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MORE THAN MEETS THE EYE: DERIVATIONS AND STRATIFICATION IN BOULEZ'S 'DON' (1962)

The poetry and aesthetics of Stéphane Mallarmé were an important creative inspiration for the early and middle-period works of Pierre Boulez (1925–2016). After previous explorations in *Livre pour quatuor* (1948–9), the unrealised plan of *Un coup de dés*, and the *Troisième sonate* (1957–9), Boulez proceeded to *Pli selon pli: Portrait de Mallarmé* (1957–62, revised in 1982 and again in 1989) for soprano and orchestra, which would present not only a synthesis of his study of Mallarméan thought, but also a synthesis of his creative trajectory from the late 1940s on.¹ The *Pli selon pli* cycle, comprising five movements – ‘Don’ (1960, first version, for voice and piano; 1962/1989, second version, for voice and orchestra); ‘Première improvisation sur Mallarmé “Le vierge, le vivace et le bel aujourd’hui”’ (1957/1962); ‘Deuxième improvisation sur Mallarmé “Une dentelle s’abolit”’ (1957); ‘Troisième improvisation sur Mallarmé “À la nue accablante tu”’ (1959/1982); and ‘Tombeau’ (1959/1960/1962) – exhibits a complex network of material based on filiation planning. This underlying filiation, whether achieved by the quotation of excerpts or by the manipulation of the fundamental serial materials, provides us with a remarkable example of Boulez’s compositional dialectic between the systematic development of structural ideas and their flexible realisation in sound. This is, indeed, a central problem faced by composers throughout the history of Western music: how should one treat and reformulate the basic material in an imaginative way whilst still providing a solid structural network?

The present article aims to shed light on Boulez’s planning and realisation of material in the genesis of ‘Don’ by focusing on the composer’s renewed treatment of material through processes of derivation. In the first part, it will be shown that the work’s structure is conceived primarily in a symmetrical and complementary relationship with ‘Tombeau’, though this is veiled by a number of additional operations. The second part examines Boulez’s selection of materials, which suggests interactions between the planning and the realisation of materials during the compositional process.

From 'Tombeau' to 'Don': Construction of a Symmetrical and Complementary Structure

On 17 October 1959 Boulez's *Tombeau à la mémoire du prince Max Egon zu Fürstenberg* was premièred as the opening work on the Saturday evening concert of the Donaueschingen Festival. This was the first version of what was shortly to become the last movement of *Pli selon pli*. At the end of December 1959, the composer outlined in a letter to Karlheinz Stockhausen his plan not only to revise this first 'Tombeau', but also to compose an extensive cycle based on poems by Mallarmé that would include his three 'Improvisations sur Mallarmé', which he had already written: 'I have enlarged the plan of my Mallarmé, to the extent of making a long work that will finish Mallarmé for me for some time until I recover a taste for the *coup de dés* – which will be an essay in total synthesis [...] At this moment I'm in the process of expanding the Tombeau (if I dare risk this macabre comparison) [...] to the point of turning it into a mausoleum!!'² It was around this time that Boulez started to conceive the composition of 'Don', which initially came to fruition in a version for soprano and piano that was premièred in Cologne in June 1960 as part of the first appearance of *Pli selon pli* with all five movements. Despite the 'completion' of the *Pli selon pli* cycle, this version of 'Don' for soprano and piano was withdrawn soon afterwards and in 1962 replaced by the orchestral version.³ In another letter to Stockhausen written sometime in November 1960 or thereabouts, Boulez declares, 'I'm really making Don [*je fais vraiment le Don*].'⁴ Logic dictates, therefore, that it was after the première of *Pli selon pli* in June 1960 that the composer started the full-scale composition of the orchestral version of 'Don', which he conceived in a thoroughgoing relationship with 'Tombeau', essentially for the sake of aesthetic proportions; the cycle now starts with gift/birth (*don*) followed by three 'Improvisations', and it ends with death (*tombeau*). The first version of 'Don' can thus be viewed as a stopgap first movement composed for the 1960 concert.

This intricate chronology makes the position of the first movement clear in Boulez's planning. As a summary of the whole cycle, 'Don' embraces the other four movements, which were more or less finished by the time of this movement's composition,⁵ similar to the relation of the ninth and last movement of *Le Marteau sans maître* (1952–5), 'Bel édifice et les pressentiments, double', to the others. The summation is concretised first by quotations from the three 'Improvisations sur Mallarmé' and secondly by a symmetrical and complementary relationship between 'Don' and 'Tombeau'. Although the former is a perceptible presentation of the composer's vision, the latter, by contrast, involves no more than an underlying structure. In the following paragraphs, I will concentrate on this structural correlation between the two movements.

The principle of symmetry between 'Don' and 'Tombeau' is manifested at the earliest stage of sketching. Based on the composer's plan for 'Fin de Tombeau = Commencement de Don (Joyce Fin[n]egans Wake)',⁶ the same *ffff* tutti chord

Fig. 1 Schema illustrating the symmetry between the six subsections of the coda of 'Tombeau' and six sections of 'Don' (including the unrealised section e). The central bar line represents the symbolic axis of the symmetry, i.e. the identical chord sounded at the beginning of 'Don' and at the end of 'Tombeau'

is sounded at the beginning of 'Don' and the end of 'Tombeau'. This fully chromatic twelve-note chord (see Fig. 1) appears with the exact same registral disposition in the two movements, indicating the opening and closing points of the cycle. It is on this very chord that the six-section structural framework of both movements is based, as represented in Fig. 1 by the letters a–e for 'Don' and a–f for the coda of 'Tombeau'. All six sections of the two movements are paired in inverse order, forming symmetry with respect to the axis represented by the tutti chord. (Section f of 'Don', shown in brackets in Fig. 1, is not realised in the final composition; it appears only in the first sketch.)

