th）的两个色分别向主和弦上的根音（root-note）、五度（fifth）作 M-L 解决。

Figure 11.2. On the background of the system, the two colors of Diminished 7th are resolved by M-L to the root-note and fifth of the tonic.

11-2. Facet Melody; 分面旋律

分面旋律是最常见的色彩旋律进行（melodic progression），用于在空间包上产生不同亮度的分面，不同亮度的分面由不同音符（色）构成，称为：分面旋律。

Faceted melody is the most common color melody progression (melodic progression), which is used to produce facet of different brightness on the space packet. The facet of different brightness are composed of different notes (colors), called: faceted melody.



图 11.3、分面旋律表达的明-暗分面

Figure 11.3: Light-dark Facet lines expressed by faceted melody

分面旋律只适用膜和弦，大调的分面旋律只发生在一个膜和弦内，小调的分面旋律可发生在多个膜和弦之间。

The faceted melody only applies to the Membrane chords, the faceted melody of the major key only occurs in one Membrane chords, and the faceted melody of the minor key can occur between multiple Membrane chords.

正序旋律与反序旋律：在平均律（Equal Temperament）色环中，红色（E）的能量级最低，紫红色（bE）的能量级最高，其它色的频率高-低是相对的，如：绿色相对黄色，绿色频率更高。

Positive order melody and reverse order melody: In the Equal Temperament color circle, red (E) has the lowest energy level, magenta (bE) has the highest energy level, and the high-low frequencies of other colors are relative, such as : Green is relatively yellow, and green has a higher frequency.

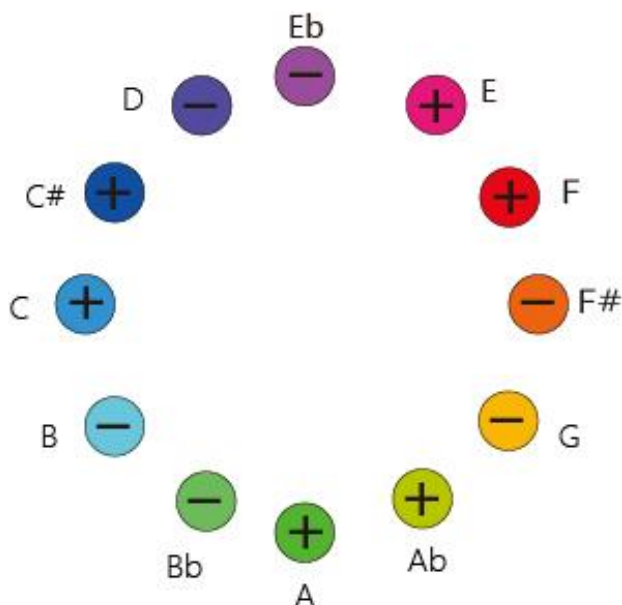


图 11.4、平均律色环

Figure 11.4, equal temperament color circle

分面旋律分为：正序旋律与反序旋律。

Faceted melody is divided into: Positive order melody and reverse order melody.

正序旋律：相对高频色在亮部，相对低频色在暗部。

Positive order melody: relatively high frequency colors are in the bright part, and relatively low frequency colors are in the dark part.

反序旋律：相对高频色在暗部，相对低频色在亮部。

Reverse melody: relatively high frequency colors are in the dark part, and relatively low frequency colors are in the bright part.

正序旋律具有图形（近）倾向，反序旋律具有背景（远）倾向，这一特征可表现在调性，无调性体系中。

The positive sequence melody has a figure (near) tendency, and the reverse sequence melody has a background (far) tendency, which can be manifested in the tonality and atonal system.

调性系统中，正序旋律通常出现在构成图形的小调上，反序进行旋律通常出现在构成背景的大调上，也出现可在同一个调中，表现相对图-底关系，见下图：

In the tonal system, the Positive order melody usually appears on the minor key that constitutes the figure, and the reverse order melody usually appears on the major key that constitutes the background. It can also appear in the same key, showing the relative figure-ground relation, as

shown in the figure below.



图 11.5、七声音阶（Heptachord）旋律进行：图形（石膏几何形）为升 f 小调，采用正序旋律，背景（墙，桌面）为 A 大调，采用反序旋律。

Figure 11.5. Heptachord melody progress: the figure (plaster geometry) is in f-sharp minor and the Positive order melody is adopted, and the background (wall, desktop) is in A major and the reverse order melody is adopted.

正序旋律，反序旋律通常用于区别图-底关系（figure-ground relation），在图-底关系不确定系统中，可减弱正序，反序旋律的区别。

Positive order melody and reverse order melody are usually used to distinguish the figure-ground relation. In the figure-ground relation uncertain system, the difference between the positive order and the reverse order melody can be weakened.

11-3、Point Melody; 点旋律

“点”是线和弦的特殊形式，用于表达一维空间上的点，如：端点，角点等，只适用于三和弦。

"Point" is a special form of line chords, used to express points in one-dimensional space, such as endpoints, corners, etc. It is only suitable for triads.

线和弦由三个音符（色）构成，表达 1 维空间语义，但是当线和弦（闭和弦，开和弦）上出现点、端点、角点时，三和弦转为分解和弦（broken chord）形式，出现在点、端点、角点上。

line chords are composed of three notes (colors), expressing the semantics of one-dimensional

space, but when points, endpoints, and corners appear on the one-dimensional line chords (closed chords, open chords), the triads are converted to broken chords. , Appears on points, endpoints, and corners.

见下图: #F 小调主和弦转为分解和弦, 出现在: 点, 端点, 角点处。

See the picture below: The #F minor tonic is converted into a broken chord, which appears at: point, end point, corner point.



图 11.7、#F 小调主和弦 (tonic) 变为分解和弦 (broken chord) 表达图形上的点, 角点, 端点等

Figure 11.7, #F minor tonic becomes broken chord to express the points, corners, endpoints, etc. on the figure.

11-4、Parallel Melody; 并行旋律

同调的空间包上出现多组旋律, 称: 并行旋律, 常用于区别色相, 分面与投影, 相对图形与相对背景等。

There are multiple sets of melodies on the same key space packet, called: parallel melodies, which are often used to distinguish hue, facet and projection, relative figure and relative background, etc.



图 11.8、并行旋律

Figure 11.8, Parallel Melody

上图的衬布上有三组分面旋律，有正序旋律，也有反序旋律，称为：并行旋律。

There are three-group faceted melody on the lining cloth of the above picture, there are positive melody and reverse melody, called: parallel melody.

12. Non-Chord Tone;和弦外色

和弦外音 (non-chord tone), 在和弦绘画是和弦包之外的色, 通常有两种用途: 1、产生亚旋律; 2、削弱色相、和弦的确定性, 在和弦绘画中常用的有: 邻音 (Neighbor note), 滑音 (Glide), 持续音 (pedal point)、延留音 (Vorhalt)、先现音 (Anticipation) 等。

Non-chord tone is a color outside the chord packet in chord painting. It usually has two purposes: 1. To generate sub-melody; 2. To weaken the certainty of hue and chord. Commonly used in chord painting are : Neighbor note, Glide, pedal point, Vorhalt, Anticipation, etc.

和弦外色 (non-chord color) 有两种常见形式:

There are two common forms of non-chord color:

和弦的频率偏移, 如: 邻音 (Neighbor note), 滑音 (Glide)。

The frequency offset of the chord, such as: Neighbor note, Glide.

和弦空间区域偏移, 如: 持续音 (pedal point)、延留音 (Vorhalt)、先现音 (Anticipation)。

The chord space area offset, such as: continuous tone (pedal point), sustained tone (Vorhalt), anticipation (Anticipation).

12-1.Frequency Offset;频率偏移

和弦频率偏移的形式很多, 按照用途可归入两类: 1、产生亚旋律, 2、削弱和弦内色的色相确定性。类似音乐中的邻音 (Neighbor note), 滑音 (Glide) 等。

There are many forms of chord frequency offset, which can be classified into two categories according to their purposes: 1. to generate sub-melody, 2. to weaken the hue certainty of the colors in the chord. Similar to Neighbor note, Glide, etc. in music.

邻音 (Neighbor note): 用于产生分面亚旋律, 通常是膜和弦的和弦外色。

Neighbor note: used to produce faceted sub-melody, usually the chord outer color of the Membrane chords.

下图为增三和弦构成的无调性系统, 图形上与背景上都有由邻音 (Neighbor note) 产生的亚旋律, 图形上用于表现分面, 背景上用于表现投影。

The figure below shows an Atonal system composed of augmented triads. There are sub-melody generated by Neighbor notes on the figure and on the background. The figure is used to

express facet, and the background is used to express projection.

邻音 (Neighbor note) 可以改变音符的正-负属性, 正音符具有背景 (远) 的倾向, 负音符具有图形 (近) 的倾向, 常用于改变特定空间区域的景深。

Neighbor notes can change the positive-negative properties of notes, positive notes have a background (far) tendency, and negative notes have a figure (near) tendency, often used to change the depth of field in a specific spatial area.



图 12.1、邻音 (Neighbor note) 产生的景深

Figure 12.1. Depth of field generated by Neighbor note

滑音 (Glide), 用于削弱色相的确定性, 表达色相不确定的对象, 如: 水、玻璃等。

Glide is used to weaken the certainty of hue and express objects with uncertain hue, such as water, glass, etc.

下图的水面使用了滑音 (Glide), 用于削弱色相的确定性。

The water surface in the image below uses Glide to reduce the certainty of the hue.



图 12.2、爵士音阶 A 大调

Figure 12.2, Weak Tonal System A major

12-2.Space Region Offset;空间区域偏移

和弦空间区域偏移通常表现为：线和弦与膜和弦互相跨界，进入对方的空间区域，类似音乐中的持续音（pedal point）、延留音（Vorhalt）、先现音（Anticipation），通常用于表达空间系统所需要的模糊性。

The offset of the chord space area is usually expressed as: the line chord and the membrane chord cross each other and enter the space area of Used to express the ambiguity required by spatial systems.

在下图中的天空部分，主和弦（线和弦）与全音阶和弦（膜和弦）互相越界，导致和弦结构与和弦语义含混，并产生空间景深，类似音乐中的：持续音（pedal point），延留音（Vorhalt），先现音（Anticipation）。

In the sky part in the picture below, the tonics (line chords) and the Diatonics (membrane chords) cross each other, resulting in the chord structure and the chord semantics being ambiguous, and the spatial depth of field is generated, similar to music: pedal point, Vorhalt, anticipation.



图 12.4、爵士音阶 A 大调

Figure 12.4, Weak Tonal System A major

空间区域偏移通常发生在线和弦与膜和弦之间，其它形式有待观察。

The spatial region offset usually occurs between the online chord and the Membrane chords, other forms are to be seen.

13. Multi-Layer Key Group; 多层调群

一个和弦空间系统包含多个和弦包（调），称为：调群，它是以和弦包（调）为单位的组织形式。

A chord space system contains multiple Chord packets (key), called: key group, which is an organizational form of Chord packets (key) as a unit.

和弦语言中包含多种调群：图-底大小调（Figure-Ground Major-Minor），平行大小调（Parallel Major-Minor），B-C#-A 调群，T-D-S 调群，前两种是同导音膜和弦（Leading note Membrane chords）调群，是同层空间系统，在前面的第 6 章、第 9 章已经介绍；本章只介绍不同导音膜和弦（Leading note Membrane chords）构成的调群：B-C#-A 调群与 T-D-S 调群，这类调群包含多个膜和弦，分别具有不同的完形状态；称为：多层调群。

The chord language contains multiple key groups: Figure-Ground Major-Minor, Parallel Major-Minor, B-C#-A key group, T-D-S key group, the first two are same Leading note Membrane chords key group is a same-layer space system, which has been introduced in the previous chapters 6 and 9; this chapter only introduces the key group composed of different leading note Membrane chords: B-C#-A key group and T-D-S key group. This type of keys group contains multiple Membrane chords, each with a different Gestalt state; it is called: multi-layer key group.

多层调群包含多个膜和弦，具有完形级别；三个减七和弦构成的 B-C#-A 调群是和弦时空的全局组织形式，与天体、生命秩序相关。

The multi-layer keys group contains multiple Membrane chords and has a Gestalt level; the B-C#-A keys group composed of three diminished 7th is the global organization of chord space time, which is related to the order of celestial bodies and life.

13-1.B-C#-A Key Group; B-C#-A 调群

B-C#-A 是 Bdim7, C#dim7, Adim7 三个减七和弦的缩写，减七和弦的完形差异产生 B-C#-A 调群的解决方向与主次秩序。

三个减七和弦的完形状态分别是：

1、Bdim7，闭合，完形。

1. Bdim7, closed, gestalt.

图 13-1.2、B-C#-A 调群

Figure 13-1.2.B-C#-A key group

说明：前面的正方体与圆球体是 Bdim7，闭合图形，完形，是系统主调群（Main key group）。

Explanation: The cube and sphere in the front are the diminished 7th B (God), which is a closed figure with the highest gestaltness, and is the main key group of the system.

中间的分面球与十字锥，C#dim7，闭合，准完形，充当系统次调群（second key group）。

The facet sphere and cross cone in the middle, C#dim7, closed, quasi-gestalt, act as the second key group of the system.

墙上的石膏挂像，Adim7，开放图形，弱完形，只能充当系统末次调群（last key group）。

The plaster statues on the wall, Adim7, open figure, weak gestalt, can only serve as the last key group of the system.

B-C#-A 调群也可以采用省略形式：只含两个减七和弦。

The B-C#-A key group can also be omitted: it contains only two diminished 7th.

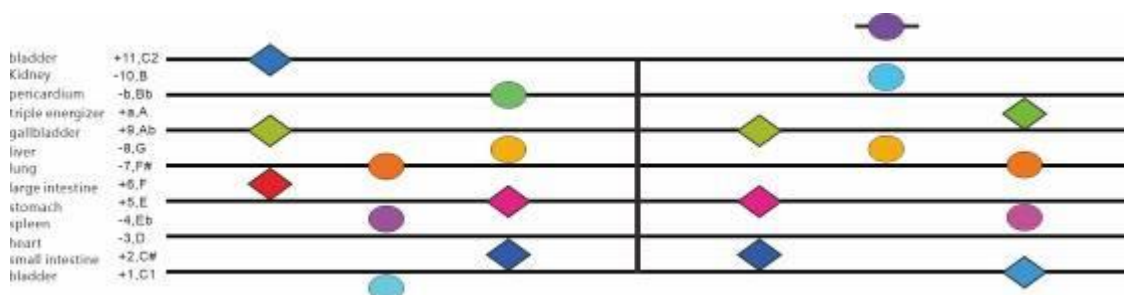


图 13-1.3、B-C#-A 调群的省略形式：C#dim7，Adim7 调群

Figure 13-1.3, the omitted form of B-C#-A keys group: C#dim7, Adim7 keys group



图 13-1.4、B-C#-A 调群的省略形式: C#dim7, Adim7 调群

Figure 14,the omitted form of B-C#-A keys group: C#dim7, Adim7 keys group

前面的正方体, 球体, C#dim7, 准完形, 充当系统主调群。

The front cube, sphere, C#dim7, quasi-gestalt, act as the main keys group of the system.

后面墙上的石膏挂像,, Adim7, 开放图形, 弱完形, 充当系统次调群 (last keys)。

The plaster hanging statue on the back wall, Adim7, open figure,weak gestalt, acts as the last keys of the system.

B-C#-A 调群的省略形式还可有: Bdim7-Adim7 调群, Bdim7-C#dim7 调群。

The omission form of B-C#-A keys group can also include: Bdim7-Adim7 keys group, Bdim7-C#dim7 keys group.

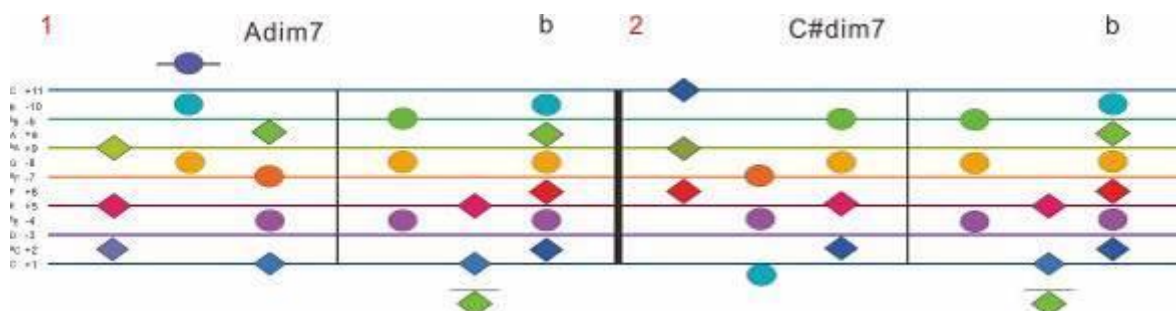
B-C#-A 调群是全局控制调群, 可以包含 T-D-S 调群, 同层调群。

The B-C#-A keys group is a global control keys group, which can include the T-D-S keys group, and the same layer keys group.

13-1.1、The Reverse Resolved Of B-C#-A Key Group;B-C#-A 调群的反常解决

七声音阶 B-C#-A 调群中的个别和弦包可转入其弱调性形式——爵士音阶, B-C#-A 调群也因此包含了两种音阶形式; 在这种状态下, 爵士音阶和弦包向七声音阶和弦包解决, B-C#-A 和弦包的解决方向与完形状态无关。

The individual chord packet in the heptachord B-C#-A key group can be transferred to its weak-tonal form—the jazz Scale. The B-C#-A key group therefore contains two scale forms; in this state, the Jazz Scale Chord packet is resolved to the heptachord Chord packet, and the resolved direction of the B-C#-A Chord packet has nothing to do with the Gestalt state.



