Pyroarchitectures
construction by combustion

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners. I understand that my thesis may be made electronically available to the public.

ABSTRACT: Pyroarchitectures; construction by combustion

Pyroarchitectures describe architecture produced by the product of fire. This thesis proposes a conceptual system to engage with burned buildings, their narrative, and a co-existence between a burned artifact and contemporary architecture. A provisional, reciprocal partnership between two parts; burned artifact and contemporary intervention. The system examines the tension between burned existing context and cast new content which traces and records the unpredictability fire has on objects. This thesis utilizes casting as a methodology to preserve and engage a burned artifact; it demonstrates layering and physical indexing with a focus on time and memory. It further explores the possibility to preserve a moment in time to document the form of architecture in spontaneous flux. The Glasgow School of Art has consumed two fires in its lifetime and is used as a case study to explore the relationship between fire and architecture, and pose the question; how can combustion inform construction?

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“We want architecture that has more. Architecture that bleeds, that exhausts, that whirls,
and even breaks.
Architecture that lights up, stings, rips, and tears under stress.
Architecture has to be cavernous, fiery, smooth, hard, angular, brutal, round, delicate, colourful, obscene, lustful, dreamy, attracting, repelling, wet, dry, and throbbing. Alive or dead.

If cold, then cold as a block of ice.
If hot, then hot as a blazing wing.
Architecture must blaze.”¹

—Wolf D. Prix, 1980

¹ “Architecture Must Blaze,” Coop Himmelb(l)au., <http://www.coop-himmelblau.at/architecture/philosophy/architecture-must-blaze>. Accessed February 18, 2019.

Figure 0.1 Glaswegian onlookers immersed in the blaze of the Glasgow School of Art, 2018.

Introduction

A history of annihilation, a self-destructive and apocalyptic legacy of blaze and fury; a cold yet thermally charged edifice, a building with a prophecy, one with purgatory and degradation; one which seeks purity as an anaesthetic for combustion; a building which shares the genesis of time and matter; one with the primordial element of creation, and one with thermal sublimation and contradiction; this is the Glasgow School of Art. The Mackintosh Building at the Glasgow School of Art was designed by one of Scotland's greatest architects, Charles Rennie Mackintosh. It was constructed in the heart of the Art Nouveau era between 1890 and 1909. It is held with high regard for its innovation in building technologies at the time of construction, its decorative and artistic detailing, and contribution to modern architecture. In 2014, the building was consumed by its first fire and later in 2018 by a second. Currently the decision still stands—the same decision following the 2014 fire—that the Mackintosh Building will be restored to its *former glory*. The Glasgow Council stated “there is a consensus emerging that the intention of Historic Environment Scotland and the Glasgow School of Art is to save the building and rebuild as before, stone by stone.”² Julian Harrap, the conservationist architect behind the Neues Museum Berlin weighed in emphatically stating that an exact replica would be a “disgrace to the profession...the idea of knocking it down and building something entirely new is equally unacceptable. We have to tread this fragile middle ground. I believe the shell of building can be retained, with a very simple interior, with memories of Mackintosh where they're

² Dunlop, Alan. “Don’t create a sad replica of the Glasgow School of Art.” *Dezeen*. June 19, 2018. <https://www.dezeen.com/2018/06/19/glasgow-school-of-art-fire-dont-create-sad-replica-alan-dunlop-opinion/>

available.”³ A sensitive approach to preserving the past starts with preserving the presence of its soul, the essence of its architecture, acknowledging its history and embracing its transformation. To preserve a building does not mean to maintain it, nor repair it, nor to rebuild it, but to reestablish it in its finished state.⁴ Harrap states the act of preservation is somewhere in the middle ground between duplication and building something new. Therefore, a new solution is required; something that cultivates a contrast with existing context and new content while witnessing culture and architecture, something which establishes a dialogue between Art Nouveau and contemporary architecture—an accentuation of the consciousness of the past time.

