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Integrering af dagslys og dynamisk kunstlys undersøgt gennem et iagttagelsesinstrument
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Forord

Denne bog er en af fire bøger udgivet i forbindelse med forskningsprojektet LEDlys; Interdiciplinær LED lysforskning. Forskningsprojektet har været et treårigt samarbejde mellem Det Kongelige Danske Kunstakademis Skoler for Arkitektur, Design og Konservering, og IT-Universitetet i København.

Med LED-lyskilden (Light Emitting Diode) er der introduceret afgørende nye betingelser for belysningsområdet. Hvor lyskilder tidligere var konstante størrelser med fast definerede lysfarver og lysintensiteter, lancerer LED teknologien helt nye potentialer, hvor det er muligt at operere med komplekse forandringer af farvekvaliteter og lysintensiteter. LED er desuden konvertibel til digitale styringssystemer, hvilket betyder, at en betydelig del af designudviklingen i fremtiden vil foregå som software-design, og at kunstlyset fremover vil være potentielt dynamisk, intelligent og adaptivt. På grund af LEDens meget lille størrelse er der mange muligheder for integrering af lyskilder i materialer, bygningstrukturer og byrum. Alle disse forhold har stor indflydelse på udformningen af fremtidens design, arkitektur og IT infrastruktur. Der er derfor et udstrakt behov for nyudvikling af begrebslige defineringer, udvikling af planlægnings-strategier, og der er i høj grad brug for en udforskning og identifisering af nye æstetiske og kvalitative parametre i relation til LED. Projektet inddrager disse komplekse sammenhænge ud fra en særlig fokus på perceptuelle oplevelsesparametre som organiserende designprincip.

Preface

This book is one of four books that is published in connection with the research project entitled *LED Lighting: Interdisciplinary LED Lighting Research*. The research project has been a three-year collaboration between The Royal Danish Academy of Fine Arts Schools of Architecture, Design and Conservation and The IT University of Copenhagen.

The LED (Light Emitting Diode) light source has introduced new, crucial conditions to the field of lighting design. Where light sources have previously been of uniform sizes with predefined colour temperatures and luminous intensities, LED technology brings forth totally new potentials, where it is possible to operate with complex changes in colourations and luminous intensities. LEDs are moreover convertible to digital control systems, which mean that a significant part of design developments in the future will occur in the form of software design, and that artificial lighting will continue to be potentially dynamic, intelligent, and adaptive. Because LEDs have a very small size, there are many opportunities for their integration into materials, building structures, as well as urban spaces. All these factors exert major influences on the shaping of future design, architecture, and IT infrastructure. Therefore, there exists an extensive need for new developments in conceptual delineations, the development of planning strategies, and – to an especially high degree – an exploration and identification of new aesthetic and qualitative parameters related to LEDs. This project engages these complex contexts and concerns via a specific focus on perceptual experiential parameters as an organising design principle.

Forskningsprojektet er opdelt i følgende tre skala områder:

Mikro skala, – hvor LEDen er forstået og undersøgt som del af et pixel system. Projektet udforsker hvilke kvaliteter LEDen potentielt tilfører belysningsapplikationer i arkitektonisk kontekst. Publikationen *Pixel Eksperimenter*, beskriver udførte eksperimenter og hvordan erfaringer fra disse test-opstillinger danner mulige strategier for design af belysningsapplikationer med LED.

Medium skala, – med en fokus på det arkitektoniske rum som lysarmatur. Disse praksis-baserede undersøgelser er opdelt i to foki. Den ene handler om integrering af dagslys og dynamisk kunstlys, som udfoldes i bogen *Integration af dagslys og dynamisk kunstlys undersøgt gennem et iagttagelsesinstrument*. Den anden – handler om undersøgelsen af rummet som lysende armatur og adaptive lyssituationer i test installationer. Undersøgelserne analyseres og diskuteres i bogen *Adaptivt lys*.

Makro skala, – med LEDlys som ny belysningskomponent i byrummet. Projektet arbejder med en mapping metode, hvormed byens oplevede belysning anskueliggøres i relation til den overordnede planlægning af gadebelysning. Projektet anvender København som case. Metoden belyses i bogen *På tværs af Københavns Gadebelysning 2014*.

I denne bog interesserer vi os for at identificere kvalitative parametre i integreringen af dynamisk kunstlys og det i forvejen meget dynamiske dagslys. Vores praksis baserede metode tager udgangspunkt i udformningen af, hvad vi kalder et iagttagelsesinstrument. Med iagttagelsesinstrumentet er der tale om et designet objekt med indbygget LED, der er tilsluttet et dynamisk styringssoftware. Vores undersøgelser har taget udgangspunkt i oplevelsesanalyser af, hvordan det dynamiske kunstlys i iagttagelsesinstrumentet udfolder sig i det daglysrum, som vejret udenfor genererer. Denne forskning benytter et koncept om kobling mellem ude og inde til at identificere et spekter af designparametre, der interesserer sig for relationen mellem de to dynamiske lyskategorier.

I forbindelse med oplevelsesanalyserne vil vi gerne takke Anne Bay, Astrid Espenhain, Astrid Mody, Brian Wendin, Ellen Kathrine Hansen, Hugo Mulder, Katja Bülow, Laura Beloff, Nanet Mathiasen, Peter Eklund og Thorbjørn Lausten for deres deltagelse i oplevelses-interviews. Disse interviews har hjulpet os med skærpelse af koncepter og tilgange i relation til formidlingen af forskningens resultater.

Karin Søndergaard

The research project is divided into the following three areas of scale:

Micro scale, wherein LEDs are understood and studied as part of a pixel system. This project explores the qualities that LEDs can potentially add to lighting applications in architectural contexts. This publication, *Pixel Experiments*, describes executed experiments and how the lessons learned from these test setups form possible strategies for the design of lighting applications using LED

Mezzo scale, with a focus on architectural space as a luminaire. These practice-based studies are divided into two foci. One concerns the integration of dynamic artificial lighting and daylight, which is unfolded is in the book called *An Exploration Into Integrating Daylight and Artificial Light via an Observational Instrument*. The second is about an inquiry of space as a luminous luminaire, as well as adaptive lighting situations in test installations. The studies are analysed and discussed in the book entitled *Adaptive Lighting*.

Macro scale, with LED lighting as a new lighting component in urban spaces. This project works with a mapping method in which the lighting experienced in the city is visualised in relation to the overall planning of the street lighting. The project uses Copenhagen as a case study. The method is illustrated in the book *Into a Mapping of Copenhagen Street Lighting 2014*.

In this book we are interested in identifying the qualitative parameters involved in the integration of dynamic artificial lighting and daylight; the latter being already highly dynamic by nature. Our practice-based methodology is based on the design of what we call an 'observational instrument'. The observational instrument is comprised of an object that has been designed using built-in LEDs connected to dynamic control software. Our studies have been based upon experiential analyses that examine how the dynamic artificial lighting in the observational instrument unfolds during the changing of the daylight situations that are generated by the weather outside. This research employs the concept of *coupling* between interior and exterior, in order to identify a spectrum of design parameters that are attentive to the relationships between these two dynamic lighting categories.

In connection with the experiential analyses we would like to thank Anne Bay, Astrid Espenhain, Astrid Mody, Brian Wendin Ellen Kathrine Hansen, Hugo Mulder, Katja Bülow, Laura Beloff Nanet Mathiasen, Peter Eklund, and Thorbjørn Lausten for their participation in the experiential interviews. These interviews helped us strengthen our concepts and approaches in relation to the dissemination of the research results provided herein.

Karin Søndergaard

Intro

Intro

Lyset og rummet kommer til syne for mennesket i ordener af gensidigt konstituerende forhold.

Som vi ved, bevæger dagslyset sig i lige parallelle stråler, der kommer til syne, når de rammer flader som væg, gulv, loft eller objekter, hvorefter lysstrålerne reflekteres videre og spredes i rummet. Lysets spredning er styret af fladens og objektets form og af det materiales karakter, som lysstrålen sammenstøder med. Det er således i lysstrålernes møde med rumlige former og materialer, at vi ser og oplever lyset såvel som den rumlige omgivelse. Denne oplevelse er ydermere bestemt af menneskets biologisk betingede perceptive egenskaber, der adaptivt justerer sig i relation til lys og mørke, farve og intensiteter.

Dagslyset er dynamisk, og afhængig af vejrlig kan det udfolde sig med både subtile og dramatiske variationer i lysets kvaliteter. Gennem bygningskroppens åbninger skaber lyset en sammenhæng mellem rummet indenfor og verden udenfor, og åbningen eller vinduet konstituerer den ramme, der på samme tid adskiller og *kobler* os til omgivelsen. Man kan sige at verden udenfor projicerer sig i rummet indenfor som mere eller mindre diffust lysende refleksioner, der, som billedligt abstrakte og slørede fænomener, stimulerer os i en interaktion med verden.

I modsætning til det varierende dagslys har et specifikt særkende ved kunstlyset indtil for nylig været dets konstans i farve og intensitet. I kraft af LED'ens teknologiske konvertibilitet med digitale styringssystemer er denne lyskilde imidlertid i stand til dynamisk at producere variation i farver og intensitet på måder, der kan tilsvare oplevelsen af dagslyset. LED såvel som andre fremtidige lyskilder kan styres dynamisk, og derved udvides kunstbelysningens potentiale med et aspekt om dynamiske kvaliteter, designet i software. Dagslyset og kunstlyset er således stillet i en ny relation. Nærværende undersøgelser har fokus på kvalitative parametre i denne relation.

Intro

Light and space appear to us in forms of mutually constitutive relationships.

As we know, daylight moves in straight parallel rays that come into visibility when they strike surfaces, such as walls, floors, ceilings or objects; after which the light rays reflect onwards and disperse throughout the given space. The dispersion of light is controlled by the surfaces, forms, and material characteristics that the light beams interact with. It is thus in the light rays' encounters with spatial forms and materials that we see and experience light, as well as the spatial surrounds. Such experience is further determined by humans' biologically-determined perceptive capabilities, which are adaptively attuned in relation to light and darkness, colour and intensity.

Daylight is dynamic and dependent upon weather conditions; unfolding with both subtle and dramatic variations in qualities of light. Through a building's apertures, daylight creates a connection between the space inside and the world outside. The aperture or window itself constitutes the frame that simultaneously separates, and connects, us to our surroundings. One can say that the world outside projects itself into the interior space, essentially as diffused illuminating reflections. As figuratively abstract and blurred phenomena, these diffused luminous reflections rouse us into interactions with the world.

In contrast to fluctuating daylight, a specific distinctive feature of artificial light has been – until recently – its constancy in colour and intensity. However, by virtue of the technological convertibility of LEDs in concert with digital control systems, LEDs are capable of dynamically producing variations in colour and intensity in ways that correspond to our experiences of the daylight. LEDs, as well as other future light sources, can be digitally controlled dynamically, and thereby extend artificial lighting's potentials with aspects of dynamic qualities that are designed into the software. Daylight and artificial lighting are thus positioned in a new relationship to one another. The present studies focus upon the qualitative parameters in this new relationship.

For at kunne identificere disse kvalitative parametre, har vi udviklet et iagttagelsesinstrument, der i en rumlig performativ udfoldelse skal tydeliggøre og visualisere et forhold mellem dynamisk dagslys og dynamisk kunstlys. Med Iagttagelsesinstrumentet har vi haft til hensigt at iscenesætte en perceptuel situation, hvor disse to forskellige belysnings-kategorier bringes i spil i et integreret forhold. Der etableres på denne måde en oplevet situation med specifik fokus på, hvordan forskellige måder det dynamiske kunstlys stilles i forhold til dagslyset er interessante, og på hvilke måder en integrering af disse kan kvalificeres. Iagttagelsesinstrumentet danner forlæg for analytiske vurderinger og fremkalder artikulation i oplevelsen af, hvorledes dynamisk kunstlys er interessant, således vi herudfra kan underbygge og begrunde de kvalitative parametre.

Iagttagelsesinstrumentet består af trefladede kuber, der i et tesseleret arrangement stikker ud fra væggen og således indfanger og reflekterer dagslyset på de flader, der, som det ses på *fig. 1*, vender mere eller mindre direkte ud mod vinduet. De flader, der vender henholdsvis opad mod loft og nedad mod gulv, modtager refleksionslys herfra. På fladerne, der vender indad i rummet, tegnes skyggedannelser. I højere grad end en flad væg tydeliggør det rumliggjorte instrument dagslysets møde med det interiøre rum, og det accentuerer skyggevirkningerne. Herved opnås en intensiveret oplevelse af det aktuelle dagslys' farver og lysintensiteter, og instrumentet virker som en slags lup, hvor det omgivende dagslys' virkninger ind i det interiøre påpeges.

fig. 1: Iagttagelsesinstrumentet / The Observational Instrument

In order to identify the qualitative parameters, we have developed an observational instrument, which in a spatial performative expression clarifies and visualises the relationship between the dynamism of daylight and the dynamism of artificial lighting. Using the observational instrument, our intention has been to stage a perceptual situation, where these two different lighting categories may be brought into play in an integrated relationship. In this praxis, an experiential position is established, which specifically focus on the different ways that dynamic artificial lighting can be meaningfully positioned in relation to daylight. By way of the instrument, we can examine how the different ways of interacting can be of interest and importance, including the ways that the integration of these may be classified. The observational instrument provides a model for analytical assessments and elicits an articulation of the experiences of how dynamic artificial lighting can be of interest and significance. In such, we are then able to substantiate and validate qualitative parameters.

The observational instrument consists of a series of three-sided cubes in a tessellated arrangement that protrudes from the wall. Protruding from the wall, the instrument consequently captures and reflects daylight onto its surfaces which directly face the window; as seen in *fig. 1*. Correspondingly, the instrument's surfaces that face upwards towards the ceiling and downwards towards the floor, receive reflected light. And the surfaces that face inwards into the given space are delineated in shadow. To a much greater degree than a flat wall, the instrument clarifies the spatialisation of the encounters of daylight with the interior and accentuates the effects of the shadows. This provides an enhanced perception of the daylight's colours and luminous intensities – and, thus, the instrument functions as a sort of microscope, where the effects of the ambient daylight on the interior are emphasised.

fig. 2a: Digitalt vejr / Digital Weather

LED diodernes størrelse, deres levetid og tekniske egenskaber også i bæredygtig henseende, muliggør en implementering af dynamisk kunstlys i arkitekturen. En sådan implementering indebærer muligheder og konsekvenser. I vores iagttagelsesinstrument er kunstlyset implementeret, og ses som lysende flader hvis farve og intensitet i et dynamisk flow, kan bestemmes af brugeren. Et antal af kuberne har translucente sider, hvor der bagved er indbygget reflektorkasser med LED lyskilder. Lysdioderne er forbundet til et digitalt styringsværktøj, der med en specialdesignet software kan iscenesætte dynamiske lysscenarier i kunstlyset. Derved kan det dynamiske dagslys og et dynamisk kunstlys analyseres i et relationelt forhold integreret i ét instrument.

Fig. 2a viser en visualisering af softwaredata, som det var indstillet på et givet tidspunkt i undersøgelserne. Metaforisk kan man tænke softwaren som et digitalt vejr, - en selvgenererende og foranderlig sky, hvormed man kan bestemme den dynamiske komposition af farvetemperaturer og lysintensiteter. Både farvetemperaturer og lysintensiteter bestemmes af tre dynamisk indstillelige parametre: *Range, Speed* og *Spread. Range* bestemmer det mulige udsving i lysfarver og lysintensitet. *Speed* bestemmer den hastighed hvormed lysfarver og lysintensitet forandres. *Spread* bestemmer hvor stor en spredning, der kan forekomme i henholdsvis farvetemperatur og lysintensitet. Disse forskellige kombinationsmuligheder af temperaturer og intensiteter i lyset, styret gennem nævnte dynamiske parametre, muliggør et meget stort spekter af fluktuerende lysscenarier, som kan styres i interagerende relation til det skiftende dagslys (Se *fig. 2b).*

fig. 2b

The diodes size, lifespan, and technical prosperities of LEDs enable the implementation of dynamic, sustainable artificial lighting in the built environment. Such implementation contains possibilities and consequences alike. Artificial lighting has been implemented into our observational instrument and can be seen as illuminating surfaces, whose colour and intensity exist in a dynamic flow that can be determined by the user. A number of the cubes have translucent sides, and behind their surfaces a reflector box outfitted with LED light sources is situated. The light emitting diodes are connected to a digitally-controlled device that, via specially designed software, can stage dynamic artificial lighting scenarios. Accordingly, the dynamics of daylight and the dynamics of artificial lighting can be analysed in an interactive relationship that is integrated into one instrument.

Fig. 2a portrays a visualisation of the software data that was set for a given moment of the investigations. Metaphorically, one can think of the software as 'digital weather' – as a self-generating and shifting cloud, with which to determine dynamic compositions of colour temperatures and luminous intensities. Both the colour temperatures and the luminous intensities in the instrument are determined by three dynamically adjustable parameters: *Range, Speed*, and *Spread. Range* determines the possible variations in the light's colours and luminous intensities. *Speed* determines the rate at which the light's colours and luminous intensities change. *Spread* determines how large of a dispersion can occur for the colour temperatures and luminous intensities, correspondingly. These various combinations in temperature and luminous intensities – guided via the aforementioned dynamic parameters – allow for an extensive spectrum of fluctuating lighting scenarios that can be controlled via interacting relationships to the shifting daylight (See *fig. 2b).*

Kuberne i iagttaglsesinstrumentet danner baggrund for et mønster, hvorpå den rumlige spredning af dagslysets refleksioner skaber en tekstur af frontbelyste flader. Kunstlyset er som nævnt implementeret i kuberne som bagbelyste flader, hvis karakter bestemmes gennem styringsværktøjet. Denne kombination af belyste og lysende flader foranstalter en oplevelsessituation, hvor vi kvalitativt kan analysere et spekter af sammensætninger af dynamiske relationer imellem de to belysningskategorier. Gennem softwaren, som i programmeringen er bestemmende for de parametriske valgmuligheder, får vi let adgang til i oplevelsesøjeblikket at nuancere kunstlyset i specifikke relationer til dagslyset. Vi får derved mulighed for at opstille kvalitative parametre i de dynamiske relationer af dagslys og kunstlys (Se *fig. 3*).

Iagttagelsesinstrumentet er også et perceptivt læringsinstrument, hvor man kan opnå en skærpelse af sin iagttagelsesevne og erfare synsperceptionens indflydelse på og samspil med dynamiske lysdannelser. Der er således tale om en iscenesættelse, hvor synsadaptionen og rumlige synsevner bliver tydelige som medskabende på synsoplevelsen. For det oplevende menneske udgør vinduet og dagslysets virkninger på den interiøre rumskabelse en *kobling* mellem verden derude og rummet indenfor. Begrebet *kobling* skal her forstås som et operativt konceptuelt greb, der påpeger betydninger og forbindelser mellem lysforhold udenfor og lysdannelser indenfor. I vores tilgang til undersøgelserne omkring relationen mellem dagslyset og et dynamisk kunstlys interesserer vi os for at identificere de relationelle *koblinger* mellem de to dynamiske lysfænomener. Koblingsbegrebet fastholder en iagttagende oplevelsesposition, hvor man kan identificere et spekter af designparametre i de dynamiske forhold mellem dagslyset og kunstlyset.

fig. 3: Kuber / The Cubes

The cubes in the observational instrument create the basis of a pattern in which the spatial dispersion of the daylight's reflections creates a texture of frontally-illuminated surfaces. As noted already, the artificial lighting is implemented inside the cubes as backlit surfaces, whose character is determined through the digital control device. The combination of illuminated and illuminating surfaces provides an experiential situation, where we can qualitatively analyse a range of compositions of the dynamic relationships between the two categories of lighting. Through the software, whose programming determines the parametric choices, we obtain easy access to being able to detail the artificial lighting in specified relationships to the daylight. We obtain this in the very instance it occurs and is experienced. Moreover, we gain the opportunity to establish qualitative parameters within the dynamic relationships between daylight and artificial light (See *fig. 3*).

The observational instrument is also a perceptive learning instrument, where one can obtain a sharpening of his/her powers of observation; noticing how visual perception influences upon, and plays with, dynamic lighting formations. Consequently, the instrument sets the stage, wherein one's visual adaptation and spatio-visual abilities become heightened, as one acts a co-creator of visual experience. For the experiencing human being, the window and daylight's effects on the creation of the interior space form a *coupling* between the world outside and the space inside. The notion of coupling should be understood here as an operative conceptual notion, revealing and emphasising meanings and connections between the conditions of the outdoor illumination and the illuminating formations inside. In our approach to the studies about the interrelationships between daylight and dynamic artificial lighting, we are interested in identifying the relational *couplings* between these two dynamic lighting phenomena. The concept of *coupling* maintains a position of attentive, observing experience, where one can identify a spectrum of design parameters within the dynamic relationship(s) between daylight and artificial lighting.

Lysrum og lyset i rummet
Light-zones and Light in Space

fig. 4: Iagttagelsesinstrumentet / The Observational Instrument

Lyset i rummet analyseret i iagttagelsesinstrumentet

Iagttagelsesinstrumentet iscenesætter en undersøgelse af den rumlige lyssituation. Det er således muligt at analysere oplevelsen af de kvalitative relationer af kunstlys integreret med dagslys, samt at afprøve hvordan de dynamiske variable i kunstlyset relaterer til dagslysets virkninger i det interiøre rum. Instrumentet er placeret midt på væggen i rummets dybde, hvor der opstår en aftegning af rummets lysforhold, og hvor lyset dynamikker udfoldes i instrumentets strukturer. En sammenligning hen over væggen giver indtryk af variationerne i lysets intensitet, farve og dynamik, helt fra lysindfaldet ved vinduet til de mere skyggefulde steder inde i rummet (se *fig.4*).

