



Francois-Xavier JEAN

France

L'horloge et le paon (opus 90, No.04)

A propos de l'artiste

Qualification : thèse de doctorat freelance
Sociétaire : SACEM - Code IPI artiste : 00483 46 92 21
Page artiste : https://www.free-scores.com/partitions_gratuites_francoisxavierjean.htm

A propos de la pièce



Titre : L'horloge et le paon
[opus 90, No.04]
Compositeur : JEAN, Francois-Xavier
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Style : 20eme siecle
Commentaire : oeuvre vectorielle

Francois-Xavier JEAN sur [free-scores.com](https://www.free-scores.com)



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L'horloge et le paon
opus 90, No. 04

L'horloge et le paon

produit scalaire et produit vectoriel

échange épistolaire avec mon ami musicien et mathématicien Jean Benoît Missoffe

En interrogeant <https://chat.openai.com/> avec les mots clés PRODUIT DE VECTEURS voici sa double réponse selon qu'il s'agisse de "produit scalaire alias produit point" et produit vectoriel alias produit croisé. J'avoue que je comprends parfaitement le premier et me noie dans le second

produit scalaire

alias produit point

Mathématiquement, si $\mathbf{u} = (u_1, u_2, u_3)$ et $\mathbf{v} = (v_1, v_2, v_3)$ sont deux vecteurs dans l'espace tridimensionnel, leur produit scalaire est :

$$\mathbf{u} \cdot \mathbf{v} = u_1v_1 + u_2v_2 + u_3v_3$$

produit vectoriel

alias produit croisé

Mathématiquement, si $\mathbf{u} = (u_1, u_2, u_3)$ et $\mathbf{v} = (v_1, v_2, v_3)$ sont deux vecteurs dans l'espace tridimensionnel, leur produit vectoriel est :

$$\mathbf{u} \times \mathbf{v} = \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ u_1 & u_2 & u_3 \\ v_1 & v_2 & v_3 \end{vmatrix} = (u_2v_3 - u_3v_2)\mathbf{i} + (u_3v_1 - u_1v_3)\mathbf{j} + (u_1v_2 - u_2v_1)\mathbf{k}$$

Pour nous amuser

1. improvisons/écrivons un court contrepoint à deux voix
2. modélisons-le, c'est à dire que réduisons-le en vecteurs de 3 éléments comme p.ex. V_1, V_2 & V_3
3. suivra une composition; on utilisera p.ex. ces vecteurs avec tout ce que les mathématiques offre de possibilité rotation, homothétie, permutation, inversion ...

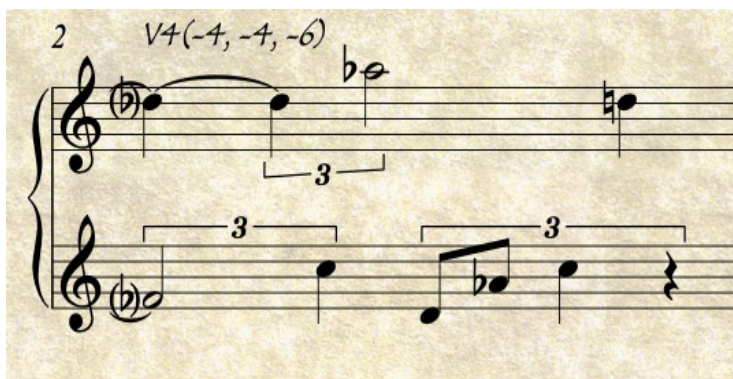
$$\text{p.ex. } V_1 \times V_3 = (-2, -4, +3) \times (-4, -2, -2) = (+8, +8, -6) = V_4$$

+8 car $-2 \times -4 = +8$. -6 car $+3 \times -2 = -6$

$$V_4 (+8, +8, -6) = \text{par réduction/renversement } (-4, -4, -6)$$

en fait $-6 = +6$

4. bonne chance !



