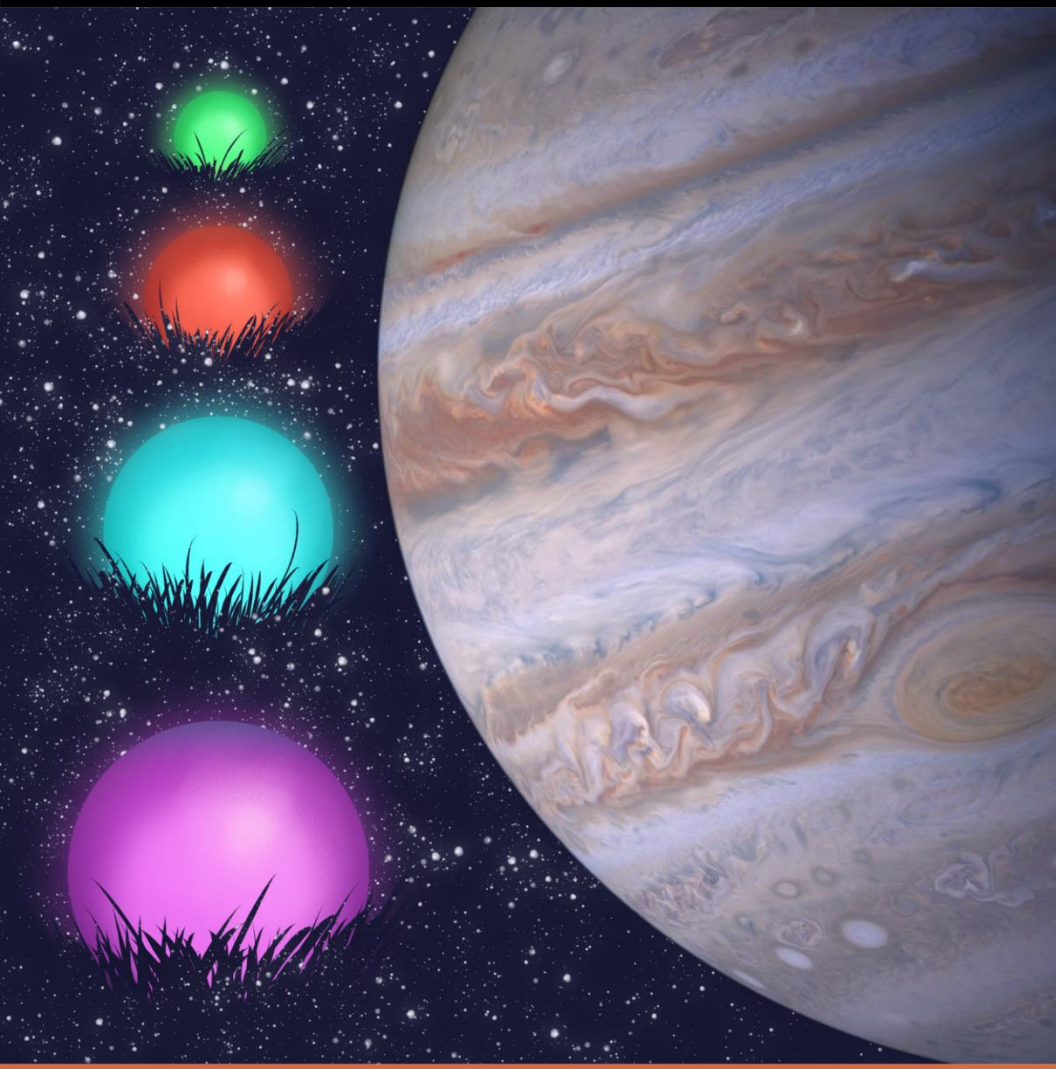
ADVANCED COLOR THEORY

A Short Story



ALEX SCOTT

ADVANCED COLOR THEORY

By Alex Scott

The Astronomical Studies club met in a small room in the bottom floor of Baxter Hall, and in some ways it was what Avery expected. The first time Avery went there, she found an array of monitors on the desk, Hubble photos and a map of the solar system on the wall, telescopes lined up on a shelf. There were two men watching the monitors and a woman typing some code into her laptop. The screens showed a set of crystal balls changing color every few seconds. Not the sort of thing Avery expected.

One of the men turned his head away from the monitor. "May we help you?"

"Um, yes." Avery adjusted her glasses and her backpack. "My name's Avery, and I'm interested in joining your club. If you've got room for me."

