

# Computational Scaffolding of Composition, Value, and Color for Disciplined Drawing - Appendix

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Figure A.1: Participant drawings and reference images used in our formative study. Reference image: *The Green Trio* by Salman Toor (2019, oil), *Summer Afternoon* by Kat Tsai (2020, digital), *Red Studio* by Sophie Treppendahl (2020, oil).

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## A Professional evaluation feedback

### A.1 Feedback for Figure 1 (Loish)

*A.1.1 E1 feedback.* This is another digital drawing of a digital drawing by an artist named Loish. So overall, I think the artist Loish, would be pleased and flattered. The biggest difference that I noticed is that Loish who definitely had more time to make their drawing just has, like a really much, much sharper lines. For example, there's this cabinet, and you can really see the sharp edges of the cabinet. The scene has a like this figure. That's kind of leaning, kind of pondering. There's a cat looking at the figure. It's a thin galley style kitchen, a little worn down, you know.

Maybe they're dreaming of, like all the upgrades they want to do to put into their kitchen. But it's got this rustic scene, and you can tell that Loish has this painterly feeling.

I see, like the edges of the cabinet, the sharp edges of the towel, the shadow shapes themselves are really sharp, like the cat's ears are really sharp, on this cafe table. There's a plant in a vase that's really sharp.

The student drawing has a much more rounded curves, and that is just probably based on like the different types of digital brushes they had access to or didn't have access to.

And then there is a major issue which I can see in the student drawing which a lot of people tend to do is that there's this orthogonal kind of line, a diagonal line that's like disappearing. It is not as severe. There's this line in this side of the ceiling where the ceiling meets the cabinet.

And it's a lot more obtuse right? Meaning wider, flatter, whereas Loish's line for that area is much more acute. There's this acute angle, this triangle in the Loish drawing, whereas the student has made it a much more obtuse angle, and as a result the space in the kitchen becomes really wonky. And so there is this convex issue, where, for example, when I see the cabinets, they're slightly curving out, right, as if there were a fisheye lens. And so you can see how these cabinets kind of are ballooning, whereas the Loish drawing, like the cabinets, are really straight.

These kind of are drawing problems in the composition. So that is probably just because they started by painting it in where I can almost say—because I've looked at a lot of digital art just as a fan—the Loish digital painting probably started with a really crisp line drawing.

And you can also see that again in the student's drawing, the perspective is kind of not aligned. The cabinets are curving, and then you can see you should be able to see a little bit underneath of the cabinets, because the cabinet is a rectangular shape, so you should be able to see the bottom of it, but not too much. But the student drawing has revealed a lot more of the underneath of the cabinet, and then the parallel line of that doesn't match up with the countertop. They're actually 2 parallel lines. Those lines should be running parallel to each other, but they're actually running away from each other. So it kind of opens up the drawing. It doesn't mean that the drawing is bad, or anything. I would hesitate to even use qualities of good and bad, but it is a difference, and in terms of composition, and like how we think about physics and gravity in drawing and composition, the lines don't sit together.

So like, I would say, the main problem in this drawing is just the drawing problems of the lines. And that's again like a skill issue, not in terms of the like in terms of the student's ability to draw, but more in terms of just the approach, because they started this as a painting, not as a drawing. Even if they had done this as a traditional painting with a brush, it would still kind of come out the same way. Whereas the painting and just the nature of visual drawing was probably started with a black line drawing, and then layered up with color swatches of color, which gives it some of those sharp edges, too.

The student has taken some fun artistic interpretations to make their drawing make sense. All of these are technical, hard problems that you can kind of easily assess in classical drawing criteria, which isn't the only criteria. It's like it's the most objective criteria to have a standard to apply something against, but in terms of their own artistic license. It's fun that they're like, "Oh, yeah, like my perspective's off, but, like the cat's tail, interacts with the chair leg in a really fun way"—it's kind of boring actually, in the Loish drawing.

