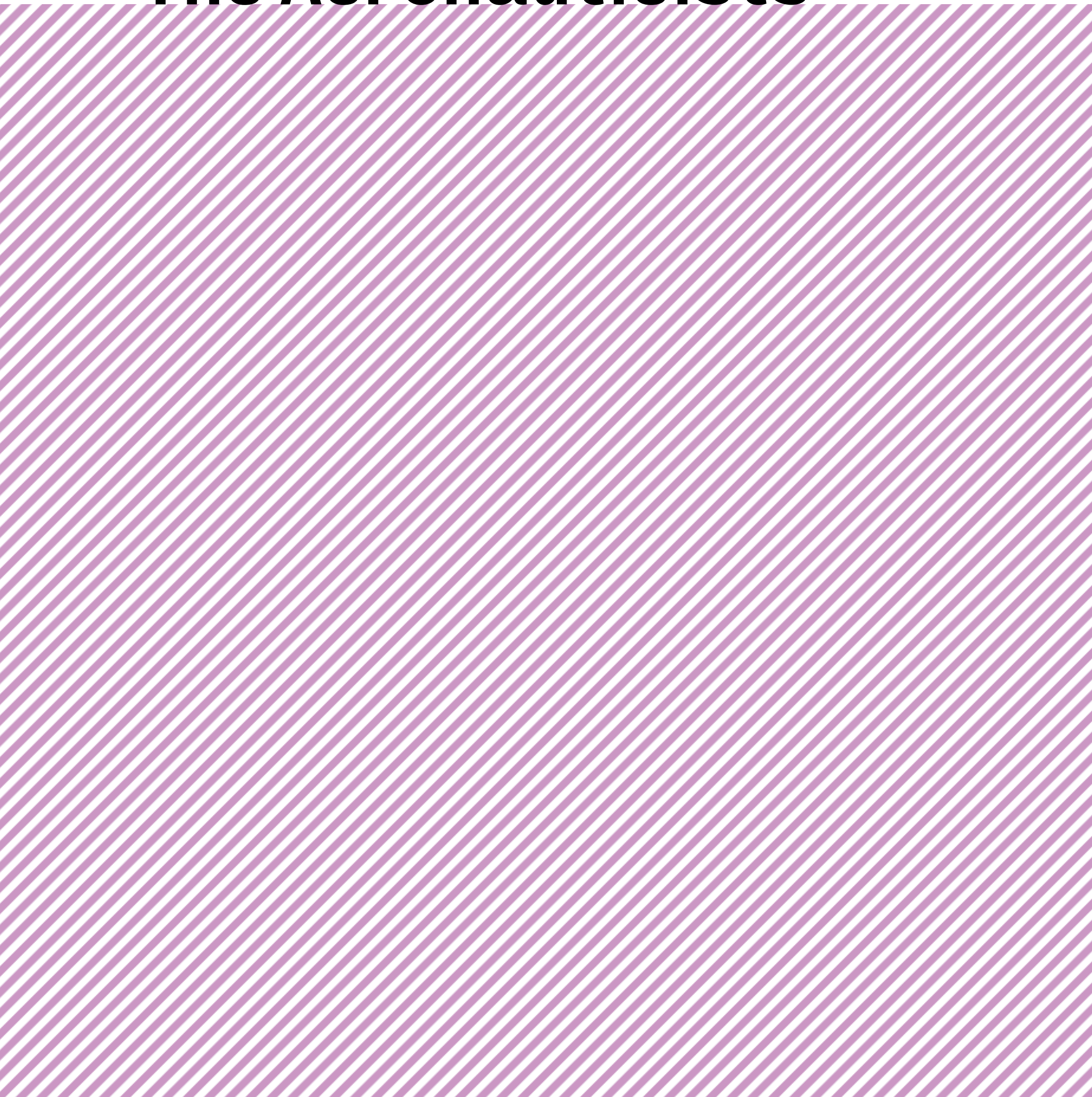
The Aeronauticists



Adam Bobbette
Reviewed by David L. Hays

Yogyakarta was a loud town. The sounds of motorbikes were as constant as the tropical heat. Cutting through the noise, mobile food vendors broadcast sounds tailored to the food they served. A constant whistle meant rice porridge, a pre-recorded nursery rhyme signalled dumplings, and bells heralded meatballs. Five times a day, the mosques on every corner maxed-out their speakers, set in minarets, and pushed the other sounds into the background, behind the muezzin's call to prayer. At night, the animals took over: cricket, frog, cicada, and lizard voices in a thick polyphony of clicks, patters, and whoops.

