Journal of Generalized Lie Theory and Applications

Anona, J Generalized Lie Theory Appl 2016, S2
DOI: 10.4172/1736-4337.S2-008

Research Article Open Access

Mathematical Aspects of Sikidy

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Abstract

It emphasizes the mathematical aspects of the formation of sikidy. The sikidy as an art of divination is transmitted by oral tradition, the knowledge of these mathematical relationships allows for a more consistent language of sikidy. In particular, one can calculate systematically all "into sikidy" special tables of Sikidy used in the "ody" (kind of talismans).

Keywords: Sikidy; Divination; Into; Abelian groups

Introduction

Divination held a special place for all peoples and all times. In Madagascar, the sikidy is an enough precise art of divination and a remedy to avert the fate of the consultant. The present paper is the English version of an unpublished paper [1] translated by Randriambololondrantomalala. Only, introduction and bibliography of the original paper are modified. I'm a differential geometer and Lie theory specialist in this previous domain as [2-6] show. But, this Malagasy art of divination which has mathematical practices has fascinated me and paid my intention in quality of mathematician. So, I made this paper as a first step of long studies about the powerful of mathematics in another fields like divinations. The original paper had plenary lecture in a scientific conference at the University of Fianarantsoa, Madagascar. Next, I think that publication of my paper [1] will be useful as well as several authors have cited my results cf. [7-11]. This article is the first step of my research in this area and mainly, my motivation is to build an algorithm about Sikidy's practice in my next paper.

Formation of Sikidy and Mathematical Relations

Generally, we use seeds of "kily" (Tamarind), the total number of seeds must be even and large enough to make all desired combinations, at least a hundred seeds. We awakens the sikidy by an invocation that expresses a certain oral tradition of Sikidy and, formulates at the end the questions that we want to have the answers, while turning in circles and always with the right hand the seeds of kily on a mat. Then we take a handful of seeds from the pile at random. It would be at this level the intervention of the Hereafter. We compute the seeds in pairs, if the handle is even number, we align two seeds; in the odd case, we align one seed.

This forms a table from right to left, said mother-sikidy:

$$\begin{array}{cccc} a_{14} & a_{13} & a_{12} & a_{11} \\ a_{24} & a_{23} & a_{22} & a_{21} \\ a_{34} & a_{33} & a_{32} & a_{31} \\ a_{44} & a_{43} & a_{42} & a_{41} \end{array}$$

Each variable a_{ij} is composed of one seed or two depending on the result obtained by the above method. The index i indicates the position of the line, j that of the column ranging from 1 to 4. The quadruplet $(a_{11}, a_{21}, a_{31}, a_{41})$ designates Tale (Consultant); next $(a_{12}, a_{22}, a_{32}, a_{42})$ Maly (Wealth), $(a_{13}, a_{23}, a_{33}, a_{43})$ Fahatelo (A third person); next one $(a_{14}, a_{24}, a_{34}, a_{44})$ Blady (Earth); $(a_{11}, a_{12}, a_{13}, a_{14})$ Fianahana (Child); $(a_{21}, a_{22}, a_{23}, a_{24})$ Abily (An elderly person); next $(a_{31}, a_{32}, a_{33}, a_{34})$ Alisay (Woman); $(a_{41}, a_{42}, a_{43}, a_{44})$ Fahavalo (Enemy).

We build eight other figures below the mother-sikidy left to right derived from the above quadruplets respecting the following law:

- One seed and one seed yield two seeds,
- Two seeds and one seed give one seed,
- Two seeds and two seeds yield two seeds.

So the law of inner composition of Abelian group $(\mathbb{Z}/2\mathbb{Z}, +)$; two seeds represent the identity element $\dot{0}$, one seed is $\dot{1}$. The combining operation is done in $(\mathbb{Z}/2\mathbb{Z})^4$ (quadruplets of $\mathbb{Z}/2\mathbb{Z}$). Thus, we obtain:

- Fahasivy (9, ninth or talisman) = Alisay (7) + Fahavalo (8);
- Haja (11, honor or food) = Fianahana (5) + Abily (6);
- Asorita (13, spirits of deads, or authorities) = Fahatelo (3) + Blady (4);
- Lalana (15 Road) = Tale (1) + Maly (2).

Then combined the above results to have:

- ombiasa (10, soothsayer) Fahasivy = (9) + Haja (11);
- Sely (14 people) = Asorita (13) + Lalana (15);
- Aky (12, god) = ombiasa (10) + Sely (14).

The last figure is:

- Kiba (16, house) = Aky (12) + Tale (1).

