Table S1: Formal and motivic analysis of *Anthèmes 1*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Large-scale form****(duration in s)** | **Formal Procedures** | **Middle-scale form** | **Motivic structure\*** | **Timings for motives (in s)\*\*** |
| Introductionmm. 1-2(18 s)[Section I in article] | Presentation of one motivic instance of some of the most important motivic families, separated by musical silence. | N/A | M1T1Batt1S1Batt1L2 | 0.511.1213.3018.92 |
| Section Imm. 3-14(55 s)[Section II in article] | Repetition of exactly the same motivic succession: S (*jeté*), T (single trill and two-line-texture trill), GrNotes(The repeated pattern is considered to start with S—rather than with GrNotes—because of the continuity in terms of contour, articulation, and character between T and GrNotes—and the relative contrast in those respects between GrNotes and S—and because in the final statement, GrNotes is clearly the end of the pattern.) | I.1 | GrNotes3S3T4T5T6GrNotes7 | 30.1630.7235.9441.46 |
| I.2 | S7T8GrNotes8 | 49.6750.28 |
| I.3 | S9T10GrNotes10 | 58.3959.04 |
| I.4 | S10T11GrNotes11 | 63.8064.34 |
| I.5 | S12T13GrNotes13L14 | 69.9570.4777.93 |
| Section IImm. 15-45(57 s)[Section III in article] | Successive statements of motives from the Pizzicato family. | N/A | P15P19P25P30P32P34P37L45 | 85.2988.4093.2096.9599.79101.50104.51117.14 |
| Section IIImm. 46-66(49 s)[Section IV in article] | Repetition of exactly the same motivic succession: Trem, S (*jeté*), T (single trill motives the first time, two-line-texture trill motives the second time), Stacc. | III.1 | Trem46S46T47Stacc48 | 142.22142.54 |
| III.2 | Trem56S57T58T59Stacc61L66 | 156.13156.48161.34175.98 |
| Section IVmm. 67-89(77 s)[Section V in article] | Highly transformed motivic materials. Exclusive use of specific and relatively clear subcategories within each motivic family: trills in multiple-stops, slurred and longer scales, and complex and diverse melodic materials. | N/A | T67T69S72T72M72Accent77M77S80T80T81L89 | 190.74196.66203.58205.09210.63218.19221.64222.57227.07250.93 |
| Section Vmm. 90-97(36 s)[Section VI in article] | Symmetrical (palindromic) distribution of motivic categories. | N/A | S90T90GrNotes91Stacc92GrNotes94T94T96S96L97 | 267.97268.53278.27284.09289.59292.78 |
| **Large-scale form****(duration in s)** | **Formal Procedures** | **Middle-scale form** | **Motivic structure\*** | **Timings for motives (in s)\*\*** |
| Section VIamm. 98-112(50 s)[Section VII in article] | Alternation of motives from the Melodic and Trill groups. The alternation pattern is (unpredictably) segmented by the occasional appearance of BrArp followed by musical silence. | VIa.1 | S98T98M99T99M100T100M101T101M102T102BrArp103 | 303.70304.44306.37306.94308.51309.53311.55312.37313.74314.42 |
| VIa.2 | M104T104M105T105BrArp106 | 321.01322.95325.88326.43 |
| VIa.3 | M107T107M108T108M109T109BrArp110 | 332.09333.02334.91335.57337.20338.36 |
| VIa.4 | M111T111M112T112 | 344.13345.18348.02349.72 |
| Section VIbmm. 113-143(84 s)[Section VIII in article] | Random sequence of motives from subgroups/groups M with *brusque* character, P, S in double-stops with descending direction, and PlTri.  | N/A | S113P114M115P116S117P118PlTri119M120PlTri121P122PlTri123P124S125S125M126PlTri127P128S129M130PlTri130P131M133S133M134S135PlTri135P136S137M137P138S139Chord140PlTri140S141Chord141PlTri142P142S143 | 353.90356.50358.81360.47363.27364.99369.46373.80380.52383.07384.09385.29389.24392.81394.48397.96402.25403.82405.60406.69410.07414.29415.99417.24420.57426.04431.36435.29 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Large-scale form****(duration in s)** | **Formal Procedures** | **Middle-scale form** | **Motivic structure\*** | **Timings for motives (in s)\*\*** |
| VIcmm. 144-165(81 s)[Section IX in article] | Formal-unit blend: boundaries in terms of both musical features and formal segmentation between motives from S, M, T, and TM are blurred. | VIc.1 | M144TM145BrArp146 | 437.53 |
| VIc.2 | M148TM149M150TM 150M152TM 152M153TM153M154TM154S154M155TM155S156M157TM159BrArp160 | 448.16464.57465.53468.03469.01 |
| VIc.3 | S161M162TM163T164T165LongNoH165L165Batt165 | 478.17480.66485.32495.03507.32 |