Instrumentet fremstiller en analyse af lysforholdene ved at fremdrage detaljer i sin struktur, og den giver adgang til at observere lysformer som arkitektoniske elementer med rumlig udstrækning og stedlig komposition. De kvalitative parametre af lyset i rummet kan observeres som tilstande af intensitet, farve, retning og dynamik i instrumentets strukturer. Situationen omkring iagttagelsesinstrumentet inddrager lysoplevelsen og synsadaptionen som en del af den analytiske kontekst. Oplevelsen af *lysrum* (Madsen 2002) skabes gennem sanselige iagttagelsesevner og er således formet af lyshedens karakter sammenholdt med vores erfaring med lys og rumlige forståelser. Forståelsen af lys i rummet som lysrum er en relationel model, som baseres på lysoplevelse snarere end lysmålinger, og som retter fokus på, hvordan oplevelsen af lysdannelser kan forstås som rumlige parametre. Konceptet lysrum er introduceret af den danske arkitekt og lyskonsulent Merete Madsen.

The Light in the Space Analysed via the Observational Instrument

The observational instrument stages an examination of a given spatial lighting situation. It is therefore possible to analyse the experience of the qualitative relationships of artificial lighting integrated with daylight, as well as to test how the dynamic variables of the artificial lighting relate to the effects of daylight on an interior space. The instrument is placed in the middle of the wall, along the depth of the space; where there is a trace of the space's lighting conditions, and where lighting dynamics unfold within the structure of the instrument. A comparison spanning across the wall gives the impression of variations in the lighting's intensity, colour, and dynamism; spanning from the daylight entering in through the window to the more shadowy areas that are more inwards in the space (see *fig. 4*).

The instrument generates an analysis of the lighting conditions by calling attention to the details in its structure; enabling one to observe the illuminated demarcations of the flux in the space. And thus, the dynamics are formed explicitly in the textures of the instrument. The qualitative parameters of the lighting in the space can be observed as states of intensity, colour, orientation, and dynamics within the structures of the instrument. The situation surrounding the observational instrument involves the experience and perception of the light and visual adaptation as part of the analytical context. The perception of *light-zones* (Madsen 2002) is created through one's sensory observational capabilities, which are accordingly shaped by the character of the perceived brightness in conjunction with one's experiences of light and one's spatial understandings. The understanding of the light in the space – as light-zones – is a relational model based on the perception and experience of light, rather than on measurements of light. Moreover, there is a focus on how the experience of lighting formations can be understood as spatial parameters. The concept light-zones is introduced by the Danish architect and lighting consultant Merete Madsen.

Oplevelsen af lys som rumlige potentialer

Lyset i rummet analyseres som lysrum. Lysrum skal forstås som rumlige zoner af lysheder, der opstår ved lysets fluktuering og møde med rummet. Set i relation til lyskilden skabes lysrum af lysets fluks mellem kilde og andre lysgivere. *Lysgivere* er en fælles betegnelse for alt, hvad der giver lys fra sig, herunder både det direkte lys fra en lyskilde og refleksionslyset. Et lysrum kan således siges at være zoner af lyshed, som opstår mellem lysgivere. Lysrum dannes således fra alle sider, både fra neden i refleksioner fra gulvet og fra oven i refleksioner fra loftet, og fra refleksioner fra vandrette og lodrette flader. Lysrum opstår ofte som en slags fortætninger af reflekteret lys, og kan tænkes som graduerede intensiteter af lys og mørke.

Analyser af lysdannelser i rum, som lysrum, bringer fokus på lysets rumkompositoriske kvaliteter. Lysrum griber mere eller mindre ind over hinanden, danner kontekst for hinandens lyshed, og har indflydelse på aspekter af hinandens komposition af lysretninger og farver. Skalaer af lysrum og deres integrering i hinandens kompositioner kan aflæses som mønstre og rytmer i rummets sammensætning af lysrum.

The Experience of Light as Spatial Potentials

The light in the space is analysed as light-zones. Light-zones are to be understood as spatial zones of perceived brightness, resulting from light's fluctuation and its interactions with a given space. Seen in relation to a light source, light-zones are created by light's flux between its source and other light giving bodies. *Light giving bodies* is a generic term for anything that emits light from itself, including both the direct light from a light source as well as reflected light. Light-zones can therefore be said to be zones of perceived brightness that emerge in between light giving bodies. Hence, light-zones are formed from all directions; from below via reflections off the floor, from above via reflections from the ceiling, and likewise from all reflections occurring from other horizontal and vertical planes. Light-zones often occur as a kind of concentration of reflected light, and can be thought of as graduated intensities of light and darkness.

Analyses of lighting formations in space, as light-zones, draws attention to light's spatio-compositional qualities. Light-zones essentially overlap one another, forming the context for one another's perceived brightness. Additionally, they influence upon the aspects of one another's compositions of lighting distribution and colour. Scales of light-zones and their integration into one another's compositions can be read as patterns and rhythms within a space's composition of light-zones.

Lysrum og mørkerum

Lys er afhængig af mørke, og som Merete Madsen (2002) konstaterer, - er det i det variable forhold mellem lys og mørke, at lyset i det arkitektoniske rum formgives. Lysrum og mørkerum dannes af grader af rettede og diffuse stråler, skarpere eller blødere konturer, kontrastforhold i intensiteter og farvespektre, og både lysrum og mørkerum opleves som ustadige fluktuerende og foranderlige størrelser.

Vi oplever lys ved at kunne se farver og former reflekteret i lyset, hvor mørket kendetegnes ved en relativt mindre synlighed. Mørkerum tager udgangspunkt i oplevelsen af mørkere rumdannelser, dunkelhed og grader af skyggedannelse. Mørke ses her som relativ til lysheder, en måde at analysere og argumentere lysdannelsen fra de mørkere ansamlinger i lysets refleksioner. Mørkerum kan forstås som nuanceringer af mørke og grader af manglende synlighed.

Light-zones and Dark-zones

Light is dependent upon darkness, and as stated by Merete Madsen (2002), it is in the variable relationship in-between light and darkness that light in architectural spaces is formed. Light-zones and dark-zones are formed by degrees of direct and diffuse rays of light – sharpening or softening contours – as well as by contrasting conditions in luminous intensities and colour spectra. Likewise, both light-zones and dark-zones are perceived as being unstable, fluctuating, and of mutable sizes.

We experience light by being able to see colours and shapes reflected in light; whereas darkness is characterised by relatively less visibility. Dark-zones are based on the experience of darker spatial formations, obscurity, and degrees of shade and shadow. Darkness is seen here as being relative to perceived brightness – as a way to analyse and distinguish the formation of light from the darker accumulations in light's reflections. Dark-zones can be understood as gradations of darkness and degrees of lacking visibility.

Vejret ude og lyset inde

Dagslysforholdene dannes af sollys, himmellys og reflekteret lys fra omgivelserne. Solens placering i sin bane på himlen opretholder en stabilitet i lysets dynamik, der varierer alt efter døgnets velkendte og forudsigelige rytme, og etablerer samtidig orienterende kendetegn i forhold til lysretning og skyggedannelse. Lysvariationen giver højere intensitet midt på dagen, og der dannes stærkere lysfarver ved den lavere solhøjde morgen og aften.

Lysrum fremstår mere skarpe eller mere flygtige alt efter solens position og vejrets forandringer. Sol og himmellysets lysfarver, intensiteter og dynamikker defineres i høj grad af skydannelser og andre forandringer i vejrforholdene. Skydækket skaber variationer i himmellyset, der opleves som fluktueringer mellem hvidlige lysfarver i varme og kolde nuancer. Dagslysindfaldet komponeres således i dynamiske flow af lysintensiteter, lysfarver og dynamikker, der nuanceres af vejrets indflydelse, ligesom lyssituationen formes af det reflekterede lys fra bygninger, trafik, græs og træer, som alle bidrager til lyssituationen i rummet.

På observationsdagene, som er skildret i denne bog, skifter lysforholdene ofte inden for sekunder. Der er tale om perioder med dramatiske forandringer og andre med subtile variationer. Lysforholdene skifter mellem varme og kolde farver, mellem mørkere og lysere, mellem skarp sol og diffust lys bestemt af skydækket, mellem dominans af lys fra himmelen til refleksioner fra omgivende bygninger.

The Weather Outside and the Lighting Inside

The conditions of daylight are generated by direct sunlight, diffuse light from the sky, and reflected light from the surroundings. The sun's position in its path across the sky maintains constancy via daylight's dynamics, which vary according to the day's well-known and predictable cycle and rhythms; and which at the same time establish orientational characteristics in relation to the distribution of light and shadow formations. Daylight's variations provide higher intensity in the middle of the day, whilst stronger colours of light are created at the lower angles of the sun path in the morning and evening.

Light-zones appear sharper, or more indistinct, depending upon the position of the sun and weather changes. The colours, intensities, and dynamics of sunlight and the diffuse light from the sky are largely defined by cloud formations and other such shifts in weather conditions. Cloud cover creates variations in the diffuse light from the sky, which is perceived as fluctuations between whitish colours of light in warm and cool tones. The daylight entering in through the window is composed of lively flows of luminous intensities, colours, and dynamics. Daylight is not only nuanced by the influence of the weather on the movements and changes in cloud cover, but it is moreover shaped by the light reflected from buildings, traffic, grass, trees, etc. – all of which contribute to the lighting situation of a given space.

On the days of observation depicted in this book, the lighting conditions can be seen to frequently shift within seconds. Represented are times of dramatic changes along with other periods characterised by subtle variations. The lighting conditions shift between warm and cool colours, between being darker and lighter, between piercing sun and diffuse light determined by cloud cover, as well as between the dominance of diffuse light from the sky and reflections from surrounding buildings.

Det digitale vejr

Iagttagelsesinstrumentet afspiller en softwaregenereret tekstur, som projiceres ud gennem de indbyggede LED lyskilder. Som før nævnt kan softwaren tænkes som et digitalt vejr, - en selvgenererende og foranderlig sky, hvormed man kan bestemme den dynamiske komposition af farvetemperaturer og lysintensiteter. For eksempel kan der indstilles et digital vejr, som minder om et let varieret skydække, hvor forandringer i skyernes form og størrelser indvirker på farve og intensitet i lysets dynamik. Kombinationsmulighederne af temperaturer og intensiteter i lyset muliggør et meget stort spekter af fluktuerende lysscenarier, hvor der kan opnås subtile sammenblandinger af lysintensiteter og farver mellem dagslys og kunstlys.

Softwaren agerer ved hjælp af animeret støj, generativ og kontinuerlig, som hele tiden varierer på rytmernes forudsætninger og udfoldelse. Softwaren benytter Perlin Noise algoritmen, som er udviklet specielt „to produce natural appearing textures on computer generated surfaces“ af Ken Perlin (web reference 2014). Softwaren er sammensat af to Perlin Noise animationer, en til kontrol af farvetemperatur (Temperature) og en til kontrol af lysintensiteten (Intensity), som varierer med hver sin dynamik i det samlede billede. Når den særlige kombination af flere Perlin Noise animationer sammenlægges til en komposition, er det muligt at syntetisere lysfluktuationer, som minder om vejrets indflydelse på dagslysets dynamikker. Fluktueringerne har tidslige kvaliteter, der fremstår både som hastigheder, udviklinger og rytmer, og fluktueringerne har rumlige kvaliteter, der kan fremstå som fordelinger i kollektive og/eller individuelle arrangementer (se *fig. 5*).

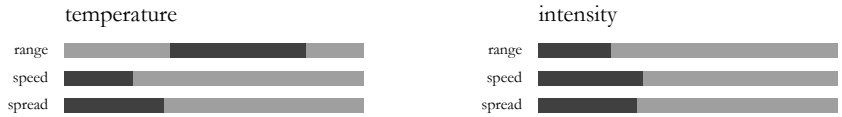


fig. 5

The Digital Weather

The observational instrument animates a software-generated texture that is projected outwards through the built-in LED light sources. As note prior, the software can be thought of as digital weather – as a self-generating and changing cloud with which to determine the dynamic composition of colour temperatures and luminous intensities. For example, a digital weather setting can be selected, which is reminiscent of a slightly varying cloud cover; where changes in the clouds' forms and sizes affect the colour and intensity of lighting dynamics. The combinations of temperatures and intensities in the lighting enable an immense spectrum of fluctuating lighting scenarios; which allow for subtle intermixings of the luminous intensities and colours in-between daylight and artificial lighting.

The software acts by animated noise, generative and continuous, which constantly varies the assumptions and expressions of the rhythms. The software uses the Perlin Noise algorithm, which is developed specifically "to produce natural appearing textures on computer generated surfaces" by Ken Perlin (web reference 2014). The software is composed of two Perlin Noise animations; one for controlling colour temperature (Temperature) and one for controlling the luminous intensity (Intensity), and each of which varies in its own dynamism within the overall composition. Once the particular combination of the Perlin Noise animations are merged into one composition, it is possible to synthesise the lighting fluctuations so that they remind one of the weather's influence upon the dynamics of daylight. The fluctuations have temporal qualities that appear as speeds, progressions, and rhythms, and the fluctuations can have spatial qualities that appear as collective and/or individual arrangements (see *fig. 5*).

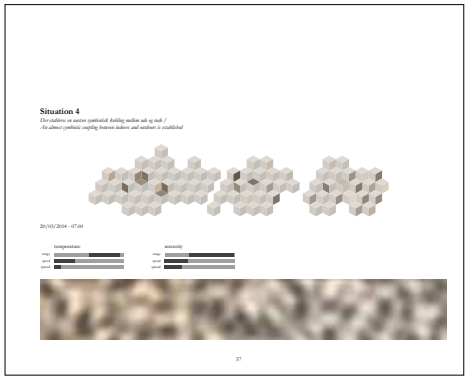


fig. 6: Visualisering af det digitale vejr / Visualisation of the Digital Weather

Det digitale vejr bestemmes af tre dynamisk indstillelige parametre: *Range, Speed* og *Spread*.
Range bestemmer det mulige mindste og højeste niveau, hvor inden for farverne og lysintensiteten varierer. **Speed** bestemmer den hastighed hvormed lysfarver og lysintensitet forandres. Hastigheden kan indstilles fra de mindste og næsten umærkelige forandringer, til hurtige og hektiske forandringer. **Spread** bestemmer hvordan henholdsvis farvetemperatur og lysintensitet fordeler sig i instrumentet, om de grupperer de sig i større sammenhænge eller har de en mere individuel opførsel. Denne funktion er softwareteknisk et zoom ind i det digitale vejrbillede, og kan opfattes som en skala mellem klyngedannende og individualiserende lysanimationer i det distribuerede arrangementet af LED lysene (se *fig. 6*, uddybes i Koblingens iscenesættelse).

Softwaren arbejder indenfor en ramme af lysfarver og lys intensiteter afgrænset af det tekniske design af LED lyskilderne. Den valgte LED teknologi kan levere et spekter af lysfarve fra cirka 2.200-5.000 kelvin, standarten indenfor LED med dagslys kvaliteter. Det er et relativt begrænset i forhold til dagslysets variationer, som både bliver meget varmere og meget koldere i farven, og har variationer som bevæger sig mod helt andre farvenuancer som grønne og magenta farver. Det maximale lysniveau matcher solens direkte refleksion i iagttagelsesinstrumentet og styres ned til meget lave lysintensiteter. LED lyskilderne styres med meget høj opløsning og med delikat kontrol specielt af de lavere værdier, således at lysafgivelsen fremstår uden spring i variationerne.

Iagttagelsesinstrumentet giver adgang til i oplevelsesøjeblikket at nuancere kunstlyset i direkte relation til dagslyset, og det giver mulighed for at udforske og kvalificere de subtile relationer med parametriske lysstrategier. Det digitale vejr kan genspilles så der opstår præcis den samme lysdannelse i kunstlyset. Man kan således afspille både fortidige og fremtidige lyssituationer med præcision. Dette asynkrone aspekt ved det digitale vejr muliggør design af lysscenarier, som kan tilrettelægges ud fra fremtidige behov og allerede eksisterende lyssituationer.

The digital weather is determined by three dynamically adjustable parameters: *Range, Speed*, and *Spread*. **Range** determines the minimum and maximum levels possible within which colours and luminous intensities vary. **Speed** determines the velocity at which colours of light and luminous intensities change. The speed can be adjusted from the smallest and almost imperceptible changes to the fastest and most frenzied of variations. **Spread** determines how the respective colour temperature and luminous intensity are distributed in the observational instrument; i.e. if they group themselves in larger compositions or if they exude more individualised behaviours. Technically, this feature of the software zooms into the digital weather picture, and can be comprehended at a scale that is in-between clustering animations and more individualised animations in the distributed arrangement of the LEDs (see *fig. 6*, discussed in The Staging of the Coupling).

The software works within a framework of colours of light and light intensities determined by the technical design of the LED light sources. The designated LED technology can deliver a colour temperature range of approximately 2,200 - 5,000 kelvin; the industry standard for LEDs having attributes of daylight. This is relatively limited compared to daylight's variations, which can be both significantly much hotter and cooler in colour than the LEDs' range. Daylight also differs in that it has variations which can transmute towards completely other colour tones, such as green and magenta. The maximum lighting level matches the direct solar reflection in the observational instrument and is controlled down to lowest luminous intensities. The LED light sources are controlled with very high-resolution and delicate control, especially in the lower range values. Thus, the light emanation appears without any jump-cuts in the variations.

The observational instrument provides the possibility to be able to detail and nuance artificial lighting in direct relation to daylight at the very instance of it occurs and is experienced. It provides the opportunity to explore and qualify the subtle relationships between the two forms of lighting using parametric lighting strategies. The digital weather can be replayed so there are exactly the same lighting formations in the artificial lighting. One can play both previous and future lighting situations with precision. This asynchronous aspect of the digital weather allows for the creation and design of lighting scenarios, which can be organised according to future needs and pre-existing lighting situations.

Kobling og konstans i lysoplevelsen

*Koblings*forholdet er dobbeltrettet. Lysrumsvariationer indenfor forbindes således med dagslysvariationerne udenfor i en oplevelse af en gensidig betydningssammenhæng. Man kan sige at der foregår en gensidigt konstituerende *kobling* mellem lysdynamikken i vejret udenfor og lyset i rummet indenfor. Den ene vej fungerer *koblingen* ved at lysforhold og vejrlig udenfor opleves som direkte årsag til lysforholdene indenfor. Den anden vej fungerer *koblingen* ved at lysrum indenfor erfares som en adgang til at opleve variationer i vejret udenfor.

En tydelig *kobling* mellem lysfænomener ude og inde opleves som direkte årsagssammenhænge, hvor vejrets dynamik udenfor tydeligt fornemmes i de dynamiske lyskvaliteter indenfor, som solspejlinger og bevægelige skyggedannelser, der kan efterspores som resultatet af solens stråler og skyernes bevægelser. I mere komplekse forhold, hvor dynamiske lyskvaliteter forbindes til mere sammensatte situationer, som blæsende bevægelser i træer, reflekser fra omgivelsen eller farveforandringer i morgenlyset, er *kobling* en form for sammenhæng mellem situationer, som dannes af rytmer og mønstre i lyset fluktueringer.

Coupling and Constancy in the Experience of Light

A *coupling* relationship is reciprocal. The variations of light-zones indoors are thus interconnected to the variations of the daylight outside, via an experience of a mutual cohesion of meaning. One can say that there is a mutually constitutive *coupling* between the dynamics of light brought about by the weather outside and the lighting inside the interior space. In one way, the *coupling* works by the outdoor lighting conditions and the weather appearing to be the direct cause of the lighting conditions on the interior. In another way, the *coupling* works by the interior light-zones being perceived as an access to experience the variations in the weather outside.

A clear *coupling* between the exterior and interior lighting phenomena are experienced as direct causal relationships, where the dynamism of the weather outside can clearly be perceived in the dynamic qualities of the lighting inside; as sun glints and as moving shadow formations that are traceable as a result of the sun's rays and the movements of the clouds. Where the dynamic qualities of the light emerge from to more complex situations – such as the windy movements of trees, reflections from the surrounding environment, or colour changes in the morning light –, the *coupling* is a link between the situations that are formed as rhythms and patterns within the light's fluctuations.

Koblingsanalyser med iagttagelsesinstrumentet

Med iagttagelsesinstrumentet kan man undersøge *koblingens* kvaliteter ved at indstille på det indbyggede kunstlys. Hver indstilling af det digitale vejr og derved kunstlysets fremtræden iscenesætter et analytisk forhold til dagslyset i rummet. Kunstlyset kan være meget forskelligt og præsentere kontrastforhold og dynamiske forskelligheder, eller det kan blande sig næsten symbiotisk med dagslysets og fremdrage allerede eksisterende kvaliteter.

Den kontekst man befinder sig i, bringer en logik til det lys man ser, som noget der kommunikeres omkring forhold i omgivelserne. Konteksten inkluderer her bygningen med dens åbninger, vejret og de aktuelle omgivelser. *Koblingen* opretholder en løbende orientering om geografien: træer, huse og bakker; biler og mennesker i bevægelse; dagens forløb og solens retning, som et omgivende landskab af forudsigelige og konstante forhold, konkrete og præcist orienteret med retning og afstand.

Ved hjælp af forskellige indstillinger af kunstlyset undersøges det, hvordan det er muligt at underbygge *koblings*kvaliteter som lokaliserende orienteringsparametre – som en *kobling* mellem et bestemt ude og inde – når dagslyset bliver integreret med dynamiske kunstlyskilder.

Coupling Analyses with the Observational Instrument

With the observational instrument, one can examine the *coupling's* attributes by calibrating the built-in artificial lighting. Each setting of the digital weather – and thus the performance of the artificial lighting – initiates and stages an analytical relationship with the daylight in the space. The artificial lighting can be very different and can present contrasting conditions and dynamic variances. It also mixes nearly symbiotically with the daylight, thereby accentuating the extant qualities.

The context within which one is situated brings logic to the light that one sees, as something that communicates about the surrounding environment. The context here includes the building with its apertures, the weather, and the actual surroundings. The coupling maintains a continuous orientation to the geography: the trees; the houses and hills; the cars and people that are on the move; the cycles of the day, etc. The latter includes the direction of the sun as a surrounding landscape of predictable and constant conditions; concretely and precisely oriented in direction and distance.