"Yeah, we got room," the other guy said, still staring at the screen. He wrote something down on his notepad whenever the colors changed, even when they all became fully transparent. "I'm Perry, this is Watts, and that's Dana."

"Afternoon," Dana said, turning away from her laptop. "So what brings a lady like you to a place like this?"

Avery opened up her backpack and took out the flyer advertising the Astronomical Studies club. "I saw this at the student center, and I figured I had to join." The way they watched her, she felt like one of their monitors. "You see, I've been interested in astronomy ever since I was little, and I'm majoring in it, but, well, I was homeschooled, and a lot of the other homeschool kids weren't really into it the same way I was, so I've never really had the chance to hang out with people who were."

Watts crooked his brow. "Homeschool, huh?"

"Well, you've sort of come to the right place," Perry said. "I mean, this is an

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astronomy club, and we do go stargazing every few weeks, but there's a bit more to what we do than that."

"How so?" Avery said. For a college with such a respected Astronomy department, there didn't seem to be a lot of members, now that she thought about it.

"Before we say anything," Dana said, "I'll just let you know, you have every right to walk out the door if you don't like it. Capiche?"

Avery nodded.

"To start with, a question. What is your take on the existence of intelligent extraterrestrial life? Like, if it's out there, what do you think the odds are that there's a lot of them, or that they know about us?"

"Oh, well, since you asked, I'd say I'm more or less agnostic. I *hope* there's life on other worlds, but I don't think there's any proof. Yet."

Everyone else nodded in approval. "Smart answer," Perry said. "Now, you see the crystal balls in that monitor? They're proof that aliens exist."

A tingle crossed Avery's shoulders. These weren't amateur astronomers, they were new-age UFO nuts. In the corner of her eye, she made sure the door was still open. She could just take a few steps, then sneak out when they weren't looking.

On the other hand, an agnostic had to be open minded. "What is it?"

"It's something that came to me in a dream around exam time last year," Watts said, and Avery felt an ice pick impale every scientific instinct within her. "Showed me all the tools and materials I needed. I won't bore you with the details. I just had to do some big favors for some friends in the chemistry and geology departments to get all of them. But I made three of them, and every five days, around midnight, they start changing colors for about ten minutes. We record them every time. I call them chromeglobes. Those colors are messages from the aliens that put that device in my head."

Avery checked the door again. "Yeah, I'd better go."

"Wait," Dana said. "Before you leave, just hear me out. I know what this sounds like. When Watts told me, I honestly thought about taking him to the campus clinic. But I know they're real. Know why? Because I've made my own chromeglobe. It shouldn't work, but it does. Those colors? They aren't LEDs, and they aren't a video effect. There are no electronics in any of them! And yet, they all show the same colors, at the same time, even when they're not in the same building. They're real, and they're telling us something. So what do you think? Do you want in on this or not?"

The crystal balls in the monitor shifted from one color to the next,

from red to blue to clear to gold, always matching between the four of them. Perry was still staring at the screen, writing his notes.

"What does it mean when there's no color?" Avery said.

"Either infrared or ultraviolet or nothing," Perry said. "We have frequency sensors next to the chromeglobes to pick them up. I think the aliens may have a different visible spectrum than we do."

"No kidding." Avery eased the door toward the frame, not quite closing it, but not leaving it wide open, either. "Tell me more."

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In addition to the chromeglobes, the club also had a decoder ring—or rather, a cipher disk that Perry had put together with a 3D printer. There were 144 cells on the disk, each with its own pictograph, including numbers, directions, and various other concepts, almost like Chinese characters.

"One thing I should clarify," Watts said, "is that these symbols aren't any alien language. I came up with all of them. I just needed something to match the concepts."

"I see," Avery said. "So how'd you figure out which concepts to use?"

"I didn't. It came to me in the same dream as the chromoglobe."

Watts demonstrated by putting on a video of the chrome globes and laying out a blank sheet of paper. The globes began glowing. A window in the corner showed the frequency picked up by the sensor. Whenever the color stayed static, Watts paused and wrote down the frequency. The globes went transparent twice. The first time, the window displayed a frequency of 800 THz—definitely ultraviolet. The second time, no light at all. "Whenever that happens, that means it's the end of the statement. We'll stop there and decode it."

He typed the wavelengths into another program, which translated them into simple integers, both positive and negative.