They did do a really good job of noticing this crazy detail. There's this reflection of red in (what I am going to assume is) the female figure. I'm just going to call it the figure, because we can't really tell but there's this like reflected light on the back of the hand. That may actually be a mistake, because it's not coming from anywhere. It's the only part of the Loish drawing where this fluorescent red orange, which is supposed to be from the cup this character is holding, is on the back of their hand. And in the student drawing they captured that like that. They're close. They're looking really, really, closely. It wouldn't reflect, there. But what's really cool is the student caught that and like, put it in there. And so they didn't fix the mistake they like caught that. That's fun.

And the last thing I'll say about this drawing, which is so cool about digital drawing, is this whole lens and lighting effect. When you're looking in the galley kitchen—it's narrow, long, and they're looking out into a day in the woods. Feels like the Pacific Northwest or Northern California, perhaps Ukraine, like a rich dense forest. You can see the moisture in the air. And there's this amazing kind of lens flare effect going through it, which the student did for the attention to detail that they have.

They're just noticing things. And then, of course, like the papers like in the pin board. There's like these bills, this poor person has to pay. They kind of took their own artistic interpretations there, too.

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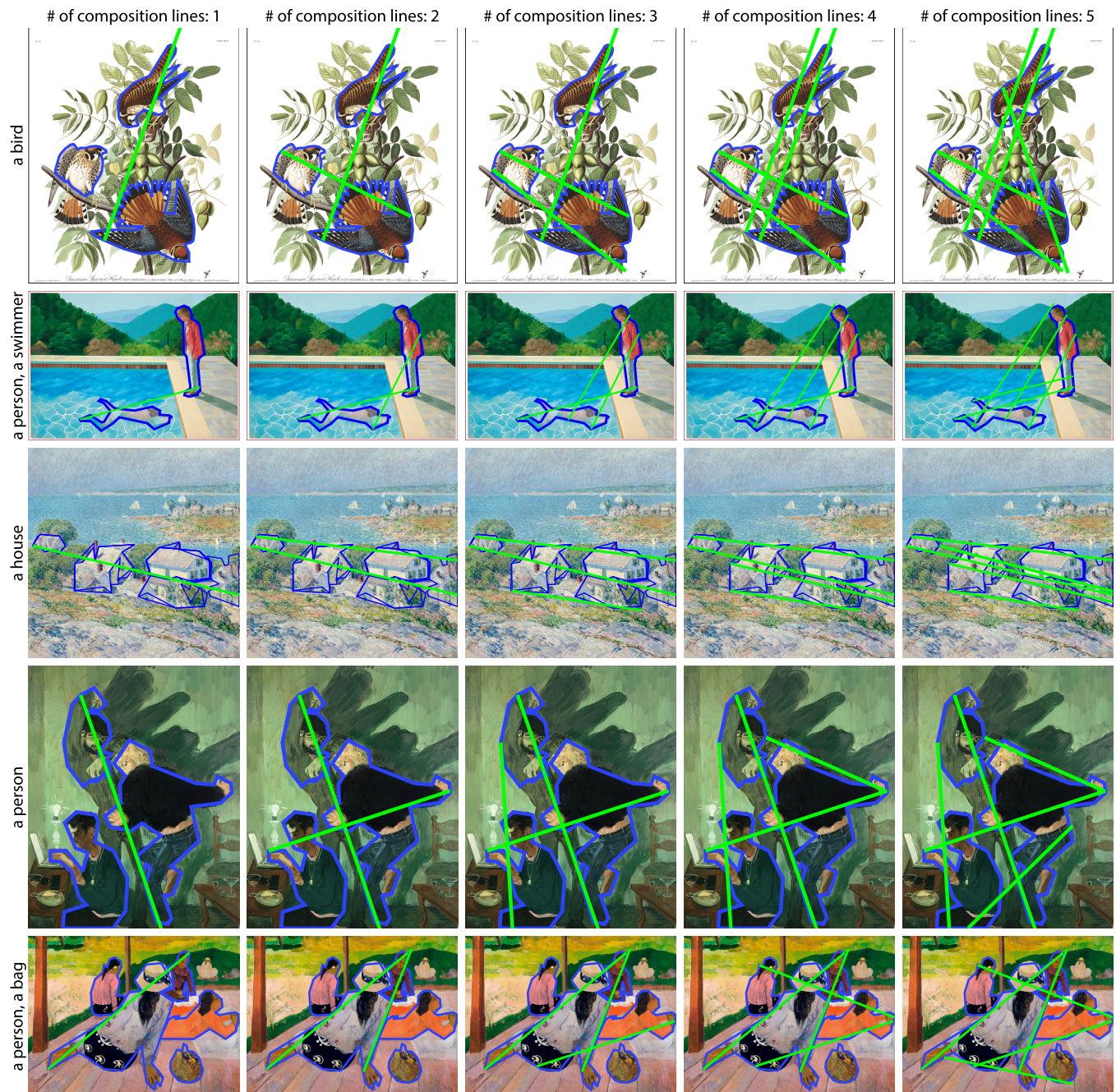
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**Figure A.2:** More adaptive composition line generation results produced by our pipeline. *Reference images: American Sparrow Hawk by John James Audubon (1827, lithograph), Portrait of an Artist (Pool with Two Figures) by David Hockney (1972, acrylic), New England Headlands by Frederick Childe Hassam (1899, oil), The Green Trio by Salman Toor (2019, oil), The Siesta by Paul Gauguin (ca. 1892-94, oil).*