Architecture can be understood as objects, buildings, or artifacts that assert themselves in nature; an act of human influence or interference with the outside environment. But what happens when the outside environment lashes back? Nature here will refer to the element of fire and its forces with architecture. The relationship fire and architecture share evolved through time out of necessity. First as the creator of architecture and its formation, and later to the extinction of necessity and function, slowly moving into a symbolic representation, even though it is so important to the way we’ve come to experience space. As humans became familiarized with fire and its thermal qualities, they began to produce mechanical systems and technology to perform in the *same* way as a fireplace or hearth. Today, fire and its thermal quality have become homogenized; thermal conditions have become standardized with the use of mechanical systems—mainly due to efficiencies and progression of technology. Since the hearth has slowly disappeared in the home, have we lost touch with our thermal sense?—differences in warm, cool, humid, airy, radiant, cozy—all qualities which

³ Wainright, Oliver. “Bulldoze or building? Architects at odds over future of Glasgow School of Art.” The Guardian. June 19, 2018. <https://www.theguardian.com/artanddesign/2018/jun/19/bulldoze-or-rebuild-architects-at-odds-over-future-of-glasgow-school-of-art>

⁴ Wong, Liliane. *Adaptive Reuse: Extending the Lives of Buildings*. Basel, Switzerland. Birkhäuser, 2017, 64.

encompass our sense of space.⁵ Typically, architecture and its construction is meant to combat fire by fire ratings, fire walls, compartmentalizing exit stairs, fireproof exit corridors, fire rated assemblies, etc. Additionally, through a variety of materials such as different glasses, bricks, steel, ceramics, and more—all which involve fire in their creation. But fire as a design element and tool for design has essentially been worked-out of the equation; the limits of its use now rests at material creation and fire-spread prevention. Through decades of technological advancements in heating systems, the hearth has slowly experienced demise in the spatial design of architecture, and its elemental presence in the home. How can the universal symbol be reintroduced as a catalyst for intervention and creation of new architectures today? This thesis positions fire as the universal element, the creator, and transformative agent for change. It proposes a conceptual system and hyper-speculative, philosophical perspective on fire and its effect on architecture. Furthermore, this thesis explores the phenomena of architecture and fire, and the evolution of fire as a symbol within the cultural realm of architecture by proposing a *pyroarchitecture* which looks at a reinterpretation of our relationship between construction and combustion in a contemporary setting. *Pyroarchitectures* describe construction produced by the phenomena of fire; formations or disarrangement through the process of combustion; a reapplication of Bachelard's term; *pyromena*, which are phenomenas produced by fire.⁶ By reinterpreting Bachelard's psychological concept of pyromena as an architectural one, we can begin to uncover the origins between fire and building.

⁵ Heschong, Lisa. (1979). *Thermal Delight in Architecture*. Cambridge: MIT Press. vii

⁶ Bachelard, Gaston. (1964). *The Psychoanalysis of Fire*. Boston: Beacon Press.

0.2 *Sectional model of Glasgow School of Art burning.*

Casting as narrative

—*A systematic preservation*

This thesis utilizes casting as a methodology for material testing through a series of hybrid models which experiment ways to reinterpret the effects of fire and its role as a design tool. Material explorations analyze the transitional aspects of the casting process which look at the relationship between a structure, its burn, and the result of a new construction. A series of cast models were created to explore these concepts; they capitalize on the transitional and transformative aspect of architecture and its designer; fire. This thesis proposes a conceptual system; a partnership on which the existing burned artifact can co-exist with a new cast intervention. It simply uncovers an approach to on how to engage with a burned artifact by a means of preserving the memory of the burn. In some cases, acts of overwriting or editing perform with the purpose of erasing history, while others aim to extend history with a new chapter of reinterpretation.⁷ The tension between *burned* existing context and cast new content traces and records the unpredictability fire has on objects which aim to extend its history. It becomes a negotiation of material behaviour and competition of resources; a dialogue between a burned, pre-existing order, and a ravenous elemental force—a play between addition and subtraction, construction and destruction.