By day, I was usually working alone at my desk in a small wooden bungalow. Every so often, I would hear a lone whistle cut through the normal sounds. The tone changed, which meant it was not rice porridge. Sometimes it felt close, then faded into the distance as if making circles in the sky. Its pitch was intentional and musical, a satisfying, deep *gneee*. I would rush outside to spot its source, but there was nothing. I asked friends about it, but they didn't know what I was talking about; they'd never heard it. Once, I ran outside to chase it, and the only people around were a couple of old ladies picking weeds beside the neighbour's house. I asked, "Do you hear that? Not the motorbikes, not the roosters, that?" I pointed to the empty sky, then said, "*Gneee*, *gneee*."

"It's a bird," one of them said.

"What kind of bird makes that noise?" I asked.

"Don't know," they said in unison, not looking at me, picking weeds.

"Well, who knows about it? Who can tell me about it?"

"Go ask some men, they like to play with birds."

They were right. Only men played with birds. These are some that I met.

Supri, 47, was tall, slender, and dressed in comfortable slacks and a button up shirt. He had big white teeth and an empathetic smile. We first met in March, when I saw him standing in the centre of a cul-de-sac with a crowd of grey pigeons milling around his legs.

He worked at an art gallery that was also a private home in an old, dark but airy, Javanese wooden house. Its red tile roof was shaped like a pointy hat with an expansive brim. The property was full of sprawling trees with birdcages hanging from them like Christmas balls.

On his days off, Supri told me, he packed up his favourite pigeons and drove 30 kilometres on his motorbike to the top of the local volcano. Facing the direction of home, he'd release a male and female together.

"Together they are smarter. They're just like people, you know. We're the same. Together we are sure to find a way home." He explained this calmly and with mime-like hand gestures.

He put his index and middle fingers together, then brought them to the tip of his nose, tapping it a few times, "They always come back, because they can smell where home is."

"How do they smell from that far away in the sky?" I asked.

"I don't know. You should research when you get home." He made his fingers look like they were tapping on a computer keyboard. "You tell me how they do it. However they do it, from up there, they smell here." He pointed his thumb behind him to the ruined old neighbour's house, where he had kept the cages.

They were so far away when he released them that he attached specially built whistles to their tail feathers. They were made of bamboo or wood, carved and ornamented by local artisans with line drawings of dragons or other mythical figures. Their flat tops and square mouths caught the wind and made the *gneee*. They looked like the kind of thing hobbyists worked on in a corner of their house, hunched over a worktable, carefully fritting materials into smooth edges. Their shapes were sometimes aggressive and aerodynamic, sometimes bulbous, almost apple-like, with concern not for velocity, but tone and volume. They were sometimes double-, triple-, or even quadruple-barrelled and sounded like a miniature pipe organ on which all pipes were blown at once.

One night in May, someone drove up to Supri's house, maybe in a truck or a car, nobody knew exactly what happened, but in the morning, his sixty pigeons were stolen. They thought that maybe they were sold in markets in nearby towns. Each bird could bring in five to thirty dollars, an excellent paycheck for a thief of sixty birds. It could have paid off someone's debts, taken care of healthcare bills, or been invested in more profitable contraband animals. Supri had no plans to replace the pigeons; he didn't make enough money, he told me without emotion, glancing at the lot with the empty cages spattered with white guano. Instead, he settled for hanging out with his caged birds dangling from the trees.

As I was leaving one afternoon, his friend, who looked like Supri but with less teeth and lanky, as if Supri had been stretched and aged, began singing with one of the birds in a cage hanging above him. It was a shiny, charcoal black and bright white kacer, a species famous in the area for its high-pitched song. He whistled and craned his neck toward the bird, and it did the same thing back.

I asked him, "Where can I find pigeon whistles and the people who make them?"

He pointed his thumb over his shoulder and said, "There, in Pasthy."