*A.1.2 E2 feedback.* I feel like their mark making feels a little more authentic to me. This mark making feels a little more mannered. So I think that the observation in here is helping them. Their observation of the piece helps them make more authentic marks. Yeah, because I think when you're observing it's just more interesting

to see, because there's more specificity. I think the problem with illustration can be is like, when you have a certain competency in it. There's not that looking as much.

And I think there's a little more of a sense of discovery, and part of it is because they are translating. They're down translating a





**Figure A.3:** Drawing produced by Arthur as described in the example usage scenario in the main paper. *Reference image: The Green Trio by Salman Toor (2019, oil).*

level of detail which is always involves abstraction, right? And so the way that they're representing the ceiling here with like color, whereas here there's very little tonal color in it, as a way of trying to represent the depth, or even like the way these strokes are working.

## A.2 Feedback for Figure 2 (Toor)

**A.2.1 E1 feedback.** The values and the color are pretty close. There are values in the painting are a little bit too bright, for example, in the hand of the character that's dancing. It's a little too bright. Or even in the face of the other character that's making that shape. But as a composition, the composition is really well done.

In the sense that, like, I could compare these 2 images. I can see exactly what's being referenced, and I'm sure somebody who is extremely familiar with Salman Toor's work would know exactly what this is coming from.

And so that's in terms of the shape is really the composition is well done in terms of light. The shape matches, everything is in scale to one another. The characters are in scale to one another, the hands are in scale to the face. I would kind of consider this really to be like a value study, right? So the focus here seems to be a value study. This is a kind of exercise that art students, particularly painting and drawing students, do where they're less concerned about the specific individual shapes, but more concerned about just getting the color focusing on the composition, focusing on where your lights and darks are landing.

That's kind of how I read this, because the drawing itself in terms of like, well, where's the detail? Where are the individual shapes?

It's kind of under-drawn. So, for example, like this character in the blue jeans and the puffy furry coat, like the hand, there's no distinguishing fingers. The hand is more of a blob. There's no individual hairs kind of that are emphasized like in that character's beard, or like the eyebrows. The person typing on their computer. This character, like, you'll notice, like there's they have a pearl bracelet like a pendant necklace, and a golden bracelet in the original. But it's not drawn in on the character on the left. So I'm like that could be keyed up. But I don't necessarily know. Like as a student, I'm assuming this assignment here is, that's not the focus or the emphasis. If that were the focus or the emphasis, then I would say they need to kind of slow down a little bit and focus on

that. Another area that manifests this is like, for example, in the character's blue jeans, the character kind of in front of us you can see like in the original. There's like the denim, the stitching in the denim in the pocket. And so that is like, that's all drawing. It's less painting like.

