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In-between

Reflections of refraction and perceptions of precipitation

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Abstract: Our theme for this paper is how we use and experience water and moisture in design and art, and how we can understand nature, local and global relationships and how it influences our own design processes. We will discuss how water and moisture can be active participants in project development, how we can design with non-human and non-manmade tools for new human experiences. With local atmospheric differences as one starting point and immersive experience and participatory design as another, we will argue for that our experiments with refraction of light in liquid matter and moisture and graphic reflections on rain experience can help us to better understand nature's, and our own, power and complexity. We will present three water-based projects where we experiment with how water can bring new awareness to our own identity and artistic practice.

Key words: Water, moisture, rain, temporal expression, curiosity and immersion

1. Introduction - the projects

In-between is a process orientated artistic research and a course theme at the Bergen Academy of Art and Design (KHiB) which is a follow-up of a paradigm shift in communication. Charles Michalsen, Room and space, and Torkell Berntsen, New media, initiated the courses. The ideology of the research area builds upon the belief in new possibilities in our understanding of space and time. Before we built rooms stone for stone, both physically and metaphysically present as dominant architecture in central urban contexts, and those rooms and buildings, which were built the highest, usually represented rigidity and authority. Today rooms have a more elastic character and more horizontal orientation allowing and improving communication and

interaction between people. We believe that we now able to merge our daily indoor and outdoor spaces with both nature and technology. We believe that with differentiation and improvement we now have greater possibilities in our art and design processes, possibilities to formulate space, to emphasize how we can humanize space and to naturalize more man–made space.

The main aim of the In-between project is to research and experiment with how to formulate (not form) space linked with time. Addressing the concept in the space of all dimensions in a playful and intuitive way, with temporal expression and an unlimited use of tools. Our main aim with the three projects we are presenting is to examine and experience not only how we can design the space and time around us but also how it designs us.

We will present three water-projects: 1. In-between Moisture and Light = Colour, 2. Floating Shadows and Dancing Lights and 3. Rainy Days. We will discuss and exemplify how we use and experience the nature of water and moisture in design and art, from moisture as a material and water as a tool to rain as an immersive experience, and how this helps us to better understand nature, local and global relationships and how it can influence our own design processes. With our temporal experiments we want to encourage reconsideration and sustainable perception.

2.1. In-between Moisture and Light = Colour

Associate Professor Charles Michalsen

This project is about refraction and reflection of light through the moisture in the atmosphere.

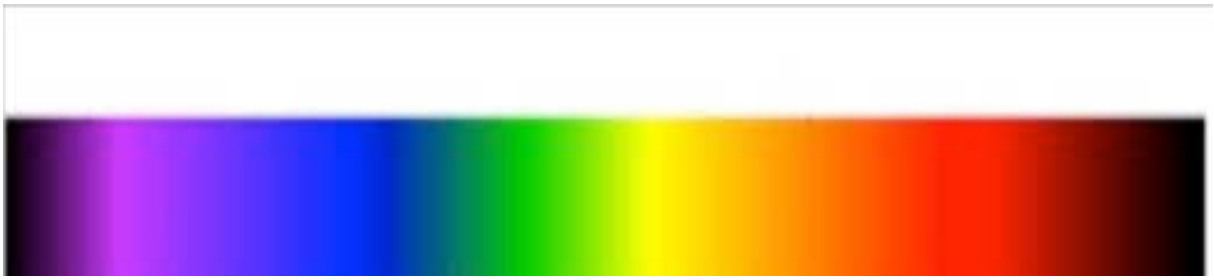
In Sir Isaac Newton's famous colour project, he split white light with a prism into the colours of the spectrum. His assumption was that white light is composed of seven colours, and he successfully published the results of these experiments, in a paper to the Royal Society in 1672, which he called "Celebrated phenomenon of colours" and later in his book *Opticks*, 1704. His results still form a basis for colour education today. But now we know that two complementary colours can also provide white light. And we now know that the colour range varies in time, sunlight and location, Newton was sitting in Woolsthorpe, Lincolnshire.