NOTES:

\* The letter portion of the motivic labels corresponds to the motivic families as described below. The number that follows corresponds to the measure number that corresponds to the onset of the motives in the score published by Universal Edition (Boulez, P., 1992: *Anthèmes 1*. Vienna: Universal Edition). Motivic categories labeled with a single letter (rather than a multiletter abbreviation) were used in the experiments.

M: Melodic, singable style, slurred articulation, isochronous rhythm, relatively clear yet multidirectional pitch directionality

T: Trill or trilling figure

S: Scalar, mostly stepwise and unidirectional

L: Long tone(s) in harmonics, most frequently with a glissando

P: pizzicato articulation, rhythmic

Batt: Clearly separated notes with *spiccato* articulation produced beating the strings with the bow (*battimento*)

GrNotes: Slurred pattern in triplets ornamented with emphatic grace notes.

Trem: *Tremolando* pattern *sul ponticello* ornamented with quick grace notes.

Stacc: Pointillistic texture in *staccatissimo* with sudden and rapid dynamic contrasts.

Accent: A gesture of 2 accented notes that sounds like an emphasized quasi-repetition of the end of M2. Because of the surrounding silences and the contrasting character with respect to M2 and M/77, these 2 notes are here interpreted as a separated, contrasting material.

BrArp: Broken arpeggios with a regular rhythm and diminuendo dynamic profile, in staccato.

PlTri: Rapidly arpeggiated plucked (guitar-style) trichords.

Chord: A trichord in multiple stops and loud dynamic level with *brusque* indication. This material can be seen as related to the Melodic subgroup with *brusque* character. Nevertheless, since it is only one musical event, it does not have any of the characteristics of the Melodic group.

LongNoH: Long tone on open string and not in harmonics.

\*\* Timings are based on the recording by J. M. Conquer at IRCAM in 2002 (Boulez, 2013). Only timings for motives used in the experiments are indicated.

