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Involvement of Straight Motion Kinematics as a Basic Musical Features In The Music Work of Albertus Tanuwidjaya's "Jalan Menuju Surga"

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Abstract: This research examines the stages of Albertus Tanuwidjaya's creative process in making the final project musical work "Jalan Menuju Surga". It aims to discover the form of involvement of elements of the kinematics of straight motion in musical works, as the basic concept in making a final project music work in 2019. Albertus Tanuwidjaya also explored the concept as an extramusical idea. This research uses descriptive qualitative research methods with a case study approach. For the result, there are several stages in the process of creativity in the cultivation, namely the stages of processing kinematic data and presenting data in the form of graphs. The next stage of transformation results from the process of kinematic data into musical works with the establishment of rules to limit the transformation process. The last stage is the processing of creating a musical composition by applying the transformation according to the composer's wishes and then combining it with other aspects beyond the transformation rules. The kinematic elements involved in "Jalan Menuju Surga" transformed into the form of musical features that uses as basic concepts in the process of producing musical works.

Keywords: kinematics of straight motion, musical composition, music, and science.

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INTRODUCTION

In creating a work of musical composition, the experience of the life of the composer is very influential in the creative process and the quality of a musical work (Girdzijauskienė, 2018: 168). Various

internal and external stimuli inspire the creation of musical works (Girdzijauskienė, 2018: 171). Apart from this, composers create works through the ability to interpret and implement or direct manipulation of materials related to sound sources ((Michel Hogenes et al., 2014: 150).

There are several stages of exploration carried out by composers, one of which is by exploring musical ideas. Nowadays, exploring musical ideas in composing musical works tends to be more accessible, broad in scope, and unbound. One example is to apply other branches of science outside the science of music as part of the foundation of the idea of creating works.

This is not something new because it has been done by composers in the past, especially in intersecting the branch of art and the branch of science.

Ibekwe describes (2020: 176) that human beings carry out arts and science activities to achieve the desire for a specific result. Art represents the expression of human creativity, whereas science involves critical study, experimentation, scientific investigation, and the existence of a discovery.

Music in this discourse can be likened to art as well as science. Music as an art is depicted in the artistic features and characteristics of music and its position in the realm of other related fields. From the science perspective, music can be described in acoustic studies, sound production, and relationships with mathematics. Art involves the thought of creativity to achieve the goal, while science interacts with knowledge and studies to produce a new scientific work discovery (Ibekwe, 2020: 156). Music is created based on sounds of frequency, tone, resonance, vibration, and echo. The topic is pure science based on the formula of mathematical elements (Onwubiko & Neilsen, 2017).

According to Ibekwe (Ibekwe, 2020: 176), there is a scientific ability and artistic disposition in music. It describes dual characteristics as both art and science. Composer to explain how musical impulses during composition also require scientific experimentation. The musicality of a composer sometimes depends mainly on the level of ability naturally. Inspiration and perception of sound are mathematical interpretations in the form of music. Composers whose ability to develop ideas can visualize their musical works through creative imagination (Ibekwe, 2020: 166).

Seashore argues that a composer can enhance his creative abilities with several sources of inspiration, including physical phenomena and environmental also cultural features. Composers can develop that inspiration through an in-depth study of existing creative work. It takes special abilities before composers can make the most of all inspiration (Ibekwe, 2020: 166), including inspiration involving elements from other branches of science.

Since ancient times, this has been done in connection with the inspiration for creating musical works involving elements of other branches of science. According to Stewart (Ibekwe, 2020: 160), Pythagoras teaches about numbers as a guide to interpreting the universe and can explain everything, including music. For example, as done by Pythagoras in observing the relationship between mathematics and music and doing experiments on the preparation of ladders using multiplication and division procedures between the initial ratios and predetermined constants (Kralj et al., 2014: 67). The experiment resulted in a Dorian mode, which then became a foothold in determining other ways.