The colour gamut, in general for the world, is affected by the average of 0,48 per cent of moisture in the atmosphere. This is the overall percentage including the outermost layer of the atmosphere, but it can also be 75 per cent closer to the earth's surface. (NMI, Norwegian Metrological Institute). This moisture (humidity) and the angle of sunbeams cause the colour to be different depending on where you are in the

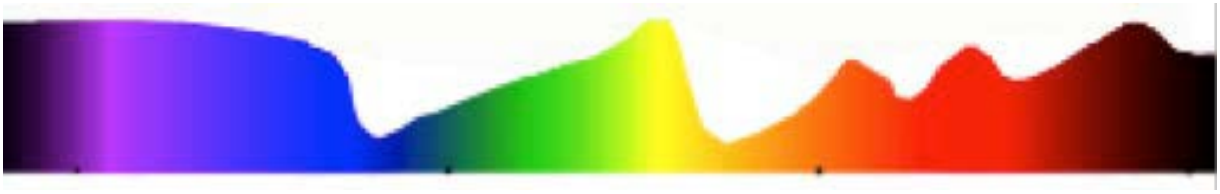
world. I have worked in the wintertime in Spitsbergen (Norway, 78' north) this is an artic environment. In 2013, I was working with my research at the Jingdezhen Ceramic Institute (China) 29' north, which has a sub-tropical climate. While working with my research focus about light, colour and location I experienced colour as a global and local phenomena and compared the perception and reality of colour between Spitsbergen and Jingdezhen. My research showed how colour in various geographical locations could differ and therefore affect my design.

Figure 1. The motives on these two plates illustrate how the same colours are seen differently, in two different places at the same time.

My experiments included over glazed painting on porcelain, I painted an Asian woman seen from behind, I made two versions one in Spitsbergen and one in Jingdezhen (figure 1). The colours varied enormously. In arctic winter conditions I experienced a density of colours, whereas in subtropical conditions I saw a width in the colour palette. I compared Jingdezhen's colour spectrum with one from Longyearbyen which I received from the University of Tromso's Department for Aurora Research (figure 2). Longyearbyen's colour spectrum is rather different from Jingdezhen's. In Longyearbyen the sunbeams enter the atmosphere at a lower angle, but there is colour and light even when the sun is low on - or below the horizon because the sunbeams are reflected from particles of moisture This happens when the sunbeam angle is less than 30 degrees (figure 3), the same natural phenomenon also occurs in a drop of water and is the basis for Per Erik Larsen's Floating Shadows and Dancing Lights installation.



29 `North . Light spectrum in Jingdezhen (China) .



78 `North . Light spectrum in Spitsbergen (Norway) .
Figure 2.

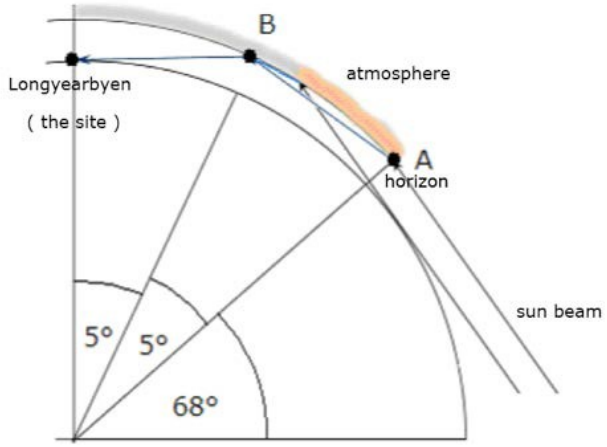


Figure 3.

Scientists can report local areas' atmospheric differences regarding humidity, but do they see or record the light and colour? It was a challenge for me professionally; I could not find the resources that could help me see what a colour looks - on the basis of location, humidity, light and angle of the sunbeams. This lead me to ask: - Do we have this information available and how can we use this to simulate light colour elsewhere in the world and work with more realistic colour settings to enable us to collaborate with other colour cultures?