The work began with extensive archaeological excavation recovering the existing plan in time, following its most recent fire. The project works to recover spatial complexity by reinterpreting the building and its conditions in its current state and simulating those conditions in its next burn in its legacy. Through the use of casting, one uncovers the apocalyptic legacy of change through the act of the burn in material transformations. The reinterpretation of these conditions becomes a way to examine how a building can evolve through many fires, and the record of change being a

⁷ Wong, Liliane, 32.

physical layering of new parts. This layering has become a natural derivative of visual sequences of casual links of construction by combustion, the effect of fire which changes the formal arrangement of the architectural section, thus altering a new site condition.

0.3 *Sectional model of Glasgow School of Art as semi-ruin.*

1.1 *Exterior render of North elevation following construction of new concrete casts.*

Chapter 1

Fire

What is fire?

—*The universal explanation*

"Fire and heat provide modes of explanation in the most varied domains, because they have been for us the occasion for unforgettable memories, for simple and decisive personal experiences. Fire is thus a privileged phenomenon which can explain anything. If all that changes slowly may be explained by life, all that changes quickly is explained by fire. Fire is the ultra-living element. It is intimate and it is universal. It lives in our heart. It lives in the sky. It rises from the depths of the substance and offers itself with the warmth of love. Or it can go back down into the substance and hide there, latent and pent-up, like hate and vengeance. Among all phenomenon, it is really the only one to which there can be so definitely attributed the opposing values of good and evil. It shines in Paradise. It burns in Hell. It is gentleness and torture. It is cookery and it is apocalypse. It is a pleasure for the *good* child sitting prudently by the hearth; yet punishes any disobedience when the child wishes to play too close to its flames. It is well-being and it is respect. It is a tutelary and a terrible divinity, both good and bad. It can contradict itself; thus it is one of the principles of universal explanation."⁸

This definition by Bachelard encapsulates the very essence of fire in almost every single dimension of one's life and the primitive relationship humans share with this element. The discovery of fire has been a well documented area of research, yet the specificity of its date in time remains unknown. However, the idolatry of its existence has rendered a stronger social reality, opposed to a natural reality. Respect for fire is something which has been taught, this is not a natural respect.⁹ The first general knowledge we have of fire is not to touch it, therefore, one could argue that our primitive reality has been socially constructed; thus, forming our preconceptions about

⁸ Bachelard, Gaston, 7.

⁹ Bachelard, Gaston, 10.

its behaviour.¹⁰ That being said, inner experiments are inevitably a contradiction of an objective approach—because of these difficulties exploring fire objectively, everything must be called into question: sensation, common sense, usage, and even etymology—building our hypothesis aids to form convictions with the appearance of true knowledge.¹¹

1.2 1,000,000 years ago. *Homo Erectus* and the discovery of fire. The first known being to control fire; no specific date has been established for the discovery of fire.

¹⁰ Bachelard, Gaston, 11.

¹¹ Bachelard, Gaston, 2.

Nonetheless, any preconceptions with our fundamental knowledge of fire has conjured a desire and obsession for knowledge surrounding fire as the first phenomena. Fire has been broken into two linked phenomenas described by Bachelard as the *pyromenon*; being the product of fire; and the *pyromena*; being the phenomenon produced by fire. Brought into the realm of architecture, these concepts will be referred to as *pyroarchitectures*; architectures produced by the product of fire. By working with pyromenon and pyroarchitectures, this thesis aims to discover a unique knowledge-set on ways to experience material, program, space, and inhabitation through preservation, legacy, and creation of pyroarchitectures.

Why fire?

—*The pyromenon*

Fire is preeminently the connecting link for all symbols; it idealizes materialistic knowledge, and it materializes idealistic knowledge.¹² It is critical to uncover *why fire* is not only applied to the generation of architecture in isolated circumstances, but in a holistic approach which encapsulates the entirety with the subject. Through history, fire has been a catalyst for cultural formation of society; its generative function as a seed which has linked inhabitation and animistic cultures, thus connecting construction and combustion which are bound in a close, and permanent relationship. This close bond between fire and architecture are evident when architecture has been reduced to its most elemental and primitive form.¹³

“Fire is not a separable datum from experience; already linked by analogy and identity to a dozen other aspects of experience. Its heat is analogous to the internal heat we feel as warm-blooded animals; its sparks are analogous to seeds, the units of life; its flickering movement is analogous to vitality; its flames are phallic symbols, providing further analogy to the sexual act, as the ambiguity of the world “consummation” indicates; its transforming power is analogous to purgation.”¹⁴

¹² Bachelard, Gaston, 55.