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Pasthy (an acronym) was the animal market in the south of the city. It was a mixture of permanent stalls and pavilions where men displayed their animals. Everyone knew the black market for stolen animals and endangered species was also there. The underground stuff made the place an uneasy and paranoid spectacle of depravity. It smelled like sadness: piss and shit, animal food and wood shavings. Miniature owls with scabby skin were hanging in cages in the daylight, and giant bats huddled, exhausted, in cages too small for them.

Some stalls specialised in bird food and steroids, others sold intricate animal houses in the style of Supri's traditional house. Hat-roofs could be bought for the top of fish tanks or pigeon houses. It seemed that humans and animals should share architectural styles.

I talked with the owner of a bird food and steroid stall who had fading tattoos covering both arms. His wife sat in the background, behind the counter, wearing a sheer pink polyester hijab, her eyebrows pencilled in.

"Where can I buy the best pigeon whistles?" I asked.

"Oh, not at Pasthy. Here, they are just normal."

"Where can I buy the best?" I asked.

"Hmm," he made the sound of thinking, "you have to go to Muntilan," an adjacent town, "to the market."

"The one beneath the bridge?" I asked, having been through the town many times.

"By the station, that one. Go there. There are many stalls with the best whistles. They make them at home, the really expensive ones, small, like this big"—he pointed to the tip of his pinkie finger—"but the sound is high and loud. You can hear it coming through the clouds, then they come down fast." He dashed his hand down toward the ground like a swooping pigeon. "There people even cut little pieces of thick paper to put inside the whistle. It warbles the sound." He then whistled in a wobbling way and pointed his nose to the grey sky.

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The road to the market in Muntilan wound through densely packed small towns, then opened into long stretches of highway with shops huddled up to the road's edge, followed by radiant green fields. Like a syncopated rhythm, that pattern repeated with unexpected variations for fifty kilometres: straight road, small winding town, open field.

In one field, I noticed four, tall bamboo poles painted in broad, horizontal, bands of red and white and arranged in a square. The alternating stripes of color seemed to reference the Indonesian flag. At the top, a sash, also red and white, was strung amid the poles. It looked celebratory, partyish, its ruffled edge fluttering in the wind, like the setting for a birthday.

Photo: ©Adam Bobbette.

A small group of men were hanging around. They were smoking, texting, and chatting. Some of them held pigeons. Cages were scattered on the ground. As I approached, a guy in his forties asked me, "What are you after, brother?" He wore a t-shirt emblazoned with a portrait of Soekarno, Indonesia's first president, and big white lettering that read, "Terrific Indonesia."

"Can I watch?" I asked.

His friend wore a green backpack that was a wood cage with eight compartments for pigeons. This was how he travelled with his birds.

Awan was the youngest in the group, still a teenager. He flitted through the group wearing camouflage shorts, a black t-shirt, and a baseball cap turned backwards. But he avoided me and would only speak Javanese, a language I don't understand, even though we could both speak Indonesian. They all seemed to make fun of me, commenting in Javanese so that I couldn't understand, then they'd flip to Indonesian and avoid translating what they'd said. My responses were always funny to them because I could never respond to what was really happening. Anything I said or did was then bound to be funny, like they were watching a real-life bloopers victim.

Soon, Awan gathered his own pigeon backpack and looked ready to leave. I asked if I could join. His friends laughed, then Awan laughed, then he said, "O.k., let's go, are you ready, now?" I got ready, then he put his backpack down, returned to hanging out, and ignored me. Suddenly, he gathered his stuff and peeled off on his motorbike without me. Confused, I tried to follow but was not even on my own motorbike by the time he made it out of the field and onto the road. I tried to make it look like I was leaving anyway, to avoid returning to the other guys rejected and fooled. I said farewell as if it was what I had meant to do all along, then drove off. They barely noticed me. A few hundred metres up the road, Awan was in a field, alone and with a pigeon in his right hand. He beckoned me with his head, then turned away and threw the pigeon like a ball. It darted away from him, speeding horizontally, without lifting in height, and flew in a straight, grey line above the fields. In a few minutes, it landed in the hands of one of the guys back in the ring.

They were training them for racing. Over weeks and months, Awan would drive further and further away to launch them. Each guy in the ring held a female pigeon in his hand. The male zoomed in, then furiously flapped its wings to slow down like it was suddenly about to hit a wall. It would smash into the female and fall to the dusty ground.