I have established contact with ESA (the European Space Agency). From the 4th to the 11th of May 2015 the SENTINEL-2 space mission processed for the first time a Scene Classification Map (SCM) with atmospheric corrections. Outputs were an Aerosol Optical

Thickness (AOT) map, a Water Vapour (WV) map and the Scene Classification Map where the landscape was linked together with quality indicators for cloud and snow probabilities at 60m2 resolution. (Richter, Wang and Bachmann, 2015).

According to NASA's (National Aeronautics and Space Administration) earth observatory, there is now a new system to measure light reflected by high altitude clouds before it is absorbed by the water vapour closer to the ground (Earth Observatory NASA). This gives important information when determining how large an area is and how high the volume of moisture is there, as this is what determines what kind of light it is there.

Now my question is; can the information from these mapping projects (ESA and NASA) be transferred to a lighting program for a light-lab? For KHiB's new building (opening 2017) I initiated the idea and received responsibility and funding for a light laboratory (light-lab) based on the Artistic Research work related to the In-between project. For the light-lab I am now working on how to find which parameters we need, to receive the data, to control the lighting equipment and which kind of lighting equipment. To build a system that can receive humidity and sunbeam data and transform this data to enable us to simulate light and colour anywhere in the world.

2.2. Floating Shadows and Dancing Lights

Per Erik Larsen, 2nd year BA student at KHiB.

"The ultimate experience of water must be to jump into the water, knowing that the water will envelope your whole body."

My research question for my first In-between project in 2015 was: How can water be explored as an active participant in artistic research? The project is an interactive artistic installation that observes the energy in water with an experience of floating shadows and dancing lights (Figure 4).

In my artistic research project I have asked myself how nature is reflecting its complexity, and how it can be seen as reflections of biological intelligence. Working with water (the pure element of nature) as an active participant in my projects, where I have explored its structures, movements and sensations, has given me new perspectives on our physical dimensions, and on my own perception (Figure 5 – sketches from the process). I feel a strong connection to the self-organizing structures of nature, such as evolutionary- and pattern-forming processes, and a great fascination of how their shapes seem to be in infinite motion as a part of the energies that surrounds them. One of the main connections

I have experienced between the diverse structures of nature is that there are no static boundaries, only dynamic thresholds.

In the project "Floating Shadows, Dancing Lights" I have explored the flexible structures of water in motion through the reflection of light. A drop of water on a glass surface, illuminated from above, lets us experience a reflection on the surface beneath like it is an organism in another dimension. When light passes through the water drop, it shows us a reflection of the moving shape and inner space of the material. When the water drop is in motion you can experience both the organic structures of the material, and the abstract forces of light. The light seems to be attached to the inner space of the material, but at the same time moves with a greater freedom than its shadows. It is being bent and twisted by the energies inside, which gives a distorted image that we otherwise usually do not perceive.

In the process of experimenting with the reflection (Figure 6 – Installation in Berlin) I have developed a physical interactive installation where you get a bodily connection with this phenomenon. By pulling strings, which are connected to the surface that gives the water motion, you can create a relation between our kinetic and optic sensations, and a physical connection to the everyday elements of nature. Interpreting the visual qualities of the installation as an interactive and dynamic painting, gives us new perspectives on how we can explore art and design with non-artificial materials using only the existing vibrations and variations of the physical world.

One perspective is to measure the scientific qualities of the reflection with its refraction and transposition, but I am more interested in how the visual sensation of the phenomena is affecting us as human beings. The recent studies on the impact of nature experience on human cognitive function and mental health (Bratman, Hamilton & Daily, 2012; Bratman, Daily, Levy & Gross, 2015), makes me question the structures of our modern societies and urban landscapes.