Avery loved ciphers—she liked to make up her own and write secret messages to the other homeschool kids—and Perry was kind enough to let her try out the disk. She turned the dial according to the numbers on the screen. Each color—and therefore every integer—represented how far to turn the dial in which direction. When she reached a positive number, he turned that many spaces right and wrote down the symbol there. When she reached a negative number, he turned that many spaces left.

One thing that especially interested Avery was that the numbers were all in base-12. Instead of 100 or 1000, the disk had 144 and 1728. Whoever was sending these messages apparently had six fingers.

"What does it say?" Avery asked.

"I'm not a hundred percent sure," Watts said, "but I think it's saying where they're from. This symbol means distance, and this symbol means light years—or at least, their version of it. So they're from nine of their light years away, however far that actually is. This symbol means Earth, and this means ship, and this means path, and this means radio. I think they found us by following our radio transmissions."

"Not only that." Dana handed Avery a piece of paper covered with symbols from top to bottom. "That's from the first message. Look at line four. That's the symbol for 'five,' the one for 'big,' and the one for 'planet.' That's where they are. They're from light years away, but these messages are coming from inside the solar system, around Jupiter."

"What do they want?"

"We're still not entirely sure," Perry said. "They've been sending the same four messages on repeat, but they're all over the place. They seem like they want to start some kind of relationship with us, but they're vague on what they want us to do."

"Wow, incredible." Avery read the notes surrounding the symbols. The word "trade?" was scrawled out in pencil toward the bottom, and a pen scratch near the middle said "two stars = binary system = their home?" "Are they expecting a reply?"

"If they are," Perry said, "they haven't told us how to do it. As far as we can tell, the chromeglobes only go one way. You'd think they'd explain. One of these seems to just be a story about an ancient folk hero."

"I know exactly what I want to say, though." Watts flipped open a note pad and showed Avery a set of symbols. "It means 'We want to meet you, please come visit.'"

"So what do you think?" Dana said. "You want in?"

"Are you kidding?" Avery said. "A chance to possibly meet actual alien life forms? Heck yeah I want in. I'd kinda like to look more at these messages. I don't suppose—"

"By all means, take them! And if you have any insights, just come on down and let us know. We're here every day from noon to two. Except I have a class Mondays that keeps me out. But still, you're always welcome down here."

"Great!" Avery took four pages of hand-written notes, along with a printout explaining all the symbols, and put them in her backpack. "See you later."

Avery headed out to the student center and pored over the notes while eating a chicken sandwich. With the printout, she started translating each symbol one-by-one into her physics notebook. She came to the same

conclusions on the first page as the others. These aliens had come from nine light-years away, had found Earth through its radio waves, and were currently stationed around Jupiter.

She worked on the rest at home after dark. The second page shifted gears a little bit. It mostly talked about the rigors of space travel, the fatigue and disorientation from faster-than-light speeds, and the scientists working on ways to alleviate it.

She translated the third back at her dorm. It was, as Perry said, a story about an ancient folk hero, who vanquished a tyrant and was never content to rest in luxury, but rather to seek out new adventures.

The final page talked more about Earth. You are similar to us, it said, and it remarked on how humans still had considerable diversity in its cultures. It almost read like flattery.

Avery couldn't tell what these messages had to do with each other. Space travel, old heroes, sure, but what were were human beings like her supposed to get out of this? Why reach out to random students at a mid-level college instead of a major government like America or China? They read less like an invitation to a vast interstellar culture and more like someone's non-sequitur Facebook posts. She even wondered if maybe this was the cosmic version of a poetry slam.

There had to be more to it. With all four pages now re-translated, Avery started looking for patterns in the symbols. One thing she knew for sure: these aliens liked ciphers. And when Avery made up a cipher, she didn't stop at just one. In seventh grade, when she sent coded messages to her friends, she would work in other, deeper codes with goofy bonus messages to see if anyone would notice. If these aliens were anything like her, then they were the same way. She just had to figure out what the other code was.

She didn't notice any immediate patterns in the symbols—nothing in how they were positioned, or any repeating combinations. So instead, before she went to bed, she counted the number of symbols on each line. Then, the next day, she went to the Astronomical Studies club room, and asked if she could use the cipher wheel again.

"Sure, go right ahead," Perry said. "Need to double check a symbol?"

"No, I'm just experimenting..." She laid out the numbers she'd written down, and started turning the knob. When she reached the end of the numbers from the first page, she stopped to translate.

"Dang," she said. "Doesn't make sense. At least not yet..." She explained

to the others what the numbers were for, and Dana came up for a closer look.

