

INSTRUMENTS

PanGamelan: upcycling pans into collective musical instruments

by Martí Ruiz

Synopsis: We build unusual instruments. We love gamelan. We love playing together. Not everyone has access to a gamelan. It is good to upcycle used materials. We found that playing modified pans in a group can feel somewhat like gamelan. We have identified two kinds of pans, with different ways to tune, hang, and play them. Now everyone can try it!

Background

The PanGamelan project was an evolution of several interests shared by members of two groups: the Baschet Soundsculpture Workshop at the University of Barcelona and the Gamelan Forja de Trons, founded by Jordi Casadevall in 2013.

We were all interested in other forms of music, and in other approaches to sound. Both worlds—Baschet and gamelan—had been converging since the beginning of our work together. We were all involved in the instruments developed by brothers François Baschet (1920–2014) and Bernard Baschet (1917–2015), and we were all members of a Balinese gamelan group.

We were always searching for new strategies for sound experiments that would be widely accessible. We found that our passion for gamelan was very compatible with the original Baschet sounds.

The Baschet tradition emphasizes not only sound, but social interaction: participative sound activities, applied acoustics dissemination, and an opening of ears to new sounds. The Baschet brothers were aware of gamelan, and got ideas from Bali for forms of clamped-plates tuned-percussion. They also referenced Javanese sounds, like that of the bonang.

We played kotekan on the original Baschet structures, inviting audiences to play in interlocking patterns of growing complexity.

Later we began using Balinese or Javanese scales to tune our new instruments based on Baschet principles, including the classical Cristal Baschet, clamped-plates threaded-rod multitimbral percussion, and massive directional tuning forks (freezing forks or *kouri-no-sen* in Japanese). We also tried Daniel Schmidt's style of aluminium discs designed for bonang, but made ours with higher rounder bosses for fast Balinese-style kotekan.

These experiments and experiences inspired us to develop new instrumental, compositional, and performance ideas.

[Video by the author about PanGamelan.](#) (Link also on last page.)



Figure 1. A PanGamelan instrument with pitches chosen to be compatible with the Javanese gamelan at the University of Performing Arts in Graz, Austria. Photo by Sarah Weiss.

Building Gamelan-Style Instruments

Since our gamelan group at the Museum of Music in Barcelona rehearsed only once a week, we built gangsa-like instruments with iron keys—and later lightweight aluminum keys for easier transportation—so the members of our gamelan ensemble could have instruments for practicing at home. Since we were always looking for low-cost alternatives, we came up with the idea of using pans. (When teaching applied acoustics I always challenge students to explore the sounds of found objects, such as flower pots or ceramic bowls as a way to get started with empirical experimentation, playing and retuning, creating pitch sets and so on.)

Making single instruments and ensembles from “upcycled” pans was a discovery that resonated with our interests in community music making and environmental resourcefulness. The PanGamelan project makes it possible to share music making and instrument building, while encouraging creative use of found and pre-used materials.

Inspired by Indonesian gamelan

We were inspired by our experience with Balinese gamelan, which we played at the Museum, and our love also for Javanese gamelan and its tunings (Figure 1), so we found ways to make music in groups and help people play



Figure 3. An array of PanGamelan instruments: ring mode (left) and membrane mode (right).

together, introducing damping techniques, interlocking parts, and gong structures. This approach can be applied to other instruments, of course, but in this post-industrial global-warming era, we feel the upcycling of used frying pans also has an ecological value. We have to consider how much we spend and what we spend it on, as well as make durable sound objects that escape the programmed obsolescence of a materialistic society.

Gamelan in Indonesia can feature different tunings, with subtle differences from one to the other, differences that are appreciated as the personal character of each set of instruments. Listening to recordings of gamelan does not fully convey the magnificent magnitude of the actual sound, with its beatings and tonal intervals. We feel that direct involvement with sound-making is what best creates enthusiasm for music.