¹³ Fernandez-Galiano, Luis, 13.

¹⁴ Bachelard, Gaston, VI.

1.3 *Hestia and the cult of Vesta. Vesta was the Virgin Goddess of the hearth, home, and family. The city walked barefoot to the sanctuary and gave offerings; the purity of the flames symbolized the vital force that rooted life and community. 700 B.C.*

This creates a link between fire and architecture by fire's thermal qualities and its link to sensation and space. These linkages form the thermal environment, which has, through history created the coexistence and partnership of both fire and architecture. The thermal environment generated the relationship between humans and space; the generation of warmth within our own bodies—warmth in what is alive at the very core of things, the very centre of our being—is what produced sensuality,

cultural roles, and symbolism of this thermal sense.¹⁵ The thermal sense creates the background for all experience, it cannot be isolated from experience, unlike seeing or hearing; it cannot be closed off, therefore it is essential to our perception of experience which cannot be removed from the world of architecture.¹⁶ Thermal quality within architecture enriches one's experience of a place and increases its value—the bodily experience of our thermal conditions become an elevated sense—a metaphor which becomes represented by comfort, delight and social affinity which reinforce the significance of place in people's lives.¹⁷

The most vivid and powerful experiences are those involving all of the senses at once; the primitive fascination with fire stems from the totality of its sensory stimulation. A building which has the scent of past fires; visual traces, imprints, and signs of change; a tactile and vulnerable quality to its touch; walls that echo the crackling of its former blaze; and above all a burning, reflective consciousness of past time which rests in its soul will meet the highest calibre of stimulus for its user. Together, all these senses create an intense feeling of reality, the “here and nowness” of the moment in which fire becomes completely captivating.¹⁸ These moments allow humans to become completely enveloped in a sensual, and emotional consciousness; fire becomes the agent responsible for this connection.¹⁹ Fire must always be part of architecture, as architecture has a special physical relationship with life,²⁰ and fire has a special relationship with being, a primitive type awareness for a connection and

¹⁵ Heschong, Lisa, 26.

¹⁶ Heschong, Lisa, 29.

¹⁷ Heschong, Lisa, 65.

¹⁸ Heschong, Lisa, 29.

¹⁹ Heschong, Lisa, 35.

²⁰ Zumthor, Peter. *Thinking Architecture: 2nd Expanded Edition*. Basel, Switzerland. Birkhäuser, 2006, 12.

affection to an architecture inextricably bound to fire draws on its thermal function; its effectiveness speaks to its sensibility to an architecture and its narrative with fire.²¹

If the Glasgow School of Art was simply restored to its *former glory*—and restored in a manner which covered up traces of past fires—would one perceive its true story? The same must be asked if its left as a ruin. This predicament begs a new solution; both of these instances in partnership offer a more effective and supportive result.²² But where did these elements of architecture, fire, and experience materialize? What are the origins of their partnership and why is fire *so* important?...

²¹ Heschong, Lisa, 36.

²² Heschong, Lisa, 37.

1.4 The hut and the bonfire. The Vitruvian tale of the archetypal tribe who comes across a clearing in the woods filled with branches and brush. The tribe had to decide to build a shelter or burn the wood for warmth; the architectural space of the bonfire being no less architectural than the form of the hut. This myth presents a psychological dilemma which was said to have birthed architecture where combustion precedes construction. 15 B.C.