Arnold Schoenberg created a work based on 12-tone material with the relation of each note having the same value and role. The concept is known as a dodecaphonic. Schoenberg used the term Series and its variants to sequence a sample of 12 tones randomly. It is considered the most significant innovation in twentieth-century musical art (Alonso Tomás, 2019: 1). Roberto Gerhard also carried out the same experiment. He developed a compositional technique with the circulation of all twelve-tone classifications systematically in the musical dimensions of both vertical and horizontal.

Fractal geometry and chaos theory inspired most composer Gyorgy Ligeti's musical works' creative process. In creating works, Ligeti is interested in defined and undetermined musical processes, in addition to the relationship between micro and macro, as well as the transition from regularity to chaos and vice versa. Furthermore, Ligeti also randomly introduced fractals to represent key signatures in musical compositions (Schreiber, 2019: 25). Furthermore, Gyorgy Ligeti also introduced fractals to randomly represent *key signatures* in musical compositions (Kralj et al., 2014: 68).

The example above is one of the references used by Albertus Tanuwidjaya in making the final project music work at Program Studi Penciptaan Musik ISI Yogyakarta in 2019. The concept of composing musical works by involving elements of science opens insights and provides a reference for Albertus Tanuwidjaya in developing creative work.

Albertus Tanuwidjaya involved elements from the physical branch of the kinematics of straight motion in his work " Jalan Menuju Surga." Kinematics is a part of mechanics other than dynamics, which is a branch of physical science that studies the motion of an object (Vilmala & Riau, 2020: 1). The fundamentals in kinematics, among others, are distance, displacement, speed, and acceleration (Jufriadi & Andinisari, 2020: 94). An object can be said to be an object that moves when there is a change in position from the fulcrum. One type of motion in kinematics is straight motion (Puspitasari & Febrinita, 2020: 198).

Albertus Tanuwidjaya created the musical work "Jalan Menuju Surga," involving elements of kinematics based on an interest in this branch of basic physics while studying high school. According to Albertus Tanuwidjaya, humans can understand all movements in the universe with kinematic theory because they can be measured rationally. Albertus Tanuwidjaya also considered that kinematics can be used in everyday life to predict the existence of motion events and design things related to motion. Naturally occurring movements can form graphics, and if converted into musical features, those features can be used as basic concepts in the process of creating musical works.

Albertus Tanuwidjaya transformed the kinematic movement by limiting distance and time using a motor vehicle speedometer. Recording of kinematic data from the speedometer using a camera. The data processing uses the theory of linear motion kinematics, which is presented with a line graph and becomes a basic feature. Albertus Tanuwidjaya also explored this primary feature as an extramusical idea and became a tool to make the musical work "Jalan Menuju Surga."

The musical work "Jalan Menuju Surga" is a work in the form of program music, with the formation of instruments for trio; flute, cello, and guitar. The activities of Albertus Tanuwidjaya, who at that time traveled a lot from the place of residence to the church, both to attend meetings and worship, became one of the inspirations in doing works. The work has four parts of the movement that have interrelations and reflections on the four stages of spiritual life in the Christian faith.

METHODS

This research uses qualitative research methods with research procedures that describe and relate to the perspective and the causation of a person's behavior in doing things. According to Moleong

(Tjahyadi et al., 2020: 82), qualitative research holistically produces analytical procedures based on various forms of meaning.

This qualitative research is descriptive with a case study approach. A case study is a method used to collect and analyze research data that relates to a case based on essential conditions, developments, and supporting factors (Ahyar, 2020: 64).

The stages carried out in this study begin with observation in the form of a literature study, by filtering data sources, both from library books, journals, proceedings, and all manuscripts related to the research focus. Data collection in this study was carried out using four kinds of data collection techniques: observation, interviews, documentation, and combined/triangulation.