We have found that the process of constructing a PanGamelan—listening to found pans, sorting them out, making modifications, and grouping the resulting instruments according to timbres and possible musical scales—is itself a valuable sonic experience. Choosing the tunings can be done in many ways, including just following pure personal taste. The process can be cumulative, and a PanGamelan ensemble can grow its instrumentation incrementally.

Accumulating PanGamelan instruments allows for more players, more music, more people in the community who know about this new kind of orchestra, and more chances for people to repurpose old pans instead of throwing them away. With this extensive palette of sounds, a group of people may experience communal music making, which we feel is the essential joy that comes from playing gamelan.

MAKING PANGAMELAN INSTRUMENTS

We have discovered two basic ways of modifying pans that allow for different sonorities and playing techniques. We call them *ring mode* and *membrane mode* (Figure 3).

In ring mode we treat the pan like a bell, meaning the main vibrating area is around the outer edge of the pan. We

hear this sound as analogous to gamelan instruments with keys suspended over resonators (gangsa, slenthem, etc.).

In membrane mode we treat the pan (or pot) as a metal membranophone, in which the bottom vibrates. This method creates sounds we find analogous to horizontally suspended knobbed gongs (reyong, bonang, etc.). Sounds that might represent drums can also be made this way, or by using plastic buckets or other containers.

RING MODE

Removing the Handle

When the outer rim of the pan is struck, it rings like a bell. The handle, however, stops the pan's vibrations, so we need to remove it.

To liberate the vibrations around the outer circle of the pan, we unscrew or cut the handle off. Sometimes a hacksaw or a grinding wheel is needed to cut off riveted handles or difficult screws. Some pans have a bracket where the handle is connected. Although this does not stop the vibrations, its position can affect the pitch. The bracket can be removed with a grinder, but this is a matter of personal preference (Figure 4).

Once we remove the handle, we can hear the pan's sound by holding it on our hands or laying it on a cloth and striking the edge; the bottom membrane does not vibrate much when the outer ring is struck.

A pan that is too thin will not really sing out, and a bent rim muffles the sound. But when the pitch is clear and the tone is loud enough, we can decide if the pan works for us or not.

Ring Mode Tuning

A pan can be retuned a maximum of one and a half tones from its original pitch. To raise the pitch, shorten the ring edge by grinding or cutting out a full circle. An alternative is to make the ring edge lighter by drilling holes all along the circumference, evenly spaced to maintain the symmetry.

The pitch is lowered by grinding evenly where the bottom of the pan curves to meet the sides. If a grinder is not available, a series of evenly spaced holes drilled in that area can produce the same effect (Figure 5). Both methods reduce rigidity to loosen tension on the ring and therefore drop the pitch.

To emulate gamelan instruments with several keys—like demung, saron or gangsa—many pans will be needed. The ring mode tuning will be required to build an instrument with specific pitches, or a large ensemble of matched-pitch instruments.

Mounting Ring Mode "Bells"

Pans without handles have a nodal point in the center of the bottom that does not vibrate, so drilling a hole in the center of the pan will not affect the pitch or resonance. This point allows us to drill a hole in the center (Figure 6) and stack them. A threaded rod with nuts is ideal



Figure 4. Steps to remove pan handles: 1) Identify how the handle is attached. 2) Unscrew or cut the handle off. 3) Grind off brackets if needed.

to keep them in position without rattles or vibration interference (Figure 7).

We prefer to arrange them horizontally (Figure 8). This way we can hold several of them closer in a row, allowing a playing-muting action similar to playing keyed gamelan instruments like gangsa. It is also possible to hang them vertically on a rope, separating each pan between knots (Figure 9). This may not be as comfortable for quick musical articulations, but it is visually pleasing and easy to set up by hanging on a tree branch or other structure.