The hearth

—*The symbol of house and home*

A primitive tribe travels through the night where they come across a clearing in a forest where they intend to stay the night. The clearing is littered with branches and brush. The tribe has a decision to make; use the brush and branches to build a shelter, or burn the brush and branches to create a bonfire for warmth. This single dilemma is said to have been the precise moment in history where fire and architecture came to be; one of the origin myths of architecture proposed by Vitruvius. He explains this as the life of man before the discovery of fire; this dilemma being the formation of human society, and the beginning of architecture.²³ On one hand, in satires about the origin of architecture and the rituals of urban foundation; on the other, in the infantile perception and the psychoanalysis of the house. In all beginnings or origins, in myths and rituals as well as in the preconscious or unconscious mind, construction and fire are intermingled and intertwined.²⁴ But fire also does so much more, it transforms food and symbolizes the house and as well as the city; it developed domestic foundation and material organization of space—the house (or architecture) unites construction and combustion into everyday use and into the soul of architecture.²⁵ A brief history of the hearth, technology, and the demise of the hearth will trace back the pockets in history where the hearth was slowly replaced by alternative means of production and efficiency.

²³ Fernandez-Galiano, Luis, 9.

²⁴ Fernandez-Galiano, Luis, 8-9.

²⁵ Fernandez-Galiano, Luis, 213.

1.5 *The hearth. The hearth offered the first sense of spatial planning where roofs and walls slowly followed after. This organization allowed for the separation of private affairs, sleeping, and other uses. 1 B.C.*

Fire has long been associated with the house and foundational rites and the establishment and animator of the city. Bachelard explains fire as the element which gives animation to everything, as the principle of life and death, of existence and non-existence, acts by itself and bears within itself the power to act.²⁶ Fire reproduces and divides itself, specializes, proliferates and increases in quantity; fire suffers a slow desire of quality, losing its ritual and mythical content; it is dislodged, and then ousted altogether, from the central place it occupied in the architectural space.²⁷

²⁶ Bachelard, Gaston, 72.

²⁷ Fernandez-Galiano, Luis, 214.

Since the hut and the bonfire, fire in the home developed into the *hearth*, or fireplace. It celebrated the creation of the home, domestic life, ceremony, and a metaphor for life. Fireplaces played a prominent role within the household; it assumed a functional-symbolic duality; however in contemporary architecture fire exists primarily as a symbol with its ties to the function of heating severed.²⁸ The fireplace was the centre of family life and the house, “its dancing light, smoky smells, and warm crackling created an ambience that made a house more a home—it created traditions around the hearth and connections to deep cultural roots.”²⁹ The hearth offered the first sense of spatial planning following the tale of the archetypal tribe described by Vitruvius. In Plan of St. Gall (820 A.D.), the hearth served as an element for spatial arrangement and planning as rooms were organized around the hearth.³⁰

1.6 *Plan of St. Gall. A floor plan of the hospice for pilgrims illustrating spatial arrangement surrounding the hearth. 820 A.D.*

²⁸ Heschong, Lisa, 50.

²⁹ Heschong, Lisa, viii.

³⁰ Fernandez-Galiano, Luis, 215.

By the early part of the 18th century, the fireplace became decentralized and reduced to the pursuit of efficiency—the technology behind mechanical systems and heating for centralized systems in buildings had been more or less developed. The idea of controlling heat proposed ideas about ease and regeneration opposed to disposal and loss of heat.³¹ The stove was later transformed into the furnace and for the first time people began to realize fire could be captured, enclosed, and dispersed—at this time people also started to pay more attention to building more airtight structures.³² On the threshold of modernity, the fireplace had won in efficiency what it had lost in size and centrality which it later evolved to regain in the ‘ornamental’ or artificial flame of electric stoves and fireplaces where they later were relocated from the centre of the house to walls and rooms.³³ This developed into heating systems which located all heating to one part of the house, and distributed the heat through walls and floors—shutting fire away into the stove or furnace, thus eliminating the visual cue altogether.

³¹ Fernandez-Galiano, Luis, 15.

³² Heschong, Lisa, 14.

³³ Fernandez-Galiano, Luis, 223.

1.7 Greenhouse and stove. Gardeners were slightly ahead of architects in anticipating the functional rationalization and symbolic degradation of fire. The greenhouse was highly dependent on solar radiation, yet also acquired a slow-combustion iron stove; this was the slow phasing-out of the stove as a necessity. 1873.