Using various adjustable settings for the dynamic artificial lighting, this project investigates the ways that it is possible to substantiate the *coupling's* qualities as localising orientational parameters – as a *coupling* between a particular exterior and interior – when daylight is integrated with dynamic artificial lighting sources.

Koblingens iscenesættelse
The Staging of the Coupling

Koblingens iscenesættelse

Dagslysets lysdannelser indenfor etablerer en *kobling* med verden derude. Styringen af kunstlyset i iagttagelsesinstrumentet er konstrueret til at kunne fremhæve specifikke kvaliteter af denne oplevelse af *kobling* mellem lyssituationen udenfor og indenfor. Kunstlysets indflydelse på *koblings*forholdet er analyseret som et spekter af parametre, der tilsammen fastholder et landskab af tolkningsperspektiver. Parametrene er alle tolket ud af oplevelsen af lyssituationerne, og ofte som samvirkende aspekter af hinanden i lyssituationen. De fundne parametre uddybes ved hver af de tolv lyssituationer, og nedenfor oplistes en syntese af parametrene i fem tolkningsperspektiver:

Blanding af lyssituationer – [situation 4, 6, 7, 10, 11]
Kunstlyset og dagslyset blandes således at kunstlyset underbygger den variation i farve, intensiteter og dynamikker som dagslyset leverer. Det kan ske ved, at kunstlyset opererer lige indenfor eller udenfor dagslysets variationer og involverer samtlige spektre i lysdannelsen i en symbiotisk kobling mellem lysforholdene ude og inde. Det kan ske mere specifikt ved, at ét parameter dominerer, for eksempel ved at kunstlysets hvidhed og intensitet relaterer til de tilsvarende lyskvaliteter i det direkte sollys.

Påpegning af lyskvalitet – [situation 3, 8]
Kunstlyset kan påpege og tydeliggøre bestemte aspekter af koblings forholdet, for eksempel ved at kunstlyset er mere dynamisk end daglyset og fremhæver kvaliteter i koblingen med udelyset ved en understregning af de dynamiske relationer.

Kontrast i lyssituation – [situation 1, 9]
Kunstlyset kan markere en tydelig forskel og derved danne kontraster som påpeger eller fremhæver kvaliteter i *koblingen*, for eksempel ved at etablere et kontrastligt forhold til væggen, hvor de tydelige forskelle i lyshed fremhæver *koblingens* irammesættelse.

Forventning om lysudvikling – [situation 2]
Kunstlyset kan lægge op til en forventet udvikling i lysintensitet og farver i dagslyset, hvor kunstlyset kobler til morgenlysets tiltagende styrke, men ved at være tydeligt kraftigere og rytmisk mere aktiv.

Kontekst dannet af lysiscenesættelsen – [situation 5, 12]
Koblingen kan iscenesættes ved at et *koblings*parameter danner kontekst og irammesætter fokus, for eksempel at lysintensiteten i kunstlyset etablerer en sammenhæng med lysniveauerne udenfor og danner kontekst for rytmiske interaktioner mellem dagslysrefleksionen og kunstlyset.

The Staging of the Coupling

Daylight's formations of light on the given interior establish a relationship with the world outside. The control of the artificial lighting in the observational instrument is designed to highlight specific qualities of this experience; of switching between the outdoor illumination situations and those indoors. The artificial lighting's influence upon the *coupling* relation is analysed as a spectrum of parameters, which together maintain a landscape of interpretative perspectives. The parameters are all interpreted out from the experience of the various lighting situations, and often as interacting aspects in the lighting situations. The conceived parameters are elaborated upon in each of the twelve lighting situations provided below. A synthesis of the parameters is grouped through the following five interpretative perspectives:

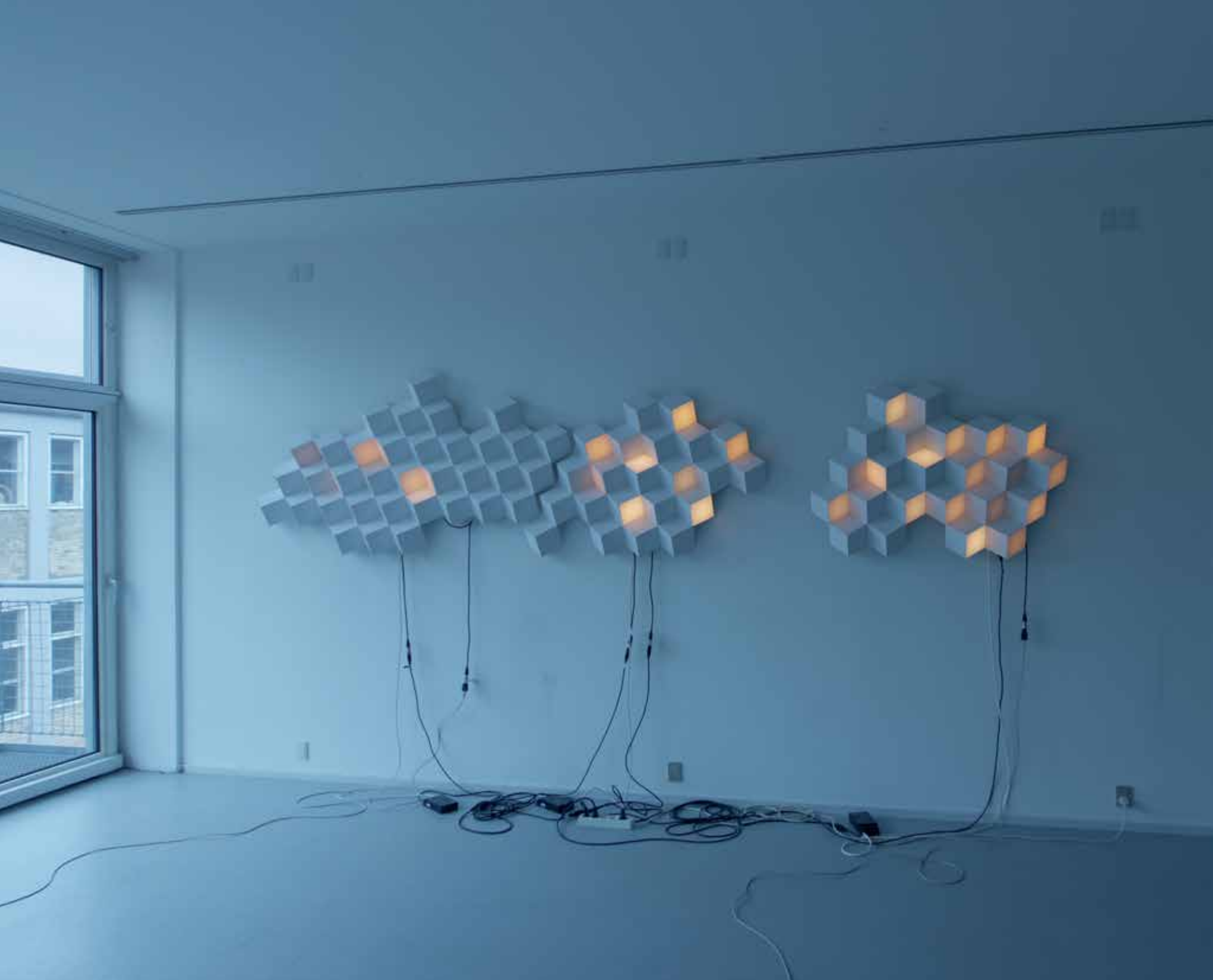
Co-Mixture of the Lighting Situations – [Situation 4, 6, 7, 10, 11]
The artificial lightning and daylight are co-mixed, so that the artificial lighting reinforces the variations in the colours, intensities, and dynamics provided by the daylight. This can occur by the artificial lighting operating just inside or outside of daylight's variations; involving all spectra in the creation of the light as a symbiotic *coupling* between the exterior and interior lighting conditions. More specifically, this can be achieved when one parameter dominates; for example, when the artificial lighting's whiteness and intensity relate to the corresponding qualities of direct sunlight.

Emphasising the Lighting Quality – [Situation 3, 8]
The artificial lighting can highlight and elucidate certain aspects of the *coupling* relationship; for example, when the artificial lighting is more dynamic than the daylight, and when it highlights the qualities in the relationship with the outdoor illumination by underlining the dynamic relationships.

Contrast in the Lighting Situation – [Situation 1, 9]
The artificial lighting can denote a clear difference and thereby create contrasts that highlight certain qualities of the *coupling*. For example, this occurs when creating a contrasting relationship with the wall. The distinct variances in the perceived brightness emphasise the *coupling* staging a difference, and thus heightens the separation between interior and exterior.

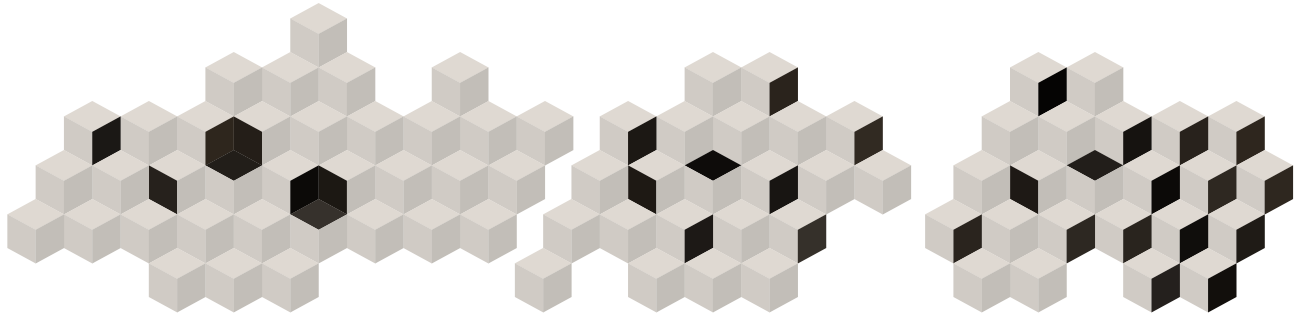
Expectations about the Lighting Progressions – [Situation 2]
The artificial lighting can lead to an expected progression and development in the luminous intensity and colour of the daylight; for example, when the artificial lighting couples with the increasing strength of the morning light, but is clearly more powerful and more rhythmically active.

Context formed by the Staging of the Lighting – [Situation 5, 12]
The *coupling* can be staged when a *coupling* parameter forms the context and frames a focus; for example, when the luminous intensity of the artificial lighting establishes a connection with the outdoor illumination level and forms the context for rhythmic interactions between reflections of the daylight and the artificial lighting.



Situation 1

En minimal variation i kunstlyset kontrasterer det blålige morgenlys /
A minimal variation in the artificial lighting contrasts the bluish morning light



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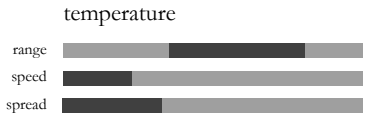
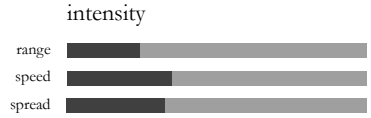




situation 1

Situation 1

En minimal variation i kunstlyset kontrasterer det blålige morgenlys

Vejret udenfor og rummet indenfor
Overskyet med antydning af rødlig horisont
Morgenlyset fra den overskyede himmel fortrænger mørket og der dannes bløde lysrum i meget kolde farver. Det rødlige lys fra solopgangen i horisonten giver en svag varm toning gennem det øverste af vinduet

Det digitale vejr
Lysfarven har et mindre variationsområde med et relativt varmere temperaturspekter.
Lysintensiteten har et meget lavt niveau og en meget begrænset variation.
Den rytmiske dynamik er langsom og udfoldes med minimal spredning i det farve- og lysmæssige arrangement.

Dagslys kunstlys relation
Både ude og inde er gennemtrængt af det blålige morgenlys, som ligger jævnt over alt. Kunstlyset bidrager med kontrast i lysfarve og intensitet, som etablerer en tydelig forskel på det lysere og varmere kunststige lys inde og det svagere morgendagslys med koldere lysfarver udenfor. En ganske minimal variation og rytme i kunstlyset kontrasterer den næsten manglende variation i det blålige morgenlys, men lægger op til den forventede udvikling fra blåligt mørke over rødlig solopgang i horisonten til dagslyset farver og intensiteter.

Situation 1

A minimal variation in the artificial lighting contrasts the bluish morning light

The Weather Outside and the Space Inside

Cloudy with a hint of a reddish horizon

The morning light from the overcast sky displaces the darkness and a soft light-zone in very cool colours is created. The reddish light from the sunrise on the horizon provides a dimmed, warm tonality through the top-most part of the window.

The Digital Weather

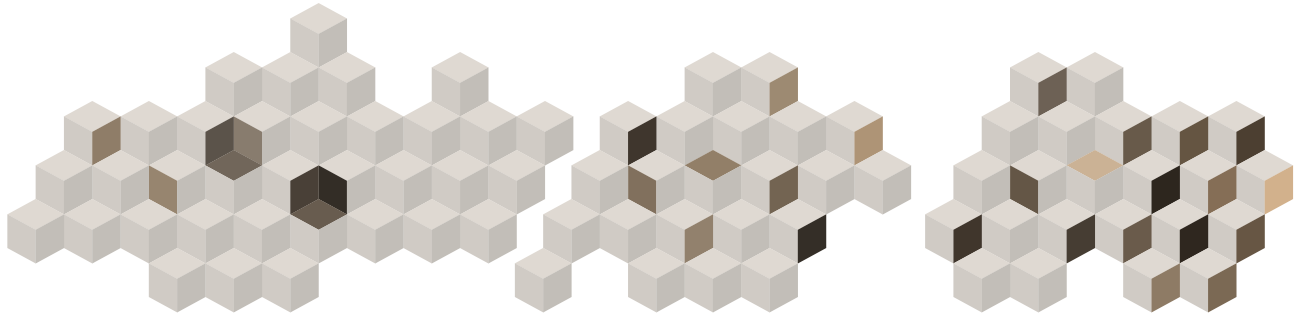
The colour of the light has a slight range of variation, characterised by a relatively warmer temperature spectrum. The luminous intensity is very low with greatly limited variations. The rhythmic dynamism is slow and unfolds with minimal dispersion in the arrangement of the colours and lighting.

Relation between Daylight and Artificial Lighting

Both the exterior and interior are permeated by a bluish morning light that is evenly dispersed everywhere. The artificial lighting helps establish contrast in the colour and intensity of the light, which establishes a clear distinction between the brighter and warmer artificial lighting inside and the fainter morning light outside in cool colours. A rather minimal variation and rhythm in the artificial lighting contrasts with the nearly absent variation in the bluish morning light. Yet, the artificial lighting sets the stage for the expected progressions from bluish darkness, over to a reddish sunrise on the horizon, to daylight's full range of colours and luminous intensities.

Situation 2

Kunstlyset kobler til en forventning i dagslysets tiltagende styrke /
The artificial lighting couples to an expectation about daylight's increasing strength



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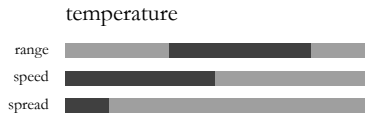
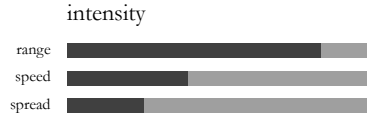
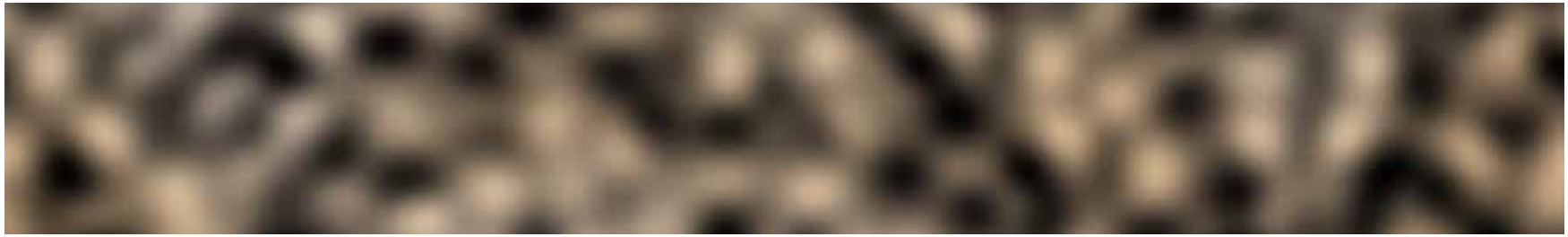






situation 2

Situation 2

Kunstlyset kobler til en forventning i dagslysets tiltagende styrke

Vejret udenfor og rummet indenfor
Lettere overskyet og lidt sol.
Himmellyset er rettet direkte ind på væggen, fortrænger morgenmørket og efterlader en stor variation i farvetegningen. Den diffuse refleksion fra gulv og væg slører rumskyggernes aftegninger.

Det digitale vejr
Lysfarven har et mellemstort variationsområde med et relativt varmere temperaturspekter.
Lysintensiteten har et relativt lavt niveau og en meget stor variation.
Den rytmiske dynamik er hurtig og udfoldes med tydelig spredning i arrangementet af lysfarven og stor spredning i lysintensiteten.

Dagslys kunstlys relation
Kunstlyset har lysere og varmere farver end dem, der udspiller sig i det reflekterede dagslys.
Dagslyset er lige brudt frem og kunstlyset lægger op til en forventet udvikling i lysintensitet og farver.
Her kobler kunstlyset til dagslysets tiltagende styrke, netop ved at være tydeligt kraftigere og rytmisk mere aktiv end dagslyset. Der skabes her en forventning om dagslysets tiltagen, som kort efter indfries med en udvikling som er hastig og synlig for øjet.

Situation 2

The artificial lighting couples to an expectation about daylight's increasing strength

The Weather Outside and the Space Inside

Slightly overcast with a bit of sun.

The diffuse light from the sky is directed onto the wall, displacing the morning darkness and leaving a large variation in the colour pattern. The diffuse reflection from the floor and wall blurs the demarcation of the space's shadows.

The Digital Weather

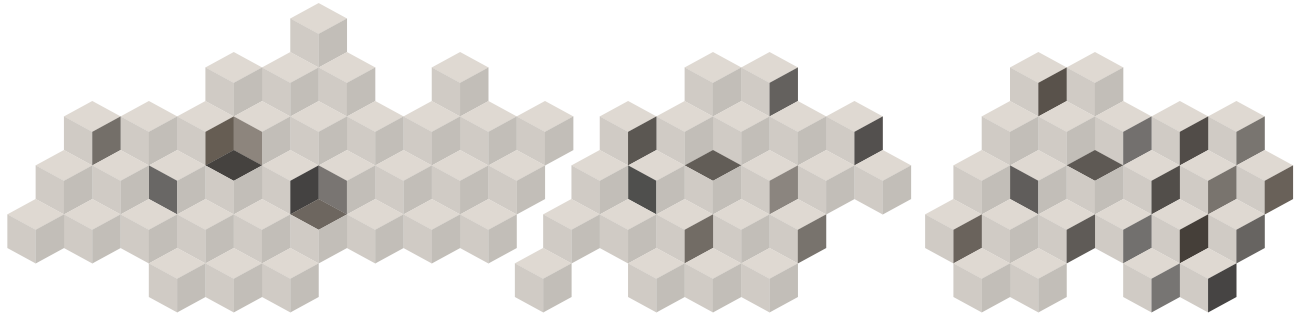
The colour of light is of a medium range of variation, with a relatively warmer temperature spectrum. The luminous intensity is relatively low level and has a vast variation. The rhythmic dynamism is rapid and unfolds with a clear dispersion in the arrangement of the light colour, as well as exuding a large dispersion of luminous intensity.

Relationship between Daylight and Artificial Lighting

The artificial lighting is brighter with warmer colours than those occurring in the reflected daylight. The daylight has just broken forth and the artificial lighting sets the stage for an expected progression in the luminous intensity and colours. Here, the artificial lighting couples to daylight's intensifying strength, just by being clearly stronger and more rhythmically active than the daylight. An expectation of the increasing daylighting is created, which shorty after is met by a progression that is fast and visible to the eye.

Situation 3

Dynamikken i lysintensiteten i kunstlysets understreger koblingen til dagslys dynamikken /
The dynamism in the luminous intensity of the artificial lighting emphasises the connection to the dynamism of daylight



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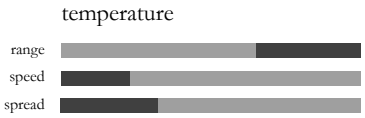
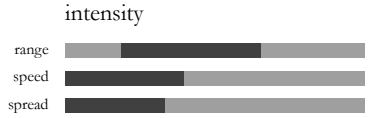




situation 3

Situation 3

Dynamikken i lysintensiteten i kunstlysets understreger koblingen til dagslys dynamikken

Vejret udenfor og rummet indenfor

Overskyet

Lyset fra den overskyede himmel producerer et jævnt køligt belyst rum, kun antydningsvis med en varmere refleksion fra bygningen overfor. De store rumskygger gør sig gældende med antydninger af farve og intensitetsvariationer.

Det digitale vejr

Lysfarven har et mindre variationsområde med et relativt koldere temperaturspekter.
Lysintensiteten har et relativt lavere niveau og en begrænset variation.
Den rytmiske dynamik er tydelig og udfoldes med mindre spredning i det farve og lysmæssige arrangement.

Dagslys kunstlys relation

Kunstlyset underbygger de farver og intensiteter der udfolder sig i dagslysrefleksionerne. Kunstlyset har dog en hastighed i dynamikken som er hurtigere end dagslysets dynamik. Intensiteten i kunstlyset er en smule stærkere end dagslyset i rummet, og relaterer sig derved til lyset udenfor. Koblingen mellem ude og inde er således her defineret ved lysintensiteten i kunstlyset samt i kunstlysets dynamiske understregning af dagslys dynamikken.