We have the colors laid in but the kind of defining shapes that really make one object stand out from the other, that is lacking from the student's drawing.

## A.3 E2 feedback

I think this is really great. I love this level of abstraction. This, to me, is like, when like digital painting works well. It allows you abstraction. They kind of know where these things are, and so they're abstracting it further, I think that is like seeing the way they're using the forms of the shapes and the way the green background is just serving his face there. They're not really doing much with the light, the way the light works. I think it's more like they're finding the forms. If I was doing that, would squint and kind of make those shapes.

## A.4 Feedback for P1 (Takumi)

**A.4.1 E1 feedback.** It's really loose in some areas and then more detailed which the compared to other drawings, for example, treated the entire picture plane equally. Whereas this student has shown some areas where it's like really loose brushwork, like in the clouds in the sky. And these various kind of volumes of the light source which kind of matches the original Pokémon card illustration.

And then there's other areas like in Skarmory—the Pokémon steel bird, weak to fire, otherwise cool—where they've gone in and they've drawn these, like, thinner lines, more illustrative lines, to carve out some details. So I'm noticing it in the eye and the beak and to separate the legs. Skarmory's a Pokémon. It like looks like it's made out of metal like a knight's armor. And so the student has gone in with this really thin black line to to kind of redefine some shapes—they have varied the line weights quite a bit. There's some broader, looser strokes. But then there's also these more like thinner, detailed fine strokes, and so the line weight in this drawing it's like pretty. It's clear from this drawing that this student knows how to draw.

I think areas where they could have sped up a little bit could be in the clouds. It's also interesting, because this one is a digital copy of a digital drawing. So you can see in the original, they are using this digital brushstroke. It's supposed to look like a dry brush. And you can see they've kind of mimicked that just a little bit, but they could have done a little bit more. Here, the clouds are a little bit looser, but that could be their artistic interpretation.

And then there are some areas where, compared to the original, they could separate some of the background shapes; for example, this bird is standing on 2 camper vans. In the master copy, the desert ground in the background is this kind of dark, which helps separate the camper van in front from that. And then this camper van, because it's supposed to be really chrome in the original drawing—it's reflecting the sand, but in the student drawing, they treat the foreground color similar to the background color. So there's not enough of a separation of distance, because the 2 values are so closely linked that it kind of flattens the picture plane.



**A.4.2 E2 feedback.** They're looking a little bit. I mean, it's hard to tell with all this stuff here, but they're looking a little bit more of like representing the color of the space or the shine of it. I feel like they're like, Okay, clouds go there. And so they're representations of the idea of a cloud a little bit less than involved in the actual drawing part.

I think it's the advantage: often when you're drawing digitally from sources that you have, you don't have to figure out where things go so much which is a real hard part about real life drawing. So I feel like there's a nice balance of kind of gesture in this kind of this area. I would say this [clouds] part doesn't look as good. This [Skarmory's legs] feels more like it involved a little more looking. This [clouds] seemed like it kind of had the idea that clouds go there. [The legs] seem a little more deliberate.

Their abstraction of the more detailed stuff to me is more compelling than the original. Like, this has a nice feel of a watercolor, or something like that where you're trying to represent something that exists. I think that they don't have as good a sense of depth and perspective. But I kind of like these mark makings. It has a nice watercolor feel to me.

## A.5 Feedback for P2 (Seurat)

**A.5.1 E1 feedback.** The composition is well done. There are different shapes. I do think there are some issues more so in this drawing with the types of values. For example, in the master painting, the sky and the water are different, have more differentiation, whereas in this drawing, without that kind of island shape back there, (or the bridge, whatever that's supposed to be), the blue of the water and the blue of the sky are too similar. And the water, probably at the river, should be a little bit darker at points. Which you can kind of see they did down here in the bottom corner, but it should carry up.