The fireplace soon became visually silent within architecture, and eventually its symbol within architecture also went silent. Through the evolution of fire and demise as a symbol in architecture; from the bonfire, to the fireplace and hearth, to the panthermicon and the stove, we have slowly seen the phasing out and demise of fire in our buildings. As the house slowly *lost* the need for fireplaces, the thermal environment became a place of thermal homogeneity. The deep, burning fascination of fire and our dominion over it prompted the invention of mechanical systems which have thus caused the fireplace and hearth to become obsolete.³⁴ The hearth is no longer viewed as the element within a house that is required to bring us thermal delight and meaning to the home, we no longer need to create one special place within the house to have the

³⁴ Heschong, Lisa, 11.

right thermal qualities, because now every space can be regulated.³⁵ Therefore, activities which were once localized by the predominant source of heat and meaning in the home have become diffused throughout buildings.

1.8 *Mechanical house, François Dallegret. Architecture moves from having installations to becoming an installation of networks and reduced to its mechanical installations with little visual or symbolic interest. 1965.*

Is it possible to regain a connection with fire—the creator of architecture—and bring it back to the very design process it once informed?

³⁵ Heschang, Lisa, 40.

2.1 *Interior render of exhibition spaces following construction of new concrete casts.*

Chapter 2

Glasgow School of Art

Glasgow School of Art ravaged by fire again

Second blaze in four years destroys large sections of the institution, after £35m restoration programme

By Patrick Sawyer and Simon Johnson

THE city of Glasgow was left heartbroken yesterday after a second devastating fire in four years had waste to its beloved School of Art.

More than 120 firefighters fought the blaze as it destroyed large sections of

Charles Rennie Mackintosh's masterpiece and threatened nearby buildings. Onlookers watched in shock and sadness as flames billowed from the roof throughout Friday night and into yesterday morning, destroying the school's ornate interiors along with months of prized work by students.

The entire roof and upper floors were severely damaged, with firefighters initially unable to enter the building because of fears the walls would collapse. Last night the ruined building was still smoking. Compounding the sense of loss being felt across Glasgow

was the fact that the School of Art was nearing the end of a £35 million restoration programme following the fire in May 2014, which destroyed large sections of the building, including its unique art nouveau library.

Damage appears to be worse this time and questions were immediately being asked as to how such a disaster could happen again. The last fire was caused by a faulty projector and an investigation will examine whether a similar electrical fault led to the latest fire and why it spread so quickly.

Work to return the building to its

former glory, led by the actor Peter Capaldi, who attended the institution as a young man, and Hollywood star Brad Pitt, had been a year from completion.

Such is the significance of Glasgow School of Art to the city that even before the flames had been fully brought under control politicians promised it would once again rise from the ashes. But damage to the stone facade was yesterday clearly visible, raising doubts as to how much of it can be saved.

Nicola Sturgeon, Scotland's First Minister, said the damage done to the building was "heartbreaking" and

"much, much worse" than in 2014. Speaking at the scene she said: "This fire has been devastating. Looking at it, it is a building that's just a shell."

Alan Dunlop, the school's professor of architecture, said: "I am devastated. The horrible thing about what's happened is the building does look as though it's been totally gutted. All that seems to remain is the stone walls."

Crews were initially called to the scene around 11:30pm, with the fire spreading in the space of a few minutes. As the flames took hold buildings on Sauchiehall Street were evacuated.

The nearby Campus nightclub and O2 ABC music venue also suffered damage. Loud bangs were heard coming from inside the school and the heat was so intense it could be felt several streets away. No casualties were reported.

Jane Sutherland, the chairman of the local community council, said: "People were dodging flat-sized flaming embers." Peter Heath, the deputy assistant chief fire officer of the Scottish Fire & Rescue Service, said: "There is a sense of loss among not just among the firefighters but I'm sure the citizens of Glasgow."