In determining the research sample, the researcher first observed several final project works of Program Studi Penciptaan Musik ISI Yogyakarta's students. After that categorized the foundation of the idea of creation until it could find student music composition works that were indicated to involve elements of the physical science branch as part of the foundation of the concept of creation. The following data collection is to conduct interviews with the primary samples of the study. The interview data collected is related to the motivation and goals of students involving elements of the physical science branch in the final project work. After the interview, it carried out the data documented related to the research focus. The last stage in data collection is the triangulation of data, combining the results of data collection from previously carried out techniques (Ahyar, 2020: 154).

The next stage is data analysis, a systematic preparation of data results. According to Miles and Huberman (Ahyar, 2020: 163), there are several stages of data analysis: the data reduction or filtering stage, the data presentation stage, and the data verification or drawing stage. According to Patilima, data reduction is a process of selection, focus centering, abstraction, and data transformation (Ahyar, 2020: 164). According to Miles and Huberman, the stage of presenting data is the collection of presented data information and the possibility of drawing conclusions and actions (Ahyar, 2020: 167). At the verification stage, the initial conclusions are still temporary, and there may be changes according to the supporting evidence (Ahyar, 2020: 170).

It is then interpreted into the results of research sourced from a discussion of the stages in the process of creating a musical work, "Jalan Menuju Surga," as well as the form of involvement of elements of straight motion kinematics in work. There is an effort to abstract a finding from several theories that have been obtained in the interpretation of data analysis. An attempt to know the explanation of a social event received from the perspectives and experiences of the sample studied (Creswell, 2013: 25). The results of the data interpretation process are expected to produce a new formulation of research problems so that it will result in the emergence of further research with new objects.

RESULTS AND DISCUSSION

In creating the musical work "Jalan Menuju Surga," Albertus Tanuwidjaya carried out several stages of the process of creativity. Among other things, collecting kinematics data with observations for the first step. An object in this observation is the application of kinematic theory in the world of human

life day, especially the life traveled by Albertus Tanuwidjaya himself. Albertus Tanuwidjaya did not prepare systematically in making these observations and was unstructured.

In the next stage, Albertus Tanuwidjaya processed data from observation results selectively to understand the basic concepts of kinematics as extramusical concepts involved and used in the work making. Data selection focuses on applying extramusical objects from the branches of physical and mathematical sciences. Applying the extramusical thing became a reference in using the concept of the kinematics of straight motion. Subsequently, Albertus Tanuwidjaya transformed the concepts into the musical work "Jalan Menuju Surga."

After the observation and data processing stages, Albertus Tanuwidjaya began to carry out the process of creating works. This process starts with the steps of processing kinematics data from collecting straight motion data samples. Albertus Tanuwidjaya collected samples of the straight motion data by using the Honda Sonic 150R motorcycle as his daily means of transportation. The data collected is mainly data during the journey from his residence in the area of Panggungharjo, Sewon, Bantul, DIY to the Wisma Immanuel in the Samirono area, Depok, Sleman, DIY. Albertus Tanuwidjaya made the trip almost every day during meetings and worship activities. Sampling kinematics data from the trip via a predetermined route with a distance of 10.8 and a total time of about 23 minutes 44 seconds.
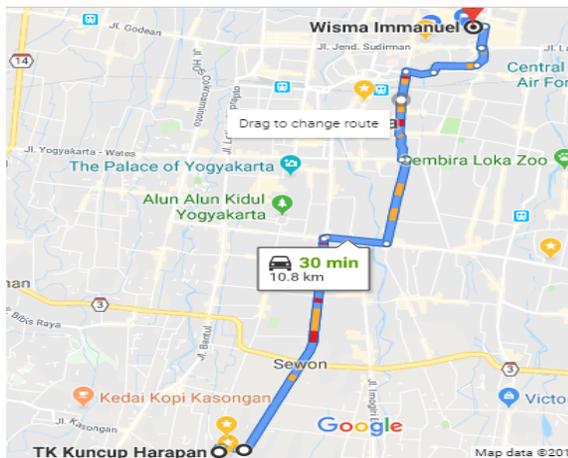
Figure 1. The route took in data sampling.
A source of google maps.