Situation 3

The dynamism in the luminous intensity of the artificial lighting emphasises the connection to the dynamism of daylight

The Weather Outside and the Space Inside

Overcast

The light from the overcast sky produces a smooth, coolly illuminated space, only with a vague warmer reflection from the building opposite the space. The large shadows in the space apply themselves with hints of colour and variations in luminous intensity.

The Digital Weather

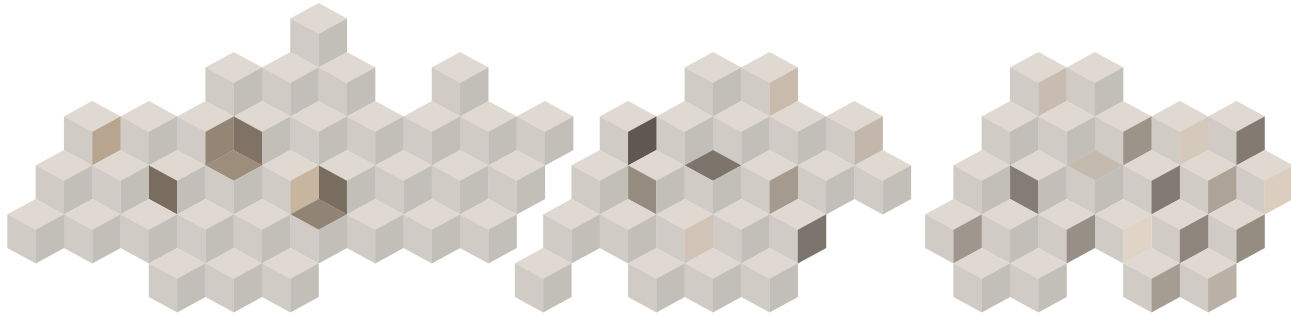
The colour of light has a slight range of variation and a relatively cooler temperature spectrum. The luminous intensity is relatively low-level and of limited variation. The rhythmic dynamism is clear and unfolds with less dispersion in the arrangement of the colour and luminous intensity.

Relationship between Daylight and Artificial Lighting

The artificial lighting supports the colours and intensities that unfold in the reflections of the daylight. The artificial lighting has a speed in the dynamics which is faster than the dynamics of the daylight. The intensity of the artificial lighting is a bit stronger than that of the daylight in the space, and thereby relates to the light outside. The coupling between exterior and the interior is consequently defined by the artificial lighting's luminous intensity and its dynamic underscoring of daylight's dynamism.

Situation 4

Der etableres en næsten symbiotisk kobling mellem ude og inde /
An almost symbiotic coupling between indoors and outdoors is established



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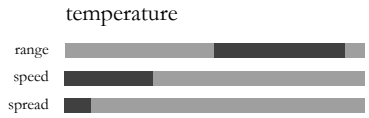
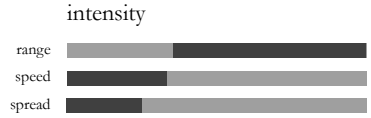




situation 4

Situation 4

Der etableres en næsten symbiotisk kobling mellem ude og inde

Vejret udenfor og rummet indenfor
Lettere overskyet og lidt sol
Rummet er opfyldt af diffust himmellys i en køligere farve, men oplyses dertil af en kraftig varm diffus solindfald gennem det øverste af vinduet. Den inderste del af rummet er tydelig oplyst af det direkte sollys, som skaber et varmt lysrum i det inderste af lokalet.

Det digitale vejr
Lysfarven har et mindre variationsområde med et relativt neutralt temperaturspekter.
Lysintensiteten er relativt høj og har en stor variation.
Den rytmiske dynamik er meget langsom og udfoldes med mindre spredning i det farve og lysmæssige arrangement.

Dagslys kunstlys relation
Et diffust sollys lægger sig hen over væggen og iagttagelsesinstrumentet, og koblingen mellem kunstlyset og det diffuse sollys fremstræder med stor tydelighed.
Kunstlyset operer her med et spekter af intensiteter og farve som minder om det samlede dagslys refleksioner, og der etableres således en næsten symbiotisk *kobling* mellem ude og inde.

Situation 4

An almost symbiotic coupling between indoors and outdoors is established

The Weather Outside and the Space Inside

Slightly overcast with a bit of sun

The space is filled with diffuse light from the sky in a cooler colour, but is then pierced by a strong warm diffuse sunlight entering through the top of the window. The inner part of the space is clearly illuminated by direct sunlight, which establishes a warm light-zone in the innermost part of the space.

The Digital Weather

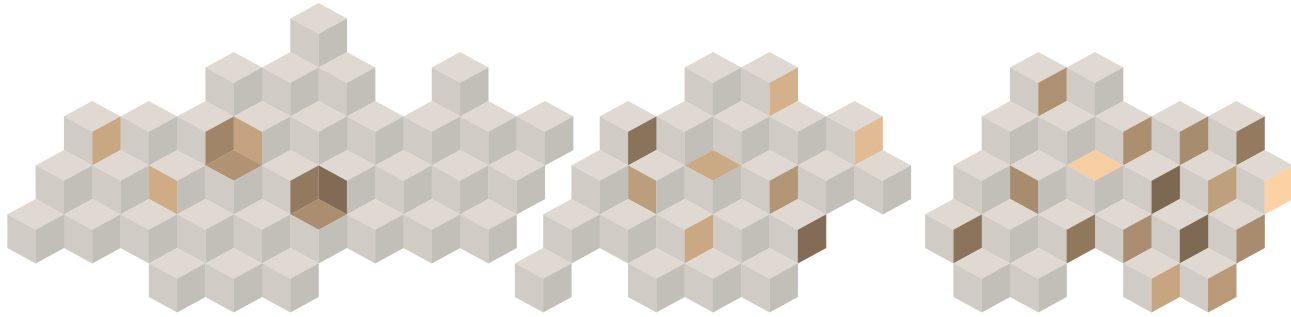
The colour of the light has a smaller range of variation and a relatively neutral temperature spectrum. The luminous intensity is relatively high and has a large variation. The rhythmic dynamism is very slow and is unfolds with less dispersion in the arrangement of the colour and luminous intensity.

Relationship between Daylight and Artificial Lighting

A diffuse sunlight settles across the wall and the observational instrument, and the coupling between the artificial lighting and the diffuse sunlight appears extremely clear. Here, the artificial lighting operates within a range of intensities and colours reminiscent of the total daylight reflections, and thus establishes an almost symbiotic coupling between outside and inside.

Situation 5

Et mindre varieret kunstlys danner kontekst for et mere uroligt sollys /
A less varied artificial lighting crates a context of a more unsettled sunlight



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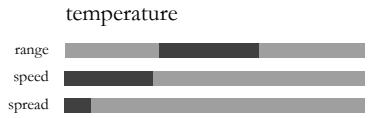
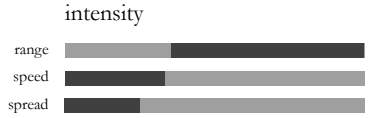
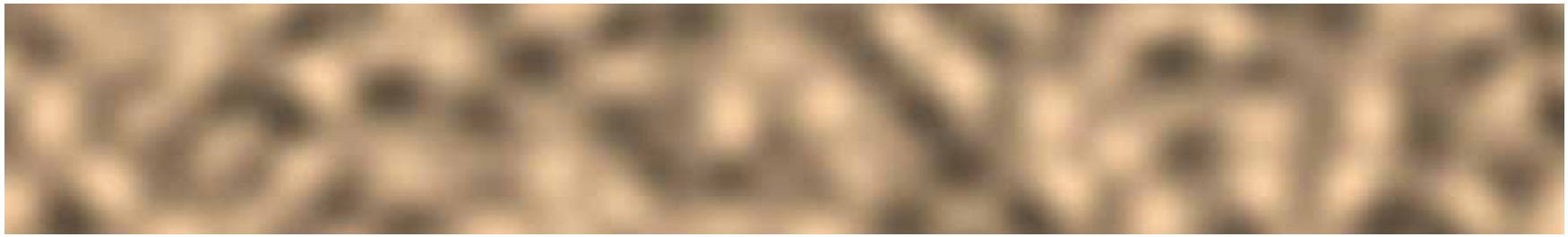






situation 5

Situation 5

Et mindre varieret kunstlys danner kontekst for et mere uroligt sollys

Vejret udenfor og rummet indenfor
Sol til let skydække
Sollyset skinner direkte ind af den øverste del af vinduet og rammer både væg og iagttagelsesinstrument, således der aftegnes skarpe skygger. De store rumskygger træder ligeledes tydeligt frem. Himmellyset og refleksionerne fra solinstrålingen skaber et sammenhængende soloplyst rum.

Det digitale vejr
Lysfarven har et mindre variationsområde med et varmt temperaturspekter.
Lysintensiteten er relativt høj og har en stor variation.
Den rytmiske dynamik er langsom og udfoldes med begrænset variation i arrangementet af lysfarve og større variation i lysintensitet.

Dagslys kunstlys relation
Da iagttagelsesinstrumentet er i direkte sollys, fremhæves koblingen mellem kunstlyset og solen som direkte lyskilde. Lysrefleksionerne i rummet opleves som en meget direkte konsekvens af det direkte sollys. Kunstlyset er her mindre varieret end dagslyset, og danner derved kontekst for det mere uroligt varierende sollys.

Situation 5

A less varied artificial lighting crates a context of a more unsettled sunlight

The Weather Outside and the Space Inside

Sun to light cloud cover

The sunlight shines in directly through the top part of the window and hits both the wall and the observational instrument so that sharp shadows are delineated. The large shadows in the space clearly stand forth. The diffuse light from the sky and the reflections from the incoming sunrays create a seamlessly sunlit space.

The Digital Weather

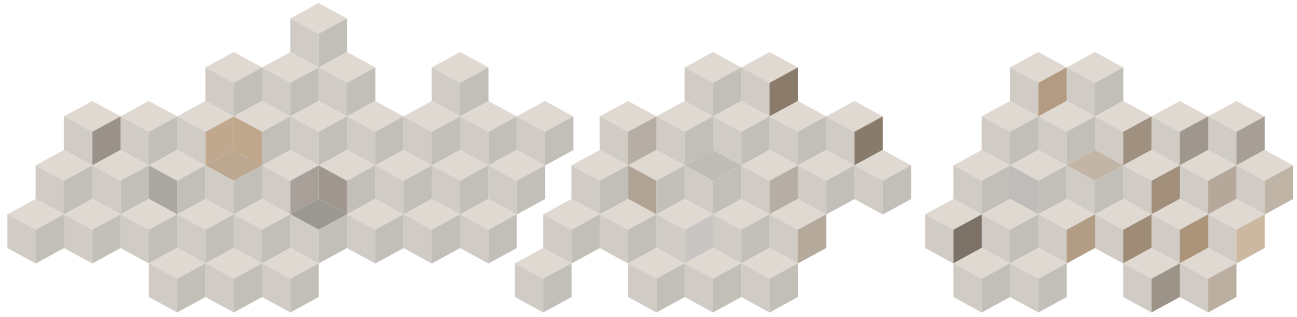
The colour of the light has a smaller range of variation and a warm temperature spectrum. The luminous intensity is relatively high and varies greatly. The rhythmic dynamism is slow and unfolds with limited variation in the arrangement of the colour, and with greater variation in the luminous intensity.

Relationship between Daylight and Artificial Lighting

Since the observational instrument is situated in direct sunlight, the *coupling* between the artificial lighting and the sun as a direct light source is accentuated. The light reflections in the space are perceived as a very direct consequence of the direct sunlight. Here, the artificial lighting is less varied than the daylight; thereby creating a context for the restless sunlight.

Situation 6

Kunstlyset bevirker en næsten symbiotisk kobling med dagslyssituationen /
The artificial lighting causes an almost symbiotic coupling with the situation of the daylight



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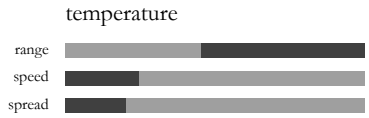
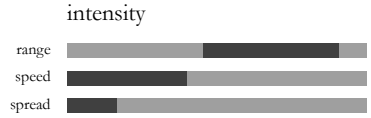




situation 6

Situation 6

Kunstlyset bevirker en næsten symbiotisk kobling med dagslyssituationen

Vejret udenfor og rummet indenfor

Jævnt overskyet

Der er tale om en kølig jævn belysning fra en jævnt overskyet himmel, med et lysrum der udfolder sig i hele rummets dybde. Rumskyggen over himmelgrænseplanet belyses af refleksion fra den gullige bygning overfor.

Det digitale vejr

Lysfarven har et mellemstort variationsområde med et relativt koldere temperaturspekter.
Lysintensiteten er relativt høj og har en stor variation.
Den rytmiske dynamik er tydelig og udfolder sig med mindre variation i det farve og lysmæssige arrangement.

Dagslys kunstlys relation

Kunstlyset underbygger her den farve-pallette, intensiteter og dynamikker, der allerede ved dagslyssituationen udfolder sig i rummet. Kunstlyset har dog en lidt stærkere intensitet og fremhæver derved de eksisterende kvaliteter i dagslyssituationen. Dette bevirker en symbiotisk kobling med det derude.

Situation 6

The artificial lighting causes an almost symbiotic coupling with the situation of the daylight

The Weather Outside and the Space Inside

Uniformly cloudy

There is a cool even lighting from a uniformly overcast sky, with a light-zone that unfolds across the depth of the entire space. The shadows of space over the no-sky line are illuminated by the reflection off the yellowish building that stands opposite the space outside.

The Digital Weather

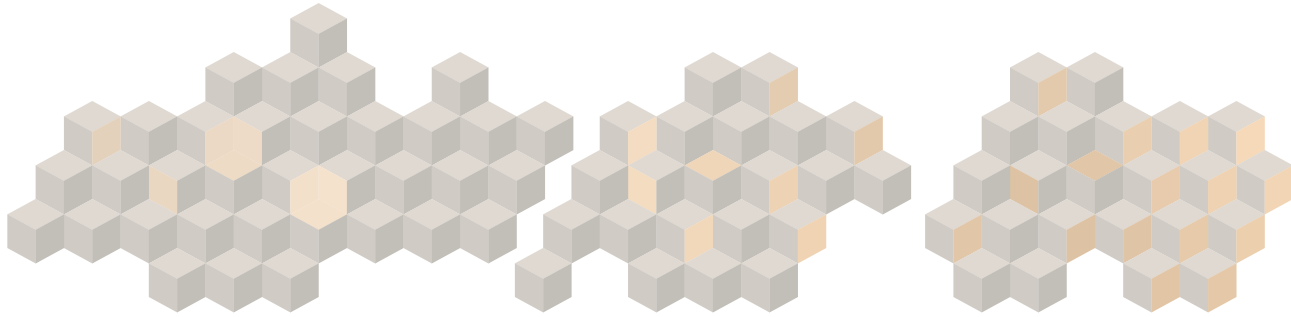
The colour of the light has a medium range of variation and a relatively cooler temperature spectrum. The luminous intensity is relatively high and varies largely. The rhythmic dynamism is evident and unfolds with less variation in the arrangement of the colour and luminous intensity.

Relationship between Daylight and Artificial Lighting

Here, the artificial lighting reinforces the colour palette, intensities, and dynamics that already unfold themselves in the situation of the daylight in the space. The artificial lighting has a slightly stronger intensity and highlights the existing qualities of situation of the daylight. This causes a symbiotic *coupling* with the outside world.

Situation 7

Kunstlysets hvidhed og intensitet kobler til de tilsvarende lyskvaliteter i det direkte sollys /
The whiteness and intensity of the artificial lighting couple to the corresponding qualities of light extant in the direct sunlight



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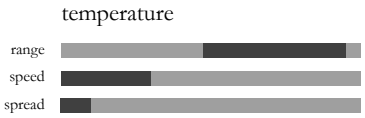
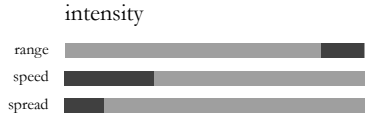




situation 7

Situation 7

Kunstlysets hvidhed og intensitet kobler til de tilsvarende lyskvaliteter i det direkte sollys

Vejret udenfor og rummet indenfor
Sol med let spredt skydække
Rummet domineres af et kraftigt varmt sollys der reflekteres fra en stor del af gulvet og det underste af den modstående væg. Himmellysets afskygning ved himmelgrænseplanet fremtræder i en varm tone, dog sløret en smule af solrefleksionen.

Det digitale vejr
Lysfarven har et mellemstort variationsområde med et relativt koldere temperaturspekter.
Lysintensiteten er høj og har en meget lille variation.
Den rytmiske dynamik er tydelig og udfoldes med begrænset variation i det farve og lysmæssige arrangement.

Dagslys kunstlys relation
Kunstlyset fremtræder her indenfor en større grad af hvidhed end det omgivende rum. Både væggen og instrumentet er helt udvisket af refleksionslyset fra den voldsomme sollysrefleksion i rummet. Kunstlyset blandes med refleksionslyset, og er varierende på lyshed og farver, der er sammenlignelige med variationerne i sollysrefleksionen. Koblingen mellem ude og inde er karakteriseret ved kunstlysets hvidhed og intensitet, der relaterer til de tilsvarende lyskvaliteter i det direkte sollys.

Situation 7

The whiteness and intensity of the artificial lighting couple to the corresponding qualities of light extant in the direct sunlight

The Weather Outside and the Space Inside

Sun with lightly scattered cloud cover

The space is dominated by a strong, warm sunlight that is reflected from a large portion of the floor and the lower part of the opposite wall. The nuances of the diffuse light from the sky along the no-sky line appear in a warm tone; however blurred a bit by the reflections of the sun.

The Digital Weather

The colour of the light has a medium range of variation and a relatively cooler temperature spectrum. The luminous intensity is high with minimal variation.

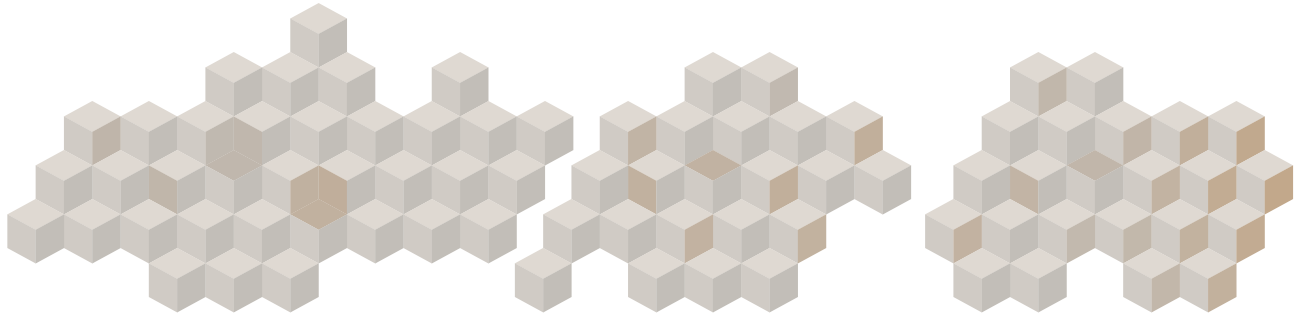
The rhythmic dynamism is clear and unfolds with limited variation in the arrangement of the colour and luminous intensity.

Relationship between Daylight and Artificial Lighting

Here, the artificial lighting flows inside with a higher degree of whiteness than that of the surrounding space. Both the wall and the observational instrument are rendered completely indistinct due to the reflected light of the powerful reflections from the sun in the space. The artificial lighting is co-mixed with the reflected light, and varies in brightness and colours comparable to the variations in the sun's reflections. The coupling between outside and inside is characterised by the artificial lights' whiteness and intensity, which relate to the paralleling light qualities of the direct sunlight.

Situation 8

Kunstlysets hvidhed og intensitet kobler til de tilsvarende lyskvaliteter i det direkte sollys /
The whiteness and intensity of the artificial lighting couple to the corresponding qualities of light extant in the direct sunlight



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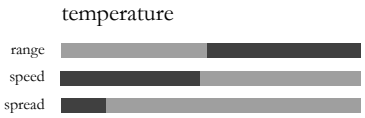
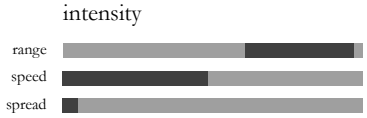




situation 8

Situation 8

Kunstlyset fremhæver kvaliteter i koblingen ved en understregning af de dynamiske relationer

Vejret udenfor og rummet indenfor
Delvis overskyet
Rummet er belyst af et diffust himmellys i en varm tone.. Den diffuse refleksion fra gulv og refleksionen fra modsatte væg gør, at der er kun antydninger af rumskygger og himmelgrænseplan.

Det digitale vejr
Lysfarven har et mellemstort variationsområde med et relativt neutralt temperaturspekter.
Lysintensiteten er høj med en relativt større variation.
Den rytmiske dynamik er hurtig og udfoldes med meget lidt variation i det farve og lysmæssige arrangement.

Dagslys kunstlys relation
Kunstlys, refleksionslys og skygger blandes inden for det samme spektrum af lysheder og lysfarver. Kunstlyset får karakter ved en hektisk dynamik der skifter hurtigere end dagslysets dynamik. Kunstlyset er altså mere dynamisk end daglyset og fremhæver kvaliteter i koblingen med udelyset ved en understregning af de dynamiske relationer.

Situation 8

The artificial lighting highlights the qualities of the coupling by accentuating the dynamic relationships.

The Weather Outside and the Space Inside

Partly cloudy

The space is illuminated by diffuse light from the sky in a warm tone. The diffuse reflection off the floor and the reflection off the opposite wall cause there only to be hints of the shadows of the space and the no-sky line.

