

Palauan Strip Patterns

By Lorraine Tellei

Melekeok, Palau

Introduction

This paper will explore and discuss the traditional uses of patterns, especially in border designs in the Republic of Palau (7°N, 134°E.) I will include photographs of the *bai* (men's house), its current descendant art form, the modern storyboard, and the triangular motif which also appears in basket weaving and tattoos. All the photos will be numbered, appended, and noted in the text.

The Palauan *bai* is more than a club house (Photo 1, Melekeok). It was used to educate boys in the ways of men, as a meeting house, and as a reservoir of the history and culture of the village (Photo 2, Chemayong). All the lintels, posts and cross-beams are richly decorated with painted carvings which illustrate stories and legends (Photo 3). It is the decorative borders and other strip patterns that I plan to explore here. It is beyond the scope of this paper to discuss the actual stories depicted and their meanings.

Methodology:

Using the Scientific Method, this project begins with observation. I have observed many Palauan *bai*, storyboards, baskets, students and laundry lines. These observations I recorded with a digital camera and took notes in a spiral book. Compiling the Palauan language required library research checking spellings and definitions in Palauan dictionaries, which are

listed in the reference section at the end of this paper. A more valuable resource was asking my Palauan friends, colleagues and relatives. They checked my lists and volunteered helpful suggestions. I asked them questions such as,

- How do women count the number of days of mourning?
- What do they do with the string used to count mourning days?
- Why do the words for counting heavy, long things stop at four?
- Are these words or practices still in use today?
- Did I misspell anything?
- What else can you tell me about traditional Palauan math?

The only experiment I could think of to do is to try to use the Palauan words I learned in this project and see if I could be understood. The second-to-last step of the scientific method that I teach to my elementary students is to share, which we as a class plan to do by publishing our work. The last step is to apply what we have learned, which in this case should improve math education.

Description:

The large island of Babeldaob is shaped roughly like a man (Photo 4). The northern state of Ngerchelong is the head facing west; Ngaraard is the neck; Melekeok with the largest freshwater lake in Micronesia is the heart; the islands of Koror are the knees, and the feet are in the Rock Islands south of Koror. Legend calls this giant Uab (Photo 5). His mother Latmikaik was born from a giant clam shell (Photo 6). Latmikaik is also the name of a shrimp *Lysiosquilla maculata* that lives in the clam. I found this creation myth published in Uchelel a Beluu er a Belau: Uchelel Belau er a Uab el me er a Miladeldil, used as a textbook for Palauan studies in our elementary school system. Seventh grade students illustrated the story (Photo 7). The

ubiquitous border of triangles frames one drawing showing a *mechas* (elder woman) in a grass skirt conversing with a *rubak* (elder man) wearing a red loin cloth. Note the zigzag lines symbolizing talking (Photo 8).

Storyboard carver Redebechi Ananias Bultedaob told me that the clam is the symbol of women (Photo 9). Since the chiefs are chosen by the old women of the clan, the clam is also the symbol of the power of the chief. My colleague Jefferson Thomas directed me to the legend cited above to explain the source of that tradition.

The two halves of the giant clam shell meet in a zigzag pattern (Photo 10). The clam shells are often used as a repeated motif on the border of the lintels and storyboards (Photo 11). An abstraction of the clam shell motif is the border of triangles (Photo 12). This triangular pattern is the most common border used for decoration in Palau and derives from the clam.

I have found many examples of the triangular pattern. It is found in all eight *bai* I have observed. All the hanging, wooden signs at Palau Community College are bordered in triangles, making them look like they were cut with pinking shears (Photo 13). Elementary school students are taught to use the pattern for posters in class work (Photo 14). A common arm band tattoo displays the triangles (Photo 15). Woven coconut-leaf baskets display the same isosceles triangles (Photo 16). This is especially apparent when the young leaves are mixed with aged fronds for a two-color pattern used in the bucket cover for Easter bouquets and other decorative baskets (Photo 17).