Crowds watch as firefighters tackle the blaze at the Mackintosh building at the Glasgow School of Art for the second time in four years. It is

feared that the damage to one of the city's most celebrated buildings is more severe than the first fire, with the building reduced to a shell, below

A heart-rending tragedy for us all and a bleak day for British art

Commentary

By Mark Hudson ART CRITIC

HOW many times can a phoenix rise from the ashes? When fire tore through Charles Rennie Mackintosh's masterpiece Glasgow School of Art in 2014, devastating the building's central library – often described as one of the finest buildings in Europe – and its

priceless archive, it seemed merely a disaster. Although around 90 paintings were lost in the blaze, including two by Mackintosh, it transpired that 80 per cent of the building and 70 per cent of its contents had been saved. A meticulous reconstruction of the library was undertaken, and an overall refurbishment was almost complete. Now, however, this extraordinary building has been gutted by a fire worse

fire that has destroyed not only the recent restorations, but substantial parts of the fabric of the building. It feels at the moment like an irreversible, heart-rending catastrophe. We don't, at the time of writing, know the causes of the fire, but many will be wondering on this bleak morning for British art if this hugely influential building and the college it houses will ever come back. Britain has

many great buildings and many great educational institutions, but to find an internationally important art school housed in a world class building that encapsulates principles that changed the face of modern design is pretty well unique. The only comparable example I can think of is the Bauhaus building in Dessau, Germany, built to house the most influential art and design school of the 20th century. If this is the end of

Mackintosh's Glasgow School of Art as we've come to know it, it will be a tragedy for architecture, for Scottish culture and perhaps most for the expository spirit that he nurtured and which has been such a feature in British art education and British creativity generally. That spirit will eventually emerge from the ashes; the building itself, sadly, may not.

2.2 Glasgow School of Art ravaged by fire again. 2018.

▼ Hopes of saving the Mackintosh art school, left, were dashed by surveys that showed significant movement of walls. PHOTOGRAPH: ROBERT FERRY

Part of Glasgow art school to be pulled down to avert collapse

Severin Carrell
Scotland editor

A significant part of the Glasgow School of Art will need to be urgently dismantled for being dangerously unstable, safety experts say, increasing doubts about the building's survival.

A large part of the south facade of the fire-ravaged Charles Rennie Mackintosh building will be taken down after surveys yesterday found its walls had moved significantly. Surveys via a drone, mobile cranes and lasers, carried out in recent days, had also revealed that the building's west-gable had deteriorated further, and that its east gable had continued to move outwards.

The dismantling is expected to start within days, officials say. The work will be done in a controlled manner to prevent a catastrophic collapse and ensure stability of surviving walls.

Immediately after the fire, which devastated the grade-A listed building, which is 110 years old, the council, the school of art, and Historic Environment Scotland said they hoped the remaining structure would be saved to allow reconstruction, some experts

suggested this could cost in the region of £100m.

However, the latest evidence has dashed those hopes, according to Glasgow city council and Glasgow School of Art officials.

"The building has moved much, much, more than we expected," a council spokesman said. "The south facade is a particular risk and we're now saying it is likely, rather than possibly, going to collapse. It will be taken down urgently to probably at least the first-floor level, but safely. And by safely we mean it will take a couple of days to come up with a methodology to do that."

Many experts had already raised concerns that the devastating fire this June, which gutted the art nouveau masterpiece, would make it impossible to rescue and rebuild the school. It had been extensively damaged by a fire also in 2014, and the intense heat of that blaze and then its rapid cooling when the flames were doused had weakened the stone.

The Mackintosh building had been due to reopen in 2019 following a £37m restoration.

Alan Dunlop, an architect who trained at the art school, said the

'As each day passes a sudden collapse is more likely - it's more dangerous now'

Raymond Barlow
Glasgow building control

decision to remove large sections of the school's walls was "a sad outcome but not unexpected".

He added: "I disagree that the replication of the art school is the best way to honour Mackintosh - let it go. There should be a full public discussion to include the option of an international competition to design a new art school."

There were some tensions between the art school and council yesterday after the dismantling decision was announced. The art school was very keen to stress the need to preserve the building's structural integrity; the council put heavy stress on the risk of imminent collapse and the need for urgent action.