It is on the basis of this framework that the composer developed the filiation from 'Tombeau' to 'Don'. Its overall plan was drawn up using the multiplication tables (*blocs sonores*) shown in Ex. 1, which had already been employed in the cycle 'L'artisanat furieux' of *Le Marteau sans maître* but was originally conceived for the twelve-voice *Oubli signal lapidé* (1952). Multiplication is one of the Boulez's most important compositional techniques, one that he uses in,

Ex. 1 Multiplication table, with boxes marking the principal materials in ‘Tombeau’ (sections b–f) and italicised letters (top left) by the author. The sections marked at the bottom of the table are also by the author. Transcript of a sheet from the pencil manuscript; PSS, Pierre Boulez Collection, Mappe F, Dossier 2a, 5 (omitting minor details). This page of the sketch has been published in the facsimiles editions of *Le Marteau sans maître* (Decroupet 2005, p. 83) and ‘Tombeau’ (Piencikowski 2010, p. 50)

Don : section f section b section c section d section e

↓ ↓ ↓ ↓ ↓

Tombeau : section a section e section d section c section b

for example, the *Troisième sonate* (1955–7), *Structures II* (1956–61), *Domaines* (1961–8) and *cummings ist der dichter* (1970). It is also the subject of a number of earlier studies.⁷ Before examining the structural relationship between ‘Don’ and ‘Tombeau’ in detail, in the next few paragraphs we will briefly look at the mechanism of pitch-class multiplication in Ex. 1.

The example shows five columns represented by the Greek letters Αλ (for *alpha*), Βη (*beta*), Γα (*gamma*), Δε (*delta*) and Επ (*epsilon*), each of which contains five lines: Μυ (*mu*), Νυ (*nu*), Ξι (*chi*), Όμ (*omega*) and Πι (*pi*). In each column the first line, Μυ, comprises five fundamental pitch classes, which are deduced from different partitionings of the basic twelve-note row, E–F–D–C#–B–B–A–C–A–E–G–F# (e.g. 24213 for ΜυΑλ, 42132 for ΜυΒη, etc.). All other complexities in the lower lines result from the multiplication of one set of fundamental pitch classes by another set. In the basic process of multiplication (Ex. 2a), first the pitch classes of the multiplicand are transposed to those of the multiplier. All resultant pitch classes are then added up to a superset with higher density, duplicated pitch classes being eliminated. The extracted table of the fifth column, Επ (Ex. 3), shows its multiplicative outline: although five fundamentals in the first line are represented as the italicised letters *a–e*, letter combinations (*ba*, *cb*, *dd*, *ec*, etc.) identify their two composite fundamentals, that is, the multiplier and the multiplicand. In order to obtain the notated pitch classes in the table, however, another transposition needs to be conducted as a part of the multiplicative process – Stephen Heinemann (1998) calls it ‘complex multiplication’ as opposed to the aforementioned ‘simple multiplication’. This additional operation has been more thoroughly investigated in recent studies by

Fig. 2 Transpositional matrix based on the five lowest notes in the first line ($M\nu$) in Ex. 3 (adapted from Losada 2008 and 2014)

	D	B $\flat$	A $\flat$	E	F $\sharp$
T $_8$	B $\flat$	F $\sharp$	E	C	D
T $_{10}$	A $\flat$	E	D	B $\flat$	C
T $_8$	E	C	B $\flat$	F $\sharp$	G $\sharp$
T $_2$	F $\sharp$	D	C	G $\sharp$	B $\flat$

Catherine Losada (2008 and 2014). What distinguishes her contribution is her insight into the structural trigger of the transpositional scheme. Based on her research on Boulez's sketches, she contends that 'the scheme associated with complex multiplication is intimately tied to the partial ordering in register of both factors and products of the multiplication operations' (2014, p. 90).⁸ The partial ordering mainly involves 'anchor notes', which are the lowest notes of the five partitioned fundamentals in $M\nu$. In Ex. 3, for instance, the anchor notes are D, B $\flat$, A $\flat$, E and F $\sharp$. The intervals of these five notes (ic8, ic10, ic8 and ic2) are subsequently utilised to generate the transpositional scheme for the lower lines (Fig. 2). When multiplying two sets of the fundamental pitch classes, multipliers' anchor notes are successively transposed by these intervals, T $_8$, T $_{10}$, T $_8$ and T $_2$, as seen in the case of ba , exemplified in Ex. 2b. Note that transposed anchor notes lead to the transposition of the complete sets of multipliers' pitch classes. This is why the matrix of anchor notes in Ex. 3 works as a determinant of the register of the resulting complexities: most of the transposed anchor notes are set in the lowest position, on which the other unordered pitch classes are superimposed (compare Ex. 3 and Fig. 2).⁹

Such a generative process leads us to an essential feature of the multiplication table: the presence of multifold isomorphic relationships spread throughout the table. This will form a crucial point of the discussion when I turn in the second part of this article to Boulez's unique selection of materials. For now, whilst concentrating on how the composer used this multiplication table in his compositional strategy, I return to the symmetrical structure of 'Don' and 'Tombeau'.

This symmetrical structure was initially pursued through a positional relationship of the materials employed in each movement. In order to organise the pitch structure in each paired section of 'Don' and 'Tombeau' (see again

Fig. 1), Boulez used the same set of complexities from the same column; for instance (see again Ex. 1), the material from the fifth column, $E\pi$, used in section e of 'Tombeau' is also employed in section b of 'Don'. From the shared set of materials embraced in the relevant column, the 'principal' pitches in 'Don' are selected to complement those of 'Tombeau'. In other words, the structure of all the sections in 'Don' derives entirely from the position of the main sound blocks assigned to the five sections of 'Tombeau' (b–f). For this reason, the pitch organisation for 'Tombeau' needs to be revealed before the compositional process of 'Don' is examined.

In Ex. 1 five sets of one or two blocks (enclosed in boxes) show the principal materials for 'Tombeau' (section b–f). These outlined blocks present only the fundamentals, and 'commentaries' on them enabled the composer to deduce a new set of materials.¹⁰ The concept of the commentary has nothing to do with an additional technical operation but rather implies an extensive reading of the existing table. It is a device that provides the composer with a wider range of operable materials without weakening his firm conception of the movements.