Another interpretation of the strip triangular pattern is a zigzag line formed by the edge of the triangles (Photo 18). This black zigzag is used for the sign of talking in the storyboards and for borders of commercial storyboards (Photo 19). The Palauan name for this zigzag is

bisibusuch, meaning lightning and the messages of the gods. This is similar to the yellow zigzag commonly used for a bolt of lightning in western art. Zigzags are also observed in the hair, beard and earrings of the god on the pillars (Photo 20). These many uses of triangles and zigzag lines lend unity to Palauan art.

The triangle pattern also is used to decorate the cover of the Palauan dictionary published in 2000 (Photo 21). I used this and other references to compile lists of Palauan math words and their English explanations appended to this paper. This glossary will be helpful in later stages of the Macimise Project: incorporating Palauan into the math curriculum for first, fourth and seventh grades.

Much of the fabric printed for local consumption incorporates the triangle strip patterns (Photo 22).

Conversations with my old friend Redebechi Ananias taught me the Palauan words for division and multiplication. He is the father of some of my students. He answered my question about the words for long, heavy things. "Four is all a person can carry at once, so we do not need words for more than four."

Similarly, the single words for counting bunches of bananas also stop at four. Four is the greatest number people can count at a glance. Greater numbers require addition. Four is a popular and stable number. Stone platforms beside *bai* have four backrest stones. Houses have four posts. The top four chiefs sit by the four doorways at the sides of the *bai* (two on each side. No one sits in the doorways at the end of the *bai*.) Formal photos at first-child ceremonies often show four women; for example, the mother, grandmother and sisters or aunts. When they are arranging women for the photos, I have heard them say, "That's four."

That's good. Take the picture." Then they make another grouping of women from the father's side of the clan.

Redebечи uses division to plan the border patterns of his storyboards. He prices his work by the square inch requiring multiplication. In old times, storyboards were not sold, but *bai* builders still used multiplication to estimate the number of thatch pieces to sew for a roof. Some *bai* carvers do not use much math in their decorations, making the triangles uneven (Photo 23). When a group of men build a *bai*, some simple decorative parts are assigned to the less skilled men.

A very common motif for the walls is a strip of circles with a plus sign inside to symbolize Palauan money. Two rows of circles can be either lined up in parallel (Photo 24), or alternate to form yet another zigzag (Photo 25). The same symbol is used for the money bird Delerrok (Photo 26) and earrings (Photo 27). Note this god of Ngerubesang was always so angry that his hair stood up on end and became straight.

Research for this math glossary led to my realizing some interesting traditional uses of math. After living in Palau for 26 years, I knew that when a chief dies, the women must wait 30 days before they consider choosing a new chief. If it is a high chief, the period is 100 days. I asked our seventh grade teacher Kerungil how they counted the days, and she told me that every morning the female title-holder would tie a knot in a piece of string two arm-spans long. This custom was new to me. Since the string is linear, it qualifies for inclusion in this discussion of strip patterns.

When the number of knots matched the correct number of days, she would go to the beach and cut off a knot with each incoming wave to help let his spirit go. This answered my

question about seeing such a string. Since no chief I know is currently being mourned, I cannot directly observe such a string. My mother-in-law Basilia told me that instead of cutting it, some people just bury the string under a rock on the beach. The knot used is a simple overhand knot. The string can be either a fiber from a tree, or the twine made of coconut husks, the same kind of twine used to lash a *bai* together (Photo 28). The Palauan words they use to count the number of knots aloud and this funeral custom are still in use today, answering another question. The counting vocabulary is listed in a table in the Appendix.