The Digital Weather

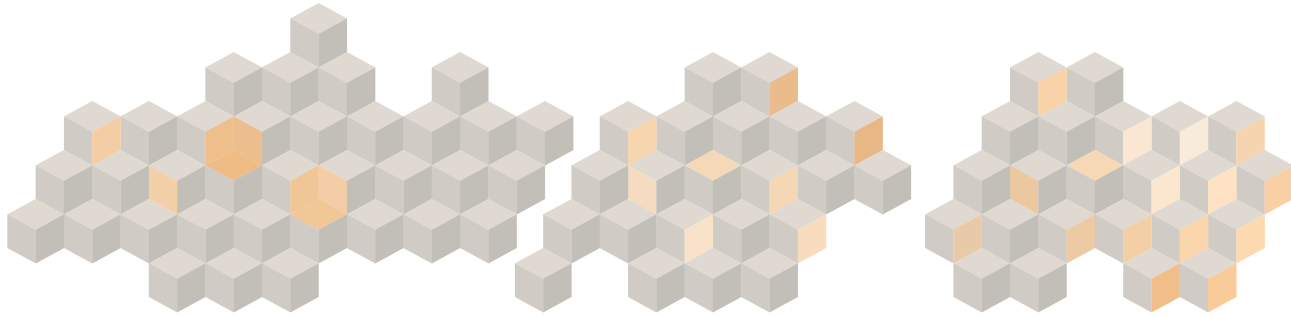
The colour of the light has a medium range of variation and a moderately neutral temperature spectrum. The luminous intensity is high with relatively large variation. The rhythmic dynamism is quick and unfolds with very minimal variation in the colour and luminous intensity in the arrangement.

Relationship between Daylight and Artificial Lighting

The artificial lighting, the reflected light, and the shadows are co-mixed within the same spectrum of perceived brightness and light colours. The artificial lighting takes on the character of a frenzied dynamic, which shifts faster than the dynamics of the daylight. The artificial lighting is therefore more dynamic than the daylight, and highlights the qualities of the relationship with outdoor illumination by underlining the dynamic relationships.

Situation 9

Kunstlyset fremhæver koblingens irammesættelse ved tydelige forskelle i lysfarver, intensiteter og dynamikker /
The artificial lighting highlights the coupling's framing via distinct differences in the colours of light, intensities, and dynamism



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situation 9

Situation 9

Kunstlyset fremhæver koblingens irammesættelse ved tydelige forskelle i lysfarver, intensiteter og dynamikker

Vejret udenfor og rummet indenfor
Sol med let spredt skydække.
Rummet domineres af et varmt diffust lys med kun antydninger at rumskygger. Himmellysets skarpere refleksion i gulvet markerer sig ligesom den modsatte væg også agerer diffus lysgiver.

Det digitale vejr
Lysfarven har et relativt stort variationsområde med et tydeligt varmere temperaturspekter.
Lysintensiteten er høj og har en meget lille variation.
Den rytmiske dynamik er tydelig og udfoldes med meget stor variation i arrangementet af lysfarven og næsten ingen variation i lysintensiteten.

Dagslys kunstlys relation
Gennem sin store farvedynamik insisterer kunstlyset på en egen tilstedeværelse, og fremstår tydeligt som selvstændig aktør med sit meget varme og intensive lys, som ikke ellers kendetegner lyset i rummet. Kunstlyset etablerer således et kontrastligt forhold til væggen, hvor de tydelige forskelle i lyshed fremhæver koblingens irammesættelse ved at påpege adskillelse og forskel i lysfarver, intensiteter og dynamikker.

Situation 9

The artificial lighting highlights the coupling's framing via distinct differences in the colours of light, intensities, and dynamism

The Weather Outside and the Space Inside

Sun with lightly scattered cloud cover.

The space is dominated by warm diffuse light, having only hints of shadows in the space. The sharper reflection of the diffuse light on the floor stands out, just as the opposite wall acts as a surface reflecting diffuse light.

The Digital Weather

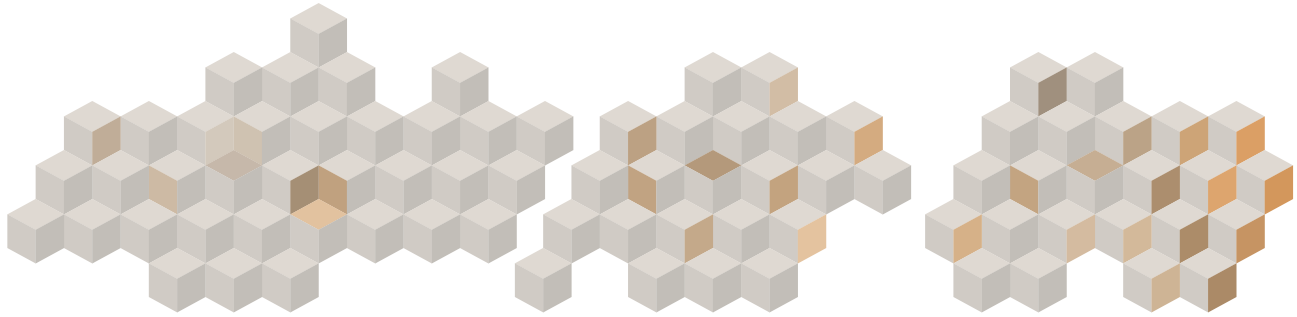
The colour of the light has a relatively large range of variation and a clearly warmer temperature spectrum. The luminous intensity is high and with very small variation. The rhythmic dynamism is distinct and unfolds with great variation in the arrangement of the colour of the lighting. And there is almost no variation in the luminous intensity.

Relationship between Daylight and Artificial Lighting

Through its vast chromatic dynamism, the artificial lighting demands its own presence and clearly emerges as an independent actor; with its very warm, intense lighting that is otherwise not characteristic of the light in the given space. Hence, the artificial lighting establishes a contrasting relationship with the wall, where the clear differences in the perceived brightness highlight the coupling's framing by pointing to separations and divergences between the colours of light, the intensities, and the dynamics.

Situation 10

Kunstlyset iscenesætter koblingen gennem en dynamik i det digitale vejrlig der blander med dagslysdynamikken /
The artificial lighting stages the coupling through the digital weather's dynamism, which co-mingles with daylight's dynamism



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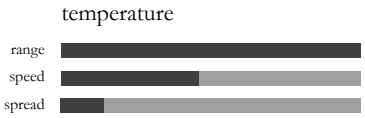
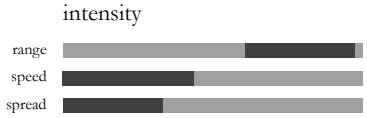




situation 10

Situation 10

Kunstlyset iscenesætter koblingen gennem en dynamik i det digitale vejrlig der blander med dagslysdynamikken

Vejret udenfor og rummet indenfor
Delvis overskyet
Rummet er belyst af et køligt diffust himmellys dog med tydelige rumskygger, således himmelgrænseplanet træder frem, og der tydeligt er mørkere ved loftet end ved gulvet.
Vinduets lysindfald reflekteres fra gulv og vægge og danner lysrum i graduerende intensiteter imellem disse lysgivere.

Det digitale vejr
Lysfarven har et meget stort variationsområde med et fuldt temperaturspekter fra varm til kold.
Lysintensiteten er høj med en relativt større variation.
Den rytmiske dynamik er hurtig og udfoldes med stor variation i arrangementet af lysfarven og mindre variation i intensiteten.

Dagslys kunstlys relation
Kunstlyset er her sat så det underbygger de farver, intensiteter og rytmiske variationer i dynamikken, som fremstår i den samlede lyskomposition i rummet.
Kunstlyset iscenesætter en fornemmelse af en direkte *kobling* mellem lyssituationen ude og inde, der involverer samtlige spektre i lysdannelsen.
Kunstlyset opretholder en dynamik i det digitale vejrlig, som holder sig indenfor dagslysets variationer, og samtidig påpeger kunstlyset de rytmiske sammenhænge mellem de digitale skyers fluktuering og dagslysdynamikken.

Situation 10

The artificial lighting stages the coupling through the digital weather's dynamism, which co-mingles with daylight's dynamism

The Weather Outside and the Space Inside

Partly cloudy.

The space is illuminated by cool diffuse light from the sky, yet there are distinct shadows in the space, such that the no-sky line emerges. The space is visibly darker towards the ceiling than the floor. The light coming in through the window reflects off the floor and walls, forming light-zones of gradated intensities between the light giving bodies.

The Digital Weather

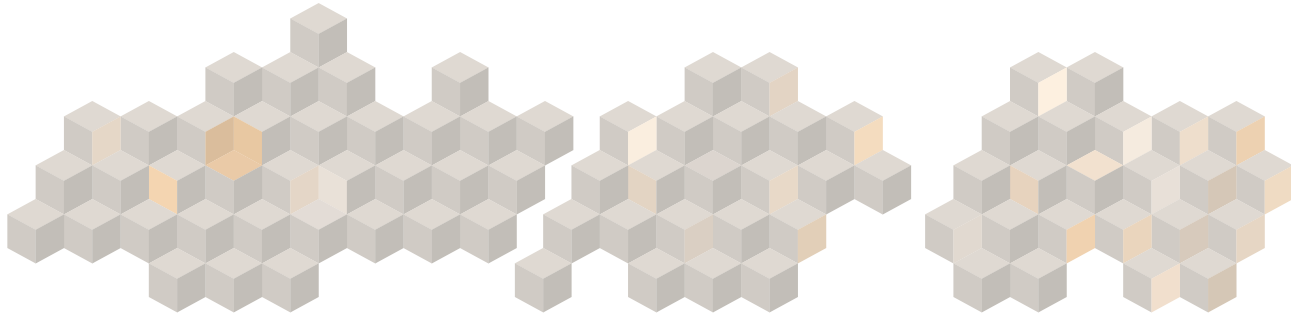
The colour of light exists with a massive range of variation and a full temperature spectrum that spans from warm to cold. The luminous intensity is high and of relatively extensive variation. The rhythmic dynamism is quick and unfolds with wide variation in the arrangement of the colour of light, and with less variation in the intensity.

Relationship between Daylight and Artificial Lighting

Here the artificial lighting is set so it supports the colours, intensities, and rhythmic variations of the dynamics appearing within the total composition of the light in the space. The artificial lighting stages the sense of a direct *coupling* between the exterior and interior lighting situations, which involve all spectra in the formation of the light. The artificial lighting sustains dynamism in the digital weather, which remains within the variations of the daylight. This also concurrently highlights the artificial lighting's rhythmic connections to the digital clouds' fluctuations as well as the dynamism of the daylight.

Situation 11

Koblingen er styret af lysintensiteten i kunstlyset, der etablerer en sammenhæng med sollyset udenfor /
The coupling is controlled by the luminous intensity of the artificial lighting, which establishes a connection to the sunlight outside



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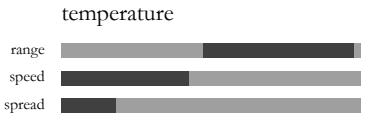
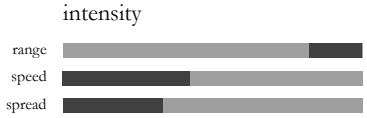




situation 11

Situation 11

Koblingen er styret af lysintensiteten i kunstlyset, der etablerer en sammenhæng med sollyset udenfor

Vejret udenfor og rummet indenfor
Sol med delvis tyndt skydække.
Indenfor reflekteres det direkte sollys meget kraftigt fra en mindre del af gulvet og den modstående vægflade. Det soloplyste gulvparti samt modstående væg agerer således som de mest dominante lysgivere og sender et meget stærkt varmt lys ud igennem rummet.
Rummet kan generelt karakteriseres ved et meget diffust varmt lys, der virker udlignende i forhold til rummets farver, til skyggedannelser og til himmelgrænseplan.

Det digitale vejr
Lysfarven har et mellemstort variationsområde med et relativt bredt temperaturspekter.
Lysintensiteten er høj men holder sig indenfor en forholdsvis begrænset variation.
Den rytmiske dynamik er hurtig og udfoldes med stor variation i det farvemæssige arrangement.

Dagslys kunstlys relation
Kunstlysets dynamik fremhæver dynamikken i solreflekslyset indenfor og derfor kobler den til sollyset udenfor.
Kunstlyset udfolder en varmere variation i lysspekteret end dagslyset umiddelbart udenfor vinduet og relaterer sig således til solen som lyskilde.
Koblingen mellem ude og inde er her styret af lysintensiteten i kunstlyset, der etablerer en sammenhæng med sollyset udenfor.

Situation 11

The coupling is controlled by the luminous intensity of the artificial lighting, which establishes a connection to the sunlight outside

The Weather Outside and the Space Inside

Sun with partial, thin cloud cover.

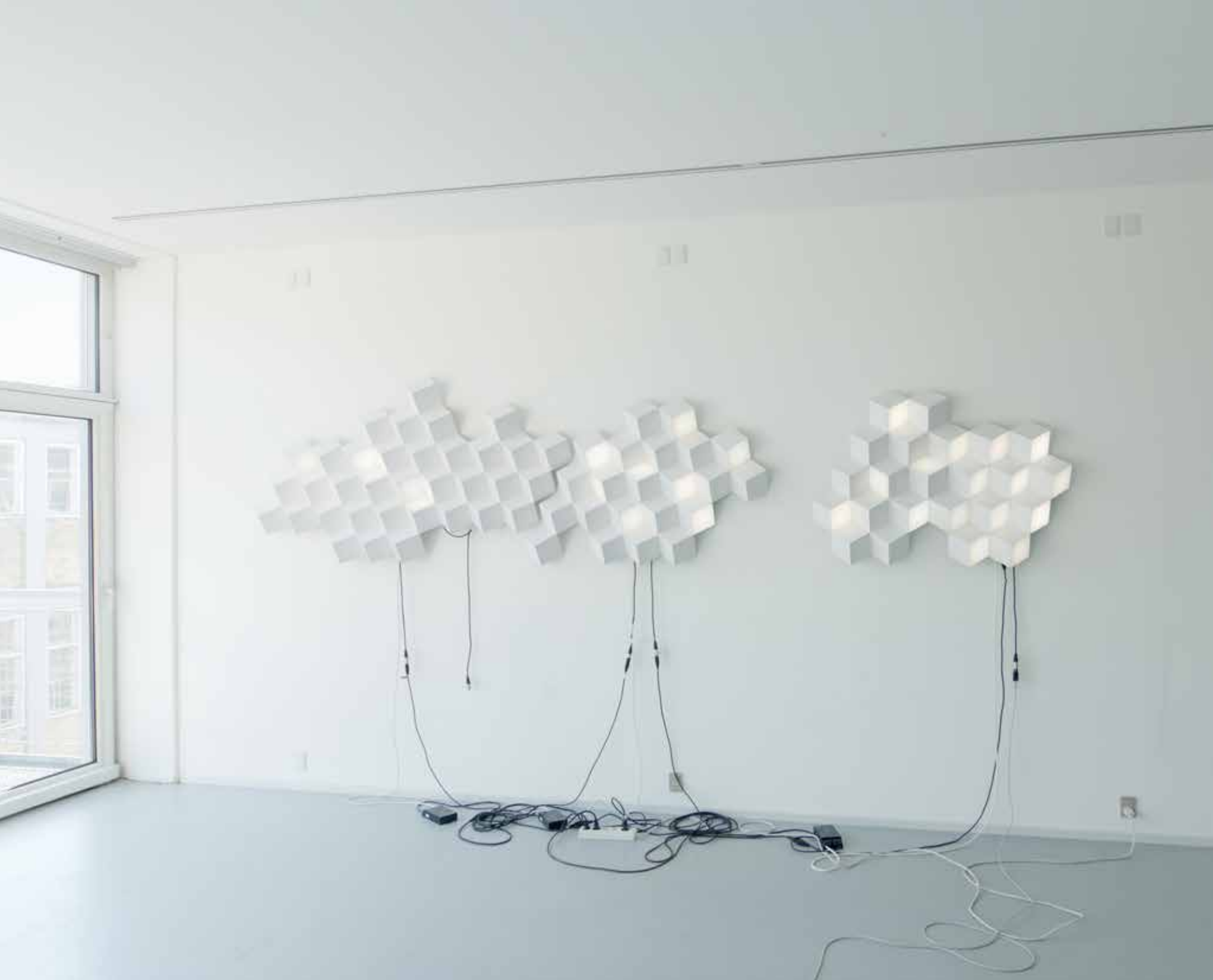
Inside, the sunlight reflects very strongly from a small portion of the floor and the surface of the opposing wall. The sunlit segment of the floor and the opposing wall act as the most dominant light giving bodies and send an incredibly strong, warm light throughout the space. The space can be generally characterised by a very diffuse warm light that seems equalising in relation to the space's colours of the space, the formation of shadows, and the no-sky line.

The Digital Weather

The colour of light has a medium range of variation and a relatively wide temperature spectrum. The light intensity is high, but continues to have relatively limited variation. The rhythmic dynamism is fast and unfolds with great variation in the chromatic arrangement.

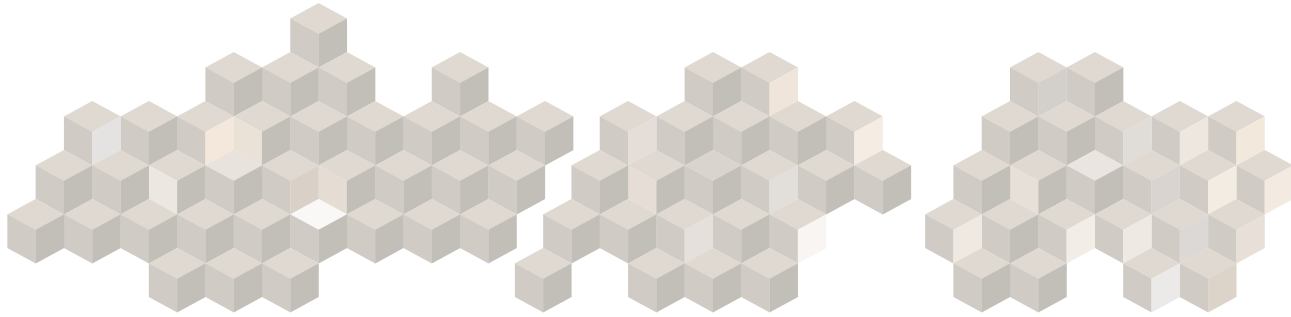
Relationship between Daylight and Artificial Lighting

The dynamism of the artificial lighting highlights the dynamism the sunlight reflected inside the space, and therefore the artificial light can be seen to couple itself to the sunlight outside. The artificial lighting unfolds in a warmer variation of the lighting spectrum than does the daylight immediately outside the window; and thus it can be seen to correlate to the sun as a light source. This coupling between inside and outside is controlled by the light intensity of the artificial lighting, which establishes a connection with the sunlight outside.



Situation 12

Koblingen iscenesættes ved at lysintensiteten danner kontekst og irammesætter fokus /
The coupling is staged by the luminous intensity creating the context and framing a focus



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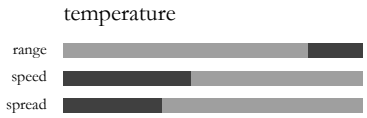
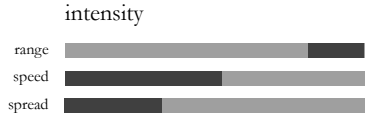




situation 12

Situation 12

Koblingen iscenesættes ved at lysintensiteten danner kontekst og irammesætter fokus

Vejret udenfor og rummet indenfor
Klar sol og blå himmel.
Hele rummet er oplyst af det kølige let diffuse himmellys. Solen bevirker stærke omgivelsesrefleksioner, der markerer sig stedvist i rummet ved deres rettethed og klare aftegning.
De reflekterende lysgivere udefra aftegner således tydelige afgrænsede lysrum. Her er det særlig tydeligt hvordan omgivelsens reflekslys udfylder skyggen over himmelgrænseplanet ud mod vinduet med relativ varm lysfarve i relativ høj intensitet.

Det digitale vejr
Lysfarven har et lille variationsområde med et relativt koldere temperaturspekter.
Lysintensiteten er høj men holder sig indenfor en forholdsvis begrænset variation.
Den rytmiske dynamik er hurtig og udfoldes med stor variation i det lysmæssige arrangement.

Dagslys kunstlys relation
Den rytmiske dynamik i kunstlyset er tydelig og en anelse hurtigere end dagslysets dynamik.
Kunstlyset underbygger her de farver og rytmiske variationer i dynamikken, som fremstår i rummets samlede lyssituation. Intensiteten i kunstlyset er dog stærkere end de dagslysrefleksioner, der udfolder sig indenfor i rummet, og kunstlyset synes således at stå mere i forhold til dagslyset udenfor end dagslyset indenfor.
Koblingen iscenesættes ved at et *koblings*parameter danner kontekst og irammesætter fokus. Her foregår det ved at lysintensiteten i kunstlyset etablerer en sammenhæng med lysniveauerne udenfor og danner kontekst for rytmiske interaktioner mellem dagslysrefleksionen og kunstlyset.

Situation 12

The coupling is staged by the luminous intensity creating the context and framing a focus

The Weather Outside and the Space Inside

Bright sun and blue sky.

The entire space is lit by cool, pale diffuse light from the sky. The sun causes strong reflections in the surroundings that gradually delineate themselves in the space via their directionality and sharp definition. Accordingly, the light giving bodies outside clearly demarcate the light-zones. Here, it is particularly evident how the reflected light in the surroundings fills the shadow over the no-sky line towards the window with a relatively warm colour of light of a relatively high intensity.

The Digital Weather

The colour of light has a slight range of variation and a relatively cooler temperature spectrum. The light intensity is high but continues to have a relatively limited variation. The rhythmic dynamism is rapid and unfolds with extensive variation in the arrangement of the colour and luminous intensity.