A new set of materials is often deduced from the unique position of certain blocks within the respective columns. For example, section e of 'Tombeau' shows how the operation of a 'vertical commentary' works in his selection of pitches (see Ex. 3). In this section, the composer applies this vertical commentary to the bottom blocks ed and ee of $\Pi E\pi$ as fundamental materials ($G\#/B$, $B\flat$), as highlighted in Ex. 3. The commentary results in the expansion of the available materials, with the ten blocks in the broken-line box derived vertically from the original bottom two; these blocks are used in a symmetrical trajectory from 1 to 10 in the resulting music of the section e of 'Tombeau' (bars 536–548).

It is these ten blocks shown in Ex. 3 that form the basis for section b of 'Don'. The composer chose a series of blocks in accordance with 'complementary horizontal commentaries in vertical order [of 'Tombeau']',¹¹ but with a reverse trajectory. Let us consider the details with a reductive diagram (Fig. 3a). In the opening of section b of 'Don', the set of four blocks in the third line is used. It begins with block ca and proceeds horizontally up to cd ; structurally, this set of blocks corresponds to ce in 'Tombeau', that is, the tenth block in Ex. 3. The reference block ce for 'Tombeau' being avoided in 'Don', the composer adopts a similar strategy to the replacement of the structural pitches in a subsection called 'Glose' from 'Tropé', the second movement of the *Troisième sonate* (O'Hagan 1998). The same principle is applied in the next phrase of 'Don': the set of four blocks in the fourth line (da , db , dc and dd) is deduced from de in 'Tombeau'. In the succeeding phrase, a further operation of 'vertical preparation' is introduced in the third set of blocks (Fig. 3b), which corresponds to ee for 'Tombeau'. With this operation, the four blocks at the bottom (ea – ed) are combined with the upper enclosed blocks, and these original four appear only as background materials. Thus, the outlined three sets of materials are assigned with high (1), middle (2) and low (3) registrations, as shown in Ex. 4.

As these examples suggest, the sketch plan of 'Don' was written alongside the outline of materials for 'Tombeau'. It does not mean that the two pieces were composed in parallel, but rather that Boulez used the structure of 'Tombeau' as a reference for the composition of 'Don', thus allowing him to design the complementary positional relationship based on shared sets of materials in the multiplication table. In this respect, the blueprint of 'Don' is derived entirely from the structural outline of 'Tombeau', though with varying interpretations of complementarity for each paired section. Furthermore, Boulez builds up a number of other underlying links between the two movements, not only by using the positional relationship mentioned above, but also by engaging in a behind-the-scenes reworking of the elements of 'Tombeau'. This is especially adapted in sections c and e of 'Don', whose generative processes provide good examples of Boulez's method of derivation.

Sections b and d of 'Tombeau' (bars 530 and 532–535), which correspond to sections e and c of 'Don' (pp. 28–38; pp. 14–21 of the published score), have the same instrumentation and the same last line from Mallarmé's 'Tombeau' (1897): guitar and horn, with the soprano melodically singing 'un peu profond ruisseau/calomnié'. It is in this trio that Boulez explores the veiled link that runs from 'Tombeau' to 'Don'. In these two sections of 'Tombeau', the horn and soprano parts make up a two-voice linear ensemble, whose pitch organisation is built on the blocks in the table. In contrast, the guitar part is more improvisational and does not adhere strictly to the table of materials. Boulez does not, however, use this instrumental and vocal material directly in 'Don'. Instead, as is described more fully below, the original material is recomposed within a new system. At the same time, this process of reinterpreting 'Tombeau' will also be integrated with the concept of positional complementarity, which eventually results in a double correlation between the two movements.¹²

Section e of 'Don' consists of antiphony between the two main instrumental groups of woodwinds/horns and strings/brass, augmented by improvisational passages for piano, harp and xylophone. The construction of these three groups is derived respectively from the voice, horn and guitar parts in 'Tombeau'. In the piano-harp-xylophone group, there is an acoustic allusion to characteristic aspects of the guitar part in 'Tombeau' through analogical imitation of rhythm and articulation (for example, arpeggiated chords, rapid passages, single sustained notes, etc.). However, the voice-and-horn texture provides a source of inspiration for the woodwind/horn and string/brass instrumental groups at a more fundamental level. The following description will concentrate on how the woodwind/horn group is structurally derived from the vocal line of 'Tombeau'.

The derivation process starts with a reduction of the vocal part of 'Tombeau' (bar 530), using the block *be* and its vertical commentary (*e*, *ce*, *de*, and *ee*) in B η (Ex. 5). They are combined with two levels of qualitatively different durations, as shown in Ex. 6: a series of long values for the fundamental block *be* (D $\sharp$, E and D), and different groups of interpolated short values for the four blocks of commentary. It is from this outline that Boulez builds up, for section e of 'Don'

Ex. 5 Vertical commentary on the block *be* for section b of ‘Tombeau’

Bη

The musical score for Ex. 5 is presented in five staves, each with five measures. The staves are labeled Mu, Nu, Et, Ou, and Pt. The notes are labeled with letters: Mu (a, b, c, d, e), Nu (ba, bb, bc, bd, be), Et (ca, cb, cc, cd, ce), Ou (da, db, dc, dd, de), and Pt (ea, eb, ec, ed, ee). A dashed box encloses the final measure of each staff, which contains the block 'be' (Nu) and 'ee' (Pt). The block 'be' in the Nu staff is highlighted with a grey circle.

with its five component subsections (A–E), a new system for the woodwind/horn strata. To obtain the resulting series of sound complexes for each subsection shown in Ex. 7, the composer goes through several reconstructive processes. First, as a framework for successive operations, the four blocks obtained by horizontal commentaries on the fundamental block *be* (*ba*, *bb*, *bc* and *bd*) are assigned respectively to subsections A–D, and secondly, the four blocks in the vertical commentary (*ee*, *de*, *ce* and *e*) are assigned to subsection E (blocks printed in boldface in Figs 4a and 4b). All these blocks are ‘distributed in 6 long durations as in the original’ to become the top notes of the complexes in each subsection (represented as semibreves in Ex. 6).¹³ As a result, the set of long values originally attached to the fundamental block *be* in ‘Tombeau’ are, in ‘Don’, re-spread out on the component pitches of the blocks derived from the aforementioned commentaries. The rest of the top notes (the black noteheads in Ex. 6) are deduced from the ‘original’ blocks by further procedures as follows

Ex. 6 A representation of Boulez's reduction of the vocal part of section b of 'Tombeau' (bar 530) as part of his preparation for the woodwind/horn strata in section e of 'Don'

Ex. 7 Transcript of a sketch from 'Don' (PSS, Pierre Boulez Collection, Mappe G, Dossier 3b, 5), omitting minor details; the numbers in the first line are the author's. (The pitches in the original are notated either in black, blue or green, the various colours implying the combinatorial process of the blocks, as described in the main text.)