The Palauan word "*chomechobech*" led me to another pattern idea. The word is used to describe the correct way to place fish into a pot for cooking (Photo 29). The whole, scaled and gutted fish must alternate heads and tails, but the clean bellies (often stuffed with a lemon leaf for flavor) all face the same way. If there is a second layer of fish, they again alternate head and tail, but the head of the lower layer is under the tail of the second layer, but again, the bellies of all the fish in the pot face the same direction. That way, when scooping your cooked fish from the pot, you know how to place the ladle under the fish to lift it out of the soup without breaking it, even if hidden under vegetables.

The same word "*chomechobech*" describes the correct arrangement for school children at morning assembly. They line up by grades in front of the school, and by height within their grade (Photo 30). All the students face forward to sing the national anthem while the flag is being raised. At afternoon dismissal assembly, they arrange themselves in four lines: first by geography (those who turn left when exiting the grounds and those who turn right,) gender (girls in the center and boys on the flanks,) and again by height (short people in front.) Even six-year-old first graders quickly master sorting by these four criteria the first week of school.

Hanging laundry properly is yet another use of the word “*chomechobech*.” Strip patterns are apparent in the proper way for hanging laundry to dry. It is not just an issue of getting them high enough to avoid animals or grass seeds. Unvoiced public opinion implies that random, haphazard laundry is uncouth. Palauans describe this with the word “*oldak*,” meaning put together or added, but not in any special order such as mixed in a salad. Since your clothes are on public display, they should be orderly and aesthetically arranged (Photo 31). All the shirts hang together, graduated by size. All the pants hang in a group, sorted by size, color and fabric type (Photo 32). Scarves, pillowcases, towels and diapers each hang in their own subsection, but these rectangular items hang separately from the tailored garments such as dresses. This sorting may also ease removal of dry laundry because similar articles would have comparable drying times. Personal underclothes dry inside or on a private line behind the house and are not for public display. Even the laundress can proudly display the patterns of her art.

Conclusion:

Here are an even two-to-the-fifth number of photos, so I will stop here. Patterns are an essential part of math. Patterns in Palau bring order, harmony and aesthetics to the islands. They help preserve the culture and improve the quality of life.

Lists of Photos, all by the author

1. *Bai ra Melekeong* and some Melekeok Elementary School students, including my son, on a Cultural Day field trip. December 2009
2. *Chemayong bai* in Koror, built by the men of Melekeok. December 2007
3. Decorated beams in *Bai ra Melekeong*, December 2009
4. Map of Babeldaob from a poster in my classroom by the Nature Conservancy
5. Uab drawn by a seventh grade student, February 2010
6. Latmikaik drawn by a seventh grade student, February 2010
7. The giant clam who spawned Latmikaik drawn by a seventh grade student, February 2010
8. Woman and man conversing with lightning symbols for talking and triangle border drawn by a seventh grade student, February 2010
9. Redebechi Ananias Bultedaob, portrait taken July 2009 for a business card
10. Giant clam shell decorating my brother-in-law's stairs, April 2010
11. Clam strip motif on Koror Museum Bai, March 2010
12. Stylized clam and other triangles under Koror bai doorway, March 2010
13. Wooden sign at PCC with triangles and lightening, February 2010
14. Eighth grade student's work with triangle border, February 2010
15. Teacher's arm with triangle tattoos, March 2010
16. Coconut leaf basket with triangles by school cook, April 2010
17. Two-toned basket with triangles also by the cook, April 2010
18. Storyboard "TedebeIngot" By Redebechi with zigzag border, July 2009

19. Detail of storyboard beam of Koror bai with talking zigzag, March 2009
20. Posts of Koror Museum bai, March 2010
21. Palauan Dictionary with triangle borders, March 2010
22. Cloth from the hem of my school uniform, April 2010
23. Uneven triangles of Koror museum bai doorway drawn by estimation, not division,
March 2010
24. Aligned Money symbols on Bai ra Melekeok, October 2009
25. Alternating Money Symbols on Koror Museum Bai, March 2010
26. Delerrok money bird with triangle border by Redebechi, July 2009
27. Chelid ra Ngerubesang god with triangle border by Redebechi, July 2009
28. Chemayong bai with story beams tied with coconut string. December 2007
29. Rabbit fish in a pot, April 2010
30. Melekeok students at morning assembly saluting flag, September 2006
31. Laundry hanging to dry, April 2010
32. Laundry hanging at the beach, April 2010