Relationship between Daylight and Artificial Lighting

The rhythmic dynamism of the artificial lighting is distinct and slightly faster than the dynamism of the daylight. Here, the artificial lighting supports the colours and rhythmic variations of the dynamics appearing in the space's overall lighting situation. The intensity of the artificial lighting is stronger than the reflections of the daylight that unfold inside the space. And the artificial lighting seems to be more related to the daylight outside than the daylight inside. The coupling is staged by a coupling parameter forming the context and framing a focus. This occurs when the light intensity of the artificial lighting establishes a connection with the illumination levels outside and forms the context for the rhythmic interactions in-between the reflections of the daylight and the artificial lighting.

Koblingens dynamiske skiften
The Coupling's Dynamic Changeability

Koblingens dynamiske skiften

De dynamiske kvaliteter i det samlede arrangement af kunstlyset udfolder en variation i lyshed og farve, der forandres over tid i fluktuerende kompositioner. I iagttagelsesinstrumentet er denne dynamiske udvikling fremkommet ved indstillingerne af det digitale vejrlig. Dagslyset og kunstlyset er således stillet i en relation, der åbner for, hvordan *koblingens* kvalitative specificiteter udvikler sig i et dynamisk flow, og hvordan denne *koblingens* dynamiske skiften bliver et kvalitativt parameter i sig selv.

Undersøgelserne har ikke fokuseret på kunstlysets muligheder for at kompensere for dagslysets variationer, men har derimod netop interesse i at identificere mulighederne for en yderligere kvalificering af de to lyskategoriers dynamiske samspil.

Den efterfølgende serie af parvise fotos fremstiller seks fænomener, som tydeligst kan påvises ved sammenligning af situationer, alle med fokus på at fremdrage de dynamiske aspekters udfoldelse over tid som forandringer i lyssituationen.

Sammenligning af situationer 1
Det dynamiske samspil mellem ude og inde kobles gennem de matchende lysfarver, intensiteter samt dynamiske flow.

Sammenligning af situationer 2
Kunstlysets digitale vejrlig opretholder en stabilitet, som dagslyset i sit dramatiske udsving relaterer sig til.

Sammenligning af situationer 3
Koblingen er her karakteriseret ved at kunstlyset opretholder en stabiliserende kontrast til dagslysdynamikken.

Sammenligning af situationer 4
Koblingen er her karakteriseret ved at kunstlyset opretholder en dynamisk kontrast i forhold til dagslysets stabilitet.

Sammenligning af situationer 5
Kunstlyset tilpasses specifikt til hvordan forskellige lyssituationer relaterer til koblingen af lyssituationen ude og inde.

Sammenligning af situationer 6
Koblingen mellem ude og inde understøttes af kunstlysets integrering i lyssituationen, men med to forskellige strategier.

The Coupling's Dynamic Changeability

The dynamic qualities of the overall arrangement of the artificial lighting unfold in a range of light colours and luminous intensities that change over time in fluctuating compositions. A dynamic progression exists in the observational instrument as a result of the digital weather settings. The daylight and artificial lighting are thus situated in a relationship that opens up to an understanding of the ways the *coupling's* qualitative specificities develop in a dynamic flow, which open for further understanding of the way the dynamic changeability of the *coupling* becomes a qualitative parameter in and of itself.

It is important to note that the studies presented here have intentionally not focused on the possibilities of the artificial lighting to compensate for the qualitative variations in daylight. Rather, the research has been primarily engaged with an interest in identifying opportunities for further qualifying the dynamic interactions of the two lighting categories.

The subsequent series of paired photographs presents six phenomena that can be clearly demonstrated by comparing the various situations; all with a focus on highlighting the dynamic aspects unfolding over time as changes in the lighting situations.

Comparison of Situations 1
The dynamic interplay in-between the exterior and interior is coupled via the matching colours of light, intensities, and dynamic flows.

Comparison of Situations 2
The artificial lighting's digital weathering maintains stability, whilst the dramatic fluctuations of the daylight interact with the digital weathering.

Comparison of Situations 3
Here, the coupling is characterised by the artificial lighting maintaining a stabilising contrast comparative to the dynamism of the daylight.

Comparison of Situations 4
In this situation, the coupling is characterised by the artificial lighting sustaining a dynamic contrast with the stability of the daylight.

Comparison of Situations 5
The artificial lighting specifically adapts to the ways the different lighting situations relate to the coupling of the exterior and interior lighting situations.

Comparison of Situations 6
The coupling between the exterior and interior is reinforced by the integration of the artificial lighting into the lighting situation – but with two different strategies.

Sammenligning af situationer 1
Det dynamiske samspil mellem ude og inde kobles gennem de matchende lysfarver, intensiteter samt dynamiske flow

Comparison of Situations 1

The dynamic interplay in-between the exterior and interior is coupled via the matching colours of light, intensities, and dynamic flows.

Sammenligning af situationer 1 / Comparison of Situations 1

Sammenligning af situationer 1

Det dynamiske samspil mellem ude og inde kobles gennem de matchende lysfarver, intensiteter samt dynamiske flow.

De to situationer er registreret på næsten samme tid, kun med et minuts forskel, og har således næsten samme vejrlig som udgangspunkt for dagslyssituationen.

Bestemt af det digitale vejrlig fluktuerer kunstlyset i en delikat variation af lysfarver og intensiteter, i en spredt og nuanceret fordeling hen over instrumentet. Kunstlyset er indstillet så lysheder og farver matcher dagslysets.

Som det fremgår af billedernes forskellighed, foregår der en dynamisk udvikling med subtile variationer både i kunstlyset og i sollysrefleksionerne. Det dynamiske samspil mellem ude og inde kobles gennem de matchende lysfarver, intensiteter samt dynamiske flow.

Comparison of Situations 1

The dynamic interplay between the exterior and interior is coupled by the matching colours of light, intensities, and dynamic flows.

The two situations are registered at almost the exact same time, only with a minute difference, and thus with almost precisely the same weather conditions as the basis for the daylight situation.

Determined by the digital weather, the artificial lighting fluctuates with a delicate range in the light colours and intensities; exuding a dispersed and varied distribution across the observational instrument. The artificial lighting is set so that the range of the perceived brightness and the colours match those of the daylight.

As seen in the diversity of images, a dynamic progression occurs, with subtle variations in both the artificial lighting and in the reflections of the sunlight. The dynamic interplay in-between exterior and interior is coupled by the matching colours of light, intensities, and dynamic flows.

Sammenligning af situationer 2
Kunstlysets digitale vejrlig opretholder en stabilitet, som dagslyset i sit dramatiske udsving relaterer sig til.

Comparison of Situations 2

The artificial lighting's digital weathering maintains stability, whilst the dramatic fluctuations of the daylight interact with the digital weathering.

Sammenligning af situationer 2 / Comparison of Situations 2

Sammenligning af situationer 2

Kunstlysets digitale vejrlig opretholder en stabilitet, som dagslyset i sit dramatiske udsving relaterer sig til.

De to situationer viser dagslysets dramatiske skift på en solrig dag med spredte skyer, registreret indenfor kun 30 sekunder.

Kunstlysets rytmiske dynamik opleves stabilt i forhold til dagslysets dramatiske udsving.
Ved dagslys fra en overskyet himmel opleves kunstlyset mere kraftigt, lysfarverne synes stærkere og lysheden varierer tydeligere. Ved klarere himmel og direkte sollys opleves kunstlyset mindre dynamisk, nærmest underspillet og synes svagere end dagslyset.

Koblingen er her karakteriseret ved at dynamikken i kunstlysets digitale vejrlig opretholder en stabilitet som dagslyset i sit dramatiske udsving relaterer sig til.

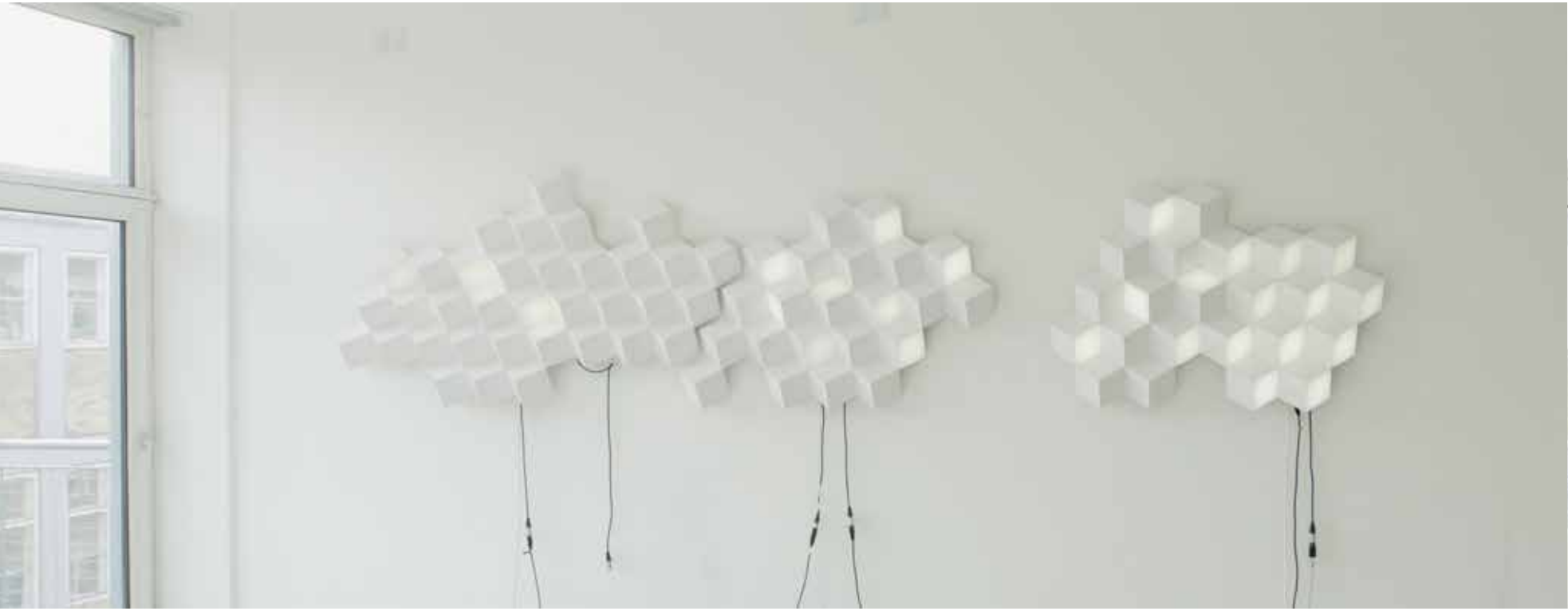
Comparison of Situations 2

The artificial lighting's digital weathering maintains stability, whilst the dramatic fluctuations of the daylight interact with the digital weathering.

The two situations show the dramatic shifting of daylight on a sunny day with scattered clouds; registered using only 30 second intervals.

The rhythmic dynamism of the artificial lighting is experienced as being stable relative to the dramatic fluctuations of the daylight. With daylight from an overcast sky, the colours of the artificial lighting appear stronger and the perceived brightness varies noticeably. With a clearer sky and direct sunlight, the artificial lighting is experienced as being less dynamic – almost understated and appearing fainter than the daylight.

Here, the *coupling* is characterized by the dynamics of the artificial lighting's digital weathering maintaining stability, whilst the dramatic fluctuations of the daylight interact with the digital weathering.



Sammenligning af situationer 3
Koblingen er her karakteriseret ved at kunstlyset opretholder en stabiliserende kontrast til dagslysdynamikken

Comparison of Situations 3

Here, the coupling is characterised by the artificial lighting maintaining a stabilising contrast comparative to the dynamism of the daylight.

Sammenligning af situationer 3 / Comparison of Situations 3

Sammenligning af situationer 3

Koblingen er her karakteriseret ved at kunstlyset opretholder en stabiliserende kontrast til dagslysdynamikken.

De to situationer er registreret kun med 30 sekunders mellemrum og tydeliggør dagslysets dramatiske skift på en dag med sol og spredte skyer.

Kunstlyset har et højt lysniveau og opretholder en meget lille variation i det koldere farvespekter. Kunstlyset synes at dele lyshedsniveau med sollysrummet, hvorimod det er dominerende ved sin tilsyneladende større intensitet i himmellysrummet. Det er her tydelig hvordan samme kunstlys-indstilling opleves forskelligt betinget af variationer i vejret.

Med minimale dynamiske variationer i kunstlyset opretholdes der en relativ større stabilitet i forhold til det skiftende dagslys. *Koblingen* er her karakteriseret ved at kunstlyset opretholder en stabiliserende kontrast til dagslysdynamikken.

Comparison of Situations 3

Here, the *coupling* is characterised by the artificial lighting maintaining a stabilising contrast comparative to the dynamism of the daylight.

The two situations are only registered with 30 second intervals, and elucidate the daylight's dramatic variability on a day with sun and scattered clouds.

The artificial lighting has a high level of illuminance and delivers a very small range in the cooler end of the colour spectrum. The artificial lighting seems to share its level of perceived brightness with the sunlit light-zone, whereas it dominates the light-zone formed by the diffuse light from the sky due to its apparently greater intensity. Here, it is evident how the same setting in the artificial lighting can be experienced differently depending upon the variations in the weather.

With minimal dynamic variations in the artificial lighting, a relative stability is preserved in relation to the changing daylight. Here, the *coupling* is characterised by the artificial lighting maintaining a stabilising contrast in relation to the dynamism of the daylight.

Sammenligning af situationer 4
Koblingen er her karakteriseret ved at kunstlyset opretholder en dynamisk kontrast i forhold til dagslysets stabilitet

Comparison of Situations 4

In this situation, the coupling is characterised by the artificial lighting sustaining a dynamic contrast with the stability of the daylight.

Sammenligning af situationer 4 / Comparison of Situations 4

Sammenligning af situationer 4

Koblingen er her karakteriseret ved at kunstlyset opretholder en dynamisk kontrast i forhold til dagslysets stabilitet.

De to situationer viser to relativt ens dagslysscenarier med let overskyet himmel, registret med 60 sekunders mellemrum.

Der er tydelige variationer i kunstlyset, hvor det digitale vejr afspiller en relativ hektisk dynamik, som er væsentlig hurtigere end dagslysets variationer. Lysfarverne er en smule varmere end dagslyset og har en større spredning i intensiteten. Vejret er jævnt overskyet og dagslyset fremstår mere stabilt med minimale variationer.

Koblingen er her karakteriseret ved at kunstlyset opretholder en dynamisk kontrast i forhold til dagslysets stabilitet.

Comparison of Situations 4

In this situation, the *coupling* is characterised by the artificial lighting sustaining a dynamic contrast with the stability of the daylight.

The two situations depict two relatively equal daylight scenarios with a slightly overcast sky, registered with a 60 second interval.

There are clear variations in the artificial lighting, where the digital weather animates a relatively hectic dynamic, at a speed which is significantly faster than the variations of the daylight. The colours of light are a bit warmer than the daylight and have a greater spread in intensity. The weather is uniformly cloudy and the daylight appears more stable with minimal variations.

In this situation, the *coupling* is characterised by the artificial lighting sustaining a dynamic contrast with the stability of the daylight.

Sammenligning af situationer 5

Kunstlyset tilpasses specifikt til hvordan forskellige lyssituationer relaterer til koblingen af lyssituationen ude og inde

Comparison of Situations 5

The artificial lighting specifically adapts to the ways the different lighting situations relate to the coupling of the exterior and interior lighting situations.

Sammenligning af situationer 5 / Comparison of Situations 5

Sammenligning af situationer 5

Kunstlyset tilpasses specifikt til hvordan forskellige lyssituationer relaterer til *koblingen* af lyssituationen ude og inde.

De to situationer er registreret henholdsvis formiddag og eftermiddag på samme dag. Om formiddagen skinner solen direkte ind ad vinduet. Om eftermiddagen er vinduet i skygge. De to meget forskellige dagslyssituationer er henholdsvis domineret af det direkte sollys og af refleksionslyset fra omgivelserne.

Daglysets dynamiske kvaliteter understøttes i begge tilfælde subtilt af kunstlysets dynamik. Forskellen i kunstlyset afspejler således forskellen i dagslyset henholdsvis formiddag og eftermiddag. Kunstlysets digitale vejrlig er i hvert tilfælde tilpasset lyskvaliteter og dynamikker i dagslyset.

De to situationer viser hvordan to forskellige specifikt situationsrelaterede kunstlysindstillinger befordrer en *kobling* af ude og inde. Forskellen i kunstlyset afspejler således forskellen i dagslyset henholdsvis formiddag og eftermiddag.

Comparison of Situations 5

The artificial lighting specifically adapts to the ways the different lighting situations relate to the *coupling* of the exterior and interior lighting situations.

The two situations are registered in the morning and in the afternoon of the same day. In the morning, the sun shines directly in through the window, and in the afternoon the window is situated in shadow. The two very different daylight situations are dominated, correspondingly, by the direct sunlight and by the light reflected from the exterior surroundings.

The dynamic qualities of the daylight are in both cases subtly reinforced by the dynamics of the artificial lighting. The difference in the artificial lighting thus reflects the difference in the daylight in both the morning and the afternoon. The artificial lighting's digital weathering is in each case attuned to the qualities of light and dynamics of the daylight.

The two situations demonstrate how two different, specific, situationally-related artificial lighting settings support a coupling of exterior and interior. The variances in the artificial lighting, therefore, mirror the variances in the morning and afternoon daylight respectively.

Sammenligning af situationer 6

Koblingen mellem ude og inde understøttes af kunstlysets integrering i lyssituationen, men med to forskellige strategier

Comparison of Situations 6

The coupling between the exterior and interior is reinforced by the integration of the artificial lighting into the lighting situation – but with two different strategies.

Sammenligning af situationer 6 / Comparison of Situations 6

Sammenligning af situationer 6

Koblingen mellem ude og inde understøttes af kunstlysets integrering i lyssituationen, men med to forskellige strategier.

De to situationer er registreret med et minuts forskel meget tidligt i det begyndende morgengry. De to situationer har således samme kølige dagslys og samme vejrlig som udgangspunkt for dagslyssituationen.

I kunstlyset er der her tale om to forskellige digitale vejr afspillet indenfor den samme dagslyssituation. Den ene med varmere farvespekter og stor variation, den anden med koldere farvespekter og mindre variation.

Koblingen mellem ude og inde understøttes af kunstlysets integrering i lyssituationen, men med to forskellige strategier. Den varmspektrede etablerer en differentiering og kontrast mellem ude og inde, hvor den koldspektrede fremstiller lyskvaliteter tættere på udelyset og forstærker en sammenhæng mellem ude og inde.

Comparison of Situations 6

The *coupling* between the exterior and interior is reinforced by the integration of the artificial lighting into the lighting situation – but with two different strategies.

The two situations are registered with a minute difference; very early at the onset of dawn. The two situations have the same cool daylight and the same weather conditions as the basis for the daylight situation.

In the artificial lighting, these are two different digital weather patterns played within the same daylight situation: one with a warmer colour spectrum and a great deal of range, and the other with a cooler colour spectrum and less range.

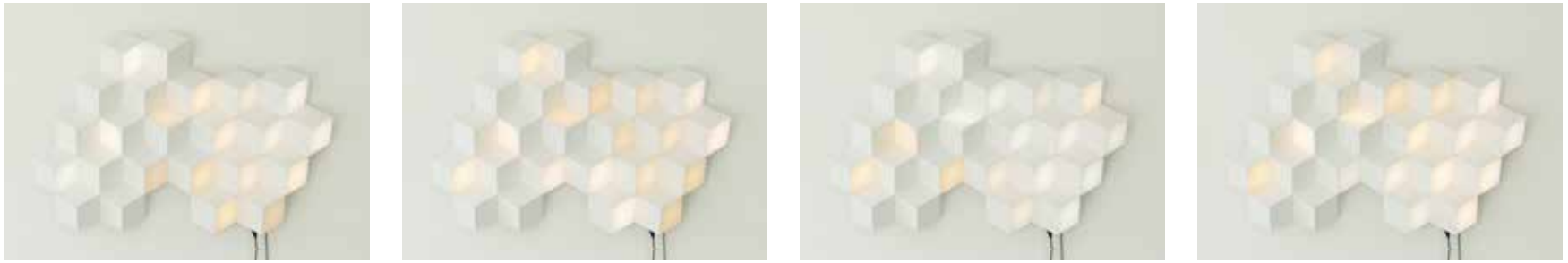
The *coupling* between the exterior and interior is reinforced by the integration of the artificial lighting into the lighting situation - but with two different strategies. The warm spectrum establishes a differentiation and contrast between the exterior and interior, whereas the cool spectrum produces qualities of light that are closer to the light outside, and can thus be seen to reinforce the coupling in-between outside and inside.