Awan turned to me and said in Indonesian, "I sell alcohol in the shop," a local homebrew. "You should come by. Anytime. We'll drink together."

He told me he couldn't afford to finish high school, so he raced pigeons to hang out with friends and chase a little extra cash. He was nineteen. He said I could sleep at his house if I wanted. Because I was a Western foreigner,

I thought he assumed the promise of alcohol was a good connection between us, that we could commune over a transgressive act in a predominantly Muslim, booze free, country.

"How do I find you?"

"Go to the market and ask for me."

"Ah, I'm also looking for pigeon whistles."

"You can do that there, too."

He made a phone call, in Javanese again, then launched another pigeon. He told me he was leaving, kick-started his motorbike, gave me a nod, and drove away.

On the way to Awan's market, I saw another pigeon ring, this time behind a dilapidated warehouse. The sky was bright blue, and the local volcano, with its greyish-blue, rocky mouth, smoked in the background. I walked up, and Tony stepped out from the group of men to greet me.

"Can I watch?" I asked.

"Sure, bro. What's your name?"

He told me he was in his forties and in the off-season for work when he delivers tobacco to cigarette factories. To pick up extra cash, he sometimes delivered eggs and produce in a small truck, back and forth across Java in fifteen-hour trips. He did not expect much cash from the pigeon races, but he told me, if you're really good, or the best, you can win the championship prize: a new Honda motorbike, the kind with bright colours and an aggressive sitting posture. It was the kind that thugs liked to modify so that the exhaust made a violent, piercing sound. Then, depending on the guys he was with and the religious inflection of his thugishness, he drove around town in caravans, flying bed-sheet-sized flags emblazoned with violent Islamic iconography, like crossed, black machetes with the Kakbah, the cube at the centre of Mecca. If they were feeling less macho, they revved their engines in parks at night. Sometimes they did both.

These guys didn't use pigeon whistles; they were "jockeys." Supri, with his urbane lankiness and gentle smile, was of a different world. This was competition: not about musical sounds, it was pigeon steroids, muscular, loud motorbikes, working class thugs and religious zealots. Some of these people could have stolen Supri's pigeons. The birds not only drew men as different as Supri and Tony toward them, but also were mirrors in which they could see their lives reflected. Like Supri, Tony thought his pigeons were just like people—meaning, like himself.

Tony pulled a pigeon out of its cage, handling it fluently. The bird bobbed its head but didn't resist. With his thumb, as if he were opening a switchblade, he spread one wing. The feathers were in alternating strips of white and beige; their stems were small, seemingly fragile, and translucent like fish bones.

"It takes about a month for a feather to grow. That's how you tell how old they are. You want to race them at about ten feathers," he said.

"How do you know which is male or female?"

"Like this."

Pulling another pigeon from its cage, he brought the two close together. Like magnets of the same pole, they retreated, flailing their wings and snapping their heads at each other. He put one away then brought out another. When they came into each other's sphere, they made that pigeon fluttering warble sound. "You can't know by their wings, shape, or colour, only by their reactions to each other," he explained. It's the magnetism, the deep attractiveness, that the jockey's exploit.

All pigeons are desirous, but some are better at acting on it. "We train them and figure out which ones are the smart and stupid ones, just like people. Some are strong and fast, others are lazy. We only find out by training them. You can't know before you work with them," he said.

Once the male birds got used to finding their way back to the females, which were kept in the ring, Tony went further away, like Awan had, so that the pigeons would start to get a good lift in the air on their way back. Then they had to dive at the correct angle, like the downward curve of a three-point basketball shot, through the sashes at the top of the square. The game relied on the intelligence of each bird to know its way back to the female and to sweep in through the top. People like Tony and Awan and their jockey forebears had worked with male pigeons long enough to figure out what they were like and how they could build relationships with both the female and the jockey. They were a trio, even if Tony only ever spoke as if he wasn't a part of the relationship, just the distant puppet master.

Tony wore a red, nylon jacket so that his male pigeons recognized him from the air. On competition day, there were three other men in the ring with Tony, each with a female in his hand and wearing a bright-coloured jacket. When one jockey identified the little moving spot in the sky as his pigeon, he screamed to get its attention and waved the female up and down like a pom-pom, coaxing the pigeon to begin its descent. Sometimes the pigeons were confused and couldn't figure out to where to descend, or perhaps they didn't want to stop flying, and they stayed circling in the sky. They were then passed by another that would plunge at just the right moment, slowing down in a flurry of flapping wings and smashing into the female.