Table S2: Formal and motivic analysis of *Anthèmes 2*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Large-scale form****(duration in s)** | **Formal enlargement** | **Middle-scale form** | **Motivic structure\*** | **Timings for motives (in s)\*\*** |
| Introduction(36 s) | Type-1 (IME) extension (M1) | N/A | M1(intro1)T1(intro1)BattS1(intro3)BattL2(/I) | 0.321.9916.1323.24 |
| Section I(69 s) | Type-1(IME) expansion (T2 and T/6) | I.1 | GrNotesS3(I1)T4(I2)GrNotes | 36.0136.64 |
| I.2 | S7(I10)T8(I11)GrNotes | 65.5266.18 |
| I.3 | S9(I12)T10(I13)GrNotes | 75.3476.03 |
| I.4 | S10(I13)T11(I14)GrNotes | 80.7481.37 |
| I.5 | S12(I15)T13(I16)GrNotesL14(I/II) | 86.7687.3895 |
| Section II(150 s) | Type-1 (IME) interpolation (P3, P/34, P/37, L3)Type-2 (ILE) extension (P2, P/37) | N/A | P15(II1)L45(I/II) | 105.10214.97 |
| Section III(131 s) | Type-1 (IME) extension (Trem, S5)Type-1 (IME) interpolation (Stacc)Type-2 (ILE) extension (Stacc) | III.1 | TremS46(III3)T47(III4)Stacc | 255.35256.09 |
| Type-1 (IME) extension (Trem, S6)Type-1 (IME) expansion (T/58 and T4)Type-1 (IME) interpolation (Stacc)Type-2 (ILE) extension (Stacc) | III.2 | TremS57(III35)T58(III36)Stacc L66(III/IV) | 319.57320.30371.78 |
| Section IV(118 s) | Type-1 (IME) interpolation (M/77)Type-2 (ILE) extension (T5, T/80, Accent) | N/A | T67(IV1)S72(IV12)T73(IV12)M73(IV12)AccentM77(IV19)S80(IV23)T80(IV24)L89(IV/V) | 386.67411.99413.70419.25431.01435.72437.08484.12 |
| Section V(92 s) | Type-1 (IME) extension (GrNotes)Type-1 (IME) expansion (T8)Type-2 (ILE) extension and interpolation (Stacc)Type-2 (ILE) extension (L6) | N/A | S90(V1)T90(V1)GrNotesStaccGrNotesT8\94(V23)S96(V29)L97(V/VI) | 504.68505.34546.80565.27569.78 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Large-scale form****(duration in s)** | **Formal enlargement** | **Middle-scale form** | **Motivic structure\*** | **Timings for motives (in s)\*\*** |
| Section VIa(149 s) | Type-3 (UAE) interpolation (sections alternating M and T, with S occasionally substituting for M and ending with BrArp are added). | VIa.1 | S98(VI1)T98(VI1)M99(VI2)T99(VI2)M100(VI3)T100(VI3)M101(VI4)T101(VI4)M102(VI5)T102(VI5)BrArp | 596.25596.97599.14599.77601.63602.82604.85605.81607.01607.82 |
| VIa.2 | MVI7TVI7MVI8TVI8MVI9TVI9MVI10TVI10SVI11TVI11BrArp | 612.71613.76615.45616.43618.10619.06620.84621.46623.49624.59 |
| VIa.3 | MVI13TVI13MVI14TVI14MVI15TVI15TVI16BrArp | 627.26627.91629.34630.34632.93634.54636.55 |
| VIa.4 | MVI18TVI18MVI19TVI19SVI20TVI20MVI22TVI22TVI23BrArp | 642.24643.47645.99647.17648.73649.25654.16655.41658.40 |
| VIa.5 | SVI25TVI25BrArp | 661.62662.72 |
| VIa.6 | MVI28TVI28BrArp | 671.86673.60 |
| VIa.7 | MVI30TVI30 MVI31TVI31MVI32TVI32BrArp | 677.10678.08679.27681.63682.62683.73 |
| VIa.8 | M104(VI34)T104(VI34)M105(VI35)T105(VI35)BrArp | 687.93689.93692.06692.66 |
| VIa.9 | MVI37TVI37BrArp | 695.63696.87 |
| VIa.10 | MVI39TVI39BrArp | 701.12701.66 |
| VIa.11 | MVI41TVI41MVI42TVI42BrArp | 704.49705.62706.51707.91 |
| VIa.12 | M107(VI44)T107(VI44)M108(VI45)T108(VI45)M109(VI46)T109(VI46)BrArp | 712.04713.08714.78715.46716.82718.11 |
| VIa.13 | MVI48TVI48BrArp | 722.42724.24 |
| VIa.14 | MVI50TVI50BrArp | 728.28729.34 |
| VIa.15 | M111(VI52)T111(VI52)M112(VI53)T112(VI53) | 733.94735.12737.71739.53 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Large-scale form****(duration in s)** | **Formal enlargement** | **Middle-scale form** | **Motivic structure\*** | **Timings for motives (in s)\*\*** |
| Section VIb(320 s) | Type-1 (IME) interpolation (S9, S10, S/133, S/137, S/139, S/141)Type-2 (ILE) extension (all P, M, PlTri) | N/A | S113(VI54)P114(VI55)M115(VI59)P116(VI61)S117(VI66)P118(VI67)PlTriM120(VI74)PlTriP122(VI81)PlTriP124(VI88)S125(VI53)M126(VI94)PlTriP128(VI100)S129(VI105)M130>(VI106)PlTriP131(VI113)M133>(VI119)S133(VI124)M134>(VI125)S135(VI129)PlTriP136(VI135)S137(VI140)M137(VI141)P138(VI144)S139(VI149)ChordPlTriMVI150S141(VI154)ChordPlTriMVI155P142(VI159) | 745.13748.27760.10764.21774.34776.71795.93816.41840.21858.02860.78878.59893.97896.40917.16938.79947.78949.61956.96972.42989.45992.05999.091015.161017.661027.501029.691046.64 |
| Section VIc(159 s) | Type-1 (IME) interpolation (M12/TM)Type-2 (ILE) interpolation (BrArp) | VIc.1 | M144(VI164)BrArp | 1065.46 |
| Type-1 (IME) interpolation (M/148, S/154, M/155, S/156, M13, BrArp) | VIc.2 | M148(VI173)S154(VI191)M155(VI192)S156(VI194)M157(VI195)BrArp | 1088.421133.011134.161139.331140.45 |
| Type-1 (IME) interpolation (S11, M14) | VIc.3 | S161(VI201)M162(VI202)T164(VI208)L165(VI209)Batt | 1160.241162.961176.091199.67 |