Urbanization is progressing at a rapid rate around the globe, with its potential decrease in exposure to natural environments. In the transition to modernity, and even through postmodern times, structures have become more straight-lined making a separation between human and nature. Now that we can see some of the potential affects of the modern structures, with an increase in mental disorders (Bratman, Hamilton & Daily, 2012), opens the question on why we are distancing ourselves from the organic structures of our biological surroundings, which seems to have given us potential affect in recovering stress, and lead to better cognitive functions and sustainable behaviour (Ulrich,

1991; Berman, 2008).

The main connections between the feedbacks I have got from participants experiencing the reflection through the installation, has been feelings of fascination and disorientation. Most of them could not explain what they looked at, which leaves it to the "realm of potential" (Massumi, 2002). This quality of ambiguity can be seen as a liminal phase, where identity and knowledge goes through a transition (Turner, 1969). During liminal periods of all kinds, hierarchies may be reversed or temporarily dissolved which creates a malleable situation that enables new institutions and customs to become established (Horvath, Thomassen and Wydra, 2009; Szakolczai, 2009).

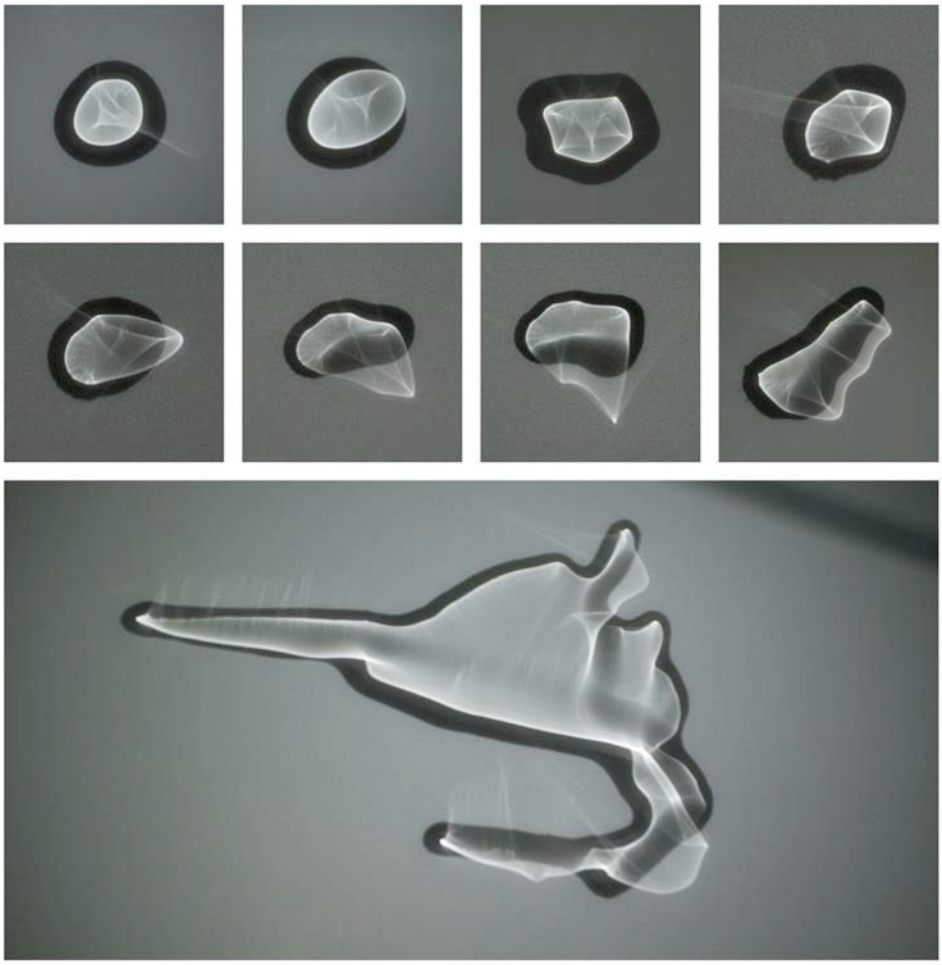


Figure 4. Floating Shadows and Dancing Lights

Figure 5. Sketches from the process

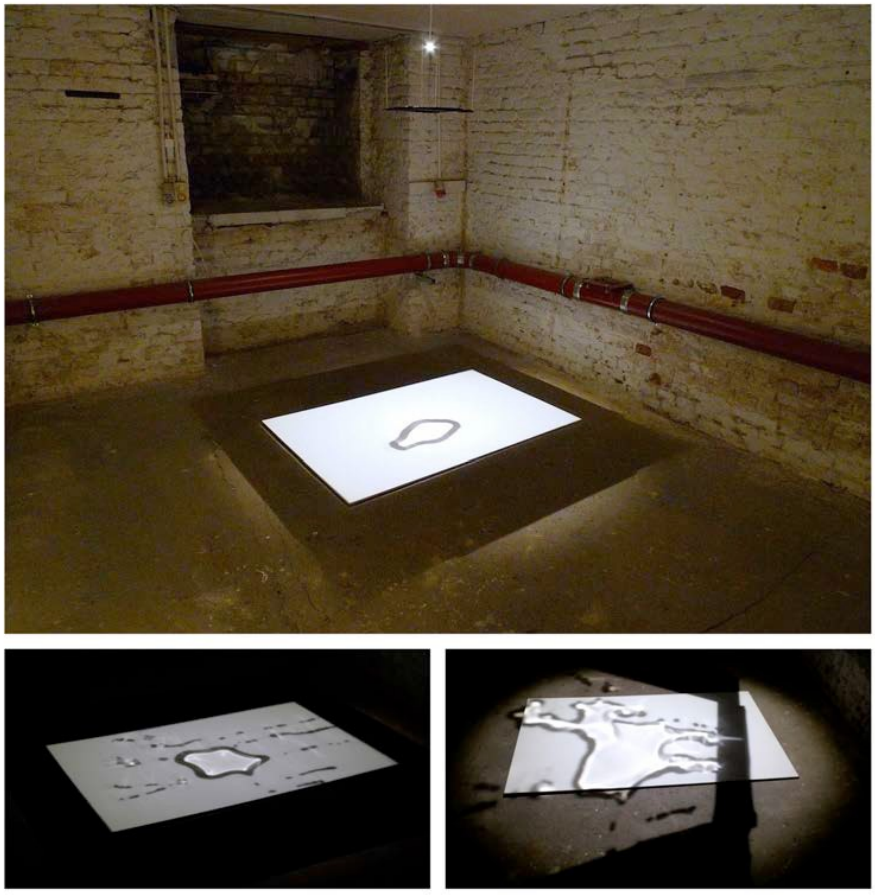


Figure 6. Installation in Berlin

2.3. Rainy Days

Professor Ashley Booth

The third water-project is Rainy Days. In Bergen and Norway we are lucky to have plenty water, but sometimes it can be too much. Visitors to Bergen, in this case the creator of the project a 2nd year BA exchange student from Germany Insa Hollenberg, can be overwhelmed that on average it rains 231 days and an average of 2,250 mm per year (SSB Statistics Norway, 2013).

Although rain can be connoted as annoying and miserable in Bergen, cultural attitudes towards rain can differ across the world. In temperate climates, people can be stressed when the weather is unstable, yet rain can also bring pleasure, as some people consider it to be soothing and enjoy the aesthetic appeal of rain. In dry places or places during periods of drought rain can be greatly pleasing.

In the Department for design we were inspired by Insa's project where she daily mapped her visual impression of the variety of rain patterns in Bergen, in a rain calendar (figure 7). She immersed herself in the different graphic characteristics of daily rain, using curiosity as a method for self-motivation for living together with rain. Together we began experimenting with Insa on how her personal project could be expanded to also engage others. Rather by being annoyed by yet another day of rain we hoped we could create empathy for the rain by making people more aware of the factors that create and form rain and to be able to visually form their rainy impressions themselves.