What about this was like a human relationship, I wondered? Circling and getting lost in the sky, preferring to fly rather than return home? Smashing into a mate? I could see the analogies, and they seemed crude. Every practice and race rehearsed the act of a simple return: find the quickest path, don't lose sight of the goal of desire, don't

Photo: ©Adam Bobbette.

get lost in the clouds. The singular vision of reunion and reward, it could make sense but missed so much about human experience.

Maybe this is what jockeys thought about: their power came from mastering the deep desire to return. The jockeys mastered it in themselves and the pigeons. In a space away from their wives, homes, and day jobs, they could practice male and female relations. When they said that pigeon relationships were the same as human relationships, it must have also meant that they were thinking of themselves as pigeons when they were at home. The jockeys created a space outside of their everyday lives that could reflect back into it. But as they controlled the pigeons, the pigeons controlled them; the jockeys became pigeon-like in their lives while the pigeons became like jockeys.

I asked what the ring was called. "*Kolongan*," Tony said.

"What does it mean?"

"It means the name of the ring," he replied, like I was some kind of human scrub jay, a bird without short-term memory.

"Yeah, but the word, *Kolongan*, what does it mean? Where is it from? Can it be used for any other kind of thing?"

"No."

*

It was a weird word because *kolong* is the space under a bed. The scary space where monsters and ghosts live. Or, it can be the dark and scary space under a bridge where monsters, ghosts, and creeps live. With the addition of *an*, it becomes general, like hous*ing*. How does a dark and scary place *underneath* become a partyish place in a rice field for pigeon racing, and what does that mean about mastering human and animal relations?

I asked my librarian friend Nang. He was living in a village close to the *Kolongan* where Tony was training his pigeons. During the day, he was a farmer, but he dedicated his evenings to scholarly pursuits. His small, private library (containing under one hundred volumes only) was used by a network of devotees of *Kejawen*, an animist philosophy on the verge of extinction because of the ascendency of Islam over the past fifty years. Today, *Kejawen* survives on the slopes of the many volcanoes and on the edges of cities in Java.

"I used to love playing with pigeons," Nang said. "But then I got busy."

His wide mouth opened all the way when he laughed, and sometimes, when something was really funny, he ducked his head forward, then threw it back in an arc, laughing along the way.

We were in his narrow, dark, pink-walled sitting room, on a red plastic sofa. His laminated wedding photo, taped to the wall, showed the bride and groom in traditional golden Javanese outfits and balls dangling from their heads. That

evening, however, Nang was wearing sweatpants and a loose shirt, and he had just washed after cutting grass in the fields. His wife remained in the kitchen with the kids, except to bring us tea.

Nang's *Kejawen* was systematic. It was regimented with calendars, fast times, meditation dates, and prayer books; its one-thousand-year history was a clear story he liked to recount. He had been studying it since high school and was now close to thirty. I figured he would have something to say about the *Kolongan*.

First, I asked him, "What is the sky made of?"

"It's like this, it's like this," he began, taking a breath and reflecting. "There are three levels." He, too, used his hands in a mime like way to explain things. He made an "L," with his thumb as the horizontal line. "The bottom is the earth, the human earth, with us and nature on top of it. Next up," he pointed to the bottom segment on his forefinger, "is called Indra Loka [literally, "the place of the gods"], that's where the air, wind, and souls are blowing around. Then," he moved up his finger, "it's on to Jono Loka, the top. Up there is eternal. Everything below is striving to make it there, but won't necessarily. If they don't go up, they go back down." His finger circled between the levels. "The second is full of souls, the dead and some that don't come from humans. Even the wind is there. Even the wind that destroys crops and houses, big violent winds, are souls."

When Nang talks about souls, he means different kinds of things. His souls are ghosts and spirits from humans and animals that have died, including pigeons. They can also be made by gods, fabricated by them, then inserted into the world.