References:

Books:

Josephs, Lewis S. New Palauan-English Dictionary Based on the Palauan-English Dictionary by McManus, Fr. Edwin G. S.J.; University of Hawaii Press, Honolulu 1977; ISBN 0-8248-1345-6

Ramarui, Augusta N. me a Temale, Melii K.; Kerresel A Klechibelau: Tekoi er a Belau mea a Omesodel: Palauan Language Lexicon; Belau National Museum 2000; ISBN 982-9041-01-8

Smith, DeVern Reed; Palau Ethnography Rechuodel: Traditional Culture and Lifeways Long Ago in Palau; Palau Society of Historians, U. S. National Park Service 1997; page 51-53

Umetaro, Steve, Uchelel a Beluu er a Belau: Uchelel Belau er a Uab el me er a Miladeldil Department of Education, Koror, Palau 1974 page 10, “Kim er a Lukes” and “Latmikaik”

People:

Buteldaob, Redebechi Ananias; male, age 58 Melekeok and Ngchesar, story board carver

Rdiall, Basilia; female, age 75, mother of 17, female title holder Melekeok clan #4

Thomas, Jefferson; male, age 45, Melekeok Elementary School teacher, fifth grade

Techur, Ngirasuong; male, age 55 Palau Museum story board carver

Tellei, Kamedaol Benedict, male; age 50, Melekeok carpenter

Tellei, Kerungil, female; age 40, Melekeok Elementary School teacher, seventh grade

Tellei, Magaria, female, age 45, Melekeok Elementary School principal & sixth grade

Appendix 1: Palauan words related to mathematics

<u>Palauan</u>	<u>English</u>
<i>auanai (Jp)</i>	mismatched, inappropriate
<i>bab</i>	up
<i>bebil</i>	few, a little, some
<i>bebleob</i>	round shaped
<i>belsebesech</i>	reflect
<i>betekngang</i>	increasing in number, accumulating
<i>betok</i>	many, abundant, more than enough
<i>bisibusuch</i>	lightning, talking, zigzag line
<i>Bitang el chim</i>	Length of the whole arm
<i>bkul</i>	corner, joint, node
<i>bkul a chim</i>	elbow
<i>Bkuliikr</i>	Length from one arm stretched out to the elbow of the other arm
<i>Bkulrrikek</i>	Length from one upper arm across chest to next upper arm
<i>blechobech</i>	line up in assembly by grade and height
<i>Blisaos</i>	Half a unit; semicircle
<i>Bouchelild/derbesekosek</i>	Triangle with three unequal sides, scalene
<i>btuch</i>	star
<i>buil</i>	moon, month
<i>chad</i>	person
<i>chaibibeob</i>	circular, round
<i>chatter (Jp)</i>	matching
<i>Cheedarullekl</i>	hourglass shape
<i>Chelid a Mungungau</i>	Orion, god of fire (Betelgeuse, the red giant)
<i>cheraches</i>	outgoing tide
<i>chereprukl</i>	colorful lobster, aloha, gaudy, clashing
<i>chidabd</i>	tool for measuring angles
<i>chim</i>	hand; root word for 5, arm
<i>chodochosong</i>	Mid day; when the sun is high arrange fish in a pot for cooking with heads in alternating direction and bellies
<i>chomechobech</i>	all facing the same way
<i>dart</i>	100 one hundred
<i>delemedem</i>	level, equalized
<i>delsemiich</i>	rhombus, diamond shape
<i>derbengais</i>	egg-shaped, oval, elliptical
<i>desiu</i>	earthquake
<i>Deulochado</i>	tongs-shaped, chevron
<i>Didil a Chebtei</i>	Milky Way