"I can see one problem already," Dana said. "No negative numbers. Some of these are probably supposed to go in another direction."

"I wondered about that. You think I'm on to something?"

"It's worth a shot. The question is, which ones are supposed to be negative?"

"We can't just write down every possible permutation," Avery said. "We'd be here forever."

Now Watts was hovering over their shoulders. "You know, I've always wondered about this symbol." He pointed at a line on page 2. "It's supposed to mean 'past,' but it always seems to turn up at the end of a line. It's the only one that does more than once."

Avery gave it a try, marking a minus sign next to every number for every line that ended with the "past" symbol. And when she looked at the result for the first message, she said, "Guys, I think we're on to something."

She worked out the symbols for the remaining pages, and showed them to everybody else.

"I knew it," she said. "There is a second code in here. And I think I know how we can contact our new pen pals."

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As it turned out, Dana lived in Radner Hall right below Avery, so when it was time to go out stargazing on Friday night, they were able to meet up out front and ride together. Dana knew the area better than Avery, so she did the driving. "Thanks a bunch," Avery said. "If I'd gone on my own, I'd definitely have gotten lost. A few weeks ago I tried to drive myself to a movie at this arthouse theater and wound up two whole counties away."

"Seriously? You got lost on the way to the Neo Bijou?" Dana let out a chuckle that was halfway between pity and sympathy. "I guess after being homeschooled, it takes some adapting to the outside world."

"I wouldn't say that. I wasn't exactly sheltered. I had the other homeschool kids to play with, and kids from the neighborhood. And my dad took me on road trips all the time—museums, historical sites, landmarks. Ever been to the Serpent Mound in Ohio? It's pretty cool." Avery leaned on the arm rest as the first stars began to twinkle in the dimming sky. "He used to make me out on stargazing trips like this, too. I'd sit here just like this, and he'd drive, and we'd sit in a field and stare up at the stars all night." She let out a soft sigh. "This is the longest I've been away from my family."

She kept her head turned away so Dana couldn't see the tears. The aliens'

cipher had been distracting her from this homesickness all week, and now it was worse than ever. The best she could do to alleviate it was send her dad a quick text. She didn't tell him what she and the rest of the Astronomical Studies Club were really up to. She didn't plan to—at least, not until they made confirmed contact. She wanted his mind to be maximally blown.

The club's preferred stargazing site was about twenty minutes out of town near a stop on a popular hiking trail. It was pitch black by the time Dana and Avery arrived, so they each turned on a flashlight as they got out of the car. Perry and Watts were already sitting on the grass next to their car. Watts had laid the chromeglobes out in a diamond, with an optical sensor about a yard away.

The stars spread bright and clear in the dome above, with the waning moon only barely giving off enough light for Avery to see the outline of her hand.

Perry pointed a flashlight under his face. "Took you two long enough."

"I had to stop at a drive-thru," Dana said. "We about ready to get started?"

"Just about." Watts opened up a cooler and passed each of the girls a beer.

Dana popped hers open, but Avery held it out at a small distance. "Um, you know I'm only eighteen, right?"

"Come on, we're miles from anywhere. Just one isn't going to hurt."

"Watts, be nice to the homeschooler." Perry took the beer, opened it, took a sip, then picked another can out of the cooler to give Avery. "Here's a Dr. Pepper."

"Thanks." Avery didn't especially care for Dr. Pepper, but now wasn't the time to be picky.

The four of them raised a toast. "To first contact!"

Perry set up a tripod and mounted a video camera. Watts sat hunched on the ground and opened up an app on his tablet. "All right. Once I start it, we can't stop until it's done. We need absolute silence. We can't risk anything interfering with the message."

"Right," Avery said.

"Of course," Dana said.

"Here we go." He set the tablet in the middle of the diamond of chromeglobes. The app was a midi composer. "Three. Two. One." Watts hit play.

A digital piano sounded the first note. The chromeglobes all shone in indigo.

The melody continued, and the globes proceeded to red, to yellow, to purple, to various other hues and shades, dancing from one to the next, a dazzling light show beneath Mother Nature's planetarium.

The secret Avery had found buried in the messages was that with the right positioning and the right frequencies,

chromeglobes could translate nearby sounds into colors. In other words, the Astronomical Studies Club could use music to send their message to Jupiter. Thanks to radio, the aliens were familiar enough with human music that they'd designed the chromeglobes to use the sound frequencies associated with traditional western notation. And of course they used all twelve notes and half-notes in an octave.