Souls are how history is transmitted across time. They are how we know the past. Nothing dies, according to Nang, but only changes shape. Talking about souls is Nang's way of wrapping his head around how the world continues through material transformations. It is how all things around us, like furniture, plants, pigeons, friends, are contiguous with their individual pasts and the greater past beyond them. It means that the world does not disappear and remake itself at every instant. This is how pigeons are not only *like* us but also *are* us, and we them. They aren't just mirrors because souls pass between shapes, from feathers and fragile bones to eyes that look forward in a body with a vertical spine and arms that reach forward. It is the same with trees and rocks: souls can go from human form, to tree form, to mineral form.

The air that we inhale and through which pigeons course is dense with these souls. Wind, clouds, rain, and breath are not blind physical forces but the striving of past individuals. Every gust of wind is an intention within the deep time of changing bodily form.

The mechanism that selects which spirits will rise to Jono Loka, and which do not, and what shape they will take (stone, pigeon, tree, or human) I still have not gotten into

with Nang. And what the mechanism is, whether a gene, a god, or something else, I also don't understand.

It is a vertical cosmos for Nang, with an overall striving upwards, away from the Human Earth to an increasing airiness. Its shape is like a cloud growing fat and full, then liquefying into rain; what is lighter rises, then falls down, rises again, then falls.

"The *Kolongan* is within Indra Loka, then?" I asked. "It's the bottom edge of Jono Loka, the space underneath. That is why it is called that. It rubs the bottom edge of the cosmos; the pigeons are circulating through Indra Loka. Is that why *Kolongan* are called *Kolongan*, because they are the bottom of the cosmos, like the *Kolong* is the underside of a bed or bridge, but they are not so scary and with pigeons? And the birds are us, but a little higher up, a little closer to the lighter realms, and we are training them to move between the realms, like we ourselves are trying to get closer to the lighter realm?"

"No."

Then he said, "I don't know why it's called that."

I reached for a biscuit.

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There was no need to make it to Muntilan; the market was everywhere. The pigeon whistles, *Kolongan*, and *Kejawen* were three methods in the hectic marketplace of men using the air as a medium for reflection on what it meant to be human.

"The air is the medium of knowledge," Santoso, in his sixties and a shoe repairman in a market during the day, explained to me one evening. He wore a sarong and chain-smoked unfiltered, sweet cigarettes.

"It's like this," he said, "humans are made of bandwidths. Reason and nature are the two basic ones. Within this basic structure are many other bandwidths: emotion, awareness, power, remembrance. Each bandwidth is beyond us as individuals, we are in them like a wave in waves."

He paused. "You with me?"

"Yes," I said.

"When we communicate, we don't send signals out to receivers, we match frequencies. We don't broadcast like radio DJs. When we want to know about other people and things, the things and people are also searching for us. Knowing is about synchronizing. Knowing is not in one direction. Sometimes we don't match."

He smoothed his green sarong over his thighs.

"It's like this, it's like this," he continued, dragging on his cigarette, the cloves and other spices crackling with the heat. Wrapped around one finger was a fat silver ring with a milky-coloured stone.

"Earlier on, I knew your friend Suparno was going to come here tonight. I closed my eyes and concentrated and could see him. I synchronized with his frequency. This is all you have to do. Frequencies are like electricity; you can't see them, but they are all around you. That is the same as the frequencies of others. You just have to learn how to synchronize with them."

The thoughts of other people and their emotions were all being broadcast, he said. He had lots of practices—meditation, trials with chickens, fasting, and a lot of talking—to try and tune to their frequencies. But his most common was just sitting and thinking about other people. This was a way to be close to them while being far. There wasn't, in fact, any distance between people because, for Santoso, air is full. Every object, even thoughts and emotions, touched every other at some point as they bounced through the hyperactive fullness.

But Santoso synchronized frequencies almost exclusively with men. My friend Suparno would tell me that Santoso knew when he was coming before his arrival. Suparno, too, knew if Santoso was at home or the market or out. He would use his cell phone only to confirm if he was right. They thought about each other a lot, picturing one another in a quiet moment, imagining where they were and what they were doing.