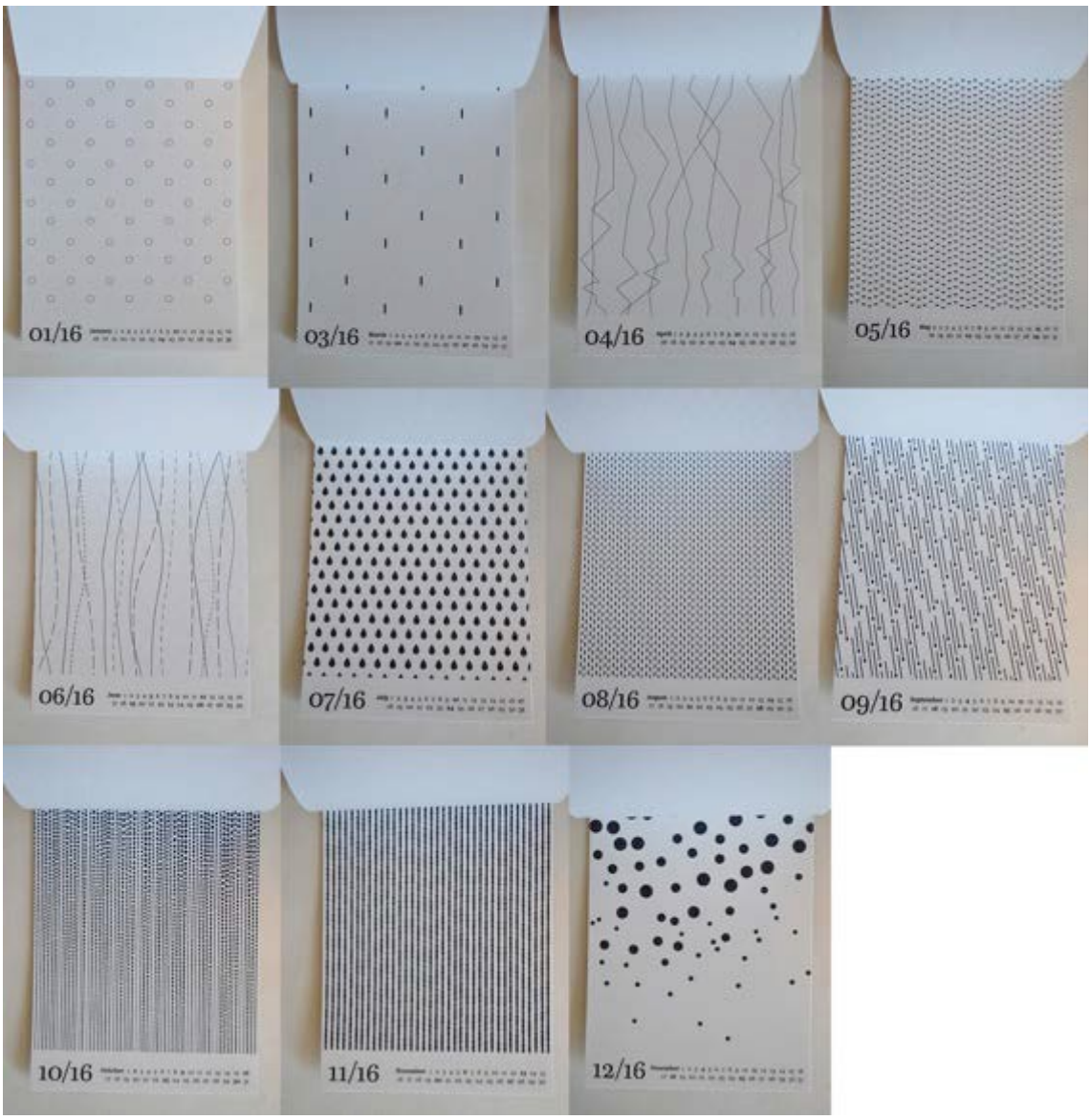


Figure 7. Some pages from Insa's rain calendar.

