

# The Book of Optics

**NOON SALEH:** If you get a chance to visit the Expo 2020 Dubai site, and you find yourself walking around the pavilions, you might start to notice public art dotted around the site. There are 11 pieces in all... and it might not be immediately clear what they're about - because by design, they're open to interpretation.

**HAYAT SHAMSUDDIN:** You know, every artwork has a label. And every artwork's label describes what the artwork is and enables you to view it in the way the artist may have created it.

**NOON SALEH:** This is Dr. Hayat Shamsuddin, senior vice president for arts and culture at Expo 2020 Dubai.

**HAYAT SHAMSUDDIN:** However, it doesn't stop you from thinking, oh, I see it in this particular way. It's our perception - and it's our perception to see commonalities and see particulars, you know, so we do have something in common, but we also have something very different, and the way we bridge it is through imagination. So it is how you see things. It could be the same as - some of it could be the same, some if it could be very different. But we still can connect.

**NOON SALEH:** The pieces were produced by artists from around the world, but are tied together by a common theme; they're all inspired by the 10th century Arab scientist, Ibn al Haytham.

**HAYAT SHAMSUDDIN:** Ibn al Haytham was very much a suitable - or a very relevant personality - because he was a scientist. And also a philosopher actually, born at a time where it's referred to as the golden age. It was a time where - it was

a creative period that saw many advances in science and medicine and even technology of that time, and it was almost like an intellectual heyday.

**NOON SALEH:** He's most famous for a book that defined for the first time, many of the scientific principles we still use today - especially to do with light and vision. The book was called Kitab al Manazier [كتاب المناظر], or the Book of Optics.

**HAYAT SHAMSUDDIN:** In Arabic, it's actually referenced as the book of sceneries. And Ibn al Haytham was the first scientist who - he spoke about how we perceive, he speaks about vision about perception. And about the power of imagination. And when you have an Expo that is bringing together cultures, that's bringing together nations, that's engaged in dialogue over a six month period on many topics of concern to all of us, of humanity. He's very much a suitable candidate in terms of his relevance.

**NOON SALEH:** But in particular, it was one part of Ibn al Haytham's work that caught the Expo team's attention.

**HAYAT SHAMSUDDIN:** He has a phrase in his book of sceneries that says - and I'll say it in Arabic. [هي ادراك الصورة الكلية تتشكل في الخيال]. Which means that the complete picture is created, understood through the power of imagination. So for us as people, me and you, how we can understand each other and how we can bridge our understanding for each other will be through the power of imagination.

**NOON SALEH:** Today, we're going back in time to look at the story of Ibn al Haytham, the public art programme his work inspired, and how it hopes to integrate into the everyday life of District 2020, after the Expo has finished.

I'm Noon Salih, and this is Inside Expo, an official podcast of Expo 2020 Dubai, where history is being made.

### [INTRO STING]

**NOON SALEH:** To hear about Ibn al Haytham's story, and the book of optics, we wanted to speak to a historian who could tell us more.

**ZEYNAP KARASHAHAN:** Zeynep Kueli Karashahan, I am a fourth year doctoral student at Johns Hopkins university in the history of science and technology department. I was actually so drawn to Ibn al Haytham when I found out his uniqueness in the sense of - he's a unique figure standing so modernly in the middle of the middle ages. So that's why I was so interested in studying his books and especially the book of optics, which is his revolutionary book.

**NOON SALEH:** But to understand how Ibn al Haytham came to write the book of optics, it helps to go back a little bit. Zeynep has

been able to piece together parts of his life story, but what we know is limited.

**ZEYNAP KARASHAHAN:** We even don't know for sure whether he had a family, but in his autobiography, Ibn al Haytham actually draws a nice portrait of himself as a very observant student of nature, that he was so interested in natural phenomena since his childhood.

We know that he was born in Basra in the 10th century, 965, and he had an administrative office under the [Buyid] dynasty, and then he quitted his job and moved to Cairo.