Albertus Tanuwidjaya used a digital speedometer on a motorcycle and recorded it using a cellphone camera as a speed measurement device. The results of video recording the speedometer activity are processed using GOM Player software. This software captures images of the speedometer screen from the beginning to the end of the trip. The time interval of capturing the screen image is about one second. Albertus Tanuwidjaya took a screenshot as a sample of the motorcycle's instantaneous speed data and collected the samples in a table.

Figure 2. A sample set of instantaneous speed data.

In the next step, Albertus Tanuwidjaya processes the sample set into a $a = \frac{\Delta v}{\Delta t} = \frac{v_{finish} - v_{start}}{t_{finish} - t_{start}}$ formula. The procedure aims to obtain a sample of instantaneous acceleration motion data. Albertus Tanuwidjaya determined Δt in a stagnant state at number 1, which indicates one second, so the above formula changed to $a = \frac{\Delta v}{\Delta t} = \frac{v_{finish} - v_{start}}{1} = v_{finish} - v_{start}$. The instantaneous acceleration motion data sample is then also entered into a table. The presentation of both straight motion data samples is made into the form of a graph with the line chart feature as a tool.
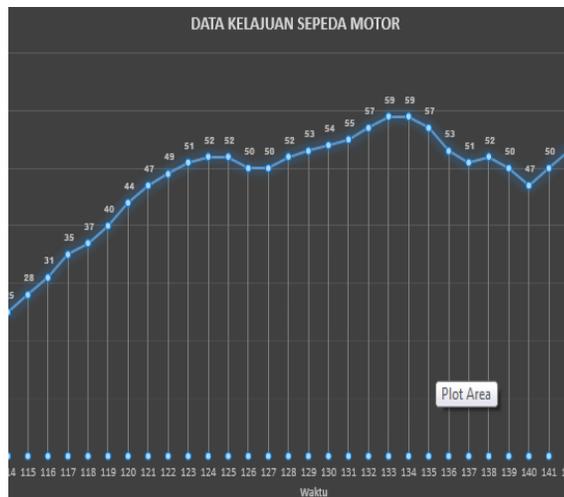
Figure 2. Instantaneous speed data graph.
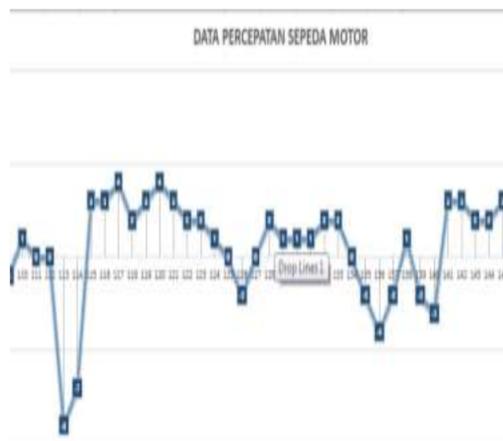
Figure 3. Instantaneous acceleration data graph.

In data sampling, Albertus Tanuwidjaya obtained 1396 data samples. Albertus Tanuwidjaya then used the results to set the rules in making the musical work "Jalan Menuju Surga." The establishment of these rules is one part of the process of transforming kinematic data into musical features.

After collecting kinematics data, the next stage is transforming the data into a musical feature and used in making the music work "Jalan Menuju Surga." The use of features in each part or movement in the musical work "Jalan Menuju Surga" has different ways. Albertus Tanuwidjaya also limited the transformation of such kinematics data by setting rules in the table.

The sample data is then organized into a section of the musical work "Jalan Menuju Surga," consisting of four movements. The first movement used data samples from 1 to 257. The second movement used data samples from 258 to 597. In the third movement, Albertus Tanuwidjaya used data samples from 598 to 1105. In the fourth movement, there is the use of data samples from 1106 to 1396.