The Rainy Days project is inspired by the Department for design's interest in Social design, based upon social and participatory design thinking. Already in the 1970s, the designer and educator Victor Papanek dealt with the social responsibility of designers, and in his well-known book Design for the real world, he proclaimed that designers should "design for people's needs rather than their wants" (Papanek, 1971:219).

Rather than fleeing from the rain, as many people who have moved from Bergen claim to have done (rain migrants), we wanted to help us to appreciate the rain by creating a tool to encourage a daily curiosity about rain's personal characteristics, then a personal relationship between yourself and rain could be established. "Cognitive psychologists propose that we form our identities in part through the information and attitudes we gain from being curious… curiosity may serve as a means by which we

develop interpersonal relationships" (Clark, 2015).

With participatory design and curiosity as our central themes we planned a rain generator as an interactive application for mobile devices and an installation, where participants themselves could document or design the rain. Either through the visuals generated in the application's rain forecast or adjust them to their own experiences of the daily rain. The visualizations of the daily rain could then be saved in your own personal rain calendar or you can publish them in the rain experience archive to share your impressions with others.

We are cooperating with the University in Bergen (UiB), with Ellen Viste a Researcher in Meteorology at the Geophysical institute. We will use live data collected at the university's city centre premises in Florida, Bergen and/or with local radar in the application to record and forecast the rain. We divided their data (UiB, 2015) into three categories: Precipitation; Amount and density, Air; Temperature and Wind; Direction, gusts and speed.

In addition we considered adding convection and orographic effects, particle size, pollution and acidity. Following the advice of UiB we limited ourselves to these three categories with 6 variables for graphic rain generation, choosing only the variables that affect the visual experience of the rain. Later we will also consider pollution, although this can affect rain frequency it does not affect the look of rain, but it can be a very interesting variable for greater understanding of the rain.

The rain generator generates its own visualization forecast of the rain (every 10 minutes).This data can then be manipulated through 6 level controls (like on a mixing board, plus an option for sound experiences to be added later) enabling you to adjust the strength, density and 'look' of your experience.

By encouraging participants to immerse themselves in the characteristics of rain we believe this will help them feel more empathy for the rain in Bergen. "The word "empathy" can be translated as insight, solidarity and sharing feelings. Being empathetic means you have the ability to emotionally put yourself into another's place, into another's feelings" (Booth and Lien, 2015).

We hope that by showing you the daily uniqueness of "everyday" rain and by encouraging you to immerse yourself in our graphic rain generator, that you too will visit and experience the beauty of Bergen rain ornamentally and be tempted to design your own experience of rain.

3. Conclusion

The In-between water projects show great diversity, from technical challenges, artistic expression to user participation; we believe these variations show the strength and possibilities of the project concept.

In the Moisture and Light = Colour project we see how technological development has made it possible to read lights and colours at almost anytime and anywhere on earth. In the artistic research project In-between and the building of the Light-lab we are actively pursuing the opportunity to practically implement this research showing that both nature and different devices can be an integral part of the design process. With presenting this paper at this Cumulus conference we seek help to find information and solutions on how to correctly simulate light and colour from anywhere in the world in a light-lab.

In the Floating Shadows and Dancing Lights project we show how art be a method to create conditions that make us reconsider our perception of the elements of nature. And that it is then possible to trigger sensations through interactive rituals that encourage disorientation, reorientation and sustainable appreciation.

In the Rainy Days project we encourage user participation to enable the identity and knowledge of rain to be in transition. And hope that this can enable us to reconsider our perception of rain and enjoyment. We are designing the application to be usable anywhere in the world where data is available.

But, instead of just analysing and abstracting, we also want to heighten your senses by experience. By showing you the colour and light energies and variation of the physical world and by showing through our experiments, that water and moisture are both communication tools and designers themselves.

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