(see blocks enclosed in boxes in Figs 4a and 4b). Four vertical blocks for subsections A–D and four blocks (*ea*, *b*, *cc* and *dd*) for subsection E are derived through a double procedure of selection, combining the remaining four lines and the four columns in B η .¹⁴ Thus, below these disposed top notes, the composer builds up several other notes that ultimately form the entirety of the complexes. All of these resulting agglomerations are also logically constructed on a certain set of blocks from the multiplication table, essentially related to 'Tombeau'. This will become even more evident when we consider certain details from subsection E.

In subsection E, the original blocks (*ee*, *de*, *ce* and *e*) are not 'described' in the same way as the semibreve linear notes in subsections A–D;¹⁵ rather, they maintain their shape as a vertical complex. These four blocks, labelled by the composer as α , β and γ (see subsection E in Ex. 7), function as important

Fig. 4 Derivation of fundamental blocks for (a) subsection A–D and (b) subsection E shown in Ex. 7

(a)					(b)				
<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
<i>ba</i>	<i>bb</i>	<i>bc</i>	<i>bd</i>	<i>be</i>	<i>ba</i>	<i>bb</i>	<i>bc</i>	<i>bd</i>	<i>be</i>
<i>ca</i>	<i>cb</i>	<i>cc</i>	<i>cd</i>	<i>ce</i>	<i>ca</i>	<i>cb</i>	<i>cc</i>	<i>cd</i>	<i>ce</i>
<i>da</i>	<i>db</i>	<i>dc</i>	<i>dd</i>	<i>de</i>	<i>da</i>	<i>db</i>	<i>dc</i>	<i>dd</i>	<i>de</i>
<i>ea</i>	<i>eb</i>	<i>ec</i>	<i>ed</i>	<i>ee</i>	<i>ea</i>	<i>eb</i>	<i>ec</i>	<i>ed</i>	<i>ee</i>

Ex. 8 Three different modes of multiplication based on the multiplicand α and the top note of A1 from Ex. 7

The diagram illustrates three modes of multiplication in musical notation. It features three staves. The top staff shows the initial state with a treble clef, a key signature of one flat (B-flat), and a time signature of 4/4. It contains a whole note chord labeled A1 (G and F#) and a whole note chord labeled alpha (G and F#). The middle staff shows the first mode of multiplication, where the A1 chord is multiplied by alpha, resulting in a complex labeled alpha1 (G, F#, and E). The bottom staff shows the second mode of multiplication, where the A1 chord is multiplied by alpha, resulting in a complex labeled alpha1+2 (G, F#, and E). The third mode of multiplication is shown in the rightmost part of the diagram, where the A1 chord is multiplied by alpha, resulting in a complex labeled alpha1+2+3 (G, F#, and E).

subsets for multiplying the top notes in all subsections A–E. Note that the blocks *e* (G and F#) and *ce* (D and C#) are related by transposition (T_7) and therefore share the same label γ . Using these sets of blocks as multiplicands of the top notes, Boulez executes an additional multiplicative operation in three different ways in order to change the density of the resulting complexes. In subsection A, for example, all of the complexes are deduced by the application of multiplier α , but the number of component notes varies. There are three different levels of density: complexes with three, four and five notes. As shown in Ex. 8, the first step is simply the multiplication of multiplier α with pitch

C (first semibreve of line A in Ex. 7 = A1), which results in a new block ($\alpha 1$: C/D $\flat$ /B). The same process is used to deduce A2, A3, A4 and all other blocks containing three blocks. The second and third steps demonstrate the process of 'multiplied multiplication': if we apply the same operation of multiplication on these resulting notes C, D $\flat$ and B, we obtain two other blocks ($\alpha 2$: B/C/B $\flat$ and $\alpha 3$: D $\flat$ /D/C). By combining blocks $\alpha 1$ and $\alpha 2$, we obtain a four-note block (C/B $\flat$ /D $\flat$ /B), for example A5, A6 and A9, and adding the blocks $\alpha 1$, $\alpha 2$ and $\alpha 3$ results in a five-note block (C/B $\flat$ /D/D $\flat$ /B), for example A7, A8 and A11. Boulez thus acquires more possibilities for materials by means of three different types of multiplication based on the three fundamental multipliers α , β and γ in all five subsections. This operation finally leads us to all resulting agglomerations shown in Ex. 7, which are combined with the rhythmic series notated above in each subsection and finally put into place in the final score.

The compositional system of 'Don', as demonstrated so far, is made up of minute deductive elaborations of the original materials. Thus the fully realised material in the score never appears in the same form as the material that acts as its starting point; there is a considerable distance between the two. It is indisputable that the creative process of 'Don', as is often the case with Boulez's works, is based on gradual deductive steps from elaboration to *mise en place* of the prepared material. At first glance these generative steps might appear to follow a simple trajectory. Yet these stages cannot really be described as unidirectional; rather, they present a continual back-and-forth in his compositional practice. Some sketches of 'Don' suggest that the composer reflected on the possibility of sound realisation at the earliest stages of planning by carefully selecting the blocks in the multiplication table. In other words, Boulez's elaboration of material is not always a result of procedural thinking, but may come about through a more subtle conflict between system and freedom. The next section will focus on these strategic selections of material.