In the first part of the movement using the Eb Major ladder, there is a rule that the determination of the low height of the tone is based on the last single digit of the number in the sample of instantaneous speed data. Albertus Tanuwidjaya set the tone duration in such part of the movement base on the rules.

Table 1. Rules that determine
the pitch of the tone in the first movement

Last digit 1	The first note of the harmonic minor scale
Last digit 2	The second note of the harmonic minor scale
Last digit 3	The third note of the harmonic minor scale
Last digit 4	The fourth note of the harmonic minor scale
Last digit 5	The fifth note of the harmonic minor scale
Last digit 6	The sixth note of the harmonic minor scale
Last digit 7	The seventh note of the harmonic minor scale
Last digit 8	The previous two notes in the sample data are resurfaced
Last digit 9	The previous two notes in the sample data are resurfaced
Last digit 0	Silent

Table 2. Rules that determine
the duration of the tone in the first movement

Sample data numbers 4 to 6	Length of 1/4 tap tone duration
Sample data numbers 1 to 3	Length of 1/2 tap tone duration
Sample data numbers 0	Length of 1 tap tone duration
Sample data numbers -1 to -3	Length of 2 tap tone duration
Sample data numbers -4 to -6	Length of 4 tap tone duration
Sample data numbers -7 to -9	Length of 6 tap tone duration
Sample data numbers -10 to until next	Length of 8 tap tone duration

The second movement uses the C Major ladder. Compared to the first movement, there is a difference in the detailed rules for determining the low height of the tone in the second movement. There is no set rule for the tone of duration in the second movement. The determination of rules is based on the details of specific numbers in the instantaneous speed sample data.

Table 3. Rules that determine
the pitch of the tone in the second movement

Numbers 1-5	The first note of the C major scale
Numbers 6-10	The second note of the C major scale
Numbers 11-15	The third note of the C major scale
Numbers 16-20	The fourth note of the C major scale
Numbers 21-25	The fifth note of the C major scale
Numbers 26-30	The sixth note of the C major scale
Numbers 31-35	The seventh note of the C major scale
Numbers 36-40	The first note is in the one octave higher of the C major scale
Numbers 41-45	The second note is in the one octave higher of the C major scale
Numbers 46-50	The third note is in the one octave higher of the C major scale
Numbers 51-55	The fourth note is in the one octave higher of the C major scale
Numbers 56-60	The fifth note is in the one octave higher of the C major scale
Numbers 61-65	The sixth note is in the one octave higher of the C major scale
Numbers 66-70	The seventh note is in the one octave higher of the C major scale

Eb Major and G# Minor ladders are used in the third movement. There is a comparison between the rule of high low of the second movement and the detailed rule of determining the high low pitch of the tone in the third movement. If in the second movement, the determination of the low height of the tone is based on the detailed numbers in the instantaneous speed data, but in the third movement, it is based on the instantaneous acceleration data. Determinations regarding the tone duration in this movement are based on a sample of instantaneous acceleration data, as in the first movement but with different numerical details.

Table 4. Rules that determine
the pitch of the tone in the third movement

Numbers -12 to -11	The first note of the Eb major / G# minor scale
Numbers -10 to -9	The second note of the Eb major / G# minor scale
Numbers -8 to -7	The third note of the Eb major / G# minor scale
Numbers -6 to-5	The fourth note of the Eb major / G# minor scale
Numbers -4 to -3	The fifth note of the Eb major / G# minor scale
Numbers -2 to-1	The sixth note of the Eb major / G# minor scale
Number 0	The seventh note of the Eb major / G# minor scale
Numbers 1 to 2	The first note is in the one octave higher of the Eb major/G# minor scale
Numbers 3 to 4	The second note is in the one octave higher of the Eb major/G# minor scale
Numbers 5 to 6	The third note is in the one octave higher of the Eb major/G# minor scale
Numbers 7 to 8	The fourth note is in the one octave higher of the Eb major/G# minor scale
Numbers 9 to 10	The fifth note is in the one octave higher of the Eb major/G# minor scale
Numbers 11 to 12	The sixth note is in the one octave higher of the Eb major/G# minor scale
Numbers 13 to 14	The seventh note is in the one octave higher of the Eb major/G# minor scale