13-3.1、七声音阶-爵士音阶混合的 B-C#-A 调群

13-3.1, B-C#-A keys group mixed with heptachord-jazz Scale

在下面的两个例图中，石膏正方体与球体为爵士音阶和弦包，墙上的石膏挂像为七声音阶和弦包，完形状态较高的爵士音阶和弦包向完形状态较低的七声音阶和弦包解决。

In the following two examples, the plaster cube and the sphere are the diatonic Chord packets, and the plaster hanging image on the wall is the heptachord Chord packet. the diatonic Chord packet with the higher gestalt state is resolved to the heptachord Chord packet with the lower gestalt state.



图 13-3.2、七声音阶降 A-d 调与爵士音阶，降 b-E 调混合调群

Figure 13-3.2, the mixed keys group of the heptachord A flat-d and the jazz Scale b flat-E



图 13-3.3、七声音阶 C，升 f 调与爵士音阶降 b-E 调混合调群

Figure 13-3.3, the heptachord C, f-sharp tone and the jazz Scale b flat-E tone mixed tone group 独立的爵士音阶和弦包不含完形语义, 但在七声音阶调群中的爵士音阶和弦包可以获得完形语义: 与其三和弦在七声音阶中的完形语义一致。

The independent jazz Scale Chord packet does not contain Gestalt semantics, but the jazz Scale Chord packet in the heptachord key group can obtain the Gestalt semantics: it is consistent with the Gestalt semantics of its triad in the heptachord.

13-1.2. Chord Universe Model; 和弦宇宙模型

B-C#-A 调群是和弦语言（和弦时空）的全局组织结构，也可视作和弦宇宙模型。

The B-C#-A key group is the global organization structure of the chord language (chord space-time), and can also be regarded as a chord universe model.

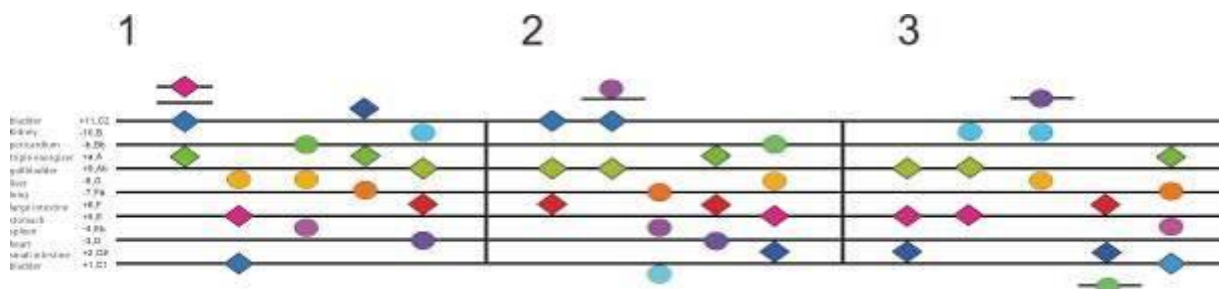


图 13-1.1、Bdim7-C#dim7-Adim7 调群

Figure 13-1.1, Bdim7-C#dim7-Adim7 keys group

和弦宇宙模型的两个基本法则:

Two basic laws of the chord universe model:

1) 和弦语言中, 纯大调构成非生命空间（天体）, 纯小调构成生命空间, 两者是七声音阶的±大-小调对称法则体现, 生命是和弦宇宙的必然部分。

1) In the chord language, the pure major scale constitutes the non-living space (celestial body), and the pure minor scale constitutes the living space, both of which are the embodiment of the ± major-minor symmetry law of the heptachord, and life is an inevitable part of the chord universe.

2) 和弦空间按照完形性产生天体-生命秩序, 完形性高的和弦包处于主导地位, 完形性较低的和弦包处于被从属地位。

2) The chord space produces the order of celestial bodies-life according to gestalt, the chord packet with high gestalt is in the dominant position, and the chord packet with lower gestalt is in the subordinate position.

完形性较高的纯大调和弦包处于非生命空间（天体）的中心，完形性较低的纯大调和弦包处于非生命空间（天体）的边缘。

The pure major chord packet with higher gestalt is at the center of non-living space (celestial body), and the pure major chord packet with lower gestalt is at the edge of non-living space (celestial body).

完形性较高的纯小调和弦包在生命系统中处于主导地位，完形性较低的纯小调和弦包在生命系统中处于从属地位。

The pure minor chord packet with higher gestalt is dominant in the life system, and the pure minor chord packet with lower gestalt is in the subordinate position in the life system.

13-2.T-D-S Key Group;T-D-S 调群

T-D-S 调群是 T-D-S 三和弦的转调形式，用于表达空间系统中不同亮度的分形-分面关系；较 T-D-S 三和弦具有更高的确定性。

The T-D-S keys groups is a transition form of the T-D-S triad, which is used to express the fractal-facet relationship of different brightness in the spatial system; it has a higher certainty than the T-D-S triad.

T-D-S 调群是七声音阶（heptachord）调群，其中的属和弦（Dominant）、下属和弦（Subdominant）分别转为属调（dominant key）、下属调（Subdominant Key），两调使用爵士音阶形式，常见形式是：三和弦+导音（leading note）增三和弦。

The T-D-S key group is a heptachord Key group, in which the Dominant and Subdominant chords are converted to the dominant key and Subdominant Key respectively, and the two keys use the jazz scale form. The common form is: Triad + leading note augmented triad.

大调的属调（dominant key）、下属调（Subdominant Key）表达不同亮度的分形图形；小调的属调（dominant key）、下属调（Subdominant Key）表达同一图形上不同亮度的分面。

The dominant key and subdominant key of the major key express fractal figure of different brightness; the dominant key and the subdominant key of minor key express the facet of different brightness on the same figure.

T-D-S 调群与 T-D-S 三和弦一样：副调群（second key group）服从正调群（first key group）的和弦亮度级关系。

The T-D-S keys group is the same as the T-D-S triad: the second key group obeys the chord intensity relationship of the first key group.

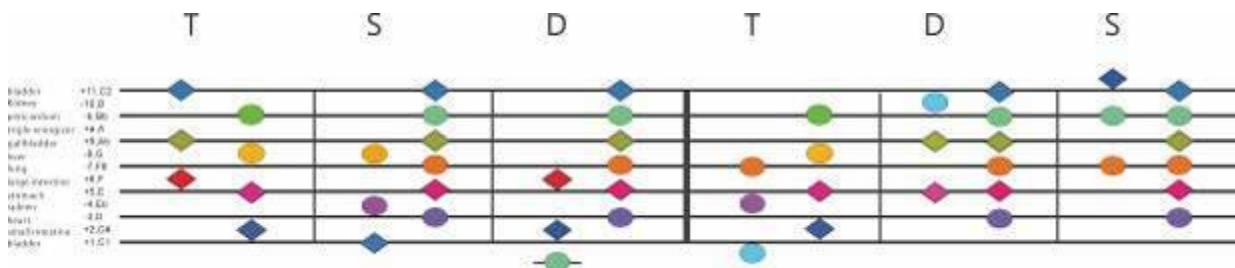


图 13-2.1、1 栏: C 大调 T-D-S 调群; #F 小调 T-D-S 调群

Figure 13-2.1, column 1: C major T-D-S key group; #F minor T-D-S key group



13-2.2、#F 小调、C 大调 T-D-S 调群

13-2.2, #F minor, C major T-D-S key group

#f 小调 (石膏图形), 亮面=#f 小调-属调 (dominant key); 暗面=#f 小调-下属调 (Subdominant Key), 中间色=#f 小调主和弦。

#f minor (gypsum graphics), bright side = #f minor-dominant key; dark side = #f minor-subdominant key, middle color = #f minor major chord.

C 大调 (背景): 墙上的白色挂盘=C 大调的属调 (dominant key); 墙上的黑色挂盘=C 大调的下属调 (Subdominant Key)。中间色背景=C 大调主和弦。

C major (background): the white hanging plate on the wall = the dominant key of C major; the black hanging plate on the wall = the subdominant key of A major. Mid-color background = C major major chord.

13-2.2、Solar System Model;太阳系模型

T-D-S 调集团中, 各调存在完形状态差异, 这种差异来自三和弦隐含的导音减七和弦。

In the T-D-S key group, there are differences in the Gestalt state of each key, and this difference comes from the leading diminished 7th implied by the triad.

太阳系(恒星系)是C大调T-D-S调集团系统, 下属调构成太阳, 属调构成地球, 主调构成背景空间。(见图: 13-2.2)

The solar system (star system) is a group system in the key of C major, T-D-S. The subordinate key constitutes the sun, the dominant key constitutes the earth, and the tonic key constitutes the background space. (See Figure: 13-2.2)

References

Bibliography; 参考书目

Basic Theory Of Music; 音乐基础理论

Harmony; 和声学

Chord Painting; 和弦绘画

General Physics; 普通物理学

14、Chord Spacetime;和弦时空

24 届世界哲学大会会议论文

Papers of the of 24th World Congress of Philosophy

人类常用到两种时空：和弦时空与非和弦时空，前者基于和弦（量子化频谱，弦），常用于音乐，绘画等；后者屏蔽了和弦，依赖外部参考系（时钟，尺子、参照物），常用于经典物理学等。前者是和弦场（时空场），后者是相对性经验与概念。

There are two kinds of spacetime commonly used by humans: chord spacetime and non-chord spacetime. The former is based on chords (quantized spectrum, strings) and is often used in music, painting, etc. The latter masks chords, relies on external reference frames (clocks, rulers, reference objects), and is often used in classical physics, etc. The former is the chord field (space-time field), and the latter is the relative experience and concept.

和弦时空由和弦构成，和弦频谱只能取特定离散值（ $n \cdot f$, $H^n \cdot f$, $H=1.059463$, $n=1,2,3,\dots$ n ）。

Chord spacetime is composed of chords, and the chord spectrum can only take specific discrete values ($n \cdot f$, $H^n \cdot f$, $H=1.059463$, $n=1,2,3,\dots$ n).

和弦时间与和弦空间互为数学镜像，互为反和弦，可以相互转换，空间具有定域性，时间具有非定域性，表现出：时空二相性（波粒二相性）。

Chord time and chord space are mathematical mirror images of each other and anti-chords of each other, and can be converted into each other. Space is local and time is non-local, showing: space-time duality (wave-particle duality).

和弦具有空间语义（开，闭，膜弦），表达空间的状态与作用，并产生空间场。

Chords have spatial semantics (open, closed, membrane strings), express the state and function of space, and generate spatial fields.

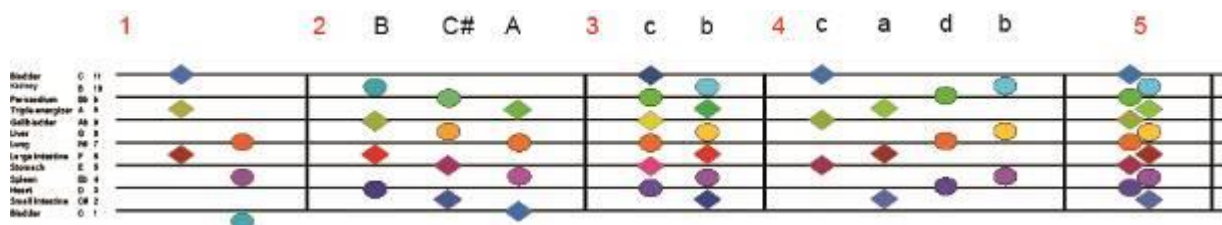
音符，和弦均有 \pm 属性，是频率的物理属性，也是场的属性。

Notes and chords all have \pm properties, which are physical properties of frequency and also properties of the field.

和弦是时空语言，包含时空编码与语义，分布为和弦场（时空场），它是物理事件的底层作用；

音乐与绘画是常见的和弦时空现象。

Chords are a space-time language that contains space-time coding and semantics, distributed as chord fields (space-time fields), which are the underlying function of physical events; music and painting are common chord space-time phenomena.



基本和弦表: 1-1、大三和弦 (闭弦), 1-2、小三和弦 (开弦)、2、减七和弦 (膜弦)、3、全音阶和弦 (膜弦), 4、增三和弦 (膜弦), 5、半音阶和弦 (膜弦)

*和弦频谱公式: $n*f$, H^n*f , $H=1.059463$, $n=1,2,3,\dots,n$

*符号: \blacklozenge = + 音符, \bullet = - 音符, 音符色 = 色荷

Basic chord table: 1-1, major triad (closed string), 1-2, minor triad (open string), 2, diminished 7th (membrane string), 3, diatonic chord (membrane string), 4, augmented Triads (membrane strings), 5. Chromatic Chord (membrane string)

* Chord spectrum formula: $n*f$, H^n*f , $H=1.059463$, $n=1,2,3,\dots,n$

* Symbol: \blacklozenge = + note, \bullet = - note, note color = color charge

关键词: 和弦, 音乐, 绘画, 时空, 量子, 弦理论, 电磁

Keywords: Chords, music, painting, space-time, quantum, string theory, electromagnetism

14-1.The Structure Of Chord Spacetime;和弦时空的结构

和弦由“音符”组成, 这是和弦时空的“基本粒子”, 音符为特定离散值 ($n*f$, H^n*f), 具有正-负属性与十二种色荷, 总数为 $12*n$ 。

A chord is made up of "notes", which are the "elementary particles" of chord space-time, and the notes are specific discrete values ($n*f$, H^n*f), with positive-negative properties and twelve color charges, for a total of $12*n$.

和弦是和弦时空的“单词”, 线和弦 (开弦, 闭弦) 定义膜和弦 (膜弦) 的边界 (轮廓线, 分面线等), 由此产生时空, 时空 (宇宙) 开始于和弦。

Chords are the "words" of chord space-time, line chords (open, closed string) define the

boundaries (contours, Facet lines, etc.) of membrane chords (membrane string), from which space-time arises, and space-time (the universe) begins at chords.

线和弦定义膜和弦的边界, 产生和弦包 (调), 这是和弦时-空的基本单位。

Line chords define the boundaries of membrane chords, producing chord packets (keys), which are the basic unit of chord space-time.

多个和弦包 (调) 组成和弦包群 (调群), 这是和弦空间的全局组织形式, 具有全局控制作用。

Multiple chord packet (keys) form a chord packet group (key group), which is a global organization form of chord space and has global control.

和弦空间的产生原理已在本书前面部分介绍, 请回顾前面章节。

The generation principle of chord space has been introduced in the previous part of this book, please review the previous chapter.

*和弦取值的计算方法见: 1、和弦数学

* The calculation method of chord value is as follows: 1. Chord mathematics

*本文相关图形实验: * Graphic experiments related to this article:

[\(PDF\) Chord Painting \(researchgate.net\)](#)

14-2.Chord Packet;和弦包

和弦空间由和弦表达, 基本语句形式是: 和弦空间包 (调), 在前面章节已有介绍; 本节主要讨论和弦空间包与电-磁现象之间的关系。

The chord space is expressed by chords, and the basic sentence form is: chord space packet (key), which has been introduced in the previous chapters; this section mainly discusses the relationship between the chord space packet and electro-magnetic phenomena.

本章的讨论默认采用爵士音阶, 下面分析一个典型的和弦空间包。

The discussion in this chapter uses the jazz Scale by default, and a typical chord space package is analyzed below.

三和弦 (开弦, 闭弦) 定义全音阶和弦 (膜和弦) 的边界 (轮廓线, 分面线等), 生成爵士音阶的和弦空间包, 下面以 A 大调, F#小调为例:

Triads (open chords, closed chords) define the boundaries (contours, Facet lines, etc.) of diatonic chords (membrane chords), and generate the chord space packet of the jazz Scale. The following

takes A major and F# minor as examples:

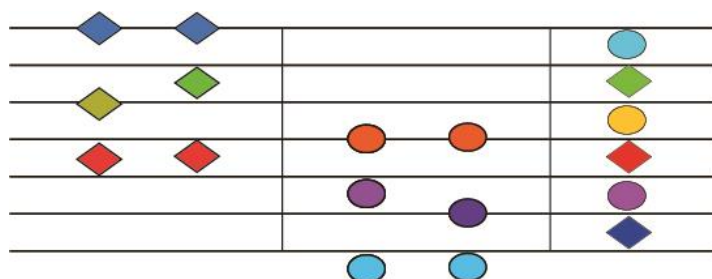


图 14-2.1、爵士音阶和弦包：1、F#小三和弦（开弦），2、C 大三和弦（闭弦），3、全音阶和弦（膜弦）（◆=正音符，●=负音符，色彩=色荷）

Figure 14-2.1, jazz Scale chord package: 1, F# minor triad (open string), 2, A major triad (closed string), 3, diatonic chord (membrane string) (◆=positive note, ●=negative note, color=color charge)

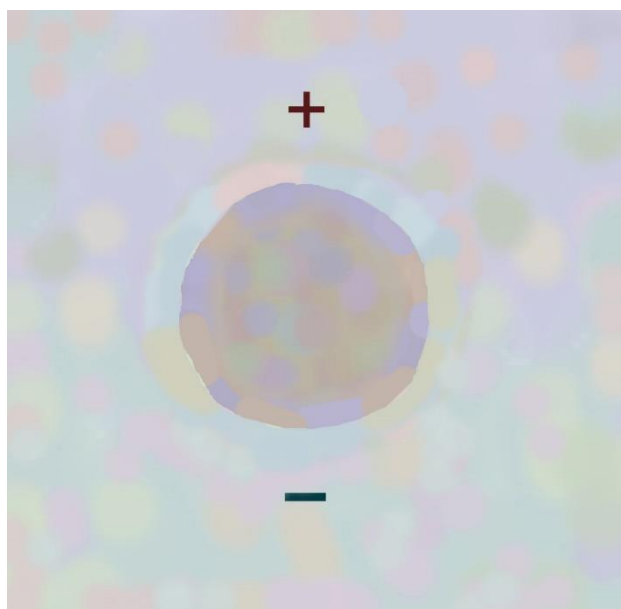


图 14-2.2、爵士音阶 f#小调，A 大调空间包

Figure 14-2.2, jazz Scale f# minor, A major space packet

实验 1：A 大三和弦（闭弦），构成了图形的闭合轮廓线，封闭、束缚和弦包，全音阶和弦（膜弦）填充所有非线性空间。

Experiment 1: A major triad (closed string), which constitutes the closed contour of the figure, closed, bound chord packet, and diatonic chords (membrane chords) fill all non-linear spaces.