So there's a kind of big problem in the value here where this is supposed to be kind of the sandbar shape that's coming out of the bank. And then there's this seated figure. The values are so closely aligned that the sandbar color becomes almost the same color as the skin tone, and so they need to be more separated. And there are a couple different ways to do that: you could make the sandbar darker, and the seated figure's skin lighter, or vice versa. The seated figure skin could be lighter, and the sandbar could be darker, which it actually looks like that's what it would be in the master painting.

And then also there's like some more shapes that could go in, like the house in the background. The thing that stands out to me the most majorly is that Georges Seurat is famous particularly for his pointillism. The mark making that Georges Seurat is doing is all about this intensive, close looking and seeing, and I think that the students work in Krita could kind of like match that, right? Because there's all these tiny little subtle shifts in value from how the individual brushstrokes are laid down.

The student's work is much more shape driven. The shapes are not exact, but they're pretty close. I'm really appreciating how the figure that's standing in the water with the orange bucket cap—their back is arched and they match that arch.

**A.5.2 E2 feedback.** Ah, a famous painting by Seurat. Yeah, I guess I like it! I think one thing with all this is, I kind of like the way the digital painting facilitates a kind of repeated rapidness.

I like how they're drawing the form. I think in this case for me, Seurat, is this very specific constructed compositions, right? So everything kind of works if it's in the right place, and for me, this original is about like this direction [the downward diagonal] versus the horizon. Here, the horizon breaks down a little bit, so it's not giving the counterbalance.

It's funny, because with the Seurat it's not like the horizon is super rigidly drawn. But I think you can kind of see this line here, which isn't in this one connects to this here and here, and if I squint, I feel like there is like a ruler line across there and then there's sort of like the perspectival diagonal. I think this just loses that sense of that line there. Yeah, it doesn't have a strong definition. But I like how they were drawing the figures. I like the sloppiness of it.

## A.6 Feedback for P3 (Utagawa)

**A.6.1 E1 feedback.** Somebody took on Utagawa! Hiroshige's Ukiyo-e print. So that's hard. That's really hard because it's not a drawing. It's a print. And they're made really, really complicated. They're just made from many, many layers of color with incredibly complicated gradients. So this is a really noble feat.

Things work well here, and you can actually see how the student is working that way. Where they have these kinds of colors, they've matched. They're focusing on the big shapes. We have this vanishing perspective in the student drawing, to use that fancy art historical term, orthogonal lines converging on a center point, they figured out the composition of the Hiroshige.

The scene has also been focusing on the colors, and you can see where they are building some of the colors up in their digital drawing, layer by layer. But they ran out of time because they were probably spending a lot of time figuring out, where does the actual vanishing point go? Which is somewhere back behind this row of shops. And then there's this kind of crazy hill that doesn't actually makes sense for how big it looks compared to the miniature trees on it. And, compared to the size of the people. Like, is that a mountain? Or is it a mound with shrubs on it? It doesn't quite make sense. But that's okay, because Ukiyo-e prints are all about these fantasy scenes.

They've matched the values pretty well. They did do that thing where the human eye just has a tendency to flatten shapes and make shapes a lot more, particularly angled. We tend to bout, make them more parallel to the ground when it should be more drastic. That's nowhere more apparent than right here, where this line is going down and like this is going ever so slightly up. And so that's going to throw the whole thing off, because that's a big issue that they'll have to resolve later. But they got this cool waste bin in.

Interestingly enough, I think this captures the feeling—and this is more of a subjective kind of art criteria—they've done this excellent job of capturing the feeling, going back to that idea of line weights. They're using a calligraphic brush. Which is cool to me because it's like it would be, particularly used in the arts of Asia. People are using ink brush, and it creates a calligraphic line. A line that can taper, start really wide and then taper to become hairline thin. And you can see that all over their drawing. So it actually mirrors the folds in the clothes, because a lot of these Japanese wood blocks were made as when they were started as drawings. They start with ink and brush, and so they actually do have a calligraphic line. So

even though they didn't finish the drawing it like has a feel, you know.