Table 5. Rules that determine
the duration of the tone in the third movement

Sample data numbers 0 to 9	Length of 1/4 tap tone duration
Sample data numbers 10 to 19	Length of 1/2 tap tone duration
Sample data numbers 20 to 29	Length of 1 tap tone duration
Sample data numbers 30 to 39	Length of 2 tap tone duration
Sample data numbers 40 to 49	Length of 4 tap tone duration
Sample data numbers 50 to 59	Length of 6 tap tone duration

The D major scale is used as a reference in the transformation of kinematic data in the fourth movement. The basis for determining the low pitch of the numbers in the instantaneous speed data with different details of the first, second, and third movements. In this fourth movement, Albertus

Tanuwidjaya did not perform a kinematic transformation to determine the rules for the tone duration, just as it was with the second movement.

Table 6. Rules that determine
the pitch of the tone in the fourth movement

Numbers 1,3,5,7,9	The first note of the D major scale
Numbers 2,4,6,8,10	The second note of the D major scale
Numbers 11,13,15,17,19	The third note of the D major scale
Numbers 12,14,16,18,20	The fourth note of the D major scale
Numbers 21,23,25,27,29	The fifth note of the D major scale
Numbers 22,24,26,28,30	The sixth note of the D major scale
Numbers 31,33,35,37,39	The seventh note of the D major scale
Numbers 32,34,36,38,40	The first note is in the one octave higher of the Eb major/G# minor scale
Numbers 41,43,45,47,49	The second note is in the one octave higher of the Eb major/G# minor scale
Numbers 42,44,46,48,50	The third note is in the one octave higher of the Eb major/G# minor scale
Numbers 51,53,55,57,59	The fourth note is in the one octave higher of the Eb major/G# minor scale
Numbers 52,54,56,58,60	The fifth note is in the one octave higher of the Eb major/G# minor scale

After completing the process stage of processing the straight motion kinematics data, Albertus Tanuwidjaya involved the processing results in the musical work "Jalan Menuju Surga." The sample data involved in the musical work is only what suits the wishes of Albertus Tanuwidjaya. There is an amalgamation of the data results involved with other musical aspects. The musical aspect is also unregulated and according to the will of Albertus Tanuwidjaya. Albertus Tanuwdijaya attributes four movements in the musical work "Jalan Menuju Surga" with a correlation of the four stages of Christian spiritual life.

The first movement has the form of Rondo, which consists of the A-B-A-C-A period. Rondo's form is likening to the meaning of human life in sin and a reflection of the spin of life at the same point.

This movement uses the Eb minor scale. For Albertus Tanuwidjaya, this minor ladder can interpret a dark character, feelings full of anxiety, and even an atmosphere full of depression.

Albertus Tanuwidjaya took the results of the 72nd to 85th data samples and transformed them according to the table of drafting rules for the main melody of period A in the first movement. The result of such transformations is made along four rhythms. The four rhythms are then divided into two parts and processed with rhythmic augmentation at twice the price of a longer tone. Each augmentation section repeats consecutively twice. In this A period, Albertus also transformed the data sample results to 60 to 70 and processed them similarly into a new main melody.

Notation 1. The result of the transformation
in the period A of the first movement

Notation 2. The main melody of period A
in the first movement

Notation 3. The result of the transformation
data sample result to 60 to70.

Notation 4. The second main melody of period A
in the first movement

In period B, the transformation carried out was from the processing of data samples 1-8, data samples 128-134, data samples 158-166, data samples 76-81, and data samples 19-23. Albertus Tanuwidjaya raised a picture of the atmosphere of something uncertain and mysterious in the melody

of the beginning of period B. The atmosphere results are from the transformation of data samples 1-8. There are processes into a pattern of small motifs that repeat with dynamics that tend to rise.