空间包的轮廓线由大三和弦（闭弦）构成，用于束缚空间包，轮廓线（闭弦）的内部由全音阶和弦（膜弦）充实，线和弦与膜和弦分别构成和弦空间包的外层与内核。

The contour of the space packet is composed of major triads (closed strings), which are used to

bind the space packet. The interior of the contour line (closed strings) is enriched by diatonic chords (membrane strings), and the line chord and membrane chord form the outer and inner core of the chord space packet respectively.

和弦是否可以表达天体或原子这类空间现象呢? 可以确定的是: 和弦时空事件都适用和弦表达。

Can chords express spatial phenomena such as celestial bodies or atoms? What is certain is that chord space-time events apply to chord expressions.

观察原子的最好方式是获得完整的视觉经验, 这个无法做到, 现在将上图 15-3.2 与下面的照片比较。

The best way to look at atoms is to get a full visual experience, which can't be done, now compare Figure 15-3.2 with the photo below.

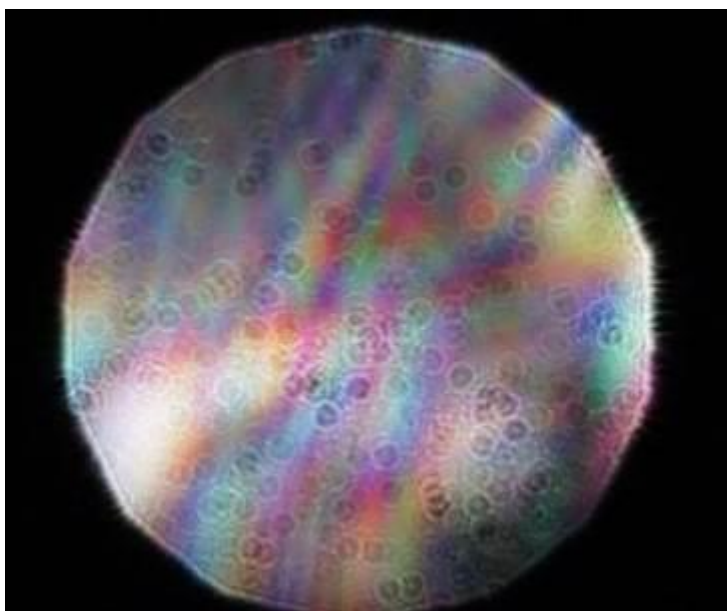


图 14-2.3、孔径光栅显微镜拍摄的铁原子 (图片来自互联网)

Figure 14-2.3. Iron atoms taken by aperture grating microscope (picture from Internet)



图 14-2.4、孔径光栅显微镜拍摄的铁原子（图片来自互联网）

Figure 14-2.4. Iron atoms taken by aperture grating microscope (picture from Internet)

14-2.1. Electric Charge And Magnetic Charge; 电荷与磁荷

音符具有正负属性，由此产生和弦的正负属性，正和弦的根音符为正音符，负和弦的根音符为负音符，通常：正和弦为大三和弦（闭弦），负和弦为小三和弦（开弦）。见图：14-2.1

The notes have positive and negative properties, resulting in the positive and negative properties of the chord, the root note of the positive chord is a positive note, the root note of the negative chord is a negative note, generally: the positive chord is a major triad (closed string), and the negative chord is a minor triad (open string). See Figure 14-2.1

【电荷】下图和弦包中包括+和弦（大三和弦，闭弦）与-和弦（小三和弦，开弦），闭弦构成轮廓线，开弦构成分面线，膜弦充满所有非线性空间。

【Charge】The following chord package includes positive chords (major triad, closed string) and negative chords (minor triad, open string), the closed string forms the contour line, the open string forms the Facet lines, and the membrane string fills all the non-linear space.



图 14-2.5、和弦空间包的构成

Figure 14-2.5, the composition of the chord space packet

下面是一组和弦空间包相互作用的视觉实验。

Below is a visual experiment of a set of chord space packages interacting with each other.

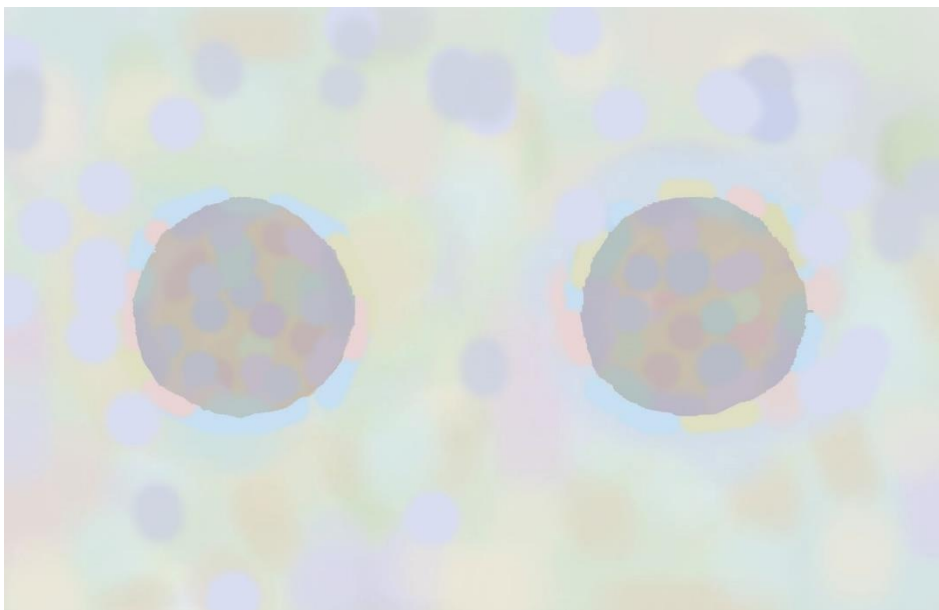


图 14-2.6、左右两个和弦空间包均含有正和弦（大三和弦，闭弦），负和弦（小三和弦，开弦），表现为稳定状态。

Figure 14-2.6. Both the left and right chord space packages contain positive chords (major triad, closed string) and negative chords (minor triad, open string), which are represented as stable states.

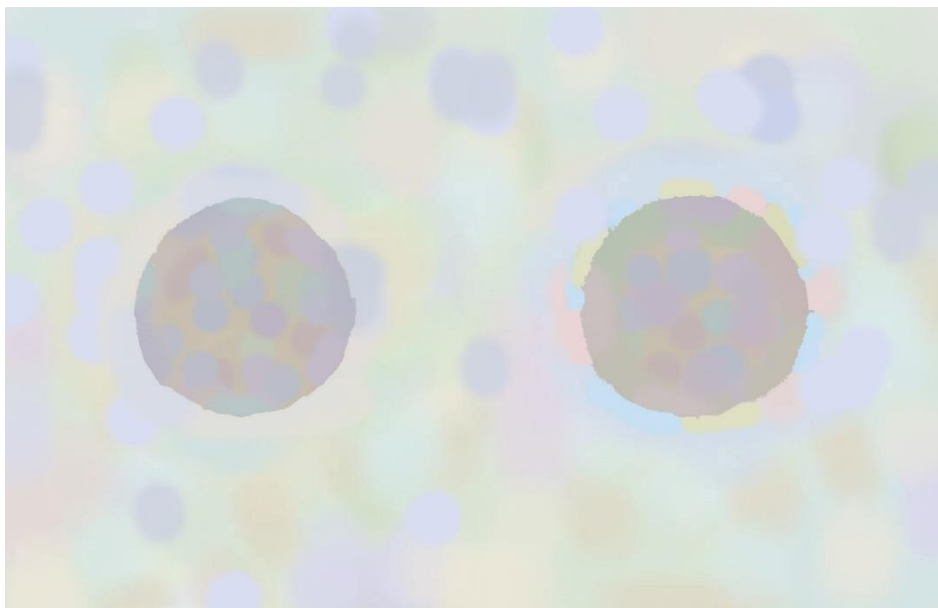


图 14-2.7、左图含大三和弦（正和弦，闭弦），右图含小三和弦（负和弦，开弦），分别为正、负和弦空间包，表现出相互吸引的倾向。

Figure 14-2.7, the left picture contains the major triad (positive chord, closed string), the right picture contains the minor triad (negative chord, open string), respectively, positive and negative chord space packages, showing a tendency to attract each other.

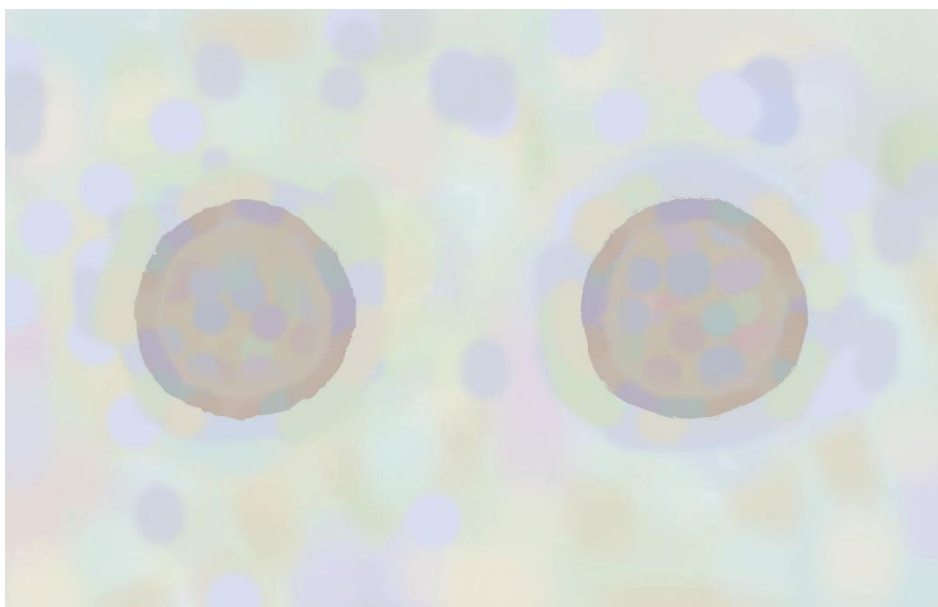


图 14-2.8、左，右两个和弦包都含同种三和弦（小三和弦，负和弦，开弦），表现出相互排斥的倾向。

Figure 14-2.8. Both left and right chord packages contain the same triad (minor triad, negative chord, open string), showing a tendency to exclude each other.

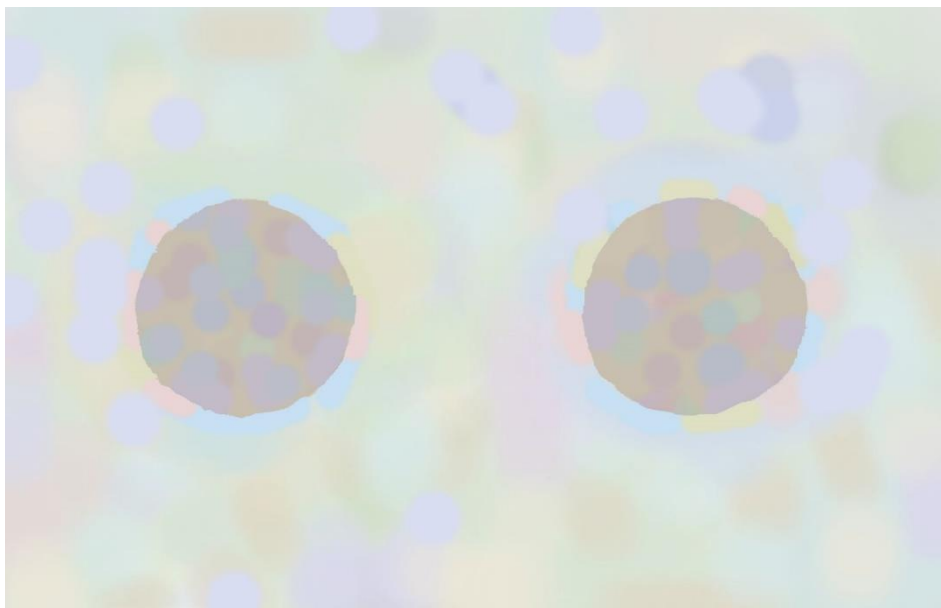


图 14-2.9、左, 右两个和弦包都含同种三和弦 (大三和弦, 正和弦, 闭弦), 表现出相互排斥的倾向。

Figure 14-2.9, left and right chord packages contain the same triad (major triad, normal chord, closed string), showing a tendency to exclude each other.

上面的视觉实验中, 和弦空间包的表现类似电场效应, 两种和弦之间存在库伦力, 合理的解释是: 正-负电荷来自正-负和弦。

In the above visual experiment, the chord space package behaves like an electric field effect, there is a coulomb force between the two chords, and the reasonable explanation is that the positive-negative charge comes from the positive-negative chord.

大三和弦 (闭弦、正电荷) 用于构成轮廓线, 封闭、束缚空间包, 不能脱离和弦空间包, 小三和弦 (开弦、负电荷) 可以自由的出现和弦空间包的内外。

Positive major triads (closed strings, positive charges) are used to form contour lines, closed and bound space packet, and cannot be separated from membrane chords space packet, minor triads (open strings, negative charges) can freely appear inside-outside of the chord space packet .

【磁荷】 爵士音阶和弦包的膜和弦是全音阶和弦, 全音阶和弦包含六个音符, 各音符分别具有正-负属性与色荷, 所有色荷混合产生白色。

【Magnetic charge】 The membrane chord of the chord packet of the jazz Scale is the diatonic chord. The diatonic chord contains six notes, and each note has positive-negative attributes and color charges, and all color charges are mixed to produce white.

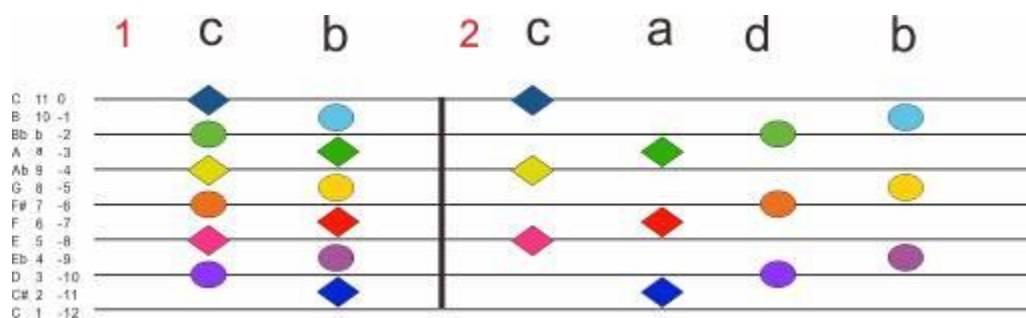


图 14-2.10、1、全音阶和弦；2、增三和弦（◆=正音符，●=负音符，色彩=色荷）

Figure 14-2.10, 1. Diatonic chords; 2. Augmented triads (◆=positive note, ●=negative note, color=color charge)

全音阶和弦充满所有非线性空间，在被闭弦（轮廓线）的环绕条件下，全音阶和弦表现出如下特征：其中的正-负音符分别倾向于在图形轮廓线（闭弦）外的上下对立位置聚集，形成正极与负极，与磁场中的±磁荷分布形态符合。

Diatonic chords fill all non-linear Spaces. When surrounded by closed strings (contours), diatonic chords exhibit the following characteristics: the positive and negative notes tend to gather in the upper and lower opposite positions outside the contour of the figure (closed strings), forming positive and negative poles, which are consistent with the distribution pattern of \pm magnetic charges in the magnetic field.