Japanese prints and many prints are built back to front or layer by layer, and the digital drawing is mirroring that. I do kind of wish the student had also dealt with some of these big shapes of color, because in the Hiroshige print there is this amazing kind of Prussian blue, this deep, this really, really deep blue at the top of the print that goes all the way across, which is supposed to be kind of like the night sky above the clouds or the evening sky above the clouds. And then there's also this, like this kind of brownish ochre, brown at the bottom. This kind of it gives the scene like a director's cut widescreen effect, it creates the widescreen effect. I think this purple line could be a little bit more steep, too. It could go down, it could descend and really hit that vanishing point.

*A.6.2 E2 feedback.* I love this! I think this makes sense because they're kind of analyzing the forms of it. You know, I think the color seems a little arbitrary, and doesn't seem like they worked on it for very long, which is fine. This seems like a compositional study. I think they have a better grasp of how the shapes of the background that are creating the perspective. When you're kind of sketching out, you want to think about them.

What I would want to tell them is to use blocks, and how it creates direction. They don't need specificity—like they didn't get caught up in trying to draw these signs—but I think here, they're a little caught up in understanding these blocks as people rather than as additional forms.

If I was doing this study, and I was drawing that person, I would probably just represent it with a shape, or like a little bit of red here and a little bit of red there, thinking about how the color is forming, how we look, right? Because when we look at it, we're drawn to these 2 color areas because they're in the form. There's not so much in this drawing. This seems more like a character drawing. And this seems more like understanding the perspective. So it's like 2 things combined into one.

But I like seeing this approach, because it seems like they're going to it because they like the composition. So they're trying to understand how to do that rather than a certain kind of illustration or mark making.

## A.7 Feedback for P5 (Seaside)

*A.7.1 E1 feedback.* Whoa! Portrait of a lady on fire. That's what this reminds me of. I can see the student's work is incomplete because they didn't quite paint in some of the figures. They're still trying to figure out the composition and kind of taking their time to even study, just like, what is the composition? Where do these shapes go in? How do they relate to each other? And I can see, for example, that becomes really apparent, based on how they're sketching in some of these distant shapes, but also trying to figure out how the shore jets out. And you can see them trying to work out the space between the point and the arm, the curve of the shoulder, and the arm of the woman with her parasol. But the shape—there's like a space between them that's almost about the same. It's a little bit larger in the student one, but I see them as working it out because they're trying to like figure that out. The colors are actually, interestingly enough, they have kind of tried a

more impressionistic approach where the strokes are much more individualized.

They're trying to figure out, too, again, like where the values of greens go. And there's a grassy patch in the bottom right-hand corner. And another one just below the horizon line. But they have left out the boats. There's 1, 2, 3, 4 boats. Probably there's 4 major shapes that make boats. And then there's this other kind of shape, of like a stick with some kind of flags, or something else in the background.

And there could be a little bit more. The master copy is a little bit browner. It's harder, because it's a painting and just probably aged over time, which I think I can actually see. There are more browns in the original work, whereas the student work has could actually have more. I think they would have an easier time with their painting by matching some of the browns. And there's a really great example of this. If we look in the right-hand side of the master drawing, you can kind of see there's more ochre. There's this kind of orange brown, and it looks like it actually is sitting on top of the paint, probably from some old varnish. But that's what we see. So I think, like the student, if they had kind of pushed some of those colors, it would be easier for it to pop out because it is a muted scene. It's a low contrast overall palette.

*A.7.2 E2 feedback.* The woman on the seashore. Yeah, this is interesting. I feel like this person is interested in like the palette. This kind of green thing. I think it's interesting. They're pulling in a lot of blue.

It's representing the sea. But then the cool areas are fairly limited, right, like you have the area around the woman, and then you have the skyline. And then actually, a lot of the cloud is a warmer tone.

I think this is similar to the Hiroshige, where they're they're representing the figure kind of sketchily, whereas I think I would say, if I was doing this, I wouldn't think about the land and the person as different categories. Think of them as blocks of color. Because I think we see this as this sort of block of color, and then we have some purple and red and yellow note which kind of pops out. I don't think it's important that that person is that shape, or they have a hat right like this. The sketching here would be better done as blocks.