Notation 5. The first main melody
in the beginning of period B
of the first movement

Notation 6. The atmosphere of mysterious
in the main melody at the beginning of period B.

There is a new melody of data samples transformation result, from 128 to 134, with diatonic transposition processing of intervals three below and piano dynamics for added contrast. After that, Albertus Tanuwidjaya transformed the data samples from 158 - 166, 76 - 81, and 19-23 in successive bars, and there was a repeat of the cadence that ended period B.

Notation 7. Transformation of the data samples from 158-166, 76-81, and 19-23
in successive bars.

There was a transformation of data samples 115-125, which was processed as the main melody played by the flute at the beginning of period C and continued with melodic processing from the results of the transformation of data samples 19-26. The cello instrument then resurfaces the main melody. After this C period ended, period A reappeared and continued with the repetition of period C. Both periods were played in a completely unchanged format and became the end of the first movement.

Notation 8. The main melody of processing tranformation data samples 19-26
played by the flute

Notation 9. The cello that resurfaces
the main melody of processing tranformation
data samples 19-26

Albertus Tanuwidjaya described the second movement in the musical work "Jalan Menuju Surga" as proof of God's love in attituding to human sins. The C major scale is used to meet the characteristics of a pure, simple, and innocent. The slow tempo, with a swinging and gentle style, gives an idea of calmness, covetousness, and tenderness due to love from God. Albertus Tanuwidjaya marked the slow tempo with an adagio and a tempo mark of 60 bpm, as well as in the A-B-A structure.

The main melody of the initial part in period A of this second movement uses the results of data sample transformations 258-285 and 358-369, played by the flute at bars of 1-15. Furthermore, the cello takes over the melody, which results from processing the transformation of data samples 331-356 at bars 15-21. In the mid-period A section, the flute again plays the main melody with the diatonic transposition of the third interval and the superficial extension. The subsequent melody is the result of processing the transformation of data samples 438-380. The main melody at the end of this period passes to the cello instrument by processing the results of the transformation of data samples 531-556.

Notation 10. The beginning melody
in period A of the second movement.

Period B of the second movement begins on the 50th bar, the fourth tap. The main melody in period B results from processing the transformation of data samples 294-316 and is played by the flute. There is the processing of transformations in such melodies with the transposition of intervals three below in diatonic with the addition of cadence. In the latter part of the B period of the second movement, the cello takes over the main melody in bars 62 - 81. The melodies process the transformation of the 390-405 data sample with the addition and repetition of C notes and processing of the rhythm. Furthermore, there is a melody from the results of processing the transformation of data samples 294-316 with diatonic transposition of fourth intervals above. In addition, there is the addition of F and G tones with repeated cadence.

The third movement in the musical work "Jalan Menuju Surga" describes man's life continuously in contact with God. This third movement has an A-B-A structure with an Andante tempo in 80 BPM. This period A, made in the Eb Major scale, has a sense of love and faithfulness nuances in close communication with God. In the B period, this third movement is made with the G# Minor scale in the Moderato tempo. It gives rise to contrasting characters, such as nuances full of grievance, full of pressure, struggle, challenge, and lamentation. The next period is to return to period A, playing with the same tempo and ladder as period A before.

Beginning of period A of the third movement, the cello plays a long note with a response guitar accompaniment. The way guitar instruments play in this period was done by rubbing the fingertips of the hand against the intended string. The flute followed afterward by playing the melody of the results of the processing of the transformation of data samples 630-638 with rhythmic diminutive and transposition intervals of three. In some bars afterward, the cello played the main melody repeat once. There was a procession of 908-917 data sample transformations with rhythm diminutive and diatonic transpositions of third intervals above played by flutes in bar 25 of this period.

Notation 11. Processing of 908-917 data sample transformations with rhythm diminutive.