<i>Dikil a chieb</i>	Orion's bow, the branch for a pigeon's perch
<i>diluches</i>	north
<i>dimes</i>	south
<i>Dochedacheb</i>	Length from one upper arm across to chest
<i>e</i>	and for verbs
<i>Edei</i>	3 rd generation female, "grandmother" as a form of address
<i>Edeichid</i>	Three fingers width(placed vertically)
<i>Eldis</i>	Pentagon
<i>elecha el kesus</i>	tonight
<i>elechang</i>	today
<i>elii</i>	yesterday
<i>eliseksikt</i>	cursive writing, tangled, scribbled
<i>Erechid</i>	Two fingers width(placed vertically to an object)
<i>Etiud el chur</i>	One half length of a coconut leaf stick
<i>Euaichid</i>	Four fingers width(placed vertically)
<i>iars</i>	sail
<i>ideliseb</i>	day before yesterday
<i>idelsebel</i>	2 days before yesterday
<i>kahol (Sp)</i>	coffin
<i>katur</i>	left hand
<i>kebesenge</i>	evening
<i>kebtot</i>	twins
<i>kellebakl</i>	flood from big wave
<i>kemetai</i>	twins, fraternal
<i>keriik</i>	incoming tide
<i>kesai</i>	too few
<i>kesus</i>	last night
<i>kitalong</i>	chalkline
<i>kiuar, skak (Jp)</i>	square
<i>klalo</i>	things or animals
<i>Klchukliars/klaches</i>	Triangle
<i>klebesei</i>	night
<i>kliars</i>	triangle, from sail of canoe
<i>klisichel</i>	right hand, strong
<i>kliuar, kahol (Sp)</i>	rectangle
<i>Kloranges</i>	hexagon "Octagon" (error in <u>Ethnography</u> text pg. 53)
<i>klukuk</i>	tomorrow
<i>kmal</i>	very
<i>kmal betok</i>	too many to count

<i>Kreongel</i>	Largest unit of measurement , is approximately the length of both arms extended out
<i>ma</i>	and for nouns or adjectives
<i>mak (Ger. mark)</i>	50 cents
<i>mededaes</i>	adjective: clean, neat, clear, orderly, tidy
<i>mekeruul</i>	northeast
<i>melemalt</i>	straight
<i>Mengal</i>	northwest
<i>mengedmokl</i>	verb, to tidy and arrange
<i>mengesadel</i>	multiply
<i>Mesikt</i>	Pleiades, moon and sun in which mark year ends; cluster
<i>milliong (Eng.)</i>	million
<i>mui</i>	full
<i>ngais</i>	egg
<i>ngebard</i>	west
<i>ngesonges</i>	not enough
<i>ngiaos</i>	day after tomorrow
<i>Ngill</i>	Smallest unit of measurement, equivalent to a piece of hair
<i>ngiosel</i>	2 days after tomorrow
<i>Ngkeal</i>	southeast
<i>oach</i>	foot, leg, root of number 4
<i>Ochadu</i>	Taurus, tongs, scissors
<i>Oilmtemutel</i>	southwest
<i>Olchesobel</i>	Ursa Major, ladle
<i>Olkael</i>	Measuring device
<i>Omeraich</i>	Venus
<i>omii</i>	divide
<i>ongos</i>	east
<i>oreor</i>	work
<i>ouchelmoll</i>	big wave on reef
<i>rak</i>	year, six months, time the wind blows from one direction
<i>rongel</i>	reflection in the sky before sunrise or moonrise or after sunset
<i>Rreongel</i>	Length of two arms both stretched out
<i>Sabadong</i>	Saturday
<i>sandei (Eng)</i>	week, (Sunday)
<i>sesei</i>	some
<i>sils</i>	sun, day
<i>soiu</i>	ripples on the water in a pattern from a gust
<i>sueleb (German)</i>	noon