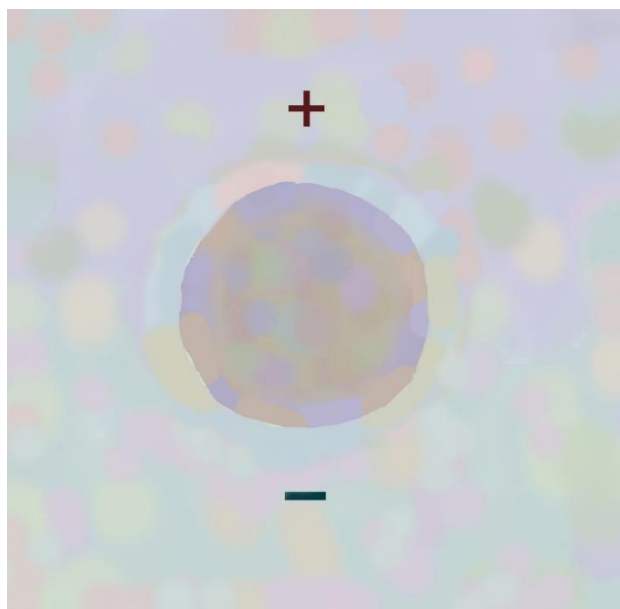


图 14-2.11、全音阶和弦中的±音符分布表现出类似±磁荷的特征

FIG. 14-2.11. the \pm notes in diatonic chords show characteristics similar to \pm Magnetic charge

以上观察的印象是：电荷来自三和弦，磁荷来自膜和弦，大三和弦（闭弦）带正电荷，小三和弦

（开弦）带负电荷，闭弦两侧的膜和弦中，正-负音符产生正-负磁荷，在远离闭和弦的（闭弦）空间区域，膜和弦不表现磁极特征。

The impression of the above observation is that the charge comes from the triad, the magnetic charge comes from the membrane chord, the major triad (closed string) has a positive charge, the minor triad (open string) has a negative charge, in the membrane chord on either side of the closed string, the positive - negative note produces a positive - negative magnetic charge, and in the region of space away from the closed chord (closed string), the membrane chord does not show magnetic pole characteristics.

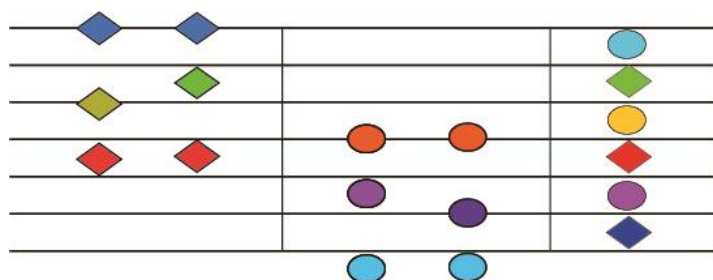


图 14-2.12、爵士音阶和弦包：1、F# 小三和弦（开弦，负电荷），2、A 大三和弦（闭弦，正电荷），3、全音阶和弦（膜弦，磁荷）（◆=正音符，●=负音符，色彩=色荷）

Figure 14-2.12. The chord packet of the jazz Scale: 1. F# minor triad (open string, negative charge), 2. A major triad (closed string, positive charge), 3. diatonic chord (membrane string, Magnetic charge) (◆=positive note, ●=negative note, color=color charge)

大三和弦（闭弦），小三和弦（开弦），等比数列和弦（膜弦）产生电荷，磁荷，电磁场。

Major triads (closed strings), minor triads (open strings), and isometric series chords (membrane strings) generate electric charges, magnetic charges, and electromagnetic fields.

上面观察表明：±电荷，±磁荷来自±音符。

The above observation shows that ± charge, ± magnetic charge comes from ± note.

正电子（闭弦）与其束缚的膜和弦（膜弦）不能分离，两者共同表现为质子，带正电荷。

The positron (closed string) cannot be separated from its bound membrane chord (membrane string), and both appear together as protons, with a positive charge.

闭弦与膜弦的相互作用还有如下特征：膜弦中的各音符被闭弦环绕，束缚在和弦包中，类似夸克禁闭与强相互作用。

The interaction between the closed string and the membrane string also has the following characteristics: the notes in the membrane string are surrounded by the closed string and bound in

the chord packet, similar to quark confinement and strong interaction.

开弦在和弦包中产生分离作用: 包括分面与图形分裂, 类似弱相互作用。

Open strings produce separation effects in the chord package: including faceting and figure splitting, similar to weak interactions.

膜和弦在无调性解决 (solution) 时, 和弦包不含三和弦 (正-负电子), 表现为不带电荷的中性和弦包 (中子)。

Membrane chords In the atonal solution, the chord package contains no triads (positive-negative electrons) and appears as a neutral chord package with no charge (neutrons).

增三和弦 (augmented triads) 只含有正音符或负音符, 不能表现出 \pm 磁荷。

augmented triads contain only positive or negative notes and cannot show \pm magnetic charges.

天体与原子都是和弦包空间包 (调), 但恒星系是和弦空间包群 (调群), 两者是不同的空间组织。

Celestial bodies and atoms are both chord-packet-space-packet (tone), but star systems are chord-space-packet groups (tone groups). The two are different spatial organizations.

14-2.2. Chord Packet Spectrum; 和弦包光谱

和弦空间的基本单位为和弦空间包, 各调的和弦空间包都有其特征光谱。

The basic unit of chord space is the chord space packet, and the chord space packet of each key has its characteristic spectrum.

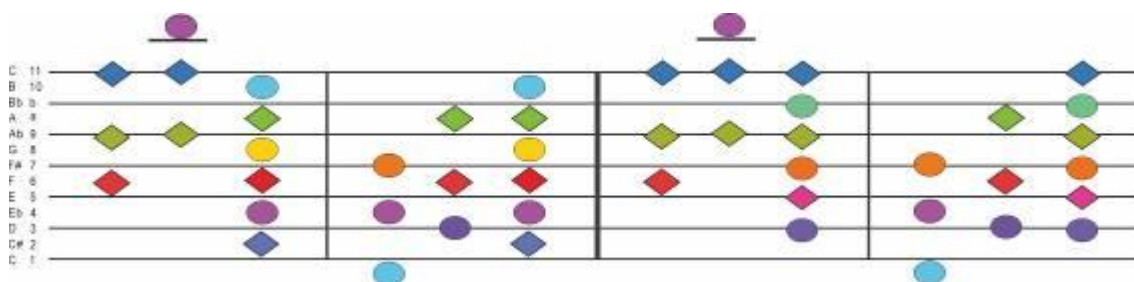


图 14-2.13: C 大调、Eb 小调、f#小调; A 大调和弦包特征光谱

Figure 14-2.13: C major, Eb minor, f# minor; A major chord packet characteristic spectrum

将和弦空间包的特征光谱与原子光谱进行比较, 或是个好主意。

It may be a good idea to compare the characteristic spectrum of the chord space Packet with the spectrum of atoms.

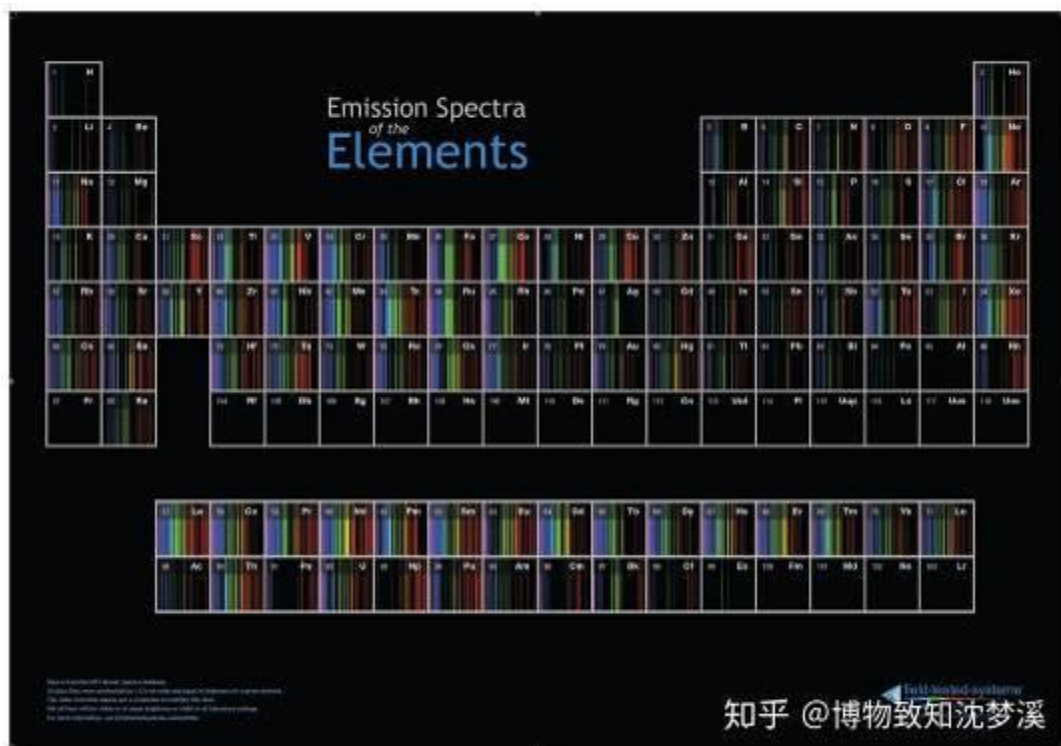


图 14-2.14、元素光谱

Figure 14-2.14, element spectrum

（计算方法见：和弦（量子）数学）

(For the calculation method, see: 1. Chord Mathematical; Chord Math)

14-3. Space-Time Duality;时-空二相性

和弦语言包含时间语义和空间语义，在本书前面部分已经介绍了和弦空间语义，本节侧重介绍时-空关系。

Chord language includes temporal and spatial semantics. Chord spatial semantics have been introduced earlier in this book. This section focuses on space-time relations.

和弦时间与和弦空间互为镜像（ $H^n \cdot f$, $H^{-n} \cdot f$, $H=1.059463$ ），两者互为反和弦（反物质），时间是反空间，空间是反时间，可以相互转换，不依赖时钟，尺子。

Chord time and chord space are mirror images of each other ($H^n \cdot f$, $H^{-n} \cdot f$, $H=1.059463$), the two are anti-chord (antimatter), time is anti-space, space is anti-time, can be converted to each other, independent of clocks, rulers.

和弦时空由和弦定义，包括空间定义（定域性：图-底，分形等）与时间定义（非定域性：时段、

音序等), 定域性与非定域性产生时空二相性 (波粒二相性)。

Chord space-time is defined by chords, including spatial definition (locality: figure-ground, fractal, etc.) and time definition (non-locality: time period, sequence, etc.), and locality and non-locality produce space-time duality (wave-particle duality).

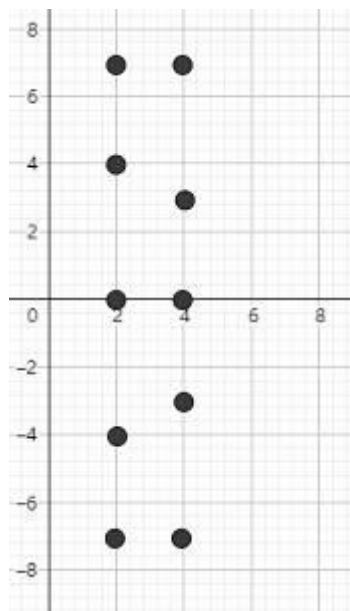


图 14-3.1、C 大三和弦-小三和弦的镜像-对称形式。

Figure 1-6. The mirror-symmetrical form of the C major triad-minor triad.

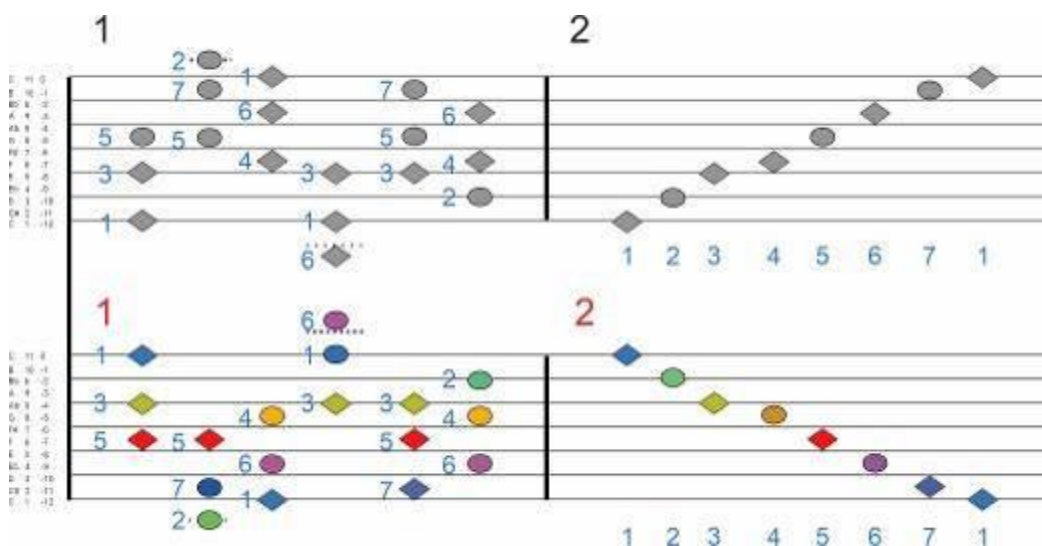


图 14-3.2、平均律镜像坐标: 和弦时间 (上), 和弦空间 (下) 互为反和弦, 反音阶

Figure 14-4.1. Mirror coordinates of the equal temperament: chord time (top), chord space (bottom) are mutually anti-chords, anti-scale

和弦时间是纯能量 (频率, 振幅等) 变化, 不依赖外部时钟 (外部参考系)。

Chord time is generated by changes in pure energy (frequency, amplitude, etc.), does not

depend on an external clock (external reference frame).

和弦时间包构成“时段”，主和弦构成时段的边界，等比数列和弦填充主和弦之外的时间。

The chord time packet forms the "period", the tonic chord forms the boundary of the period, and the Geometric sequence chord fills the time outside the tonic chord.

时间与空间的边界都需要由三和弦定义，缺乏边界定义，等比数列和弦没有确定的时-空状态。

The boundaries of time and space need to be defined by triads. Without boundary definitions, Geometric sequence chord have no definite Space-time state.

时间和弦不含空间语义，没有空间状态（非定域性），可以处于任意空间位置的叠加态；反之，空间和弦不含时间语义，没有时间状态（非时段性），处于任意时间的叠加态；两者构成了和弦语言的“时空二相性”，类似“波粒二相性”。

Time chord do not contain spatial semantics, have no spatial state (non-localized), and can be in a superposition state at any spatial position; conversely, space chords do not contain temporal semantics, have no time state (non-periodic), and are in a superposition state at any time; The two constitute the "space-time duality" of the chord language, similar to the "wave-particle duality".

在巴赫的乐曲中，我们只能观察到和弦，旋律（和弦频谱）变化产生的时间；不能观察到任何空间语义，如：位置，形状等，它是不可视物质，是纯时间。

In Bach's music, we can only observe the time when the chords and melody (discrete frequency spectrum) change; we cannot observe any space semantics, such as position, shape, etc. It is an invisible matter, it is pure time.

纯时间状态下，空间无意义，如果一定要对巴赫的乐曲做出空间描述，那就只能是：任意空间位置的叠加态（superposition state）。

In the state of pure time, space is meaningless. If Bach's music must be described in space, it can only be a superposition state at any spatial position.

如果要在巴赫的作品中观察到位置，形状等空间属性，唯一的途径应是：将和弦时间转化为它的镜像-对称形式——和弦空间；满足这一条件，空间位置、形状出现，空间位置的叠加态消失。

If spatial properties such as position, shape, etc. are to be observed in Bach's work, the only way to do this is to transform membrane chords time into its mirror-symmetrical form— chord space; When this condition is met, the spatial position and shape appear, and the superposition of the spatial position disappears.



图 14-3.3、巴赫手稿

Figure 14-4.2. Bach manuscript

和弦时空中的维纳斯具有“时空二相性”；莫奈的维纳斯是空间表达，具有“定域性”，不能处于既在卢浮宫又在奥赛的叠加态；莫扎特的维纳斯是时间表达，具有“非定域性”，可处于任意空间位置的叠加态——包括卢浮宫和奥赛——维纳斯具有莫奈（空间）-莫扎特（时间）二相性（波粒二相性）。

Venus in chord space-time has "space-time duality "; Monet's Venus is a spatial expression with "localization", which can not be in the superposition of both the Louvre and the Orsay. Mozart's Venus is an expression of time that is "non-local" and can be in superposition at any spatial location - including the Louvre and the Orsay - with Monet (space) -Mozart (time) duality (wave-particle duality).

14-3. 1. Movement; 运动

和弦时空在音乐与绘画中分别表现为“纯时间”与“纯空间”，纯时间不含空间表达，纯空间不含时间表达，两种状态是速度的极限，或 $v=t/s$ 失效。

Chord space-time is represented in music and painting as "pure time" and "pure space" respectively, pure time does not contain spatial expression, pure space does not contain time expression, the two states are the limit of speed, or $v=t/s$ failure.

和弦时空基于和弦频谱，是能量的不同形式（时间能与空间能），时间表达非定域性（动），空间

表达定域性（非动），两者叠加产生空间运动。

Chord spacetime is based on chord spectrum, which is different forms of energy (time energy and space energy), time reaches non-locality (motion), space expresses locality (non-motion), and the superposition of the two produces spatial motion.

设: $s+t=1$; s =和弦空间, t =和弦时间

Let: $s+t=1$; s =chord space(boundary, diameter), t =chord time(unbounded, diameter)

当 $s=0$, 表达为纯时间, 非定域性, 无空间。

When $s=0$, it is expressed as pure time, non-locality, and no space.

$t=0$, 表达为纯空间, 定域性, 无时间。

$t=0$, expressed as pure space, locality, no time.

$v=t/t+s$ 。

和弦时空中, 速度与外部参考系无关。

In chord spacetime, velocity is independent of the external reference frame.

和弦时间与和弦空间互为反和弦（镜像-对称），可以相互转换，在纯时间中，空间消失，在纯空间中，时间消失，这表明：和弦时空可以不连续。

Chord time and chord space are antichords to each other (mirror image - symmetry), which can be transformed into each other in mathematics, in pure time, space disappears, in pure space, time disappears, which shows that chord space-time can be discontinuous.