Then, an array of sikidy is written:

$$\begin{array}{cccc} (4) & (3) & (2) & (1) \\ \downarrow & \downarrow & \downarrow & \downarrow \\ a_{14} & a_{13} & a_{12} & a_{11} \leftarrow (5) \\ a_{24} & a_{23} & a_{22} & a_{21} \leftarrow (6) \\ a_{34} & a_{33} & a_{32} & a_{31} \leftarrow (7) \\ a_{44} & a_{43} & a_{42} & a_{41} \leftarrow (8) \end{array}$$

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Received January 29, 2016; **Accepted** March 02, 2016; **Published** March 04, 2016

Citation: Anona FM (2016) Mathematical Aspects of Sikidy. J Generalized Lie Theory Appl S2: 008. doi:10.4172/1736-4337.S2-008

$$\begin{array}{cccccccc}
(9) & (10) & (11) & (12) & (13) & (14) & (15) & (16) \\
\downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\
a_{31}+a_{41} & \sum_{1\le i\le 4} a_{i1} & a_{11}+a_{21} & \sum_{1\le i,j\le 4}\left(a_{i1}+a_{1j}\right) & a_{13}+a_{14} & \sum_{1\le j\le 4} a_{1j} & a_{11}+a_{12} & \sum_{1\le i,j\le 4}\left(a_{i1}+a_{1j}\right)+a_{11} \\
a_{32}+a_{42} & \sum_{1\le i\le 4} a_{i2} & a_{12}+a_{22} & \sum_{1\le i,j\le 4}\left(a_{i2}+a_{2j}\right) & a_{23}+a_{24} & \sum_{1\le j\le 4} a_{2j} & a_{21}+a_{22} & \sum_{1\le i,j\le 4}\left(a_{i2}+a_{2j}\right)+a_{21} \\
a_{33}+a_{43} & \sum_{1\le i\le 4} a_{i3} & a_{13}+a_{23} & \sum_{1\le i,j\le 4}\left(a_{i3}+a_{3j}\right) & a_{33}+a_{34} & \sum_{1\le j\le 4} a_{3j} & a_{31}+a_{32} & \sum_{1\le i,j\le 4}\left(a_{i3}+a_{3j}\right)+a_{31} \\
a_{34}+a_{44} & \sum_{1\le i\le 4} a_{i4} & a_{14}+a_{24} & \sum_{1\le i,j\le 4}\left(a_{i4}+a_{4j}\right) & a_{43}+a_{44} & \sum_{1\le j\le 4} a_{4j} & a_{41}+a_{42} & \sum_{1\le i,j\le 4}\left(a_{i4}+a_{4j}\right)+a_{41}
\end{array}$$

As a result, the number of sikidy's tables is determined by the mother-sikidy or $2^{16} = 65536$.

There are two categories of sikidy's figures, princes whose number of seeds is even, and slaves to the odd number of seeds.

The tradition imposes this rule:

"A sikidy can not be interpreted if the Aky (12) is not a prince."

In fact, if we sum all elements of Aky, we have

$$2\sum_{1\le i,j\le 4} a_{ij}$$

Even if the Aky couldn't be a prince, we were wrong calculation.

For clarification on the interpretation, we continue to combine the figures that appear on the table [12]. Thereupon, we must take into account the mathematical links of the sikidy, otherwise we may give different meanings for the same thing [12]:

"The ninth (9) and the healer (10) give the leaves or plants to be used as medicines, ravin'ody".

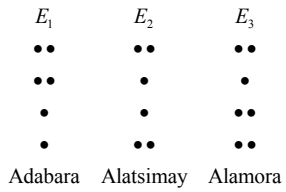
In fact, given the binary operation of the group, the combination of Fahasivy (9) and Ombiasa (10) gives Haja (11), that is to say a figure that already exists on the table (the relationship (9) + (11) = (10) is equivalent to (9) + (10) = (11)).

There are other examples of contradictions.

Into Sikidy

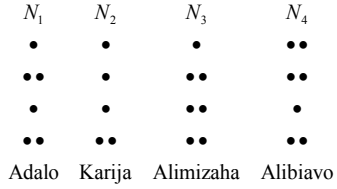
The sixteen figures of Sikidy are classified according to the cardinal directions. The classification below is used mainly in the southern region of Madagascar. Subscripted letters above each figure will be used to identify the respective figures.