Dynamiske variationer i lysfarve og lysintensitet
Dynamic Variations in Light Colour and Luminous Intensity

Dynamiske variationer i lysintensitet




Dynamic variations in luminous intensity



Dynamiske variationer i lysfarve

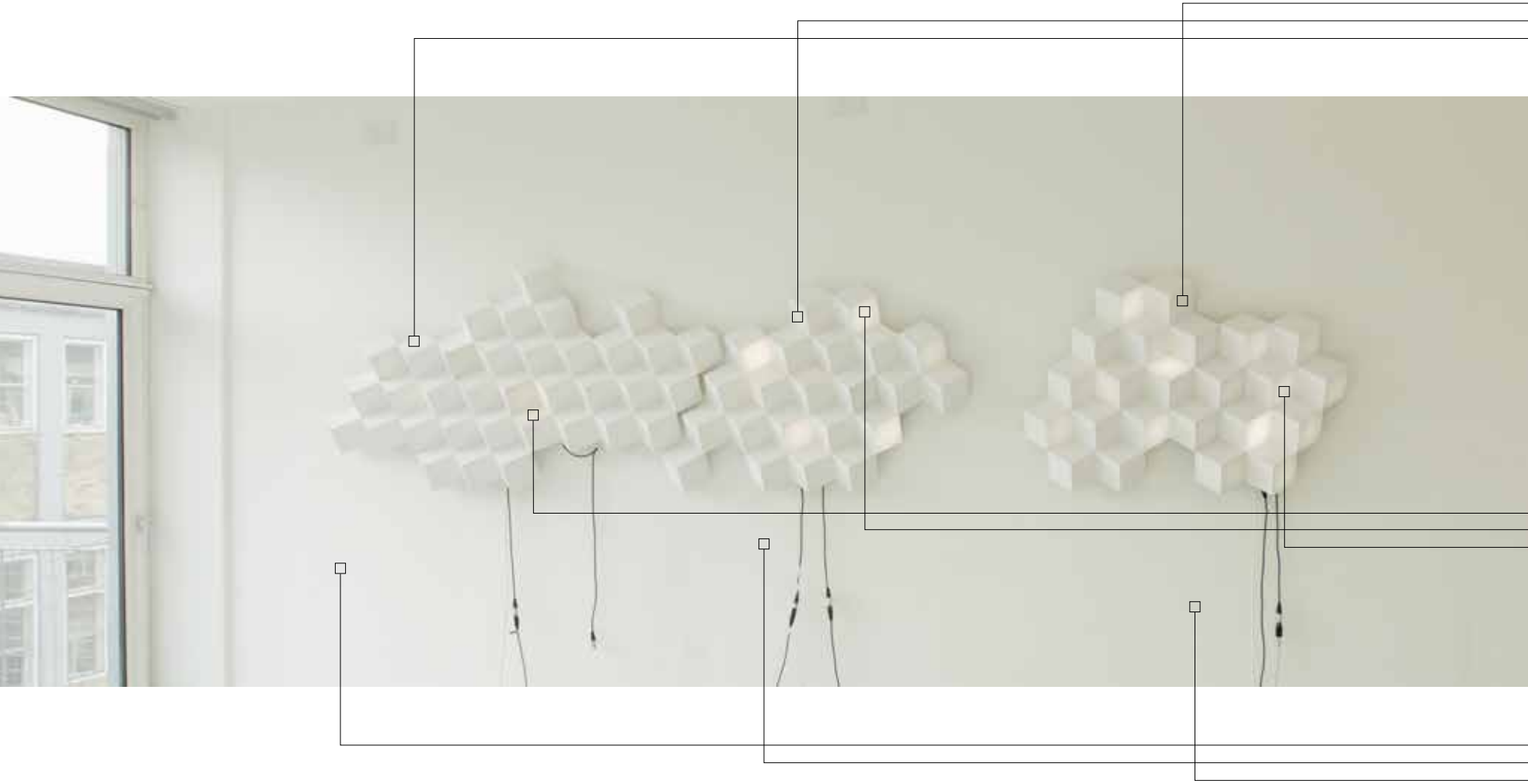
Dynamic variations in light colour

Dynamiske variationer i lysintensitet

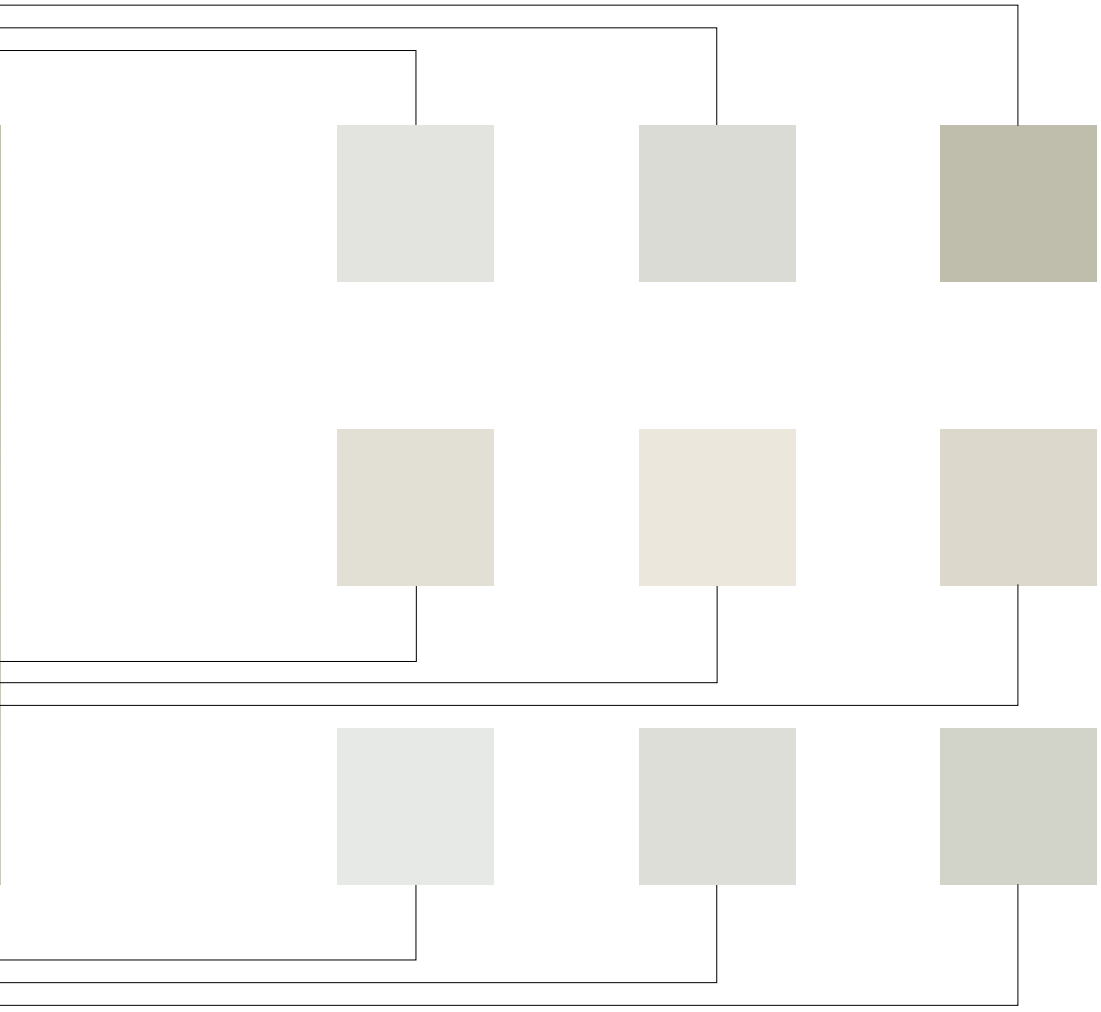
Dynamic variations in luminous intensity

Dynamiske variationer i lysfarve

Dynamic variations in light colour



Sammenligning af situationer 5a

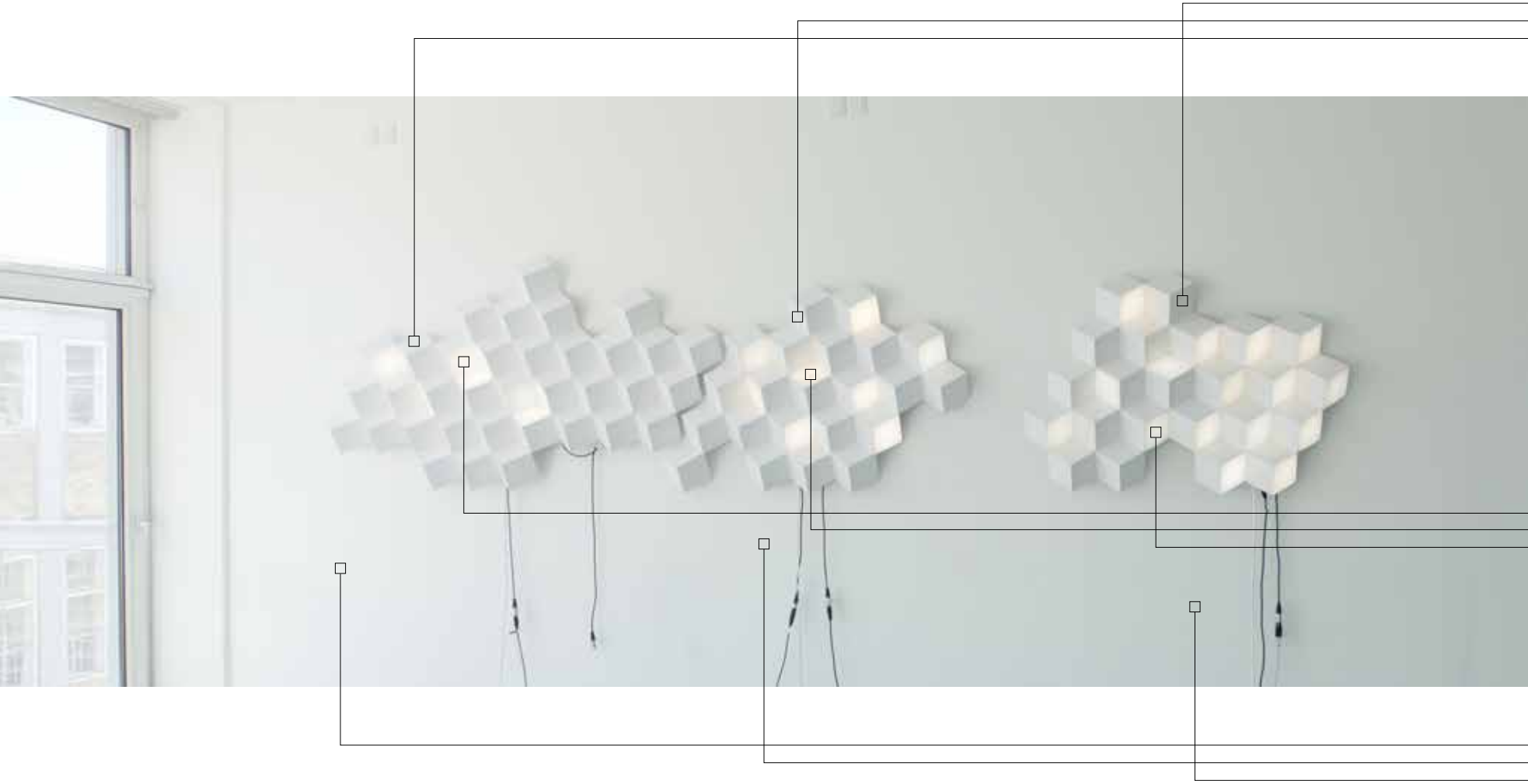


Reflektioner i instrumentet /
Reflections in the instrument

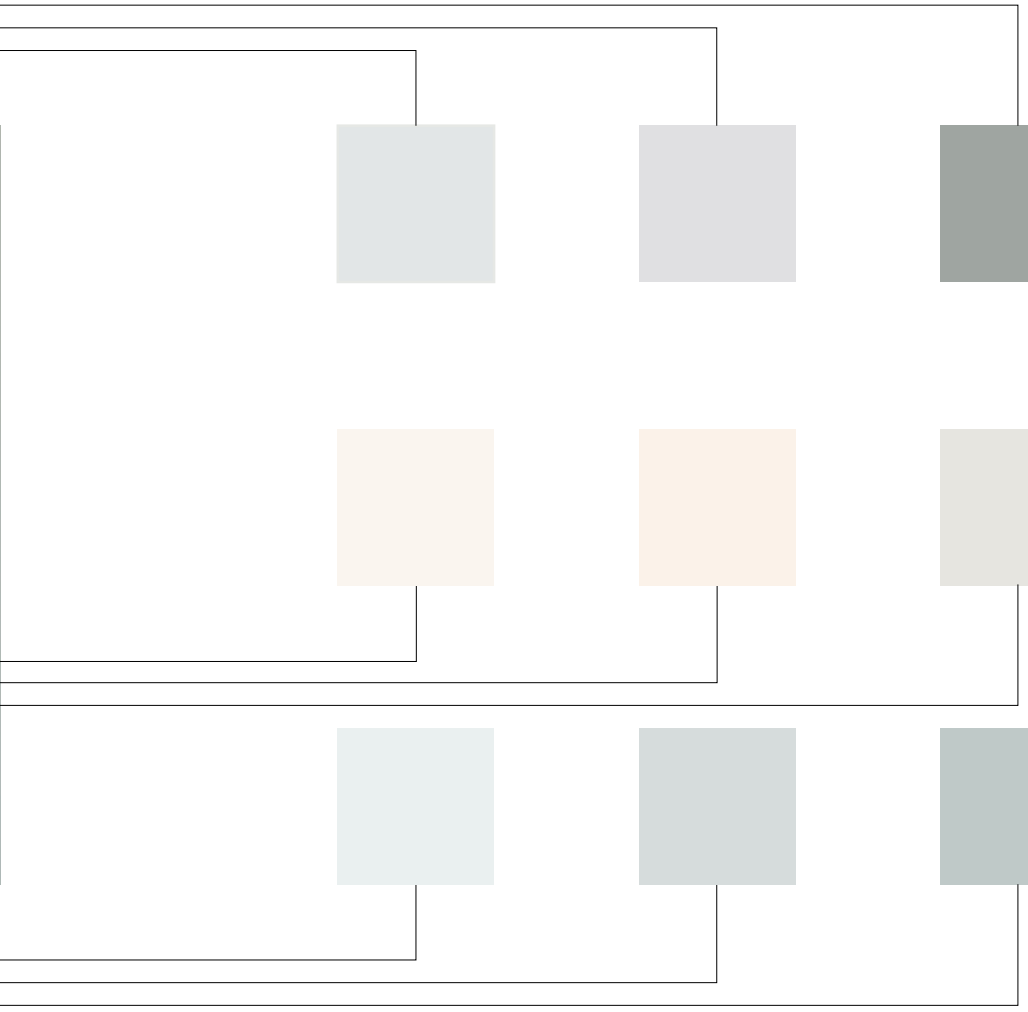
Digitalt vejr i instrumentet /
Digital weather in the instrument

Lysdannelser i rummet /
Lighting qualities in near surroundings

Comparison of Situations 5a



Sammenligning af situationer 5b

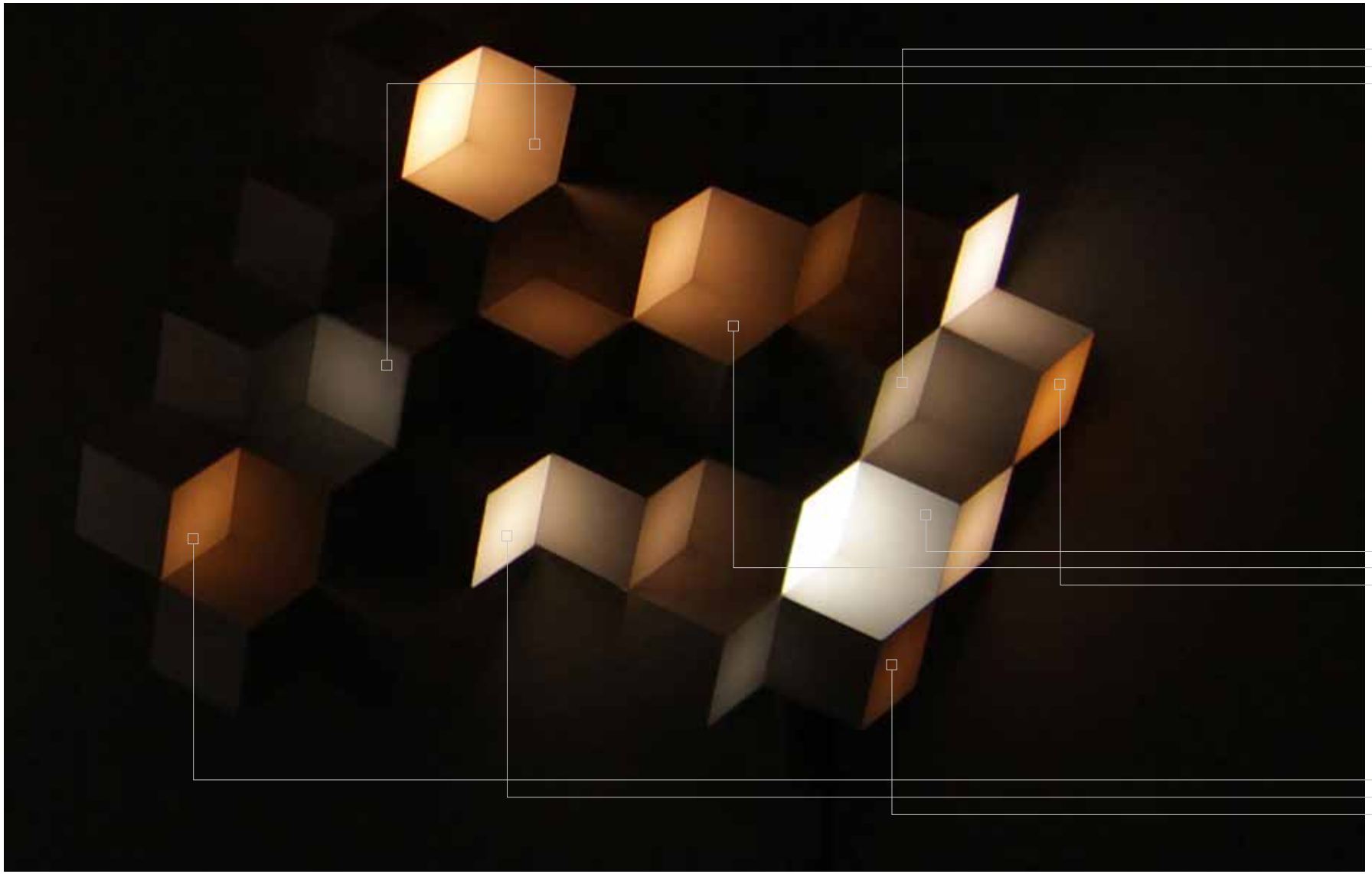


Reflektioner i instrumentet /
Reflections in the instrument

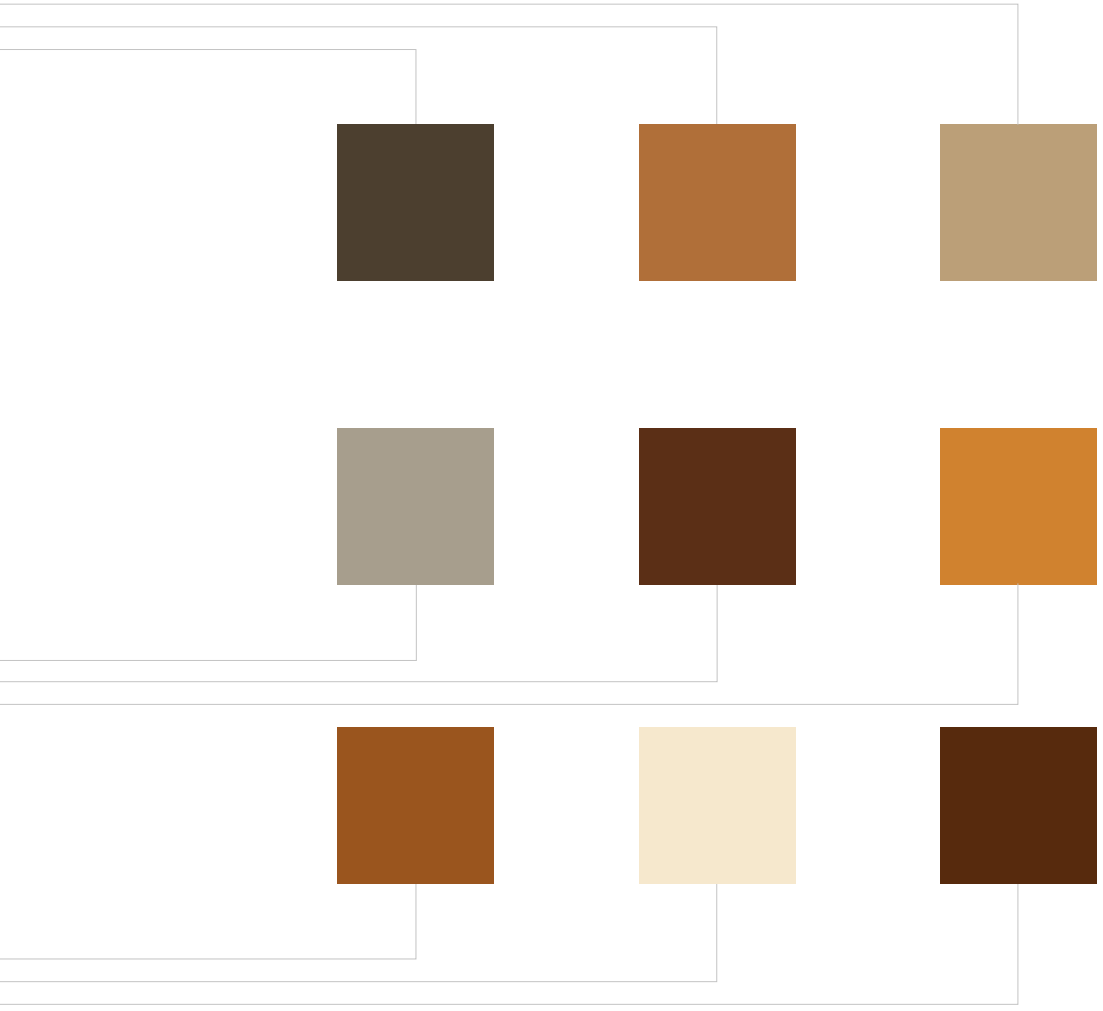
Digitalt vejr i instrumentet /
Digital weather in the instrument