4. Spatial Interaction;空间相互作用

在和弦空间场中, 所有和弦, 和弦空间包都相互关联与作用, 常见的作用方式为: 分离与结合。

In the chord space field, all chords and chord space packages are related and acted on each other, and the common modes of action are: separation and combination.

闭和弦（闭弦, 轮廓线）主要表现为结合作用, 包括: 图形结合与图-图结合（figure-figure combine），也有分离作用, 如: 图-底分离, 图-图分离。

Closed chords (closed strings, contour lines) mainly manifest themselves as combining effects, including: figure combining and figure-figure combining (figure-figure combine), and also have separating effects, such as: figure-ground separation, figure-figure separation.

开和弦（开弦, 分面线）主要表现为分离作用, 在图形轮廓线的内-外产生分面作用, 其变化形式

下也能产生图-图分离作用。

Open chords (open strings, faceting lines) mainly manifest as a separating effect, producing a faceting effect inside and outside the figure contour line, and its changing form can also produce a figure-figure separating effect.

两种和弦可能与强、弱相互作用有关。

Both chords may be associated with strong and weak interactions.



图 14-4.1、闭弦，开弦，膜弦的空间作用

Figure 14-5.1. The space effect of closed strings, open strings, and membrane strings

空间相互作用有两种方式：电磁作用与非电磁作用：和弦（调性）空间的相互作用是闭弦（正电子），开弦（负电子），膜弦（磁场）的作用，是电磁作用；非和弦（无调性）空间不含闭弦（正电子）、开弦（负电子），是非电磁作用。

There are two ways of space interaction: electromagnetic and non-electromagnetic interaction: Chord (tonality) Space interaction is closed string (positron), open string (negative electron), membrane string (magnetic field), is electromagnetic action; Non-chord (atonal) space does not contain closed strings (positrons), open strings (negative electrons), and is non-electromagnetic.



图 14-4.2、无调性空间相互作用

Figure 14-5.2. Figure-figure combination of the Membrane chords。

完型性：完型性与闭弦，减七和弦有关，空间包相互作用与完型性相关，完型性越高，结合力（引力）越大，由此可产生宇宙秩序，如：星系，恒星系等。参见：8.Gestalt;完形性，13.Multi-Layer Key Group;多层调群。

Gestalt: space packet interaction is related to gestalt, the higher the gestalt, the greater the binding force (gravity), which can produce cosmic order, such as: galaxies, stars, etc. See: 8.Gestalt, 13.Multi-Layer Key Group



图 14-4.3、完型性的结合（引力）作用

Figure 14-4.3. Binding (gravitational) action of gestalt

该内容涉及较多，需要参阅本书前面全部章节。

This section is much more extensive, and you need to refer to all the previous chapters in this book.

14-5.Chord Space-Time Measurement;和弦时空测量

在和弦时空的观察、测量中，一些和弦语言特征可能被观察到。

In the observation and measurement of chord space -time, some chord language features may be observed.

1、离散性：和弦时-空由和弦表达，可测量到一系列频率（能量）值，不是任何频率（能量）都能进入和弦系统，系统只接受和弦法则允许的一系列离散值（ $C=H^n \cdot f$, $H=1.059463$ ），表现为和弦频谱。

1, discrete: chord space-time is expressed by the chord, can be measured to a series of frequency (energy) values, not any frequency (energy) can enter the chord system, the system only accepts a series of discrete values allowed by the chord law ($C=H^n \cdot f$, $H=1.059463$), expressed as the chord spectrum.

2、和弦空间语义：和弦空间由和弦表达，和弦按空间语义分为：开弦，闭弦，膜弦。（参见：

3、和弦与弦）

2. Chord space semantics: Chord space is expressed by chords, and chords are divided into open strings, closed strings, and membrane strings according to spatial semantics. (See: 3, Chords and Strings)

3、±对称：和弦时-空的“基本粒子”是±音符；和弦组织都涉及±音符对称性。

3. ± symmetry: the "fundamental particle" of chord space time is ± note; chord organization involves ± note symmetry.

4、时-空二相性：时间和弦与空间和弦互为反和弦，数学形式为：镜像-对称，和弦时间具有非定域性，和弦空间具有定域性，在观察中会表现出“时空二相性”（波粒二相性）。

4. Time-space duality: time chord and space chord are antichords to each other, and the mathematical form is: mirror image and symmetry. Chord time has non-locality, chord space has

locality, and the observation will show "space-time duality" (wave-particle duality).

Reference;参考

Basic Theory Of Music; 音乐基础理论

Harmony; 和声学

Chord Painting; 和弦绘画

General Physics; 普通物理学

The Nobel Prize in Physics 2023: [The Nobel Prize in Physics 2023 - Popular science background](#)

15. Chord Biology;和弦生命

人类观察到两种生命形式: 和弦(量子化频谱, 弦)与生物体(细胞, 分子等), 分别来自和弦观察者(自观察者)与非和弦观察者(外观察者), 生命是和弦场与生物体二层存在。

Humans observe two forms of life: chords (quantized spectrum, strings) and organisms (cells, molecules, etc.), which come from chord observers (self-observers) and non-chord observers (external observers), respectively, and life is a two-layer existence of chord fields and organisms.

和弦在人体上表现为经络(脉轮)系统, 来自和弦观察者的自观察: 十二经络具有受激反应特征频率, 分布为: 十二平均律(Equal Temperament), 与音乐, 绘画共同基于和弦数学模型, 表现为: 和弦编码, 和弦场(生命场)。

Chords are manifested in the human body as a system of meridians (chakras) from the self-observation of chord observers; The twelve meridians have the characteristic frequency of stimulated response, and the distribution is: twelve Equal Temperament, which is based on the mathematical model of chord with music and painting, and is represented as chord field (life field).

经络(脉轮)是生命的和弦形式, 也是自我(Atman)的和弦形式, 自我(Atman)是生命本体, 相对独立于生物体, 服从和弦场的自然法则, 其生-死是移调(Transpose)事件, 其终极目的是永生。

Meridians (chakras) are the chord form of life and also the chord form of self (Atman). Self (Atman) is the life entity, relatively independent of the organism, and obeys the natural laws of the chord field. Its birth and death are transpose events, and its ultimate goal is immortality.

5-1. Qualitative And Dimensional;定性定量

十二正经(Twelve regular meridians)是经络系统的主体, 每一经络都具有特征频率与正-负(阴-阳)属性, 这是本节的要点。

Twelve regular meridians are the main body of the meridian system. Each meridian has a characteristic frequency and positive-negative attributes. This is the main point of this section.

本文数据来自对人体经络系统(和弦编码系统)的自观察: 经络对乐音-色光的受激反应; 不同的

频率的乐音-色光在不同经络上诱发受激反应, 表现为经络线路区域出现相应体觉——循经传感 (Propagated sensation along the channels), 特定经络的受激反应与乐音-色光的频率相关。

The data in this article comes from the self-observation of the human body meridian system (chord coding system): the stimulated response of the meridian to the music tone-color light; the different frequency of the music-color light induces the stimulated response on the different meridians, which is expressed as the meridian Corresponding somatosensory emerges in the line area—Propagated sensation along the channels. The stimulated response of a specific meridian is related to the frequency of music tone-color light.

上述观察得到如下结果:

The above observations have the following results:

在十二正经 (Twelve regular meridians) 中, 每一经络均能在乐音信号作用下产生受激反应, 表现为: 循经传感 (Propagated sensation along the channels)。

In the Twelve regular meridians, each meridian can produce an stimulated response under the action of music signals, which is expressed as: Propagated sensation along the channels.

特定经络只对特定频率的乐音产生受激反应, 对其余频率无确定的反应: 十二正经 (Twelve regular meridians) 具有受激反应特征频率, 具有类似“弦共振”的性质。

Specific meridians only produce an stimulated response to music with a specific frequency, and have no definite response to other frequencies: Twelve regular meridians have a characteristic frequency of stimulated response, which is similar to "string resonance"

以膀胱经 (bladder meridian) 为例: 下表中的频率均能在膀胱经 (bladder meridian) 上诱发受激反应。

Take the bladder meridian as an example: the frequencies in the table below can all induce a stimulated response on the bladder meridian.



图 15-1.1、C 音的倍频数列。

Figure 15-1.1. The octave sequence of C tone.

*和弦取值的计算方法见：1、和弦数学模型

*For the calculation method of chord value, please refer to: 1. Chord Mathematical Model

用色光作刺激信号，对十二正经（Twelve regular meridians）进行观察，得出如下结果：

Using colored light as a stimulus signal and observing the Twelve regular meridians, the following results are obtained:

1、在十二正经中，各经络均能在色光的刺激作用下出现受激反应。

1. In the twelve regular meridians, each meridian can have a stimulated response under the stimulation of color light.

2、特定经络只在特定频率的色光作用下产生反应，而对其它频率的反应不确定。

2. A specific meridian only reacts under the action of the color light of a specific frequency, and the response to other frequencies is uncertain.

这与光电效应非常相似，经络只接受特定能量值，仍以膀胱经（bladder meridian）为例：它只在频率为 690 兆赫的蓝光作用下出现受激—反应，而对其它频率的反应不确定。

This is very similar to the photoelectric effect. The meridian only accepts a specific energy value. Take the bladder meridian as an example: it only appears stimulated-response under the action of blue light with a frequency of 690 MHz, while the response to other frequencies is uncertain.

十二正经分别具有不同的受激-反应特征频率，乐音、色光、十二正经与十二平均律的对应关系之间如下：

The Twelve regular meridians have different stimulus-response characteristic frequencies, and the corresponding relations between musical tone, color light, Twelve regular meridians and the equal temperament are as follows:

指数 Exponential	12 进制 Duodecimal	音名 pitch names	色彩 Color	±	十二经络 Twelve Meridians
12	11	C	blue	+	Bladder channel;足太阳膀胱经
11	10	B	cyan	-	Kidney channel;足少阴肾经
10	b	Bb	Green	-	Pericardium channel;手厥阴心包经
9	a	A	yellowgreen	+	Triple burner channel;手少阳三焦经
8	9	Ab	yellow	+	Gallbladder channel;足少阳胆经
7	8	G	yelloworange	-	Liver channel;手厥阴肝经
6	7	F#	orange	-	Lung channel;手太阴肺经
5	6	F	Red-orange	+	Large intestine channel;手阳明大肠经
4	5	E	Red	+	Stomach channel;足阳明胃经
3	4	Eb	purplishred	-	Spleen channel;足太阴脾经
2	3	D	purplishred	-	Heart channel;手少阴心经
1	2	C#	indigo	+	Small-intestine channel;手太阳小肠经
0	1	C	blue	+	Bladderchannel;足太阳膀胱经

图 1-3：十二平均律（Equal Temperament）元素对应表

Figure 1-3: Equal Temperament element correspondence table

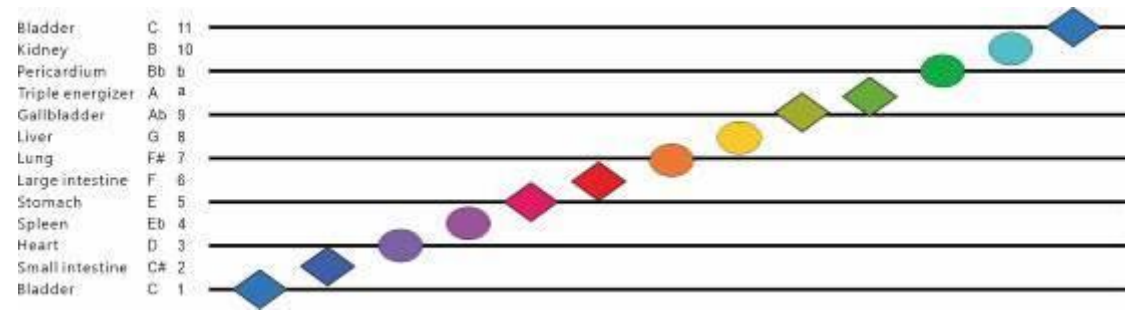


图 15-1.3：乐音、色光、十二正经与十二平均律的对应关系（坐标）

Figure 15-1.3: Correspondence between music tone, color light, Twelve regular meridians and twelve equal temperament (coordinates)

*和弦取值的计算方法见：1、和弦数学模型

*For the calculation method of chord value, please refer to: 1. Chord Mathematical Model

以上定性、定量观察表明：经络是和弦语言现象。

The above qualitative and quantitative observations show that the meridian is a phenomenon of chord language.

表中的音符含有±标记，这是经络（频率）的另一重要属性。

The notes in the table contain ± marks, which is another important attribute of meridians (frequency).

经络的正-负（阴-阳）属性，由《黄帝内经》等古代医学著作记载，频率值与正-负（阴-阳）值

不可分割，应是某种物理属性。见图 15-1.2，图 15-1.3，请注意音符上的±标记。

The positive-negative (yin-yang) attribute of the meridian is recorded in ancient medical works such as Huangdi Neijing. The frequency value is inseparable from the positive-negative (yin-yang) value and should be a certain physical attribute. See Figure 15-1.2, Figure 15-1.3, please pay attention to the ± mark on the note.

频率值与正-负值都是重要的和弦编码元素，对和弦语法、语义具有支配作用，在和弦实验中可观察，验证。请参阅前面：1，2，3，4 等章节。

Frequency and positive-negative values are both important chord coding elements, which dominate the chord syntax and semantics, and can be observed and verified in chord experiments. Please refer to the previous chapters: 1, 2, 3, 4, etc.

15-2.Chord Distribution On The Human body;人体上的和弦分布

和弦语言在人体上表现为经络系统，线和弦（线和弦）、膜和弦（膜弦）在人体上都有相应的形态-定位，两种和弦组成生命和弦包。

Chord language is expressed as a meridian system on the human body. line chords (line chords) and Membrane chords (membrane chords) have corresponding shapes-positions on the human body. The two chords form a life Chord packet et.

15-2. 1. Line Chord; 线和弦

线和弦（大三和弦、小三和弦）分布在身体左右两侧的十二正经上。

The line chords (major triad, minor triad) is distributed on the Twelve regular meridians on the left and right sides of the body.

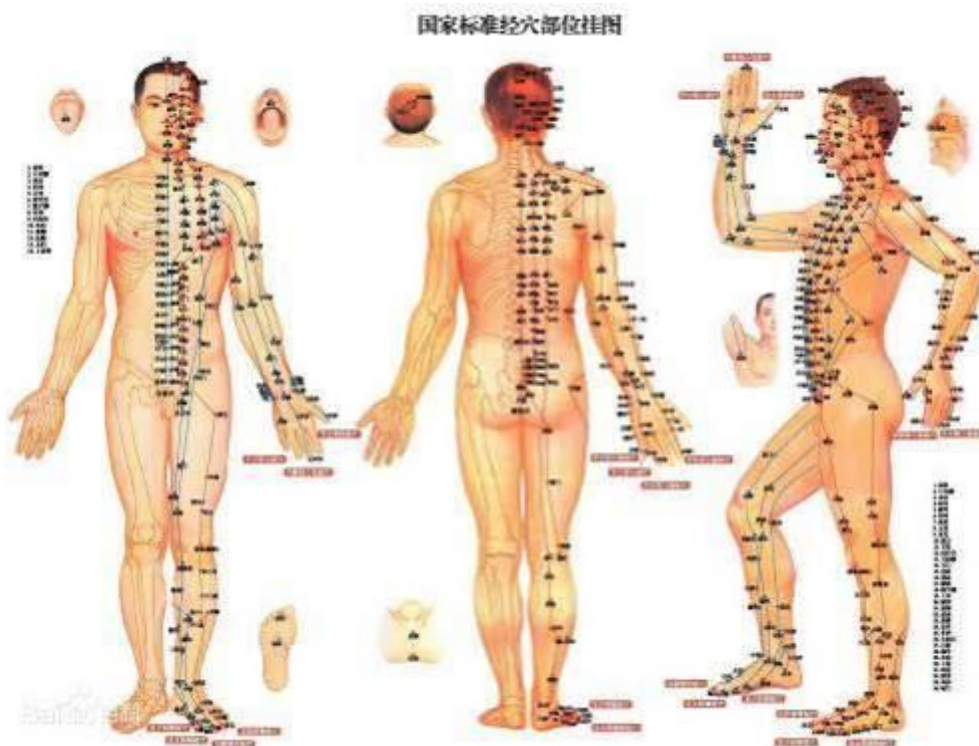


图 15-2.1、十二正经

Figure 15-2.1, Twelve regular meridians

十二正经具有特征频谱与正-负属性, 请注意下图中各和弦上的+、-符号。

The twelve regular meridians have characteristic frequency spectrum and positive-negative attributes. Please pay attention to the + and - signs on each chord in the figure below.