essayons

essayons $-V1 \times (-1, +2, -3) = (-2, -4, +3) \times (-1, +2, -3) = V5 (+2, -8, -9)$
 alias $V5 (+2, +4, +3)$ où par renversement (9 \rightarrow 3) & t (8 \rightarrow 4).

essayons $V4 \times V5 = (-4, -4, -6) \times (+2, +4, +3) = (-8, -16, -18)$
 alias par réduction $(-4, -4, -6) \rightarrow V6 (-4, -4, -6)$

$V6 \times V1 = (-4, -4, -6) \times (-1, +2, -3) = (+4, -8, +18)$
 alias par réduction $\rightarrow V7 (+4, +4, +6)$.

essayons des vecteurs à 5 éléments

p.ex. $V8(-2, -4, +3, -1, +2)$

petite polyphonie

En improvisant j'ai produit ces quelques notes mélodiques que j'ai étagées en accord: Eb F G Bb vectorisé ainsi vecteur V (+2, +2, +3). Ce petit groupe de notes par la magie du rétrograde, miroir, augmentation, diminution ... va déterminer comme il convient la suite.



L'horloge et le paon

opus 90, No. 04

A ♩=60

François-Xavier Jean

The first system of musical notation consists of two staves. The upper staff is in treble clef and the lower staff is in bass clef. The music begins with a treble clef and a key signature of one flat (B-flat). Above the first measure, there are two wavy lines indicating a trill. Above the second measure, there is a tilde symbol (~). The notation includes quarter notes, eighth notes, and a half note with a slur.

The second system of musical notation consists of two staves. The upper staff is in treble clef and the lower staff is in bass clef. The music begins with a treble clef and a key signature of one flat (B-flat). The notation includes eighth notes, quarter notes, and half notes. There are several triplet markings (3) over groups of notes in both staves.

The third system of musical notation consists of two staves. The upper staff is in treble clef and the lower staff is in bass clef. The music begins with a treble clef and a key signature of one flat (B-flat). The notation includes eighth notes, quarter notes, and half notes. There is a trill marking (*tr*) above the first measure of the upper staff. There are several triplet markings (3) over groups of notes in both staves.

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N° 00483 46 92 21

thèse freelance de doctorat

7

Musical notation for measures 7-9. Measure 7 shows a bass clef with a dotted quarter note and an eighth rest. Measure 8 features a melodic line with a slur and a fermata over a dotted quarter note, and a bass line with a dotted quarter note and an eighth rest. Measure 9 continues the melodic line with a slur and a fermata over a dotted quarter note, and a bass line with a dotted quarter note and an eighth rest.

10

Musical notation for measures 10-11. Measure 10 features a melodic line with a slur and a fermata over a dotted quarter note, and a bass line with a dotted quarter note and an eighth rest. Measure 11 features a melodic line with a slur and a fermata over a dotted quarter note, and a bass line with a dotted quarter note and an eighth rest.

12

Musical notation for measures 12-13. Measure 12 features a melodic line with a slur and a fermata over a dotted quarter note, and a bass line with a dotted quarter note and an eighth rest. Measure 13 features a melodic line with a slur and a fermata over a dotted quarter note, and a bass line with a dotted quarter note and an eighth rest.

14

Musical notation for measures 14-15. Measure 14 features a melodic line with a slur and a fermata over a dotted quarter note, and a bass line with a dotted quarter note and an eighth rest. Measure 15 features a melodic line with a slur and a fermata over a dotted quarter note, and a bass line with a dotted quarter note and an eighth rest.

8

16

Musical notation for measures 16-17. Measure 16 consists of two treble clefs. The first treble clef has a 7-fingering indicated above the first eighth note. Both treble clefs contain triplets of eighth notes. Measure 17 consists of a treble clef with a quarter rest and a bass clef with a dotted quarter note.

17

Musical notation for measures 18-19. Measure 18 consists of a treble clef with a quarter rest and a bass clef with a dotted quarter note. Measure 19 consists of a treble clef with a quarter rest and a bass clef with a dotted quarter note.