Commentaries as a Preparation for *mise en place*: Quotation of 'Improvisation III' and Introduction

Apart from the symmetrical relationship with 'Tombeau', another Boulez tactic for synthesising *Pli selon pli* was to quote excerpts from the three 'Improvisations sur Mallarmé' in sections b and d of 'Don'.¹⁶ Whereas the symmetrical relationship, as shown, makes use of underlying and therefore imperceptible filiations, these quotations are tangible compositional gestures.

Five instrumental fragments from 'Improvisation III "À la nue accablante tu"' are quoted in section b, as are three vocal fragments from all three 'Improvisations' in section d. The quoted fragments are readily identified in the published score of 'Don', since each is enclosed in a box.¹⁷ At the level of perception, furthermore, the appearance of these quotations is often marked out by their stillness. Locating their point of origin in the three 'Improvisations'

is more complicated, however, since the fragments are to varying degrees reformulated. For instance, although one of the instrumental quotes from 'Improvisation III' – a section called 'Hétérophonie', for two xylophones – in section b of 'Don' is almost exact, it differs from the original, which has here been separated into several parts and inserted in a different order.¹⁸ Other quotations are more approximate. The third quotation on pages 8–10 of 'Don' (rehearsal numbers 9–11 in the revised version), for example, is taken from pages 38–39 of 'Improvisation III' but retains only the outline figuration and dynamics, the details of pitch and ornamentation having been greatly modified. The vocal quotations in section d of 'Don' show a similarly varied approach: although the quotations from 'Improvisations II and III' are fairly straightforward, that from 'Improvisation I' differs considerably from the original in that the text is fragmented and the melodic lines reconstructed.

Another aspect of the quotations is equally important in section b. Beneath the instrumental fragments from 'Improvisation III', Boulez inserts sustained piano sounds. These derive from the multiplication table, his particular selection of materials being strongly associated with the network of isomorphs therein. As previously discussed, this multifold isomorphic network is a natural outcome of the multiplicative process. In fact, what is included in this network is not only isomorphs but also a considerable number of *identical* blocks with the same notes. For example, Pascal Decroupet and Jean-Louis Leleu (2006, p. 189) point out that six sets of identical blocks are symmetrically situated in relation to the diagonal from top right to bottom left in the fifth column of Ex. 9. This is a predictable consequence of (1) the same pairing in inverse relation between multiplicand and multiplier (e.g. *bc/cb* or *bd/db*) and (2) the transpositional scheme deriving from the five anchor notes. In Fig. 2 the same pitch classes are situated diagonally, matching the placement of the identical blocks in Ex. 9. Note that the transposed anchor notes – mostly the lowest notes – determine the register of the resulting multiplications. It can therefore be said that the network of identical blocks shown in Ex. 9 is entirely a result of the transpositional outline in Fig. 2. What is striking is that these series of identical blocks function not only as a potential network in the structural level, but also as a perceptible musical gesture in the final composition of 'Don'. Boulez exploits this characteristic of the multiplication table with the intent of creating a specific sound beneath the quotations.

The following description demonstrates an example from section b, where Boulez introduces a quotation from 'Improvisation III'. As previously discussed, the structural outline of the first half of section b is designed according to the principle of complementarity with 'Tombeau', but in the second half Boulez sketches a series of blocks that form 'diagonal commentaries' for the background piano part of the quotation. First of all, *cc*, in column $E\pi$, which is the last block used in the previous part of section b, is chosen as a starting point to select four other blocks that together form a left diagonal line, that is, one that descends diagonally from right to left, *cc–db–ea–e–bd* (Fig. 5a). These five

Ex. 9 Reproduction of Ex. 11 in Decroupet and Leleu (2006, p. 189)

blocks are vertically combined with other blocks, though with a progressive reduction of the commentaries: the first contains a vertical set of five blocks, the second four, the third three, and so on (see the blocks in boldface in Fig. 5b). After this process a set of diagonal commentaries is applied again. When developing these supplementary diagonals, Boulez changed his strategy, and in the end he used only two different diagonals (*be-cd-dc-ea-a/e-bd-cc-db-ea*). A possible reason for this selection can be found in the table itself, which contains a number of symmetrical arrangements around *cc*, the central and densest block. Ex. 10 shows numerous isomorphs (exact or by transposition) among the blocks, resulting in a dense network of symmetrical relations within the table: for example, *bb*, *bd*, *dd*, and *db*; *bc*, *cd*, *dc*, and *cb*; *bd*, *be*, *de*, *ed*, and *eb*; *c*, *ce*, and *ec*; and finally, *e* and *ee* as well as *a* and *ea*. Considering the harmonic detail, we observe that blocks *eb* and *be* consist of interval class 3 (*ic3*); in blocks *db* and *bd*, these *ic3*s are duplicated. In blocks *dc* and *cd*, the duplicated *ic3*s appear simultaneously in two chromatic transpositions, and the central block *cc* also consists of three chromatic transpositions of *ic3*s. Moreover,

Fig. 5 Two stages (5a and 5b) in the construction of diagonal commentaries on block *c*, used for the piano part underneath the quotation from 'Improvisation III'

(a)

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
<i>ba</i>	<i>bb</i>	<i>bc</i>	<i>bd</i>	<i>be</i>
<i>ca</i>	<i>cb</i>	<i>cc</i>	<i>cd</i>	<i>ce</i>
<i>da</i>	<i>db</i>	<i>dc</i>	<i>dd</i>	<i>de</i>
<i>ea</i>	<i>eb</i>	<i>ec</i>	<i>ed</i>	<i>ee</i>

(b)