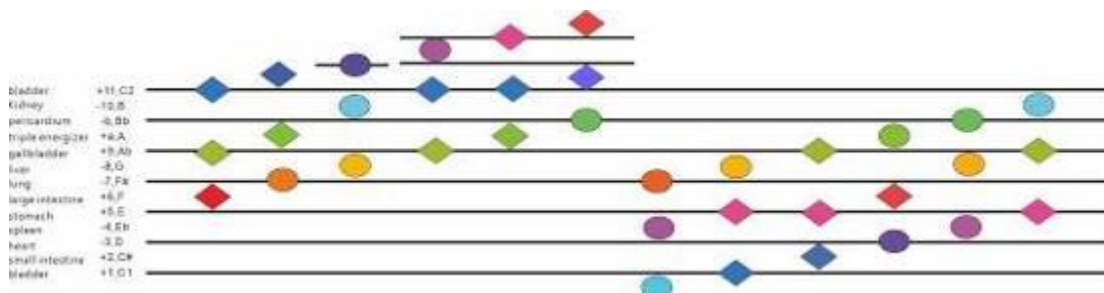


图 15-2.1、十二正经上的线和弦 (◆=正音符, ●=负音符, 色彩=色荷)

Figure 15-2.1 The line chords on the Twelve regular meridians (◆=positive note, ●=negative note, color=color charge)

*和弦取值的计算方法见: 1、和弦数学模型

*For the calculation method of chord value, please refer to: 1. Chord Mathematical Model

身体左右两侧的线和弦相同, 但两侧的音阶、调集团形式有显著的区别, 在后面有专门介绍。

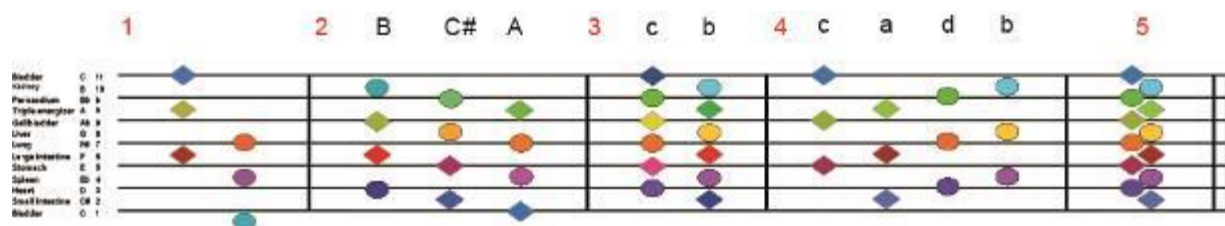
The line chords on the left and right sides of the body are the same, but there are significant

differences in the scales and key groups on both sides, which will be introduced later.

15-2. 2. Membrane chords; 膜和弦

膜和弦分布在躯干中央的任脉（Ren meridian）、督脉（Du meridian）上。

The Membrane chords is distributed on the Ren meridian and Du meridian in the center of the trunk.



基本和弦表: 1-1、大三和弦（闭弦）、1-2、小三和弦（开弦）、2、减七和弦（膜弦）、3、全音阶和弦（膜弦）、4、增三和弦（膜弦）、5、半音阶和弦（膜弦）

*和弦频谱公式: $2^n \cdot f$, $n \cdot f$, $H^n \cdot f$, $H=1.059463$, $n=1,2,3,\dots,n$

*符号: ◆=+音符, ●=-音符, 音符色=色荷

Basic chord table: 1-1, major triad (closed string), 1-2, minor triad (open string), 2, diminished 7th (membrane string), 3, diatonic chord (membrane string), 4, augmented Triads (membrane strings), 5. Chromatic Chord (membrane string)

* Chord spectrum formula: $2^n \cdot f$, $n \cdot f$, $H^n \cdot f$, $H=1.059463$, $n=1,2,3,\dots,n$

* Symbol: ◆=+ note, ●=- note, note color = color charge

*和弦取值的计算方法见: 1、和弦数学模型

*For the calculation method of chord value, please refer to: 1. Chord Mathematical Model

下图: 膜和弦在人体上的分布

Below: the distribution of the Membrane chords on the human body

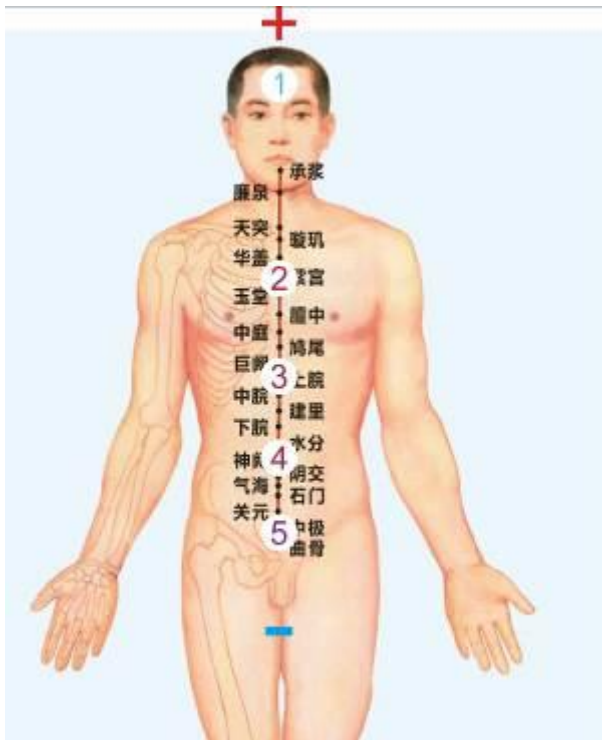


图 15-2.3、膜和弦在任脉，督脉上的分布

Figure 15-2.3, the distribution of the Membrane chords on the Ren and Du channels

膜和弦位置：1、Bdim7：神庭；3、C#dim7：膻中*；4、Adim7：关元；百会：正磁极*；会阴：负磁极*。

Membrane chord position: 1, Bdim7: Shenting; 3, C#dim7: Tanzhong *; 4. Adim7: Guan yuan; Baihui: positive magnetic pole *; Perineum: negative magnetic pole *.

*C#dim7 具有动态位置，其完形状态越高，位置越靠上，并可占据其它减七和弦的位置。

*C#dim7 has dynamic positions, the higher the gestalt state, the higher the position, and can occupy the position of other diminished 7th.

*表中+、一号位置是人体的南北磁极。

*The positions of + and-in the table are the north and south magnetic poles of the human body.

*全音阶和弦是减七和弦的弱调性形式。

经络（中国医学）与脉轮（瑜伽），丹田（道教）具有显著的相关性，从下面图例中可以看出他们之间的联系：

Meridians (Chinese medicine), chakras (yoga), and dantian (Taoism) have a significant correlation. The connection between them can be seen from the following illustration:



图 15-2.5、三脉七轮图（瑜伽及相关宗教）

Figure 15-2.5, Three Chakras and Seven Chakras (Yoga and related religions)

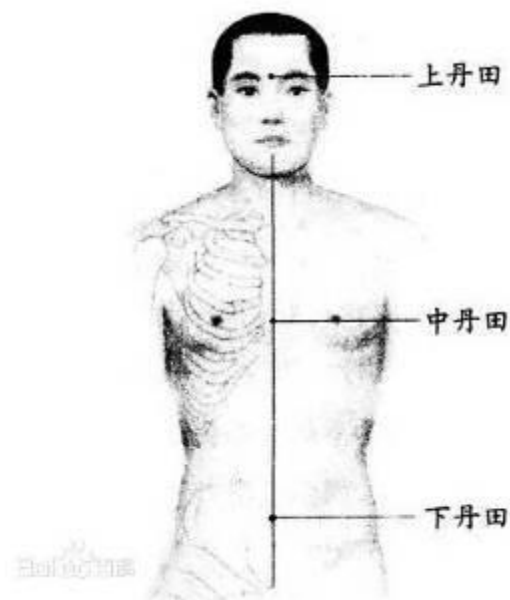


图 15-2.6、丹田位置图（中国道教）。

Figure 15-2.6. Location map of Dantian (Chinese Taoism).

从上面三个图例中，可以看出东方的生命-宗教的观察方法（自观察）与观察基础。

From the above three illustrations, we can see the method of observation (self-observation) and the basis of observation of Eastern life-religion.

15-3.Chord Life Packet;和弦生命包

位于躯干中轴任脉（Ren meridian）、督脉（Du meridian）上的膜和弦向身体左、右侧的 12 正经（The Twelve regular meridians）上的线和弦解决，构成和弦时空包，和弦生命包是和弦时空包的形式之一。（参见：基本和弦表）

The Membrane chords on the Ren meridian and Du meridian on the central axis of the torso is resolved to the line chords on the twelve regular meridians on the left and right sides of the body, forming a chord space-time packet and a Chord Life packet It is one of the forms of the chord space-time packet. (See: Basic chord Table)

膜和弦分别向身体的左侧与右侧解决，产生各种和弦包。

The Membrane chords resolves to the left and right sides of the body, respectively, producing various chord packet.

左侧解决：减七和弦（diminished 7th）向身体左侧解决，形成七声音阶（Heptachord）和弦包，与七声音阶调集团。

Left side resolution: diminished 7th is resolved to the left side of the body, forming the Heptachord chord package and the Heptachord key group.

生命特征和弦包的构成形式为：纯小三和弦+导音减七和弦（leading note diminished 7th），和弦包语义为：自我（Atman），基于三个减七和弦的和弦包表达不同层级的自我（Atman）。

The composition of the life characteristic chord package is: pure minor triad + leading note diminished 7th , chord packed semantics: self (Atman), chord package based on three diminished 7th express different levels of self (Atman).

右侧解决：全音阶和弦，增三和弦向身体右侧解决，形成爵士音阶和弦包，无调性和弦包。

Right side resolved: diatonic chords, augmented triads are resolved to the right side of the body, forming a jazz Scale chord packet, atonal chord packet.

爵士音阶与无调性体系都会削弱七声音阶的和弦语义，在和弦生命语言中有着特殊的用途。

Both the jazz Scale and the Atonal system weaken the chord semantics of the heptatonic scale and have special uses in the language of chord life.

15-3.1.Mirror (Exterior And Interior) Relationship; 镜像（表里）关系

在生命的和弦表达中，每个和弦都有其镜像和弦，两者互为反和弦，根音符为相邻的两个正负音符。（参阅：1-5.镜像-对称）

In the chord expression of life, each chord has its mirror chord, with the two being opposite chords and the root note being two adjacent positive and negative notes. (Refer to: 1-5. Mirror Symmetric)

十二调（十二经络）中有六对镜像和弦，在中医中被称为：表里（exterior and interior）关系。*

There are six pairs of mirrored chords in the twelve tones (twelve meridians), which are referred to as the "exterior and interior" relationship in traditional Chinese medicine*

15-4.Correspondence Between Human And Universe;天人相应

本节的内容涉及和弦宇宙模型的两个基本法则。（参见：13-1.2、和弦宇宙模型）

This section deals with two fundamental laws of the chord universe model. (See also: 13-1.2, the chord universe model)

1) 和弦语言中，七声音阶纯大调表达天体空间，七声音阶纯小调表达生命空间，是和弦语言±对称法则的体现，生命是宇宙的必然部分。

1) In the chord language, the pure major of the heptatonic scale expresses the celestial space, and the pure minor scale of the heptatonic scale expresses the life space, which is the embodiment of the chord language ± symmetry law, and life is an inevitable part of the universe.

生命-天体关系在七声音阶中表现为图-底大-小调（Figure-Ground Major-Minor），背景纯大调表达天体，图形纯小调表达生命，两者相互依存。（参阅：5-1、图-底大-小调）

The relationship between life and celestial bodies is expressed in the heptatonic scale as Figure-Ground Major-Minor, the pure major key of the background expresses the celestial body, and the pure minor key of the figure expresses life, and the two are interdependent. (See: 5-1, Figure-ground Major-Minor)

2) 和弦空间按照完形性产生天体-生命秩序，完形性高的和弦包处于主导地位，完形性较低的和弦包处于被从属地位。

2) The chord space produces the order of celestial bodies-life according to gestalt, the chord

packet with high gestalt is in the dominant position, and the chord packet with lower gestalt is in the subordinate position.

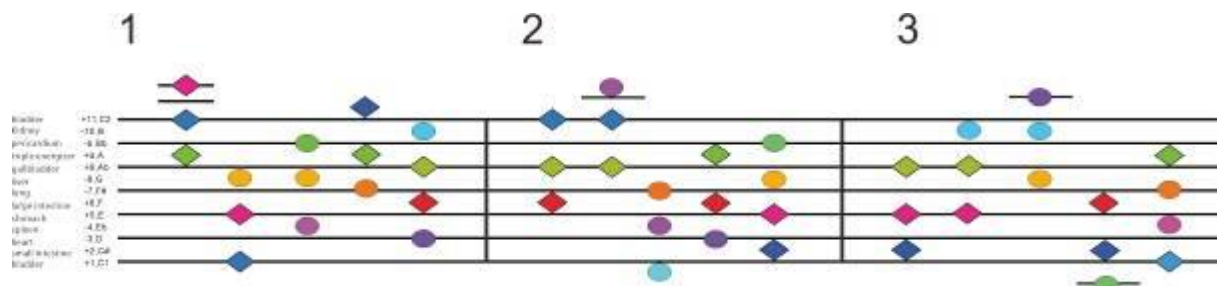


图 15-4、七声音阶图-底大小调

Figure 15-4. heptachord figure-ground major-minor

15-5.Self(Atman);自我 (Atman)

生命和弦包的构成形式为：纯小三和弦+导音减七和弦，主要语义表达为：自我 (Atman)，它是不同于细胞-形态学的另一种生命存在形式。

The form of life chord packet is: pure minor triad + leading tone diminished 7th chord, the main semantic expression is: self (Atman), which is another form of life existence different from cell-morphology.

自我 (Atman) 的形式是：和弦 (H*f)，是物理实在。

The Self (Atman) is in the form of: chords (chord spectrum), which is a physical reality.

导音减七和弦 Bdim7, C#dim7, Adim7 具有不同的完形状态，分别表达不同的自我状态，并形成生命的完形-自我等级。

The leading note diminished 7th chord Bdim7, C#dim7, and Adim7 have different gestalt states, expressing different ego states respectively, and forming the gestalt-ego level of life.

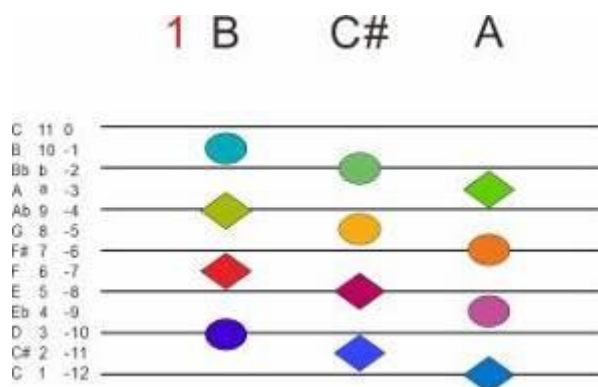


图 8.1、减七和弦表： 1、Bdim7，2、C#dim7，3、Adim7

Figure 8.1. diminished 7th table, 1.Bdim7,2.C#dim7, 3,Adim7

七声音阶中，纯大调表达天体状态，纯小调表达生命（自我）状态，三个导音减七和弦分别表达不同的完形状态。

In the heptatonic scale, the pure major expresses the state of celestial bodies, the pure minor expresses the state of life (self), and the three leading note diminished 7th chords express different gestalt states respectively.

1) Bdim7: 完形；纯小调：神性，神，永生，爱；背景纯大调：星系。

1) Bdim7: Gestalt; pure minor: divinity, god, immortality, love; background pure major: galaxy.

2) C#dim7, 次完形，纯小调：人性，健康，今生；背景纯大调：恒星系。

2) C#dim7, sub-Gestalt, pure minor: human nature, health, this life; background pure major: star system.

3) Adim7: 弱完形；纯小调：魔性，植物性，仇恨，暴力，堕落；背景纯大调：星云。

3) Adim7: Weak Gestalt; Pure Minor: Demonic, Vegetative, Hatred, Violence, Fallen; background Pure Major: Nebula.

*全音阶和弦是减七和弦的弱调性形式。

*The diatonic chord is the weak form of the diminished 7th chord.

C#dim7 是当前生命系统，Bdim7, Adim7 是非同时生命系统。

C#dim7 is the current life system, Bdim7, Adim7 are non-simultaneous life systems.

*参阅：8、完形性

*See also: 8.Gestalt

减七和弦决定生命个体的完形-自我状态，人体中含有三个减七和弦，同时性条件下，由其中之一处于主导地位。

The diminished 7th chord determines the gestalt-ego state of the individual life. There are three diminished 7th chords in the human body, and under the condition of simultaneity, one of them is dominant.

解决方向：三个减七和弦（diminished 7th）组成 B-C#-A 调群，这是和弦语言的全局形式；完形状态较低的和弦包向完形状态较高的和弦包解决，解决方向产生生命的需要：Bdim7 具有最高完形状态，是生命的终极需要，其和弦语义有：自我，神，永生，爱等。（参见：13-2、B-C#-A 调群）

Resolved direction: Three diminished 7th chords form the B-C#-A key group, which is the global

form of chord language; the chord packet with a lower gestalt state is resolved to a chord packet with a higher gestalt state, and the resolved direction is generated The need of life: Bdim7 has the highest gestalt state and is the ultimate need of life, and its chord semantics are: self, god, immortality, love, etc. (See: 13-2, B-C#-A key group)



图 15-4.3、Bdim7-C#dim7-Adim7 调群

Figure 15-4.3, Bdim7-C#dim7-Adim7 key group

生命和弦包的不同完形-自我状态具有不同的执行结果，类似东方宗教中的“业力”。

The different gestalt-ego states of the life chord packet have different execution outcomes, similar to "karma" in Eastern religions.

和弦生命中，神是生命（自我）和弦包的最高完形状态，既可存在于生命内部，也可存在于生命外部。

In the chord life, God is the highest gestalt state of the life (self) chord packet, which can exist both inside the life and outside the life.