1. Group of the east:



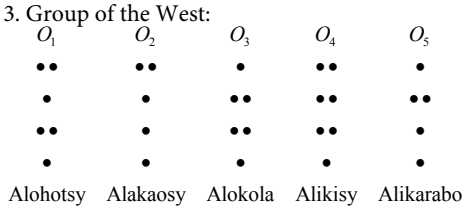
Adabara Alatsimay Alamora

2. Group of the north:



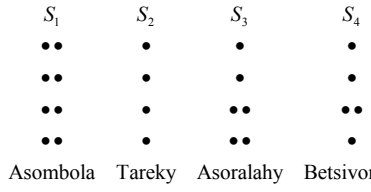
Adalo Karija Alimizaha Alibiavo

3. Group of the West:



Alohotsy Alakaosy Alokola Alikisy Alikarabo

4. Group of the South:



Asombola Tareky Asoralahy or Alasady Betsivongo or Alikasazy

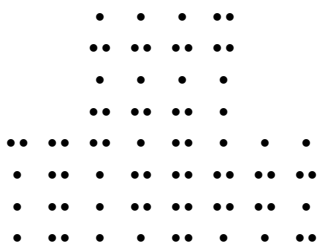
Naturally, these figures have specific meanings [12].

If we denote by P_k, $k = 1, \ldots, 16$, Tale's locations (1) at Kiba (16) in an array of sikidy; we call "Into" the case where one and only one representative of a group appears only once on sixteen seats, P_1 to P_{16}.

Example: Adabara "Into" to the Tale.

+	E1	E2	E3	N1	N2	N3	N4	O1	O2	O3	O4	O5	S1	S2	S3	S4
E1	S1	O1	O2	O3	S4	O5	O4	E2	E3	N1	N4	N3	E1	S3	S2	N2
E2	O1	S1	N4	S3	N3	N2	E3	E1	O4	S2	O2	S4	E2	O3	N1	O5
E3	O2	N4	S1	N2	N1	S3	E2	O4	E1	S4	O1	S2	E3	O5	N3	O3
N1	O3	S3	N2	S1	E3	N4	N3	S2	S4	E1	O5	O4	N1	O1	E2	O2
N2	S4	N3	N1	E3	S1	E2	S3	O5	O3	O2	S2	O1	N2	O4	N4	E1
N3	O5	N2	S3	N4	E2	S1	N1	S4	S2	O4	O3	E1	N3	O2	E3	O1
N4	O4	E3	E2	N3	S3	N1	S1	O2	O1	O5	E1	O3	N4	S4	N2	S2
O1	E2	E1	O4	S2	O5	S4	O2	S1	N4	S3	E3	N2	O1	N1	O3	N3
O2	E3	O4	E1	S4	O3	S2	O1	N4	S1	N2	E2	S3	O2	N3	O5	N1
O3	N1	S2	S4	E1	O2	O4	O5	S3	N2	S1	N3	N4	O3	E2	O1	E3
O4	N4	O2	O1	O5	S2	O3	E1	E3	E2	N3	S1	N1	O4	N2	S4	S3
O5	N3	S4	S2	O4	O1	E1	O3	N2	S3	N4	N1	S1	O5	E3	O2	E2
S1	E1	E2	E3	N1	N2	N3	N4	O1	O2	O3	O4	O5	S1	S2	S3	S4
S2	S3	O3	O5	O1	O4	O2	S4	N1	N3	E2	N2	E3	S2	S1	E1	N4
S3	S2	N1	N3	E2	N4	E3	N2	O3	O5	O1	S4	O2	S3	E1	S1	O4
S4	N2	O5	O3	O2	E1	O1	S2	N3	N1	E3	S3	E2	S4	N4	O4	S1

Table 1: Inner law of composition.



In this example, Adabara, E_1 one member of the group of the East is located at P_1, the other E_l, $l = 1,2,3$ don't take place at P_k, $2 \leq k \leq 16$.

In that table of Sikidy, we say that the Sikidy gives a formal advice (mitoka vava). The consultant would be successful.

To calculate these "Into", we use the following Table 1 of inner law of composition:

Compute these "Into" using this table is elementary. The total of the "Into" for one figure in the place P_k takes its value from 0 to a hundred. For example, Alohotsy "Into" to Ombiasa (who means the Great Divine), searched by the Mpisikidy, doesn't exist, but Alohotsy "Into" to Sely which has total number 8. Adabara "Into" to Tale has 132,...etc.

These "Into" Sikidy have particular significations and truthfully considered. We use them to get talismans.

Conclusion

In the present paper, Anona investigated mainly the mother-Sikidy. In a next paper in the same topic, he will make the Sikidy more precise in order to check daughter-Sikidy and so on. The language of the Sikidy is very large. Frequently, the data obtained from the Mpisikidy are contradictory. Certainly, make a coherent language of the Sikidy throughout different collects of data is very interesting.

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This article was originally published in a special issue, **Recent Advances of Lie Theory in differential Geometry, in memory of John Nash** handled by Editor. Dr. Princy Randriambololondrantomalala, Unversity of Antananarivo, Madagascar