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
<i>ba</i>	<i>bb</i>	<i>bc</i>	<i>bd</i>	<i>be</i>	<i>ba</i>	<i>bb</i>	<i>bc</i>	<i>bd</i>	<i>be</i>	<i>ba</i>	<i>bb</i>	<i>bc</i>	<i>bd</i>	<i>be</i>
<i>ca</i>	<i>cb</i>	<i>cc</i>	<i>cd</i>	<i>ce</i>	<i>ca</i>	<i>cb</i>	<i>cc</i>	<i>cd</i>	<i>ce</i>	<i>ca</i>	<i>cb</i>	<i>cc</i>	<i>cd</i>	<i>ce</i>
<i>da</i>	<i>db</i>	<i>dc</i>	<i>dd</i>	<i>de</i>	<i>da</i>	<i>db</i>	<i>dc</i>	<i>dd</i>	<i>de</i>	<i>da</i>	<i>db</i>	<i>dc</i>	<i>dd</i>	<i>de</i>
<i>ea</i>	<i>eb</i>	<i>ec</i>	<i>ed</i>	<i>ee</i>	<i>ea</i>	<i>eb</i>	<i>ec</i>	<i>ed</i>	<i>ee</i>	<i>ea</i>	<i>eb</i>	<i>ec</i>	<i>ed</i>	<i>ee</i>

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
<i>ba</i>	<i>bb</i>	<i>bc</i>	<i>bd</i>	<i>be</i>	<i>ba</i>	<i>bb</i>	<i>bc</i>	<i>bd</i>	<i>be</i>
<i>ca</i>	<i>cb</i>	<i>cc</i>	<i>cd</i>	<i>ce</i>	<i>ca</i>	<i>cb</i>	<i>cc</i>	<i>cd</i>	<i>ce</i>
<i>da</i>	<i>db</i>	<i>dc</i>	<i>dd</i>	<i>de</i>	<i>da</i>	<i>db</i>	<i>dc</i>	<i>dd</i>	<i>de</i>
<i>ea</i>	<i>eb</i>	<i>ec</i>	<i>ed</i>	<i>ee</i>	<i>ea</i>	<i>eb</i>	<i>ec</i>	<i>ed</i>	<i>ee</i>

a and *ea*, with density 3, are composed of precisely these two intervals, *ic*3 and one chromatic relation. On the other hand, the blocks *ba*, *ca* and *da* in the first column do not reflect such exact symmetry around *cc*; *ba* and *da*, which are simply identical by transposition, appear as incomplete variants of the type *cd*, and *ca* is an incomplete variant of *cc*. All the blocks of the table are thus irrigated by a single harmonic colouration (*ic*3), eventually combined with chromaticism, which is simply a stylistic constant in post-Webernian music. Out of this network of isomorphs Boulez finally selects the two diagonals *be-cd-dc-ea-a* and *e-bd-cc-db-ea*, which are the two possibilities with the highest level of isomorphic

Ex. 10 Network of isomorphs in column $E\pi$

relations among the blocks. In other words, the numerous recapitulated variants of similar harmonies allow the composer to concentrate precisely on a sonic limitation within the table in order to develop the structural stratum of this section.

This particular selection of blocks is not an arbitrary decision on the part of the composer, a fact that will become apparent when we see the flexible manner in which Boulez realises these materials. Ex. 11 shows a passage for piano including blocks be , cd , dc , eb , and a (first diagonal commentary; see again Fig. 5b) over which a quotation from 'Improvisation III' is inserted. The series of blocks in this commentary contains two groups of identical chords (dc/cd and be/eb); the first set of identical blocks dc/cd , positioned on either side of the sustained ec , is realised acoustically in a similar way, that

Ex. 11 Transcript of excerpts from the pencil manuscript of 'Don' (PSS, Pierre Boulez Collection, Mapped G, Dossier 3b, 7), omitting minor details. The boxes marking the identical blocks in the piano part and the italicised letters above are the author's

is, with fixed registration, short duration and an ascending arpeggio. On the other hand, the second set, *be/eb*, is treated as a unique block and combined with the external notes E and E $\flat$. It is a result of an additional operation of 'chromatic complementarity' (*complémentaire chromatique*), which is used to fill the chromatic space between the original D and F. Three of the four resulting notes are shared with block *a* (from the same diagonal commentary) and placed in the same registration. The harmonic elements of this piano passage are replicated in a quoted excerpt from the end of 'Improvisation III' played by mandolin and guitar, but its rhythmic elements derive analogically from 'Improvisation III'.¹⁹ In other words, whilst this section is based on the materials from the table, it also involves a pre-defined compositional decision inspired by the original text of 'Improvisation III'.

Subsequent passages use the other sets shown in Fig. 5b, and in these too a number of perceptibly similar sounds appear among the quotations from 'Improvisation III', with similar articulation of identical blocks and, for the most part, fixed tessitura (several notes having two registrational possibilities). This suggests that the composer intentionally selects these limited sets of materials by diagonal commentary in order to lend coherence to the sound. Interestingly, on one page of very early sketches, Boulez writes a plan for 'right diagonal commentaries' (*commentaires diagonales droite*) for section b,²⁰ which

was, however, unrealised. Although there is no way to know the exact reason for this, it is conceivable that the more homogenous nature of the blocks in the left diagonal lines, that is, the diagonals from top right to bottom left, seemed to Boulez more appropriate when realising his sound image for the quotation from 'Improvisation III'. A further examination of the sketch material supports this hypothesis; Boulez usually realises the outlined materials after careful elaboration of the distribution of intervals inside blocks or in combination with other parameters. Nevertheless, for this section of diagonal commentaries, there are no such intermediate sketches, and it seems rather that he went directly from the first sketch to drafting. Boulez's ability to design the final sound without elaborating the sketch in further detail can presumably be credited to his meticulous preparation: the left diagonal materials were prepared well enough for the composer to incorporate them into the sound image in his mind, even though that image was not yet complete in every detail. When Boulez quotes all three 'Improvisations' in section d of 'Don', he employs, as before, a limited series of materials in column B η , obtained by left diagonal commentaries that contain a greater number of identical blocks. Diagonal commentaries thus serve as a gesture for recalling the previous occurrence of the three 'Improvisations sur Mallarmé' in 'Don'.