NOTES:

\* The letter portion of the motivic labels corresponds to the motivic families as described in the notes of Table S1. Two numbering systems are used depending on whether the motives are literally taken from *Anthèmes 1* or unique to *Anthèmes 2:*

* In cases in which two numbers are indicated after the letter portion, the first number corresponds to the measure number of the onset of the motives in the score of *Anthèmes 1* published by Universal Edition (Boulez, P., 1992: *Anthèmes 1*. Vienna: Universal Edition), and the second number (indicated in parentheses) corresponds to the measure number of the onset of the motives in the score of *Anthèmes 2* by the same publisher (Boulez, P., 1997: *Anthèmes 2: Pour violon et dispositif électronique*. Vienna: Universal Edition). For the numbers in parentheses: Roman numerals indicate sections (marked on the score as well), and Arabic numbers indicate measure numbers within those sections.
* In cases in which only one number is indicated after the letter portion, that number corresponds to the measure number of the onset of the motives in the score of *Anthèmes 2* by the same publisher (Boulez, P., 1997: *Anthèmes 2: Pour violon et dispositif électronique*. Vienna: Universal Edition). For the numbers in parentheses: Roman numerals indicate sections (marked on the score as well), and Arabic numbers indicate measure numbers within those sections.

For simplification purposes, in cases in which motives from the same family are stated consecutively, only the measure number corresponding to the onset of the first motive is indicated. In addition, only the motivic families used in the experiments have measure numbers.

\*\* Timings are based on the recording by J. M. Conquer at IRCAM in 2008 (Boulez, 2014). Only timings for motives used in the experiments are indicated.

Table S3: Instructions given to participants of the Main Experiment

|  |  |
| --- | --- |
| **Steps** | **What to do?** |
| 1 | LISTEN to a musical MOTIVE SEVERAL TIMES. | MEMORIZE this motive the best you can. You will need to remember it in order to perform step 2.You can take notes that will help you remember the motive on the paper provided. |
| 2 | LISTEN to a musical PIECE in which the MOTIVE that you heard in step 1 might appear in MANY DIFFERENT VARIATIONS (including small portions of it). | AS YOU LISTEN to the piece, PRESS THE SPACE BAR every time you HEAR SOMETHING that REMINDS you of the MOTIVE you memorized in step 1. |