Notation 12. Processing of 908-917 data sample transformations with diatonic transpositions of third intervals above.

Furthermore, the main melody uses the results of processing the transformation of data samples 787-895, and there is a rhythmic addition along four beats using the 198th data sample transformation. The latter part of period A closes with a guitar playing that repeats the melody on the 5th bar.

The flute plays the main melody in period B using the fundamental G# minor tone. The melody's initial part results from the transformation of data samples 631-638 and 707-717 directly and without any processing. In the next main melody, the processing of data sample transformations 856-864 occurs. The processing was carried out by rhythmic diminution and added tone to the 864 data sample along two beats. There is a final resolution in bar 86 with data sample transformation 1084-1089 repeated three times. Completion of the melody in period B using the transformation results of data samples 1043 – 1055 without processing. The melody is played by a flute and then replaced by a cello.

Notation 13. The main melody played by the cello replaces of flute at the end of the third movement.

The final movement in the musical work "Jalan Menuju Surga" is the fourth movement. In this movement, Albertus Tanuwidjaya describes the eternal life of the man christianly, characterized by man's rapture in the end times. The melodic structure of this movement has the form of A-B-A' using the D major scale and the Andante tempo in 80 BPM. The characteristics raised by Albertus Tanuwidjaya in this movement are those that reflect joy, triumph, and joy.

Period A in the fourth movement, the main melody played flute on 1-24th bars, using the results of transformation processing from data samples 1106-1114, 1180-1190, and data samples 1226-1235. Transformation processing is carried out by rhythmic processing, and there is processing by means of transposition of intervals of five diatonically on the 1-4th bar.

Notation 12. Transformation
of data samples 1106-1114.

Notation 14. Transformation processing
of data sample 1106-1114
with diatonic transpositions of fifth intervals above.

In the 25th bar of the fourth movement, the melody reappears as a period B from the transformation result of data samples 1358-1369 by rhythmic processing. The main melody at the beginning of period B, precisely on the 29-33rd bars, is played by the flute. The cello then plays the main melody at the following rhythm from the transformation of data samples 1111-1118 to the end of period B in the 44th bar. On the 45th bar, the A' period appears by playing the A period at an octave higher. The period ended the whole movements of the musical work "Jalan Menuju Surga."

CONCLUSION

Based on the study of the musical work "Jalan Menuju Surga," it can be concluded Albertus Tanuwidjaya carried out several stages in the creative process of creating the work. The first stage carried out by Albertus Tanuwidjaya was to collect kinematics data with observation in an unstructured manner. The observation is related to the application of kinematics theory in everyday life. The focus of selection is on the kinematic application as extramusical objects.The collection of straight motion kinematics data samples was carried out with the media of a Honda Sonic 150R motorcycle speedometer used on the way from his residence in Panggungharjo, Sewon, Bantul to a place of worship, Wisma Immanuel, in

Samirono, Depok, Sleman. The mileage of the two places is about 10.8 km, with a time of approximately 23 minutes and 44 seconds.

After the following observation, the specific stages of processing the data from the observations are carried out. Data processing is carried out by connecting the basic concepts of kinematics and mathematics for resulting kinematic data samples. The kinematic observation data results are presented in the form of a graph, and the results of the processing of observational data are served with tables. Albertus Tanuwidjaya obtained 1396 data samples in the above stages and used these results to establish rules as part of the transforming kinematic data samples process.

The third stage is creating works that begin with processing kinematics data samples that are transformed into musical features. Results of the transformation data sample are then processed along with the musical elements that have been determined in each part of the movement of the work.

The data samples are transformed into a form of musical features, which are then processed into the main melody in the four movements of the musical work "Jalan Menuju Surga." The first movement used data samples from 1 to 257. The second movement used data samples from 258 to 597. Albertus Tanuwidjaya used the 598th to 1105th data samples in the third movement. In the fourth movement, there is the use of data samples from 1106 to 1396.

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