Such a compositional act shows Boulez reflecting on two questions in parallel: how to use the material according to his conceptual planning, and how to arrange it for the sound image in his mind. In contemplating the acoustic realisation (beyond the logical formalisation), the composer never hesitates to make adjustments to or substitutions for rationally outlined materials. This systematic approach to the multiplication table suggests that for him it was both a starting point for further consideration of its potential and an indispensable process for logically concretising his concept. This aspect of Boulez's composition is also evident in a final example, taken from the introduction of 'Don'.

In order to construct the opening (section a), the composer not only carefully chooses the sound blocks from the multiplication table, but also uses a device for modifying their original form. As already described, the beginning of 'Don' is paired with the end of 'Tombeau', the same chord being used both to open and to close the cycle. Ex. 12 illustrates the complementary relationship between the end of 'Tombeau' and the beginning of 'Don'. Just before the final chord of 'Tombeau', the instrumental parts play the first two blocks in $M\upsilon A\lambda$ ($a + b$; see again Ex. 1) between the two syllables of the concluding vocal line, 'la mort' (F#-D). The complementary three blocks c , d and e in $M\upsilon A\lambda$ are employed in 'Don', played simultaneously with the opening chord but perceived only in retrospect as a sustained echo. On the other hand, the two blocks used in 'Tombeau' ($a + b$) are also employed in 'Don' for the vocal line with the first line of Mallarmé's 'Don du poème' (1865): 'Je t'apporte l'enfant d'une nuit d'Idumée!' ('I bring you this child of an Idumaeen night!').²¹ It is with this vocal phrase that Boulez synchronises two parallel instrumental lines in piano and

Ex. 12 Reduction of the end of ‘Tombeau’ and the beginning of ‘Don’ indicating the blocks employed from the multiplication table (see. Ex. 1)

The musical score for Ex. 12 is divided into three staves. The top staff is for the vocal line, with lyrics 'la mort' and 'Je t'ap-por-te l'en-fant d'u-ne nuit d'I-du-mée'. It features a box labeled 'MvAλ' and annotations 'a+b' and 'c+d+e'. Above the staff, a bracket indicates a transition from 'Tombeau' to 'Don'. The middle staff is for the Piano, with lyrics 'de ee ce be ce de ee' and a box labeled 'MvEπ'. The bottom staff is for the Vibraphone, with lyrics 'de ee ce be ce de ee'. The score includes various musical notations such as notes, rests, and dynamic markings like 'fff'.

vibraphone. The pitches of these two instruments are conceptually derived from the three blocks *c*, *d* and *e* in *MvAλ*, which complement the vocal part. However, Boulez does not perform the operation of commentaries from these blocks in *MvAλ*, substituting the blocks *c*, *d* and *e* from a different column, *MvEπ*. On one page of sketches, Boulez notes an ‘excuse’ for using this alternative: that the last three blocks in *MvEπ* are ‘equal apart from B natural’ to those in *MvAλ*.²² This is a natural consequence of the multiplication table (see again Ex. 1): the five complexes in each of the five columns of the first line (*Mv*) in the multiplication table differ from one another only in different partitionings of the basic twelve-note row. In observing the three blocks *c*, *d* and *e* in *MvAλ* and *MvEπ*, it can be seen that the total number of notes is six (2/1/3) and seven (4/2/1), and their difference lies only in B. Thus, exploring column *MvEπ*, Boulez uses the vertical commentary to the fifth block (*e*) vertically back and forth (described in the sketch as ‘aller/retour’) for piano, and to the fourth block (*d*) diagonally and then downwards (‘diagonal/aller’) for vibraphone (Ex. 13). Even though the commentary to the third block (*c*) is planned in the sketch, it is not realised. In the commentary to *d*, furthermore, Boulez substitutes *dc* for *bc*, conceivably to avoid having two identical blocks, *bc* and *cb*, appear in succession.

For the two commentaries used for the vocal line ‘Je t’apporte l’enfant d’une nuit d’Idumée’ (in the piano and the vibraphone – the lowest staves in Ex. 12 – and enlarged on in the orchestra), Boulez adjusts the number of notes they contain in order to match the twelve syllables of the text. First of all, in the

Ex. 13 Vertical commentary on block *e* for piano and diagonal/downward commentary on block *d* for vibraphone

Επ

vertical commentary to *e*, the number of notes is increased by creating a structure centred on *be*, the blocks *de* and *ee* and two notes from *ce* (*E_b* and *C_#*, excluding *E* and *C*) being situated either side (compare Ex. 12, piano, and Ex. 13, right-hand boxed blocks). Secondly, the four blocks of the commentary to *d* arise through an operation of filtering to reduce the number of notes from twenty to twelve; the three blocks *c*, *d* and *e* in *MuAl* (*E-F_#-G-G_#-A-C*), which were used for the echo, are employed as a device for this filtering²³ (Ex. 14).²⁴ Moreover, the range of filtering gradually changes so that it does not excessively reduce the number of available notes. In the first step *dc* is filtered by all six notes, removing the pitch *E_b*; in the second the pitch *G* is removed from the echo filter so that only *G_#* and *E* are filtered from *cb*; in the third both *G* and *A* are removed from the filter, so that only the pitch *F_#* is filtered from *ea*. Even though Boulez draws the outline