15-5. 1. Natural Morality; 自然道德

自然道德基于减七和弦的完形性，通常表现为对生命的态度：爱-恨，善意-恶意，暴力-和平，等。

Natural morality is based on the gestalt of the diminished 7th, which is usually expressed as an attitude towards life: love-hate, kindness-maliciousness, violence-peace, etc.

自然道德现象不限于人类, 如: 母爱, 感恩, 互助等, 它是具有生物意义的自然法则。

Natural moral phenomena are not limited to humans, such as: maternal love, gratitude, mutual assistance, etc., it is a natural law with biomass significance.

和弦包的完形状态及和弦语义主要存在于七声音阶系统, 在爵士音阶, 无调性体系中被不同程度屏蔽。

The gestalt state and chord semantics of the Chord packet mainly exist in the heptachord system, and are shielded to varying degrees in the jazz Scale and Atonal system.

常见的道德现象包括: 自然道德 (Natural morality) 与契约道德 (Contract morality); 前者是和弦语言的自然语义与自然法则, 具有普世性; 后者是人类的社会契约, 具有民族-地域特征; 道德是自然道德与契约道德二层存有。

Common moral phenomena include: natural morality and contract morality; the former is the natural semantics and natural laws of the chord language, which is universal; the latter is the social contract of mankind, with ethnic-regional characteristics; Morality is the two-layer existence of natural morality and contractual morality.

自然道德包含自然奖惩机制, 实现途径是: 和弦生命包的完形状态与自然道德状态保持一致。

Natural morality includes a natural reward and punishment mechanism, and the way to achieve it is: the gestalt state of the Chord Life packet is consistent with the natural moral state.

自然奖惩按以下规则执行:

Natural rewards and punishments are implemented according to the following rules:

1、爱与善意会提升和弦生命包的完形性。

1. Love and kindness increase the gestalt of the chord life Packet.

2、仇恨与攻击会降低和弦生命包的完形性。

2. Hate and attack will reduce the gestalt of the chord life packet.

3、仇恨、伤害他人会以降低自己的完形性为代价; 被仇恨、攻击所伤害者, 会以提升自己的完形性为补偿。

3. Hate and hurt others will reduce their gestalt at the cost; Victims of hate and aggression compensate by improving their gestalt.

自然奖惩机制在各种宗教经典都有相应的表达, 如东方宗教的“因果报应”; 最被人熟悉还有耶稣的一段话: 你们听见有话说, 以眼还眼, 以牙还牙。只是我告诉你们, 不要与恶人作对。有人打你

的右脸，连左脸也转过来由他打。（圣经-新约）

The natural reward and punishment mechanism has corresponding expressions in various religious classics, such as the "karma" of Eastern religions; the most familiar one is a passage from Jesus: You have heard something saying, "An eye for an eye, and a tooth for a tooth." But I tell you, don't fight the wicked. If someone slaps you on the right cheek, turn around and let him hit even the left cheek. (Bible-New Testament)

由自然奖惩获得的和弦包完形状态可以被存储、执行；不同的完形状态有不同的执行结果；具有类似“业”的性质。

The gestalt state of the Chord packet obtained by natural rewards and punishments can be stored and executed; different gestalt states have different execution results; they have a similar "karma" nature.

对自己的恶意、伤害进行忏悔，或者承受疼痛，可以提升自己和谐生命包的完形性，这包含在主流宗教的实践中。

Repenting of one's malice, harm, or suffering can enhance the gestalt of one's chord life packet, which is included in the practice of mainstream religion.

15-6.Life And Death;生-死

人的生命有两种存在形式：和弦（经络，脉轮等）与生物体；分别来自两种观察者：和弦观察者（自观察者）与非和弦观察者（外观察者）——生命是两者的二层存在。

Human life has two forms of existence: chords (meridians, chakras, etc.) and organisms; they come from two kinds of observers: chord observer (self-observer) and non-chord Observer (Outer Observer) - Life is the second layer of existence of both.

和弦在人体上表现为经络（脉轮）；是生命的和弦场形式，也是自我（Atman）的和弦场形式，自我（Atman）是生命本体，服从场的自然法则，不适用生-死等生物学定义。

Chords are represented on the human body as meridians (chakras); It is the chord field form of life, and it is also the chord field form of the self (Atman), which is the essence of life, subject to the natural laws of the field, and does not apply biological definitions such as life-death.

和谐生命的形式是纯小三和弦+导音减七和弦，这里涉及到三个导音减七和弦，C#dim7 是当前生命（今生）和弦，Bdim7，Adim7 都不是当前（今生）和弦，这就意味着当前生命（今生）存在过

去、未来状态。

The form of chord life is pure minor triad + leading diminished 7th chord, which involves three leading note diminished 7th chords, C#dim7 is the current life (this life) chord, Bdim7, Adim7 are not the current (this life) chord, this is It means that the present life (this life) has past and future states.

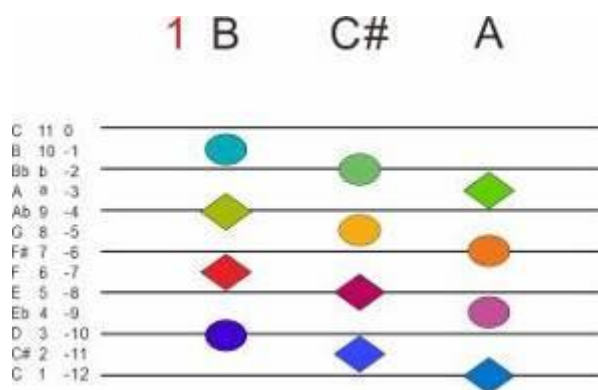


图 8.1、减七和弦表: 1、Bdim7, 2、C#dim7, 3、Adim7

Figure 8.1. Diminished 7th table: 1, Bdim7, 2, C#dim7, 3, Adim7

三个减七和弦: Bdim7, C#dim7, Adim7 在时-空维度上分离 (不同时间或不同空间), 但又能通过转调 (modulation) 相互切换; 其中之一用于当前生命 (今生), 其余两个必然存在, 但处于不同时间, 或不同空间; 死亡是当前生命 (今生) 的转调事件。

Three diminished 7th chords: Bdim7, C#dim7, Adim7 are separated in the space-time dimension (different time or different space), but can be switched to each other by Transpose; one of them is used for the current life (this life), The other two necessarily exist, but in different times, or in different spaces; death is the transmutation event of the present life (this life).

三个减七和弦是过去, 现在, 未来生命的和弦逻辑证据, 转调 (transpose) 过程类似 “轮回”, 生命 (自我) 和弦包在转调中保持永生, 完形状态 (业) 决定新生命 (自我) 的状态。

The three diminished 7th chords are chord logical evidence of past, present, and future life, the transpose process is similar to "reincarnation", the life (self) chord packet remains immortal in the "transpose", and the gestalt state (karma) determines the new life (self) status.

三个减七和弦中, Bdim7 的和弦语义包括 “永生”, 这是 “自我” 的永生, 也是物理实在。Bdim7 是全局调集团的主调, 它产生了生命的终极需要。(见 13、多层调群)

Among the three diminished 7th, the chord semantics of Bdim7 include "immortality", which is the immortality of "self" and physical reality; Bdim7 is the main key of the global key group, which produces the ultimate need for life. (See 13. Multi-Layer Key Group)

生命和弦包是调性系统, 移调后的生命可能会丢失无调性信息, 如: 自然语言。

Life chord packs are tonal systems, and life after transposition may lose atonal information, such as: natural language.

和弦生命由七声音阶系统表达; 在爵士音阶与无调性体系中, 和弦生命语义会减弱, 甚至消失, 这里还需要更多的观察。

The life of chords is expressed by the heptachord scale system; in the jazz Scale and the Atonal system, the chord life semantics will weaken or even disappear, and more observations are needed here.

15-6. 1. Religion; 宗教

多数宗教包含对和弦生命的认识, 通常通过自观察方法获得。

Most religions contain an awareness of chord life, usually obtained through self-observation methods.

多数宗教把灵魂 (Atman) 作为生命本体; 和弦语义包含自我 (Atman), 它是否能独立于生物体存在, 这是关键所在。

Most religions regard the soul (Atman) as the essence of life; Chord semantics include the self (Atman), and whether it can exist independently of the organism is the key.

东方的宗教实践通常与经络 (脉轮) 相关, 在前面的内容中已有提及。

Eastern religious practices are usually related to meridians (chakras), which have been mentioned in the previous content.

和弦语义包含: 完形状态, 自然道德, 自然奖-惩等, 这存在于主流宗教的教义中。

Chord semantics include: gestalt state, natural morality, natural reward - punishment, etc., which exist in the teachings of mainstream religions.

自然语言与和弦语言之间具有可编译性, 这是祷告的自然原理。

There is compilability between natural language and chord language, which is the natural principle of prayer.

和弦生命中, 神是生命和弦包 (空间包) 的完形状态, 只存在于调性系统中, 在无调性系统中被完全屏蔽, 这是“无神论者”的产生原因; 有神论与无神论来自两种观察者: 和弦观察者与非和弦观察者。

In Chord Life, God is the gestalt state of the chord packet of life (space packet). It only exists in the tonal system and is completely shielded in the atonic system. This is the reason for the production of "atheists"; theism and atheism come from Two kinds of observers: chord observer and non-chord observer.

世俗权威仍然基于和弦语义逻辑, 与和弦包(空间包)的解决方向相关, 解决方向为权威主体; 完形解决为完形权威, 如: 由爱产生的权威; 非完形解决的为非完形权威, 如: 恐怖、暴力产生的权威。(参阅前面章节: 13) 世俗权威不是一个独立的问题。

The secular authority is still based on the semantic logic of chords, and is related to the solution direction of the chord package (space package). The solution direction is the authority subject; the gestalt solution is the gestalt authority, such as: authority generated by love; the non-gestalt solution is non-gestalt authority, such as authority generated by terror and violence. (See previous chapter: 13) Secular authority is not an independent issue.

15-7.Chord Medicine;和弦医学

和弦生命现象包括: 经络, 脉轮等, 相关的医学都属于和弦医学, 如中国传统医学, 瑜伽。

Phenomenon of chord life include: meridians, chakras, etc. Related medicines belong to chord medicine, such as traditional Chinese medicine and yoga.

音乐, 绘画都可以直接激发人体的和弦系统(经络, 脉轮), 改善生命-健康状态, 对此已有观察、应用, 如: 音乐、色彩治疗等。

Music and painting can directly stimulate the human body's chord system (meridians, chakras) and improve life-health status. This has been observed and applied, such as music, color therapy, etc.

一些东方宗教与经络, 脉轮相关, 含有和弦医学特征, 如道教, 佛教等。

Some eastern religions are associated with meridians, chakras, and contain chord medical features, such as Taoism, Buddhism, etc.

健康状态与自我状态关联, 如: 减七和弦 C#dim7 是当前(今生)特征和弦, 和弦语义包含“健康”, 理论上, 只要在保持在 C#dim7 的状态下, 便可以一直处于今生, 健康状态。

The health state is related to the ego state, such as: the diminished 7th C#dim7 is the current (this life) characteristic chord, and the chord semantics includes "health". In theory, as long as the

state of C#dim7 is maintained, it can always be in this life, health status.

充分理解生命的和弦编码及其语义作用, 通过实验观察建立相应量纲与数学模型, 应是和弦医学的任务。

It should be the task of chord medicine to fully understand the chord coding of life and its semantic function, and to establish corresponding dimensions and mathematical models through experimental observation.

Appendix;附录

Equal Temperament Periodic Table Of Elements;平均律元素周期表

A	Bb	B	C	C#	D	Eb	E	F	F#	G	Ab
黄绿 Yellow green	绿 Green	蓝绿 Cyan	蓝 Blue	青紫 Indigo	紫 Violet	紫红 purplish red	红 Red	橙红 Red- Orange	橙色 Orange	黄橙 Yellow- Orange	黄 Yellow
三焦 triple warmer	心包 pericard- ium	肾 kidney	膀胱 bladder	小肠 Small-in- testine	心经 heart	脾经 spleen	胃经 stomach	大肠经 Large-in- testine	肺经 lung	肝经 liver	胆经 Gallblad- der
1 H 氢	2 He 氦	3 Li 锂	4 Be 铍	5 B 硼	6 C 碳	7 N 氮	8 O 氧	9 F 氟	10 Ne 氖	11 Na 钠	12 Mg 镁
13 Al 铝	14 Si 硅	15 P 磷	16 S 硫	17 Cl 氯	18 Ar 氩	19 K 钾	20 Ca 钙	21 Sc 钪	22 Ti 钛	23 V 钒	24 Cr 铬
25 Mn 锰	26 Fe 铁	27 Co 钴	28 Ni 镍	29 Cu 铜	30 Zn 锌	31 Ga 镓	32 Ge 锗	33 As 砷	34 Se 硒	35 Br 溴	36 Kr 氪
37 Rb 铷	38 Sr 锶	39 Y 钇	40 Zr 锆	41 Nb 铌	42 Mo 钼	43 Tc 锝	44 Ru 钌	45 Rh 铑	46 Pd 钯	47 Ag 银	48 Cd 镉
49 In 铟	50 Sn 锡	51 Sb 锑	52 Te 碲	53 I 碘	54 Xe 氙	55 Cs 铯	56 Ba 钡	57 La 镧	58 Ce 铈	59 Pr 镨	60 Nd 钕
61 Pm 钷	62 Sm 钐	63 Eu 铕	64 Gd 钆	65 Tb 铽	66 Dy 镝	67 Ho 钬	69 Er 铒	69 Tm 铥	70 Yb 镱	71 Lu 镥	72 Hf 铪
73 Ta 钽	74 W 钨	75 Re 铼	76 Os 锇	77 Ir 铱	78 Pt 铂	79 Au 金	80 Hg 汞	81 Tl 铊	82 Pb 铅	83 Bi 铋	84 Po 钋
85 At 砹	86 Rn 氡	87 Fr 钫	88 Ra 镭	89 Ac 锕	90 Th 钍	91 Pa 镤	92 U 铀	93 Np 镎	94 Pu 钷		

十二平均律元素周期表, 来自和弦数学推导, 有两种可能的形式: 1, 2, 3 行是降序形式, 4, 5, 6 行是升序形式; 表中的音, 色, 经络, 元素通过倍频数列 ($2^n \cdot F_0$) 产生联系。

The Periodic Table of Elements of the equal temperament, derived from membrane chords mathematics, has two possible forms: rows 1, 2, 3 are in descending order, and rows 4, 5, 6 are in ascending order; The tone, color, meridian, and elements in the table are connected through an

octave sequence ($2^n F_0$) .

Five Elements Table;五行表

五行	木	火	土	金	水
五化	生	长	化	收	藏
五色	青（绿）	赤（红）	黄	白	玄（黑）
五方	东	南	中	西	北
五季	春	夏	长夏	秋	冬
五时	平旦	日中	日西	日入	夜半
五节	新年	上巳	端午	七夕	重阳
五星	木星	火星	土星	金星	水星
五声	呼	笑	歌	哭	呻
五音	角	徵	宫	商	羽
五恶	风	热	湿	燥	寒
五脏	肝	心	脾	肺	肾
五腑	胆	小肠	胃	大肠	膀胱
五志	怒	喜	思	悲	恐
五指	食指	中指	大拇指	无名指	小指
五官	目	舌	口	鼻	耳
五觉	色	触	味	香	声
五味	酸	苦	甘	辛	咸

子午流注

平均律扩展表中有一行是经络的是时间属性，根据针灸中的子午流注学说列出；（表中时间是指观察者所在地的太阳时）。子午流注理论体系源于《黄帝内经》“天气始于子，地气始于午、子午相合、命曰岁立、谨候其时、气与可期。”其方法很多、并在针灸实践中广泛应用，各经络按其对应的时间开放，每日一个周期、周而复始。

+a	+9	-8	-7	+6	+5	-4	-3	+2	+1	-10	-b
A	$\flat A$	G	$\sharp F$	F	E	$\flat E$	D	$\sharp C$	C	B	$\flat B$
黄绿	黄	黄橙	橙	朱红	红	紫红	紫	青紫	群青	湖蓝	绿
亥	子	丑	寅	卯	辰	巳	午	未	申	酉	戌
三焦	胆经	肝经	肺经	大肠经	胃经	脾经	心经	小肠经	膀胱经	肾经	心包经

图 15-6.1：十二正经特征频率表，子午流注周期表。

这里所说的“开放”到底是指什么呢？恐怕谁也无法明确，经络具有受激反应特征频率，如果“开放”与此有关，那么特定时间具有特征频率，并能激发特定经络传感发生。

特定时间具有特征频率，不同时间的离散频率分布并符合十二平均律： $F_c = H \cdot F_0$ ，便会出现上表的结果。

又因、表中的时间周期与地球自转的周期相吻合。与观察者相对地球、太阳的位置有关，因此，由经络知觉到的随时间变化的频率周期还和地球的自转周期有关。

因此：在这里我们能看到两个地球——一个是视觉看到的实体的地球，这个地球、既有自转，又有公转。另一个是用经络看到的“波动”地球，这个地球是由十二个频率构成，这些频率都有自己的方位，它们平均的分布在一个圆上、各占据这个圆周的 1/12 的区域。这个“频率”地球的子、午联线永远指向太阳，因而这个地球只有公转、没有自转。而经络觉“看”到的时间是两个地球——实体地球相对于平均律地球的运动。