MEMBRANE MODE

The bottom of a pan or a pot struck with the hand or a mallet of some kind can vibrate as a membrane. ["Pan" can mean a pot or a pan.] Pans can be placed on a padded surface, cushions, fabrics, horizontal strings, etc. so the vibration will last longer. (Making gamelan instruments from pots was used by Indonesian prisoners in Australia to make the Gamelan Digul.¹)

Membrane Tuning

A membrane-mode pan can be tuned by hammering a boss (a projected bump) in the center. This was used for the Dresher/Schmidt aluminum discs.² The more pronounced the boss, the higher the pitch, but only within a certain

range. (Bart Hopkin has two very interesting articles about these techniques.³)

Tuning the membrane pans is an unpredictable and variable situation, since pans have different kinds of bottoms. Some of them can be too thick, or double layered for induction cooking, making it extremely difficult to hammer out a boss. But other strategies can be tried, like drilling in specific regions to reduce rigidity and loosen tension to maybe lower the pitch.

While some pans can be useless in the ring mode, because they are too thin and low, almost every pan can be used in the membrane mode, without tuning, for gong instruments like trompong, reyong, and bonang. It is just a matter of finding pans or pots with the right pitch.

Pans with thin bottoms can be retuned by hitting them, although they can get out of tune if played too hard, and may break or lose their sound if that process is done too many times. (This offers an interesting performance possibility, if you are willing to hear your tuning change in real time!) On the other hand, this kind of soft bottom pans provide an excellent stable sound if played very gently, and one can be quite precise when retuning them for a specific purpose.

There is also the possibility of using pan lids.⁴ These tend to work more like flat bells, closer to the ring mode described here, but with much less resonance than the pans.



Figure 5. Raise the pitch by removing a slice from the rim. Lower the pitch by grinding on the curve where the side meets the bottom, or by drilling holes around the outside edge.



Figure 6. Preparing pans for horizontal or vertical mounting by drilling a hole in the center.



Figure 7. Vertically-mounted pans on a threaded rod, separated by nuts and washers. (In a finished instrument, the nuts will be tightened all the way down.)

Mounting Membrane Mode Pans

The modified pans can rest on horizontal strings in wooden frames, as in reyong, bonang, or kenong. By using many pans, we can create modular sets that allow various explorations, from making musical pieces to group improvisations. Several pans lying on a cloth on the floor or on a table can be played by one person, or can be fun for a group to play if there are enough pans.

Sounds that might be likened to kendang can be achieved with some membrane pans. Some of them can sound even like modern snare drums, making it possible to explore other sonorities. Buckets and similar plastic containers can produce more rounded sounds that might work for kendang.

The “found tunings” of these ensembles can be very inspiring and liberating, offering experiences of a range of tonalities and timbres.

The processes we describe here can create sound-making opportunities for a single player, small groups, and even large gatherings with lively crowds. In each case, different building and tuning possibilities can be considered. When we work with used pans, each piece comes to us with a random tone; this can be used as is, or changed to create ensembles of instruments with the same tuning.

CREATING ENSEMBLES

Playing a newborn instrument for the first time is always a thrill, but the full potential of a PanGamelan instrument is revealed only when played by at least two people. This allows a dialogue, where the sound is an element to be contemplated and played with, and can become a tool for the joy of group music making.

Since beginning this project, we have created a few sets of instruments and organized some group activities. We



Figure 8. Horizontally-mounted pans on a threaded rod, separated by nuts and washers.

would like to continue to help establish more groups that will be able to make their own instruments and discover new approaches.

We have had the opportunity to start PanGamelan groups in several countries. Here are a few:

Barcelona, Spain. Several activities at the University of Barcelona in 2017 revealed the enormous potential of frying pans’ beautiful bell-like sounds.

Mexico City, Mexico. I was invited in 2019 by UNAM (*Universidad Nacional Autónoma de México* [National Independent University of Mexico]) to offer their first PanGamelan workshop. The group continued to be active after I left, and added local musical elements. We exchange information and experiences regularly, as we share ideas and ways to find more players (Figure 10).