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1. For the context and chronology of this work, see Albèra (2003a and 2003b), Bassetto (2003), Decroupet (2003), Durand (2003), O'Hagan (2003), Piencikowski (2003) and the introduction to Piencikowski (2010).
2. 'J'ai agrandi le plan de mon Mallarmé, jusqu'à en faire une œuvre longue qui me liquidera Mallarmé pour que temps jusqu'à ce que je reprenne goût au Coup de Dés – qui sera essai d'une synthèse totale [...] Je suis, en ce moment, en train d'élargir le Tombeau (si j'ose cette macabre comparaison) [...] au point d'en faire un mausolée!! Il y a une dialectique entre registres fixes et mobiles que j'espère réussir.' Letter from Boulez to Stockhausen, [20] December 1959, Paul Sacher Stiftung (PSS). Excerpt translated in Piencikowski (2010), p. 33.
3. The genesis of the piano version of 'Don' is an example of Boulez's self-borrowings. 'Don' for piano uses elements from *Strophes* (1957), which is originally derived from *L'Orestie* (1955); the composer then reused materials from 'Don' for the composition of *Éclat* (1965). The musical connection between these works is more thoroughly examined in Piencikowski (1993), Edwards (2006) and Salem (2014), Ch. 6.
4. The complete context of Boulez's letter is: 'Je suis toujours dans les Mallarmé./1. Je réalise un ensemble de versions fixes [de Tombeau]/2. Je fais vraiment le Don/Je recompose l'improvisation I./Encore beaucoup de travail. Ce sera finalement une œuvre qui va durer largement plus d'une heure' ('I'm still in the Mallarmé./1. I realise a set of fixed versions [of Tombeau]/2. I'm really making Don./I recompose the Improvisation I./Lots of work remaining. It will finally be a work lasting for much more than an hour.') Letter from Boulez to Stockhausen, [late November] 1959 (PSS).
5. The re-orchestration of 'Première Improvisation sur Mallarmé' was also taking place during the same period.
6. PSS, Pierre Boulez Collection, Mappe G, Dossier 3b, 4. Boulez's reference to James Joyce's *Finnegans Wake* has a symbolic meaning in this sketch. In *Finnegans Wake* the story starts mid-sentence, the first part being found at the end of the book. The result is a closed circle analogous to that in *Pli selon pli*.

7. Important contributions focusing on the theoretical aspect include Koblyakov (1977 and 1990), Heinemann (1998) and Scotto (2014). In parallel to this, the musical potential of this technique has been widely studied since Boulez's sketch material became accessible; see e.g. O'Hagan (1997), Pereira de Tugny (1999), Mosch (2004), Decroupet (2005), Decroupet and Leleu (2006), Strinz (2006) and Losada (2008 and 2014). The composer's comments on this technique are also found in a limited number of texts, e.g. 'Possibly ...' (Boulez 1991, pp. 111–40; originally published in 1952 in French as 'Éventuellement ...' and thereafter inserted in Boulez 1966, pp. 147–82) and in translation in *Boulez on Music Today* (Boulez 1971).
8. Losada's emphasis on the partial ordering in Boulez's multiplicative operation contrasts with both Heinemann's and Scotto's approaches, which treat the multiplication as the products of unordered pitch-class sets.
9. The register of the transposed multiplier in the table is not necessarily in the theoretically 'correct' place; in some cases the anchor notes are placed not in the lowest position but *above* some other pitches (e.g. *cc*, *bc* in Ex. 3). However, Losada's observation proves the structural importance of the subseries of anchor notes, showing brackets around the anchor notes in the sketch from *Structure II* (Losada 2014, pp. 97–8).
10. In the sketches of 'Don', Boulez notes the word *commentaire* as an agent by which he enlarges the interpretation of basic principles. In this article, the author uses the English translation, 'commentary'.
11. A sketch of 'Don', PSS, Pierre Boulez Collection, Mappe G, Dossier 3b, 3.
12. For more detail of section c of 'Don', see Sudo (2016).
13. '[R]épartis comme l'original en 6 valeurs longues', PSS, Pierre Boulez Collection, Mappe G, Dossier 3b, 3.
14. A possible reconstruction of Boulez's procedure reads as follows: whilst *cc* and *dd* are selected as part of the diagonal, *ea* and *b* cannot be deduced by this principle. To complete the diagonal, Boulez could have chosen *a*, but *bb* is a part of the horizontal commentary in the former subsection B. It results in the selection of *eb* as the only possibility in the second column; however, since this block is identical to the structural starting point *be*, it could not serve as commentary, so the selection of *b* and *ea* is, in the end, the only solution that satisfies the rule of equilibrated distribution among the lines and columns.

15. Boulez uses the term 'description' in a technical sense, meaning the melodic 'scanning' of a block (see Boulez 1963, p. 126, and 2005, pp. 656–7). The idea of scanning (*balayer*) is also expressed by the composer in Boulez (2005, p. 309).
16. Substantial investigations on 'Improvisations sur Mallarmé' include Stoianova (1973), Breatnach (1996), Brunner (1996a and 1996b), Guldbrandsen (1997 and 2016) and Salem (2014, Ch. 8).
17. This is only the case in the 1962 version (UE 13614); see pp. 7–14 and 24–7. In the revised score (UE 31538), the quoted fragments are thoroughly integrated (see rehearsal numbers 6–19 and 35–7).
18. Compare p. 11 in the published score of 'Don' (1962 version) and rehearsal number 8 in the revised 1982 version of 'Improvisation III' (UE 19521).
19. This passage is found at the very end of the 1959 unpublished version of 'Improvisation III', which Boulez referred to when composing 'Don'. In the revised 1982 version, this mandolin and guitar part is followed by another instrumental part (see pp. 89–90).
20. PSS, Pierre Boulez Collection, Mappe G, Dossier 3b. 2.
21. The English translation is from Mallarmé (2006), p. 27.
22. PSS, Pierre Boulez Collection, Mappe G, Dossier 3b, 3.
23. The term 'filtering' comes from the French *filtrage*, used by Decroupet (2012, pp. 240–5) to illustrate the deductive system of the series in 'Bourreaux de solitude' from *Le Marteau sans maître*.
24. The echo sound by the three blocks is also used as a definition of ambitus for all of sections a and b.

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NOTE ON THE CONTRIBUTOR

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ABSTRACT

Based on a study of the sketch material held at the Paul Sacher Foundation, this paper examines the derivation of materials in the 1962 orchestral version of 'Don', the first movement of *Pli selon pli: Portrait de Mallarmé* by Pierre Boulez. Although the composer starts with a prepared serial multiplication table, he exhibits a flexible and imaginative treatment of material between conceptual planning, conceived initially in the relationship with the last movement, 'Tombeau', and its *mise en place*. Some sketches suggest that Boulez carefully selects the material according to the sound image in his mind. The interaction between planning and sound realisation shows, furthermore, that he did not view the series as a restriction but rather as a fountain of creative inspiration.