<i>tal telial</i>	1000, one thousand
<i>te</i>	those people
<i>Telbechos</i>	One thumb length
<i>Telberober</i>	One hand palm length or width
<i>Telbesungel</i>	One-half hand palm length or width
<i>Telbisaos</i>	One half split of betelnut or such
<i>Telchimkomk</i>	Five fingers width(placed vertically)
<i>Telechid</i>	One finger length
<i>телиакл</i>	string knotted to count days, often after a death
<i>Teliutech</i>	Length from end of thumb to tip of longest finger
<i>Telmedeu</i>	Elbow to tip of longest finger, cubit
<i>Teluol chur</i>	One whole length of a coconut leaf stick
<i>tengangoi</i>	tangled; confusing, unclear language
<i>Tenteng</i>	Crux, Southern Cross
<i>tutau</i>	morning
<i>Ulengark</i>	Clamshell shaped
<i>ureor</i>	day of the week
<i>yo</i>	low, down

Appendix 2: Numeral classifiers

symbol	order	root	people	time	count	tens	bunches of bananas	things or animals	long things
½		<i>bita, blisaos</i>			<i>bitang</i>			<i>bitang</i>	
1	<i>kot</i>	<i>ta</i>	<i>tang</i>	<i>tang</i>	<i>tang</i>	<i>tacher</i>	<i>teliud</i>	<i>chimong</i>	<i>teluong</i>
2	<i>ongerung</i>	<i>erung</i>	<i>terung</i>	<i>erung</i>	<i>orung</i>	<i>lluich</i>	<i>ereiud</i>	<i>teblong</i>	<i>eroung</i>
3	<i>ongedei</i>	<i>edei</i>	<i>tedei</i>	<i>edei</i>	<i>odei</i>	<i>okedei</i>	<i>edeiud</i>	<i>kledi</i>	<i>edeuong</i>
4	<i>onguang</i>	<i>ua</i>	<i>teuang</i>	<i>euang</i>	<i>oang</i>	<i>okaung</i>	<i>euaiud</i>	<i>kloang</i>	<i>euaiuong</i>
5	<i>ongeim</i>	<i>im</i>	<i>teim</i>	<i>eim</i>	<i>oim</i>	<i>okeim</i>	<i>eimiud</i>	<i>kleim</i>	<i>eimuong</i>
6	<i>ongelolem</i>	<i>elolem</i>	<i>telolem</i>	<i>elolem</i>	<i>ololem</i>	<i>okelolem</i>	<i>elolemiud</i>	<i>klelolem</i>	<i>elolemuong</i>
7	<i>ongeuid</i>	<i>euid</i>	<i>teuid</i>	<i>euid</i>	<i>oid</i>	<i>okeuid</i>	<i>euid luodel</i>	<i>kleuid</i>	<i>eiudong</i>
8	<i>ongeai</i>	<i>eai</i>	<i>teai</i>	<i>eai</i>	<i>iai</i>	<i>okeai</i>	<i>eaiud</i>	<i>kleal</i>	<i>eaiuong</i>
9	<i>ongetiu</i>	<i>etiu</i>	<i>tetiu</i>	<i>etiu</i>	<i>otiu</i>	<i>oketiu</i>	<i>etiu luodel</i>	<i>kletiu</i>	<i>etiuong</i>
10	<i>ongerteruich</i>	<i>teruich</i>	<i>teruich</i>	<i>teruich</i>	<i>machod</i>	<i>dart</i>	<i>tacherluodel</i>	<i>tacher</i>	<i>tacheruong</i>
100		<i>dart</i>				<i>tal telial</i>			
1000		<i>telial</i>				<i>teruich telial</i>			

This material is based upon work supported by the National Science Foundation under **Grant No. 1239733**. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.



Pacific Resources for Education and Learning