Lysdannelser i rummet /
Lighting qualities in near surroundings

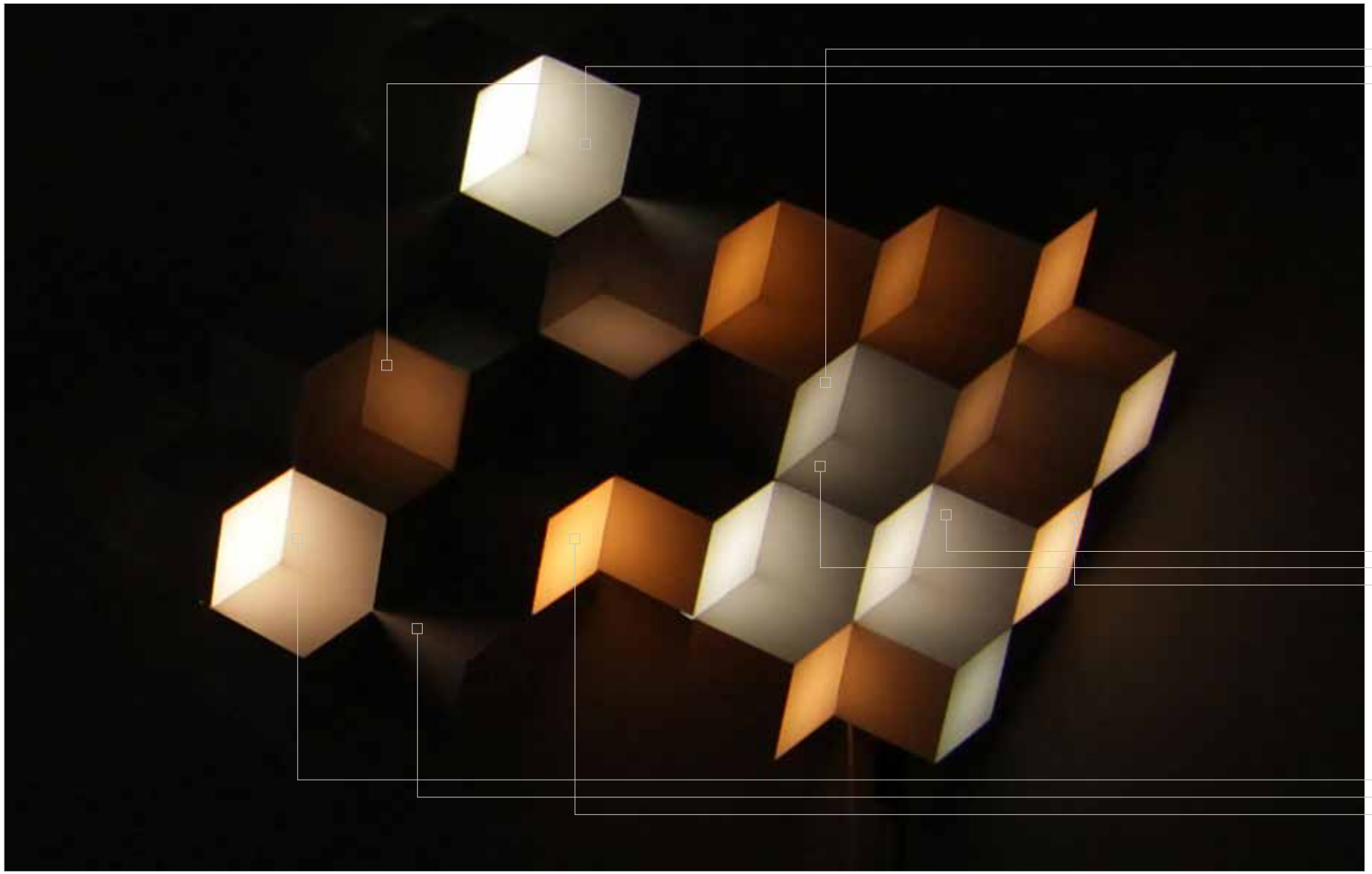
Comparison of Situations 5b



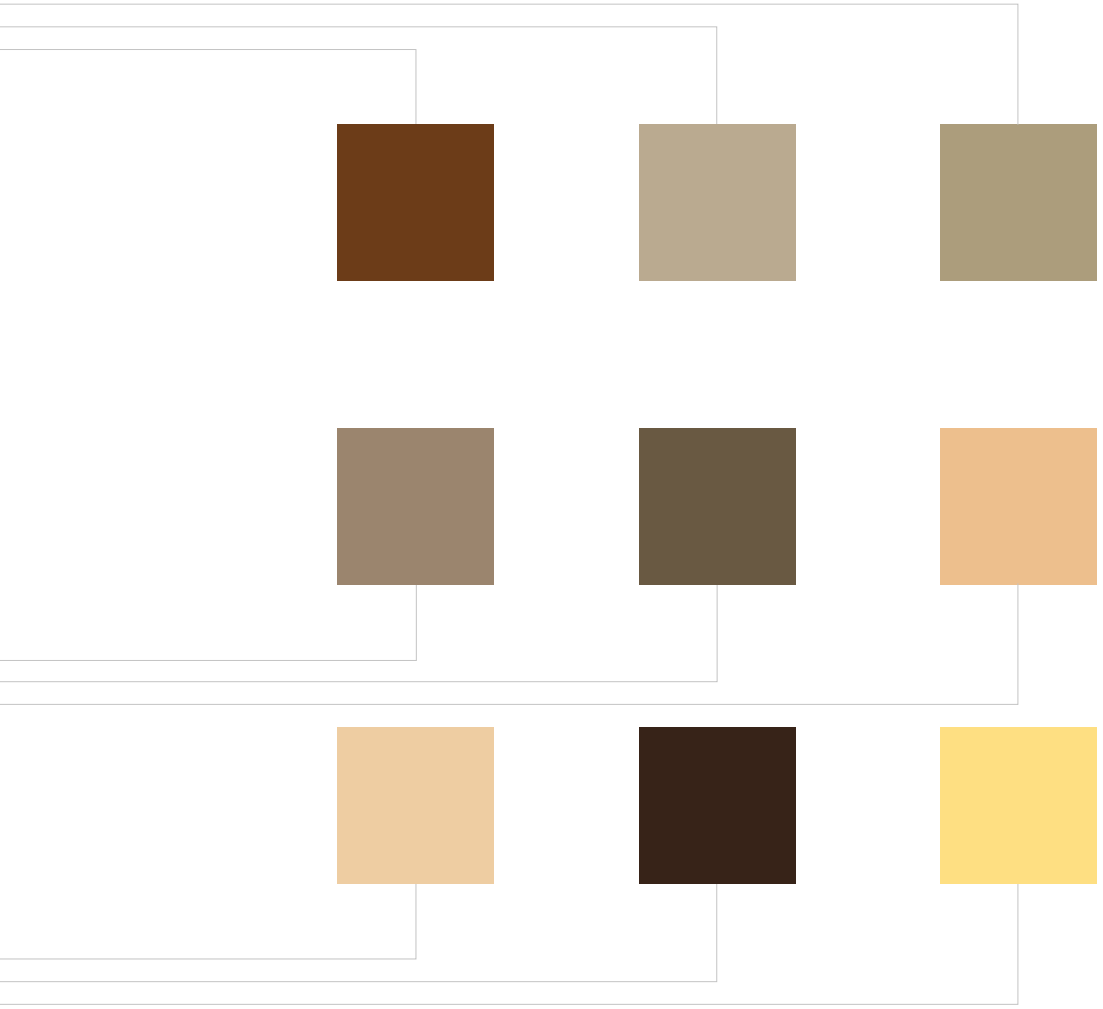
Digitalt vejr uden dagslys



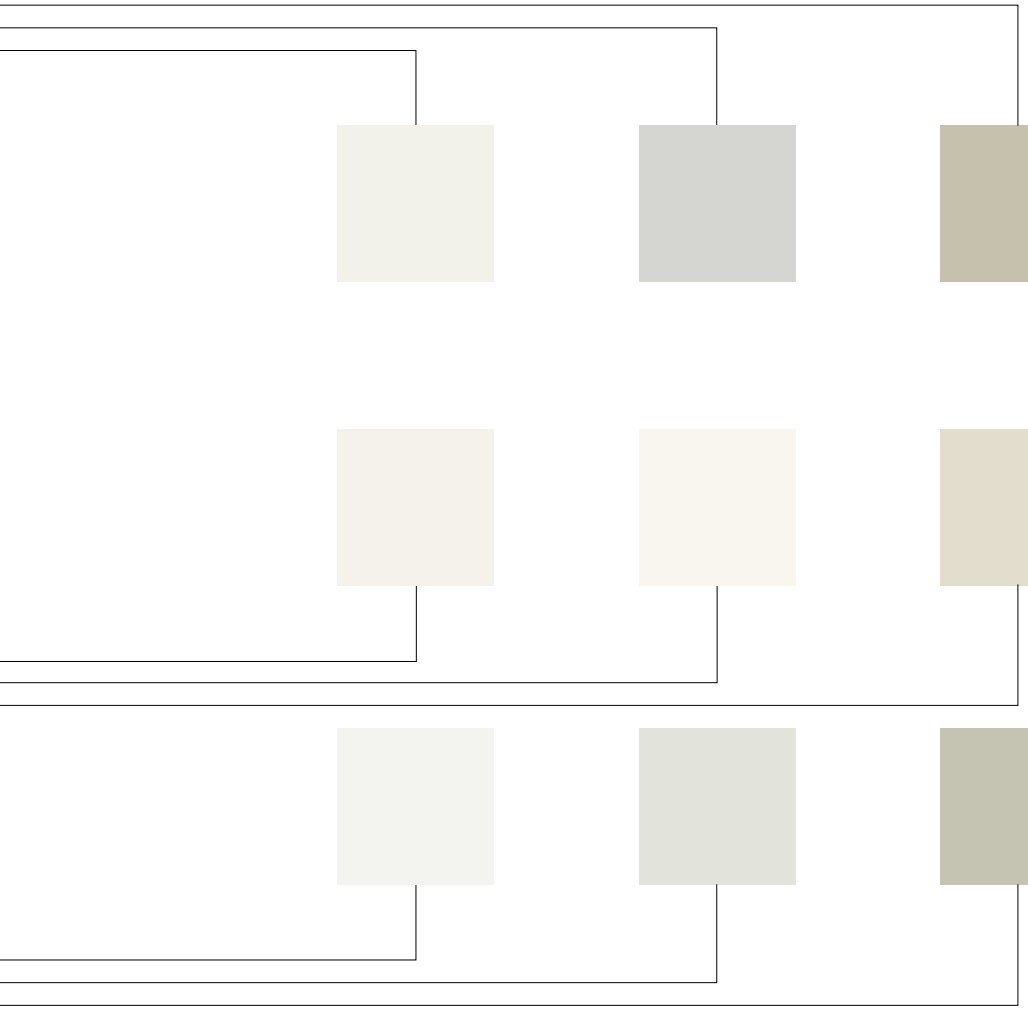
Digital Weather lighting without daylight influence



Digitalt vejr uden dagslys



Digital Weather lighting without daylight influence

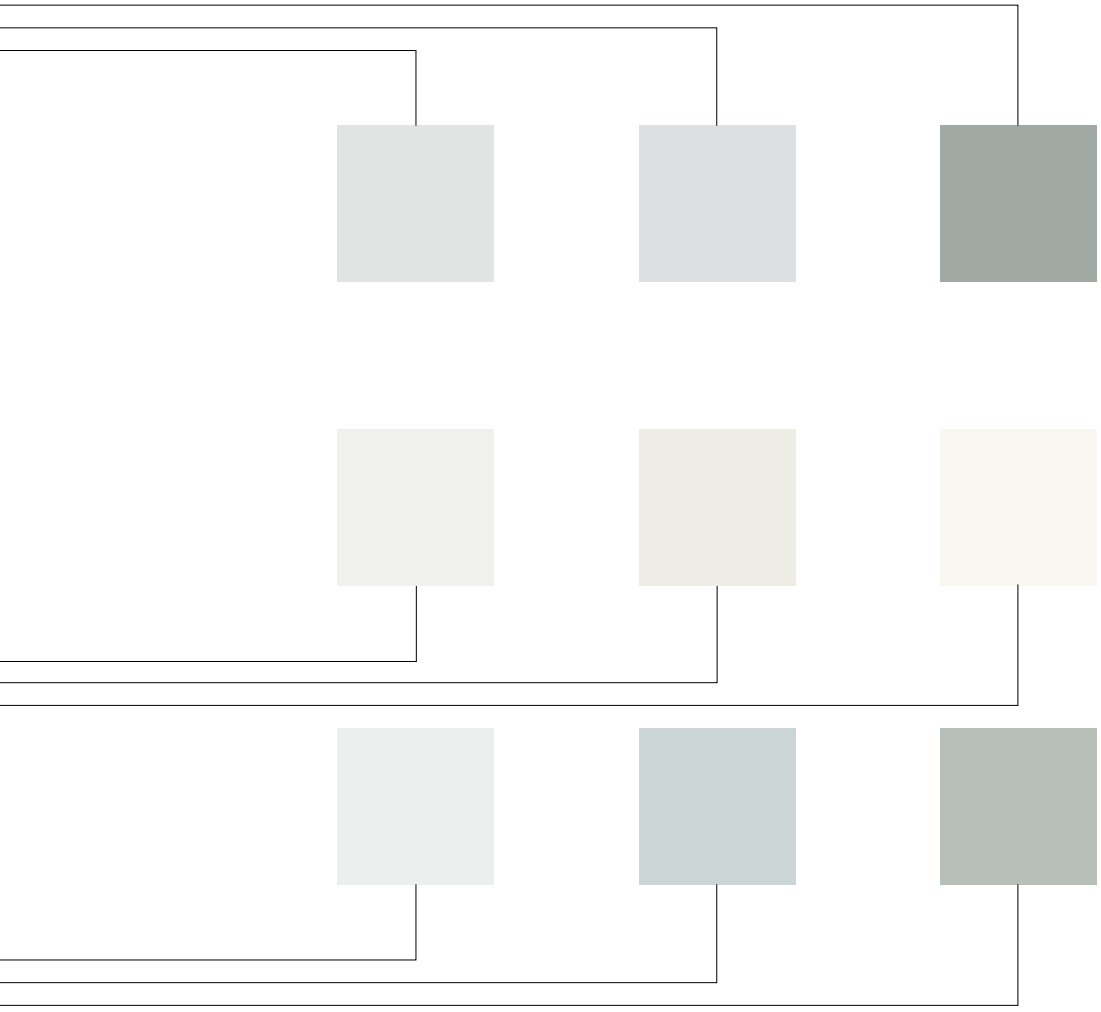


Reflektioner i instrumentet /
Reflections in the instrument

Digitalt vejr i instrumentet /
Digital weather in the instrument

Lysdannelser i rummet /
Lighting qualities in near surroundings

Situation 5



Reflektioner i instrumentet /
Reflections in the instrument

Digitalt vejr i instrumentet /
Digital weather in the instrument

Lysdannelser i rummet /
Lighting qualities in near surroundings

Situation 12

Extro

Extro

I sin artikel *Lyset i rummet og lyset på tingene* diskuterer Sophus Frandsen perifersynet og den perspektivære forsvindingshorisont i relation til øjets fokus. Han identificerer herigennem en specifik belysnings-problematik i differentieringen mellem en synsmæssig betinget fokus på henholdsvis helheden og detaljen - eller rummet og tingen. Med udgangspunkt i hvordan vores syn fungerer, argumenterer han, kan man nemlig ikke samtidig interessere sig for rummet og tingen. „Samler man sig om helheden, overser man nødvendigvis detaljen, og isoleret koncentration om [et bestemt og begrænset felt] hindrer den bevidste opfattelse af den arkitektur, man er placeret lige midt i“ (Frandsen 1984, s 68).

Ud fra en prioritering om netop synsmæssig overblik, valgte vi at forme instrumentet som en rumliggjort flade. Vores afgrænsende fokus i undersøgelsen har været at identificere og diskutere kvalitative parametre i dynamisk kunstlys i en sammenstilling med, hvordan dagslyset udfolder sig, og vi har i denne undersøgelse insisteret på dagslys kvaliteter som værdisættende for identificering af kvalitative parametre for dynamisk kunstlys. Det har derfor været essentielt at kunne analysere begge disse lyskategorier i ét integreret instrument og ét synsmæssigt overblik. Iagttagelsesinstrumentet kunne have været anderledes rumligt distribueret og ville således have forårsaget en anden oplevelsesbetingelse.

Med udgangspunkt i metoder og faglige termer udviklet indenfor faget arkitektonisk belysning har vi undersøgt dynamisk kunstlys, og den måde det integrerer sig med dagslyset i et rum. Vi har her søgt at identificere kvalitative parametre for, hvornår og hvordan et dynamisk kunstlys synes interessant i en arkitektonisk kontekst. Parametrene er tolket ud af oplevelsen af lyssituationerne, og ofte som samvirkende aspekter i lyssituationen. De fundne parametre syntetiseres i fem tolkningsperspektiver:

• *Blanding af lyssituationer – Kunstlyset og dagslyset blandes således at kunstlyset underbygger den variation i farve, intensiteter og dynamikker som dagslyset leverer.*

• *Påpegning af lyskvalitet – Kunstlyset kan påpege og tydeliggøre bestemte aspekter af koblings forholdet.*

• *Kontrast i lyssituation – Kunstlyset kan markere en tydelig forskel og derved danne kontraster som påpeger eller fremhæver kvaliteter i koblingen.*

• *Forventning om lysudvikling – Kunstlyset kan lægge op til en forventet udvikling i lysintensitet og farver i dagslyset.*

• *Kontekst dannet af lysiscenesættelsen – Koblingen kan iscenesættes ved at et koblingsparameter danner kontekst og irammesætter fokus.*

Extro

In his article, *Lyset i rummet og lyset på tingene*, Sophus Frandsen discusses peripheral vision and the perspectival vanishing point in relation to the focusing ability of the eye. Consequently, he identifies a specific lighting problem in differentiating between a visually restricted focus on the whole and the detail respectively – or, in other words, on the space and the object. Taking his point of departure in the science of optics and the mechanics of vision, he argues that one cannot be visually focused upon both the space and the object simultaneously. "If one focuses in on the whole, one essentially oversees detail. And isolated concentration on [a specific and limited field] prevents the conscious perception of the architecture that one is situated within" (Frandsen 1984, p 68).

Based on a prioritisation of exactly this visual overview, we chose to shape the observational instrument as a spatialised surface. Our delimiting focus in the study has been to identify and discuss the qualitative parameters of dynamic artificial lighting in juxtaposition with the dynamic ways daylight unfolds. Moreover, in this study we have insisted on qualities of daylight as a set of values in the identification of the qualitative parameters of dynamic artificial lighting. It has therefore been essential to be able to analyse both of these lighting categories in a single integrated instrument and in a comprehensive visual overview. It is also important to note that the observational instrument could have been distributed differently spatially, and thus would have brought forth different experiential and perceptual conditions.

Based on the methods and professional nomenclature developed in the field of architectural lighting, we have studied dynamic artificial lighting and the ways in which it integrates itself with daylight in (a given) space. We have sought to identify qualitative parameters for when and how dynamic artificial lighting seems interesting and noteworthy in an architectural context. The parameters are interpreted from the experience of the various lighting situations, and often as interacting aspects in the lighting situations. The conceived parameters are synthesised into the following five interpretative perspectives:

• *Co-Mixture of the Lighting Situations – The artificial lightning and daylight are co-mixed, so that the artificial lighting reinforces the variations in the colours, intensities, and dynamics provided by the daylight.*

• *Emphasising the Lighting Quality – The artificial lighting can highlight and elucidate certain aspects of the coupling relationship.*

• *Contrast in the Lighting Situation – The artificial lighting can denote a clear difference and thereby create contrasts that highlight certain qualities of the coupling.*

• *Expectations about the Lighting Progressions – The artificial lighting can lead to an expected progression and development in the luminous intensity and colour of the daylight.*

• *Context formed by the Staging of the Lighting – The coupling can be staged when a coupling parameter forms the context and frames a focus.*

I en identificering af disse parametre, har vi udviklet på et koncept om *kobling*. Grundlæggende, hvor der er et vindue eller en åbning i bygningskroppen, foregår der en *kobling* mellem ude og inde. Kunstlyset etablerer en differens i denne *kobling*. Med det dynamiske kunstlys kan vi variere i denne differens. Man kan således sige at dagslyset ude og dagslyset inde *kobler*, og at kunstlyset varierer på *koblingens* potentialer. De forskellige kvalitative parametre i forbindelse med dynamisk kunstlys er derfor i denne undersøgelse blevet diskuteret som forskellige variationer i *koblingen*. Disse parametre handler om måder at forstå *koblingen* som iscenesættelse af to dynamiske kompleksiteter.

Koblingens potentialer handler overordnet om relationelle pointeringer, hvor farvetemperatur, intensitet og dynamik i kunstlyset på forskellig vis relaterer til dagslysets variationer. Lysets relationelle virkninger handler om kontrastlige skærpelser og gensidige kontekstualiseringer, hvor lyset iscenesættes ud fra oplevelsen af sammenhænge i den fluktuerende komposition.

Dagslyset og kunstlyset er således stillet i en relation, der åbner for, hvordan koblingens kvalitative specificiteter udvikler sig i et dynamisk flow og hvordan denne koblingens dynamiske skiften bliver et kvalitativt parameter i sig selv.

In identifying these parameters, we have devised the concept of '*coupling*'. Fundamentally, where there is a window or an aperture in the envelope of a building, a *coupling* occurs between outside and inside. The artificial lighting establishes a variance in this *coupling*. With the dynamic artificial lighting, we have been able to vary this differentiation. Thus, one can say that the daylight on the exterior and interior couple and that the artificial light varies the potentials of the *coupling*. The various qualitative parameters associated with the dynamic artificial lighting in this study have therefore been discussed as diverse variations in the *coupling*. These parameters are about ways of understanding a *coupling* as a staging of two dynamic complexities.

The *coupling's* potentials are generally about relational emphases, where the colour temperature, intensities and dynamism of the artificial lighting relate to the variations of daylight in different ways. The relational effects of the light are about sharpening contrast and mutual contextualisations, where the artificial lighting is staged on the basis of the experience and perception of the correlations in the fluctuating compositions.

The daylight and artificial lighting are thus situated in a relationship that opens up to an understanding of the ways the coupling's qualitative specificities develop in a dynamic flow, which open for further understanding of the way the dynamic changeability of the coupling becomes a qualitative parameter in and of itself.

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