Graz, Austria. In January of 2020 I accepted an invitation from Professor Rafa Caro Reppeto, Ph.D., a former member of our gamelan in Barcelona, to offer a PanGamelan workshop at the Institute of Ethnomusicology at Kunst University of Graz, Austria for a group of enthusiastic students, as well as professors already experienced with gamelan, including Sarah Weiss and Kendra Stepputat. Participants were instructed in the basic elements and techniques of PanGamelan, and enjoyed a session of group music making on the first evening. The next day we decided to organize the gamut by choosing and constructing the first instrument, which could be a guide for future construction. The scale we chose was compatible with the Javanese slendro gamelan at the Ethnomusicology Institute, so the PanGamelan instrument could be used in ensembles for musicians to explore possible connections with gamelan (Figure 11).

Plans and Possibilities

We dream of a future in which many people can learn, enjoy, and participate in a global network of PanGamelan ensembles. In addition to musical ideas inspired by gamelan, the PanGamelan can also be used in other not so “gamelanous” ways to create amazing musical experiences. We have also found that it is very possible to combine PanGamelan pans with other instruments to make different ensembles.



Figure 11. [Video of the author playing a PanGamelan instrument](#) in the gamelan room in Graz, Austria.

The PanGamelan basics presented here can be expanded in many ways. We have used materials with different acoustic properties to make other kinds of instruments: aluminum for portable gangsa (called Gamelinus), PVC pipes for suling, wood to make keys for xylophones, like gambang. There are possibilities using auto-resonant pieces: PVC pipe for bass percussion, bamboo tubes for rindik and/or jegog, stringed instruments and so on.

We want to try larger pans—the traditional Paella pans from Valencia might serve for a low pitched gong ageng. We are also looking for low-cost ways to make a gong kemodhong, and are open to any ideas that can enrich the ensembles. We would like this project to encourage creativity, recycling, and up-cycling, all with a DIY attitude.

All of our information is shared on the principles of Creative Commons. It is not just about the sound, or making gamelan-type instruments, it is about being generous, giving away what we love and acknowledging every cultural and technical source we learn from. We believe our contemporary world needs spaces for people to meet and discover the joy



Figure 9. Vertically-mounted pans separated by knots.

of diversity, spaces not related to consumerism, but to different ways of spending time together, building instruments and making music.

Intercultural exchange and awareness can deactivate xenophobic, fascist, or totalitarian attitudes. No one needs to agree with us at this political level—everyone can use the PanGamelan resources—but we think that making music in groups may open people’s hearts to become more respectful and patient, while at the same time making them feel empowered to make their own contributions to the community.

We have learned from our experiments that there are many possibilities for these endeavors. We are planning to expand opportunities for building and playing in Barcelona, including building a larger ensemble. As our activities develop, we will share them on the website for this project at pangamelan.org



Figure 10. Community music group in Mexico City testing out their new instruments.

This is the nature of the project— it can grow, change, be enriched by everyone’s experiences. We believe there are beautiful prospects for this project, because of the enthusiasm we perceive every time we use PanGamelan instruments, and the experience we have in collective soundsculpture making and “kotekaning” with people from many backgrounds.

We are glad to have the opportunity to share our ideas, and hope that others will be inspired to look around their own world and discover sound-making objects that can be used to create music making communities. We thank *Balungan* for the opportunity to describe our experiences, and we look forward to having more people join our family! If we can make it possible for people to share moments of joy such as we have had, our mission will be accomplished. ▶

Endnotes

1. Kartomi, Margaret J. *The Gamelan Digul and the Prison-Camp Musician Who Built It: An Australian Link with the Indonesian Revolution*. Eastman Studies in Music 16, University of Rochester Press, 2002.
2. “[Aluminum Bonangs](#).” Paul Dresher. *EAR Magazine*, Barbary Benary, ed. Vol. 8, No. 4, pp. 24–25. New Wilderness Foundation, New York.
3. See “[Aluminum Disk Gongs \(Articles #1 and #2\)](#).”
4. [Terry Berlier’s Pan-Lid Gamelan](#)

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All photos were taken by the author unless otherwise noted.

Resources

PanGamelan.org

[PanGamelan on Instagram](#)

[PANGAMELAN: AN INTRODUCTION](#)

This video is an introduction by the author that demonstrates the building, mounting, and playing of PanGamelan instruments.