For Santoso, the air was the medium that connected him to Suparno. Even more, it did so for all humans, animals, and nature, across their different locations and great diversity of bodily forms. It was the medium between the pigeon and the jockey. Instead of separating them, it actually eliminated the distance between them. It was how the pigeon could be human and the human a pigeon. Air was their medium of transmission. In other words, Santoso meant that air was empathy, which means, broadly, the capacity to be moved by something outside of oneself and feel invested in what is doing the moving. In its original definition in psychology, empathy was considered an energy in the body with a capacity likened to electricity. It could rise or fall depending on a combination of internal and external circumstances. Empathy was not an immaterial emotion, like we think of it today, that formed a particular disposition towards material action. It was, instead, physical stuff that filled and depleted us as breath and linked us to all other things. So, for Santoso, *thinking about* Suparno from far away was the same as *being filled with* Suparno. And, for others, pigeon racing and whistles, *kolongan* and tuning in, were ways of being continuous with other things.

Photo: ©Adam Bobbette.

Review

By David L. Hays

Not *aeronauts*—those who travel through the air—but *aeronauticists*—those who think about how to travel through the air: contemplating, strategizing, envisioning, plotting. Doing versus thinking about doing—distanced: critically, philosophically, technically, conceptually. A history of longing.

But this is not that story, because air is empathy: an ocean—substantial, as water. Air is the ocean that is aether: our (secret) protagonist, an actor of (unseen) importance. Air is not aether AND air is aether AND aether is AND.[1]

Said differently: this is not that AND this is that AND that is AND.

So, presence is prescience. There is no foretelling, no knowing the future before now, because then is here and there is now. “Thinking about” is “being filled with.” There is only foretelling.

“But what of the past?” demands the historian.

“And what of the past?” replies the historian.

Every thing is continuous. Analog. Every time is continuous. Analog. Two old ladies picking weeds beside a neighbour’s house are (already) inside me. Supri’s hands work my own limbs (there) AND my own limbs shape Supri’s thoughts (here) AND the idea (here) in these words is (there) where you read them *now*. _Here._

This is landscape, an island without an edge.[2] I find the edge with my toe and make triangles:

> maybe in a truck or a car, nobody knew exactly what happened
>
> Like a syncopated rhythm, that pattern repeated with unexpected variations for fifty kilometres
>
> if you’re really good, or the best, you can win the championship prize
>
> its one-thousand-year history was a clear story he liked to recount
>
> I closed my eyes and concentrated and could see him. I synchronized with his frequency.

This is that story. There is no foretelling.

There is only foretelling.

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1 See Alessandra Ponte, “Architecture AND Landscape: Beyond the Magic Diagram,” *Forty-Five* (March 21, 2016): http://forty-five.com/papers/140

2 Cf. Keith Mitnick, "Nothing Here," and the review thereof by Rod Barnett, *Forty-Five* July 3, 2015): http://forty-five.com/papers/30

Biographies

Adam Bobbette is a Ph.D. candidate in the Department of Geography at the University of Cambridge. He has taught architecture, landscape, and history at the University of Toronto and the University of Hong Kong. Bobbette's writing has appeared in *Witte de With Review*, *City*, the *Journal of Architectural Education*, *Landscript*, *Log*, and the monograph *Architecture in the Anthropocene*. He has also contributed to exhibitions at the Canadian Centre for Architecture and Storefront for Art and Architecture. Based on twelve months of fieldwork, Bobbette is currently completing a study of a volcano in Indonesia and concepts of forecasting and nature in science and animism.

David L. Hays is co-editor of *Forty-Five*, Associate Head of the Department of Landscape Architecture at the University of Illinois at Urbana-Champaign, and founding principal of Analog Media Lab. Trained in architecture and history of art, his scholarly research explores contemporary landscape theory and practice, the history of garden and landscape design in early modern Europe, interfaces between architecture and landscape, and pedagogies of history and design. Hays is the editor of *Landscape within Architecture* (2004) and *(Non-) Essential Knowledge for (New) Architecture* (2013), both by 306090/Princeton Architectural Press. His essays have appeared in a wide range of journals—including *Harvard Design Magazine*, *PLOT* (City College of New York), *Eighteenth-Century Studies*, *The Senses and Society* (Oxford), *Matéricos Perifericos* and *A&P Continuidad* (Rosario, Argentina), *Tekton* (Mumbai), and *Feng jin yuan lin* and *Landscape Architecture China* (Beijing)—and as chapters in numerous books. As a designer, Hays's work explores the production of environmentally responsive objects using low-cost, low-tech materials. With particular interests in dynamic systems, environmental phenomena, and craft, his process crosses lateral thinking and intuition with grounded experiment.