And why he moved to Cairo is speculated in historical studies. One speculation holds that he quitted his job and moved to Cairo because he wanted to work on his scientific pursuits. He wasn't able to focus on them while he was working in an

administrative office. And the second one is that he moved to Cairo because he heard about a dam construction project on the Nile

**NOON SALEH:** But the Egyptian engineers were struggling to make this construction project work. So Ibn al Haytham was invited by the Egyptian caliph - Al Hakim - to travel to Egypt and see if he could help.

**ZEYNAP KARASHAHAN:** But somehow when he went there, he saw that it is not possible to build a dam on the Nile because of the geography, but he stayed in Cairo nevertheless.

**NOON SALEH:** And in Cairo, between 1011 and 1021 was when Ibn al Haytham came out with his landmark work - the book of optics.

**ZEYNAP KARASHAHAN:** It consists of seven parts and it focuses on different features of light, like one section on reflection, one section on refraction and so on.

**NOON SALEH:** But part of the reason this book was so groundbreaking is because it completely flipped the existing theories of vision at the time.

**ZEYNAP KARASHAHAN:** There were two basic theories about how vision occurs when we look at something. The first one was extramission theory, which held that there was an innate light in our eye and when we look at something we are able to see with this light.

**NOON SALEH:** Under this theory, our eyes beam light onto the world, and that's how we see - a bit like a flashlight.

**ZEYNAP KARASHAHAN:** But this was not able to explain why we couldn't see in the dark.

**NOON SALEH:** So Ibn al Haytham started investigating it. And one of the ways he did that, was with this thing called a camera obscura.

**ZEYNEP:** So a camera obscura is a dark room without any light. And then the researcher puts a small pinhole, he opens a pinhole and the sight on the outside of this dark room comes through this pinhole and is reflected on the wall.

**NOON SALEH:** Imagine the room like a giant camera, and the pinhole on the window as the lens. Through this camera obscura and other experiments with light, he laid out some of the basic principles of vision that we still follow today.

**ZEYNAP KARASHAHAN:** So this book is so novel in its content and also in its kind of rebellion to the authority because he's all the time advising the researcher to be suspicious of the ancient authors and also be suspicious of himself. And he said that, we have a theory at the beginning and now we go to data and if the data doesn't confirm it, we should go back and work on our theory again.

**NOON SALEH:** But it was one particular idea laid out in the book of optics - that our perception of things is subjective, that two people could see the same object in totally different ways - that partly inspired the Expo 2020 public art programme.

**ZEYNAP KARASHAHAN:** He discovered that vision isn't just about what isn't just about light and it's not just about what we see, but it's also about our psychology. He said that, what we see is very subjective.

**ASMA BELHAMAR:** And he also demonstrated that vision occurs in the brain rather than the eye.

**NOON SALEH:** This is the Emirati artist Asma Belhamar, who was one of the 11 artists commissioned to produce a piece for the public art programme.

**ASMA BELHAMAR:** So this idea of like you know, vision and sight or [*busra w busiyra*] in Arabic - this idea I think reflected in my mind in a way that I actually confront what we see versus what we remembered.

**NOON SALEH:** She chose to interpret the book of optics theme by focussing on the feeling of nostalgia, and her memories of driving back to Dubai as a child.

**NOON SALEH:** Asma designed 3 sculptures meant to commemorate historic buildings in the UAE, ones that she and many others in the region remember as landmarks of their childhood. They are the Toyota building (named after a long standing Toyota billboard on its roof), the Trade Center and the Trade Center apartments.

**ASMA BELHAMAR:** One of them is the ritual of visiting your relatives. If you live in Dubai or you live in this area, I think you would definitely experience moving or passing by the cities because they're so close to each other - Sharjah, Dubai, Abu Dhabi and the other Emirates. So I personally have family in Ras al Khaimah, and also another family in Abu Dhabi and I live in Dubai. So my experiences since childhood of passing by those cities, I was building this visual memory. So I know if we reached to Trade Center, that means we're in the middle of Dubai. And so on. So I think everyone thinks it on landmarks you know, without Google, without anything.