F sharp was ultraviolet. B flat was infrared. The frequencies appeared on Perry's smartphone, verifying that they were being emitted as planned.

As a song, it wasn't much. Very slow, no real rhythm, not even a perceptible key. But it wasn't like the aliens were going to hear this. The point was the colors, and the message they conveyed. Avery, Dana, Watts, and Perry had worked together the last three days on this message—deciding what to say, assigning the right symbols, translating those symbols into turns on the cipher wheel, translating those turns into notes.

Jupiter was shining especially bright tonight.

Their message was a series of simple statements.

We are from the third planet.

We have received your messages.

We are glad we're not alone.

We want to meet you.

We hope to hear from you again soon.

It took about five minutes for the full message to play out. They let it sit for a moment, then Watts took his tablet back. Perry kept his phone on Record.

"What do you think they'll say?" Dana said.

"Who knows?" Watts said. "'Thank you, your input is very important to us'? I'm just hoping we didn't screw it up somehow."

"We did the best we could," Perry said. "They should be smart enough to figure out what we meant. My question is, how long will it take for them to reply?"

"Jupiter's at least 33 light-minutes away. So maybe sometime in the next few hours."

Avery's phone rumbled. She'd gotten a reply of her own from her dad. As smart as he was, he'd never gotten the hang of texting, so his only reply was a single heart emoji. It was more than enough.

"Well, it's been four days since their last transmission to us," Dana said. "Maybe that's when we'll hear back." She took a swig of beer. "I've never been this anxious. We just spoke to an extraterrestrial race. The whole world could change from here on out, and it'll all be because of us. I never realized it'd be so much pressure."

"I know what you mean," Perry said. "We might become their emissaries, or their servants. Why us? Why such a

roundabout method of contact?"

"Maybe they don't *want* to attract attention," Watts said. "I know I wouldn't."

"Weird," Avery said. "I'm pretty calm. It's such a nice night, the stars are gorgeous, and I'm having a really nice time. I feel like, even if they don't send anything back—"

The chromeglobes flashed sky blue, followed by fuchsia.

"Holy crap," Watts said. "It hasn't even been five minutes yet. Are we still recording?"

"Never stopped," Perry said.

They watched the chromeglobes shine. The message consisted of ten statements, and ended in five minutes.

"We actually did it," Watts said. "We made contact. Did we get everything?"

"Everything." Perry held up his phone. "It's all in here."

"What are we waiting for?" Avery said. "Let's translate it!"

"Hold your horses," Dana said. "I don't think anybody brought the cipher wheel."

Which meant they'd have to wait until tomorrow.

So first thing in the morning, they met up in the university center, took over a table, gathered their materials, and started translating.

They each made their own translations to compare when they were done. It was slow, meticulous work, but as the first human beings to communicate with an alien race, it was imperative that they get it right. This was going to decide the fate of not one, but two worlds. The destinies of the four members of the Astronomical Studies Club in particular were riding on this.

Except that Avery almost wanted to stop halfway through. By that point, she understood what the message was—what all the messages were. Why the aliens were telling random stories and buttering humanity up, and why they bypassed government and industry to make contact with civilians. They were just trying to set a mood, connect very particular ideas, instigate a reaction from humanity. They didn't want to go through any red tape, or give an advantage to any potential competitors.

The old messages replayed in her mind, but now as narration, with a montage of images playing under it, accompanied by soft, soothing music, before the logo appears at the very end.

She translated the last symbol. "Done. And I don't believe it."

"Me either," Watts said. "They came all this way just for this."

Dana reached across the table. "Let me see." Watts gave her his page. "Yep. Basically what I've got."

"So we all wound up with the same

thing?" Perry said. "I didn't make a mistake? All those codes, the dreams, all this effort, was really all for a soft drink?"

"A soft drink," Watts said. "And they want us to help them sell it."

Avery tried to imagine telling her dear father about this. Hey Dad, all those years of science lessons and stargazing paid off, and I got a new job. Not sure how much it pays yet, but my boss is a space alien, and we're gonna give Coke a run for its money. Aren't you proud?

The biggest milestone in human history since the invention of agriculture, and it was a crummy commercial.

The End

ABOUT THE AUTHOR

Alex Scott is a graduate of the University of Tennessee, and he lives in Chattanooga. He is currently pursuing a Master's in Education with the goal of becoming a teacher.

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