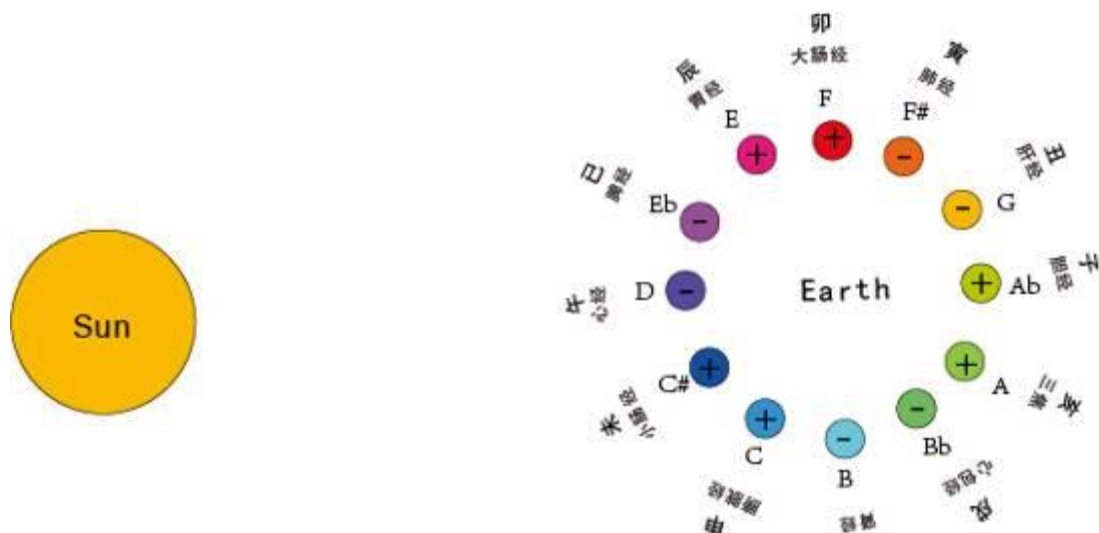


图 15-6.2，地球时间分布图

从上图中可以看出：

被特定的时间内、观察者在地球赤道某一特定点，利用经络觉观察到一系列不连续值（八度等音），例如这一点是申时点，测得值 C、C1、C2、C3、C4、C5.....一系列不连续值： $F_c = H^{12n} F$

($H=1.05946$, F =辐射频率, F_c =测得值, $n=0$ -正整数)。

观察者在 C 点, 由申时开始。二十四小时后, 测得 C、B、bB、A、bA、G.....一系列的不连续值: $F_i = h^n \cdot F$ (n =相隔半音数, F =初始频率)。

也就是说, 子午流注现象表明: 地球时间是量子化的, 并合乎十二平均律。

经络的表里关系

中医里将经脉分为十二正经, 分别对应者十二个脏腑。其中有六条阳经, 六条阴经, 阳经属表, 阴经属里, 有着表里相对应的关系。即太阴经对应阳明经, 厥阴经对应少阳经, 少阴经对应太阳经。

经络的表里关系可以反映出脏腑之间的联系, 如当心火旺盛时往往小便也是灼热的, 这是因为手少阴心经与手太阳小肠经相表里, 心火下移小肠, 导致小便灼热。

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*See: 1-6. Quantum And Chord; 量子与和弦

16. Natural Spirit; 自然精神

24 届世界哲学大会会议论文

Papers of the of 24th World Congress of Philosophy

人类有两套语言系统：符号语言（后天语言）与和弦语言（先天语言）；前者是人工信息系统，基于语音符号，如：自然语言；后者是自然信息系统，基于和弦（量子化频谱，弦），如：音乐、绘画，经络等；精神是符号与和弦二层存有。

Humans have two sets of language systems: sign language (acquired language) and chord language (innate language); The former is an artificial information system based on phonetic symbols, such as natural language; The latter is a natural information system, based on chords (quantized spectrum, strings), such as: music, painting, meridian, etc.; The spirit is a two-layer being of symbols and chords.

人的认识来自两种观察者：和弦观察者（自观察者）与非和弦观察者（外观察者），由此产生两种认识体系：和弦体系，如：音乐、绘画、经络、宗教等；非和弦体系，如：科学、哲学等——前者服从和弦语义逻辑，后者服从符号语义逻辑。

Human cognition comes from two kinds of observers: chord observers (self-observers) and non-chord observers (external observers), resulting in two systems of cognition: chord systems, such as music, painting, meridians, religion, etc., and non-chord systems, such as science, philosophy, etc., the former obeys chord semantic logic, and the latter obeys symbolic semantic logic.

和弦表现为物理事件（离散频谱，时空），生命事件（经络），精神事件（音乐，绘画），都基于和弦数学，和弦统一宇宙。

Chords are represented as physical events (discrete spectrum, space-time), life events (meridians), and spiritual events (music, painting), all based on chord mathematics, and chords unify the universe.

和弦语义来自和弦（量子）频谱，是自然精神与意志，音乐，绘画是其常见形式。

Chord semantics comes from the chord (quantum) spectrum, which is the natural spirit and will, and music and painting are its common forms.

关键词：和弦，音乐，绘画，语言，符号，自然精神，自然意志，量子，弦理论

Key words: chord language, symbol language, innate language, acquired language, symbol

semantics, chord semantics, natural spirit

*阅读本章时请同时参阅: 15、和弦生命

*Please also refer to: 15. Chord Life when reading this chapter

16-1.Two Language;两种语言

人类有两套语言系统: 符号语言(后天语言)与和弦语言(先天语言); 前者是人工信息系统, 基于语音符号, 如: 自然语言; 后者是自然信息系统, 基于和弦频谱, 如: 音乐、绘画, 经络等; 精神是符号与和弦二层存有。

Humans have two language systems: symbol language (acquired language) and chord language (innate language); the former is an artificial information system, based on phonetic symbols, such as natural language; the latter is a natural information system, based on the chord spectrum, such as music, Painting, meridian, etc.; spirit is the two-layer existence of symbols and chords.

自然语言是最常见的符号语言, 它是通过第二信号系统的条件反射获得的符号语义; 依赖人类设置, 社会约定, 后天学习; 符号语言来自是对感知经验的命名, 符号语义具有不确定性, 并存在命名主体与命名客体的差异。

Natural language is the most common symbolic language. It is a symbolic semantics obtained through the conditioned reflection of the second signal system; it relies on human settings, social conventions, and acquired learning; symbolic language comes from the naming of human perception experience, and symbolic semantics is uncertain There is a difference between named subject and named object.

和弦语言是物理事件, 基本形式为: 和弦频谱, 和弦空间(开、闭、膜弦), 和弦数学模型($2^n f$, $n f$, $H^n f$, $H=1.059463$); 是自然(物理)法则, 没有主体(心)与客体(物)的差异, 服从和弦语言也是服从自然法则。

Chord language is a physical event, and its basic forms are: chords spectrum, chord space(open, closed, membrane strings), mathematical models of chords ($2^n f$, $n f$, $H^n f$, $H=1.059463$); it is a natural (physical) law, There is no difference between the subject (mind) and the object (thing), and obeying the chord language is also obeying the laws of nature.

和弦语义来自和弦频谱, 常用于时空, 生命表达。

Chord semantics comes from the chord spectrum, which is often used in time and space, and

life expression.

1、时-空语义：和弦语言在音乐，绘画中分别表达时间与空间、两者在数学上表现为：镜像、对称关系。（参见：14、和弦时-空）

1. Space-time semantics: Chord language expresses time and space separately in music and painting, and the two are expressed mathematically as a mirror-symmetric relationship. (See: 14, Chord space-time)

2、生命语义：人体上存在一个和弦系统，表现为经络（脉轮）系统；,在人体上产生全局-整体控制作用。（参见：15、和弦生命）

2. Life semantics: There is a chord system on the human body, which is manifested as a meridian (chakra) system; it produces a global-overall control effect on the human body. (See: 15, Chord Life)

经络系统在人体实现和弦生命语言的表达-执行，如：终极目的（永生，神），自我（灵魂），自然道德（业）等，包含宗教现象的自然原理。

The meridian system realizes the expression-execution of the Chord Life language in the human body, such as: ultimate purpose, self (soul), natural morality (karma), etc., including natural principles of religious phenomena.

和弦语言包括心灵语义，如：爱，恨，自然伦理等，它们是时空-生命语义的必然成分，这是和弦语言的一个奇特特征。

Chord language includes spiritual semantics, such as: love, hate, natural ethics, etc. They are an inevitable component of spacetime-life semantics, which is a peculiar feature of chord language.

和弦语言有以下主要特征：

Chord language has the following main characteristics:

1、先天语言：和弦语言是自然精神，不依赖后天学习，如：人体的经络系统；欣赏音乐的能力并不依赖音乐学习，如：低龄儿童。

1. Innate language: Chord language is the spirit of nature, and does not rely on acquired learning, such as the human body's meridian system; the ability to appreciate music does not rely on music learning, such as: young children.

2、和弦语言是和弦频谱的能量信息作用，没有主观-客观，精神-物质的对立。

2. Chord language is the energy information function of the chord spectrum, there is no subjective-objective, spiritual-material opposition.

3、和弦语言是和弦频谱的自然信息，但又包含自然道德语义，显示了自然伦理的存在。

3. Chord language is the natural information of the chord spectrum, but it also contains natural moral semantics, showing the existence of natural ethics.

4、和弦语言是能量、信息系统，具有可执行性。

4. Chord language is an energy and information system, which is executable.

5、和弦语义来自和弦频谱，是自然精神的存在形式。

5. Chord semantics comes from the chord spectrum, which is the existence form of natural spirit.

16-2.Compile;编译

符号语言可以被理解，和弦语言可以被执行，两者之间可编译。

The symbolic language can be understood, the chord language can be executed, and the two can be compiled.

常见的和弦语言经验是：自然语言编译为和弦语言，可产生执行性；和弦语言被编译为自然语言，可产生可理解性；两者之间具有可编译性，类似计算机的高级语言与低级语言。

Common chord language experience is: natural language is compiled into chord language, which can produce execution; chord language is compiled into natural language, which can produce intelligibility; there is compilability between the two, similar to high-level and low-level computer languages .

从一首乐曲中获得的和弦语言体验，如果不能编译为自然语言，便不能被理解，它只是一种说不出的内部体验；当人们试图将它说出来，如：音乐评论，这就是一个“编译”的尝试。

The chord language experience gained from a piece of music cannot be understood if it cannot be translated into natural language. It is just an unspeakable internal experience; when people try to say it, such as: music review, this is a compilation Try.

编译的困难在于其确定性，我们可以认为巴赫，莫扎特的某首乐曲表达了某种“意义”，或者还有很多人也有类似体验，但是这种体验缺乏确定性，无法被重复观察验证。

The difficulty of compilation lies in its certainty. We can think that a certain piece of Bach and Mozart's music expresses a certain "meaning", or that many people have similar experiences, but this experience lacks certainty and cannot be verified by repeated observations.

相反的例子存在于宗教等实践：通过祷告、冥想，企图让自然语言转化为可执行的自然力（神

迹); 这里需要一个编译过程, 将自然语言转译为可执行的自然作用, 如: 物理、化学作用。

The opposite example exists in practices such as religion: through prayer and meditation, an attempt is made to transform natural language into executable natural forces (miracles); a compilation process is required to translate natural language into executable natural effects, such as: physics, Chemical action.

自然语言的不同语义会唤起不同的身-心体验, 如: 你是好人, 你是坏人; 多数人能够区别被唤起的身-心反应: 愉快或气愤, 这意味着自然语言被执行, 这里应该有一个相应的执行过程(化学, 物理等)。

The different semantics of natural language will evoke different body-mind experiences, such as: you are a good person, you are a bad person; most people can distinguish the evoked body-mind reaction: happy or angry, which means that natural language is executed, here should be There is a corresponding execution process (chemistry, physics, etc.)

如果自然语言能唤起经络反应, 如: 循经传感(Propagated sensation along the channels)或穴位反应, 并能够被重复观察, 自然语言与和弦语言之间的可编译性便可以确定, 这个实验需要特殊观察者: 经络体觉的自观察者, 这是任何人都可以尝试的方法, 也是某些东方宗教的方法。

If natural language can evoke meridian responses, such as: Propagated sensation along the channels or acupoint responses, and can be observed repeatedly, the compilability between natural language and chord language can be determined. This experiment requires special Observer: The self-observer of meridian somatosensory. This is a method that anyone can try, and it is also a method of certain Eastern religions.

部分命名符号是来自对和弦语义的编译, 如: 神, 灵魂; 这类命名对象无法在自身之外被观察, 但又是生命的普遍需要。(参见: 15、和弦生命)

Some naming symbols are derived from the compilation of chord semantics, such as: god, soul; such named objects cannot be observed outside of themselves, but they are universal needs of life. (See: 15, Chord Life)

16-3.Observer;观察者

人的认识来自两种观察者: 和弦观察者和非和弦观察者; 由此观察到两个世界: 和弦世界, 如: 音乐、绘画、经络、宗教等; 非和弦世界, 如: 科学、哲学等——前者服从和弦语义逻辑, 后者服从

符号语义逻辑。

Human cognition comes from two kinds of observers: chord observers and non-chord observers; thus two worlds are observed: chord worlds, such as music, painting, meridians, Religion, etc.; non-chord world, such as: science, philosophy, etc. - the former obeys chord semantic logic, the latter obeys symbolic semantic logic.

这里有几个典型案例:

Here are a few typical cases:

第一个典型案例是对声, 光的观察:

The first typical case is the observation of sound and light:

物理学家对声、光的观察产生了声学, 光学、相对论等; 而音乐家, 画家对声, 光的观察产生了 $2*f$, $n*f$, $H*f$, $H=1.05946$ ($2*f$, $n*f$, $H*f$, $H=1.05946$), 音乐, 绘画等; 两者均有其观察基础, 可定量, 数学表达, 但却是不同的逻辑系统。

The observation of sound and light by physicists has produced acoustics, optics, relativity, etc.; while the observation of sound and light by musicians and painters has produced Temperament and Harmonics, music, painting, etc; Both have their observational basis, which can be quantitatively and mathematically expressed, but they have completely different results.

另一典型案例是在生命领域:

Another typical case is in the field of life:

人体存在一个和弦控制系统, 由自观察 (内观察) 发现, 表现形式为: 经络 (脉轮) 系统; 十二经络具有受激反应特征频率, 分布为: 十二平均律 (Equal Temperament), 可用和弦数学表达; 与音乐、绘画在数学上同构。

There is a chord control system in the human body. It is found by self-observation (internal observation) that the manifestation is: the meridian (chakra) system; the twelve meridians have the characteristic frequency of stimulated response, and the distribution is: Equal Temperament, available Mathematical expression of chords; mathematically isomorphic with music and painting.

非和弦观察者屏蔽了调性语义, 只能观察到对象的无调性信息, 如: 形态, 位置, 运动等, 并只能在无调性条件下被验证, 如: 现有的科学方法。

The non-chord observer shields the chord semantics, can only observe the non-chord information of the object, such as: morphology, position, motion, etc., and can only be verified under non-chord conditions, such as: the existing scientific method.

和弦观察者可观察调性的语法, 语义作用及自然法则, 由此产生了和弦知识体系, 如: 音乐, 绘画, 经络等, 并只能在调性条件下被验证。

Chord observers observe the grammar, semantic action, and natural laws of chords (tonality), which give rise to chord knowledge systems such as music, painting, meridians, etc., which can only be verified under chord conditions.

最常见的范例是和声学, 它来自和弦观察者对自己身-心的和弦作用的观察, 它需要特殊的观察者——具有音乐禀赋的音乐家; 大量的特殊观察者从和弦观察中得到重复的观察结果, 逐渐形成了和弦语言的定量-数学表达形式: 和声学, 并且只能被和弦观察者所验证, 这与科学方法是非常不同的。

The most common paradigm is harmony, which comes from the chord observer's observation of the chord action of his own body-mind, which requires special observers - musicians with musical endowments; a large number of special observers learn from membrane chords. Repeated observations from observation gradually formed a quantitative-mathematical form of chord language: harmonics, and can only be verified by chord observers, which is very different from the scientific method.

我们看到一个什么样宇宙, 这与观察者有关, 非和弦观察者存在调性盲区, 这是人类认识自身与宇宙的基本障碍。

What kind of universe we see is related to the observer, and the non-chord observer has a chord blind spot, which is the basic obstacle for human beings to understand themselves and the universe.

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圣经-新约

Brief Summary; 小结

和弦表达万物，宇宙基于和弦。

Chords express everything, the universe is based on chords.

我们在音乐，绘画中观察到和弦，和弦场，根据和弦语义定性为时空场。

We observe chords, chord fields, in music, paintings, which are characterized as space-time fields according to chord semantics.

我们在人体上也观察到和弦，和弦场，形式是经络（脉轮）系统，与音乐，绘画具有相同的物理、数学形式，它是时空场的组成部分，特别是：音符的正-负属性继承自经络，它是和弦最重要的物理属性。

We also observe in the human body that the chord, the chord field, the form is the meridian (chakra) system, which has the same physical and mathematical form as music and painting, and it is an integral part of the space-time field, in particular: the positive and negative properties of the note are inherited from the meridian, which is the most important physical property of the chord.

如果没有比和弦场，时空场更基本的作用，它就是所有时空事件的底层作用与法则。

If there is no more fundamental function than the chord field and the space-time field, it is the underlying function and law of all space-time events.

和弦观察具有主体间性，不同于主-客观察，会涉及科学范式问题。

Chord observation is intersubjective, which is different from subject-guest observation and involves scientific paradigm.

本书的内容将会继续观察，修正，更新，欢迎关注。

The content of this book will continue to be observed, revised, updated, welcome attention.

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