**NOON SALEH:** The buildings that Asma references in her piece are still there, along the Sheikh Zayed road. They're harder to spot today, with the rapid development of downtown Dubai, but they've imprinted themselves into the memories of Asma and many other people who lived in Dubai in those early years.

And the relationship between the UAE's urban landscape and the people who grew up watching it change has started to manifest in other ways.

**ASMA BELHAMAR:** Let's say early 2000s, like we called a few of our cousins nicknames associates with like a specific building that was built that time. Like for example, I have the cousin who's, who's called Ammar Metro, because his birth is associated with when the Metro Dubai was launched. So it's very like very subtle but funny stories, and I do think that it brings those meaningful relation between uh, us And also the, those projects. They're built, but then we are, we are included.

**NOON SALEH:** She told us that, even in the materials used to create the sculptures, she tried to recreate the same nostalgic picture of these buildings that exists in her mind's eye. First she constructed a steel skeleton to support the concrete and fiberglass that would make up the building facades.

**ASMA BELHAMAR:** And then basically pouring the concrete with fiberglass inside the mould than then basically sandwiching it with with this steel structure. That is technically how it's how it's done. But we're very happy with with the process and the outcome.

**NOON SALEH:** But instead of reflecting the building's real-life colours, she chose to use an earthy shade of brown.

**ASMA BELHAMAR:** And I think that is also associated with the idea of rituals - when I mentioned that when you go on visit you. You mean, do you go something most of the time you go for lunch, like, you know, Friday lunch. And then when you come back to your hometown or your city, it will be around that time where it's beginning to sunset.

So I was trying to capture that light when you see it through buildings and landscape, if you're coming back from from that visit. So yeah, it went though trials and suggestions and it's all worked al hamdilliah and we're so happy with it.

**HAYAT SHAMSUDDIN:** These buildings very much were part of our memories and very much part of our growing up years. And it's a very poignant artwork for me, maybe because I have grown up during that period, and it really reminds me very much of that time. And I want to be reminded of that time. Of course, these buildings today have almost been - have almost disappeared because they've been overtaken by other bigger achievements along the road and presence of other buildings. But for us, they were the beginning. And they're the beginnings of where we are today.

**NOON SALEH:** Next year, when Expo 2020 Dubai wraps up and the site begins to evolve into District 2020, Hayat hopes that the artworks can provide the same sense of nostalgia for residents, as the Trade Center or the Toyota building did for her in the 1980s.

**HAYAT SHAMSUDDIN:** Once the Expo is over and the site converts into a residential commercial community city or a district it's very much - these 11 artworks will become sort of landmarks for the future. And I think they will be the landmarks of the future generations who will remember them and see them. And remember a point in time, very much like, you know, Asma's piece with the Trade Center. And I think every visitor to the Expo will have a favorite because people do, you know, and the works will speak to different people in different ways. And they will relate to them in different ways. They will be part of people's memories and they will be part of people's identity and they'll be part of people's way of life. You know, children will be exposed to these pieces and would make their own, you know, their own - create their own imagination around them.

**NOON SALEH:** Each piece has its own Google coordinates, which we'll link in the show notes. But if you're visiting the Expo site - there's a high chance you'll stumble across the work anyway.



**HAYAT SHAMSUDDIN:** They can do both. They can stumble if they wish to. However, they've been placed very much along the circular inner road of Expo. We have the labels - if they choose to stumble upon one immediately on that one label, they will be able to identify where the others are located. And they really are right across the site. So, you know, if you were to visit the expo, they only do a small part of the Expo at each visit because it's so large, then for sure you would come across one or two of the artworks, maybe three and four, but they are all around. And each one takes you into an imaginary world that's very different from the other.

**NOON SALEH:** Inside Expo is an official podcast of Expo 2020 Dubai. Connecting minds. Creating the future. Learn More by visiting [virtualexpodubai.com](https://virtualexpodubai.com).

Inside Expo is produced by Kerning Cultures Network.

We release episodes every Tuesday and Friday. Subscribe to Inside Expo on your favorite podcast app so you don't miss an episode. If you enjoyed the show, share it with your friends and leave us a review.