Raymond Barlow, Glasgow council's

head of building control, said: "This building has undergone substantial stress in recent days. With each passing day a sudden collapse becomes more likely. It has become urgent that we take down the south facade. As the process begins it will be likely that the other walls will also need to be reduced."

"We do not know what effect this will have on the rest of the building so I have to be clear that this site remains dangerous and is becoming more dangerous. It is particularly important that people observe the cordon in place."

A spokesperson for the art school said the contractor Reigart and structural engineers David Narro Associates were using the new data to ensure the dismantling would be "undertaken in a highly controlled way to minimise any potential risk of failure and be sufficient to achieve structural stability of the Mackintosh building".

The risk of collapse meant that some people who were moved to temporary accommodation because of the fire would still not be able to go home, the council said.

The council's statement said that if the demolition and safety work began at the eastern end of the building it could be possible to make the eastern wall safe enough to allow residents living in Dalhousie Street to return home.

"However Glasgow city council, [the art school], and the contractors wish to be clear that people should still not believe that this will be a quick process. It is still impossible to say how long the cordon will remain in place."

2.3 Part of Glasgow art school to be pulled down to avert collapse. 2018.

Blaze paints the saddest picture

First minister surveys the 'heartbreaking' scene as Mackintosh's Glasgow masterpiece goes up in smoke for a second time

Dipesh Gadhier

Investigators were last night trying to discover how the second blaze in four years to engulf the Glasgow School of Art spread so rapidly, reducing the world-renowned building to little more than "a shell".

Fire chiefs revealed that the building, designed by Charles Rennie Mackintosh, had suffered "extensive damage" throughout and was still burning more than 14 hours after the inferno began.

On a visit to the site yesterday, Nicola Sturgeon said her government would do "anything we reasonably can to ensure that the building has a future".

However, she hinted that it might not be structurally sound and that a second rescue attempt could be problematic.

"It's heartbreaking," said the first minister. "Looking at it, it's a building that is just a shell. The external structure looks as if it is damaged. It's clearly been a fire of much greater intensity than the one that took hold four years ago".

The grade I-listed building, whose alumni include the actors Peter Capaldi and Bobbie Coltrane, was in the final stages of a £35m restoration after a fire that gutted its art nouveau library and west wing in 2014. It was due to reopen next year.

This weekend's inferno was so severe that it spread to two neighbouring buildings, the O2 ABC music venue, where the roof collapsed, and the Campus nightclub.

The cause of the fire, which started at 11.15pm on Friday, remains unclear – although it is not thought to have been started deliberately.

When fire crews reached the building at about 11.20pm, about 50% of it was already engulfed in flames. More than 120 firefighters worked overnight, with water being pumped from the Clyde nearby to tackle the blaze. By yesterday lunchtime, the Scottish Fire and Rescue Service said the inferno had been "contained", but "pockets of fire" remained in the building.

There were no casualties, and residents of nearby properties were evacuated as a precautionary measure.

Sturgeon said she had spoken directly to the principal of the school to offer her government's support. But she cautioned: "It's too early to say what that might entail, what that might look like."

"We don't yet know what the structural condition of the building is."

ROBERT MURPHY/SHARON FERRIS/ALAMY/GETTY

The devastating blaze close up and from a distance, above and right; left, restoration in the library before disaster struck again

Schools 'must shut up shop to sugary snacks'

John Boothman
School breakfast times are fuelling obesity among Scottish children, according to health experts who want to clamp down on the sale of muffins, cakes, tray bakes and sausage rolls in tuck shops.

An advisory group set up by the Scottish government argues that snacks being sold on school premises are "undermining" nutritional standards that apply to school lunches.

Ministers are being asked to introduce controls on the snacks tuck shops can sell. The sale of confectionery is banned and regulations do not allow high-sugar fizzy drinks to be made available, but tray bakes, muffins, cakes and biscuits are still available.

Lorraine Fulech, of the campaign group Obesity Action Scotland, said: "We are eating three times as much sugar as we should, and we need to tackle that."

"What is provided in schools is part of that and we need to pursue a reduction in treats being offered."

A Scottish government spokeswoman said: "We have recently consulted on a package of bold measures to restrict the promotion and advertising of foods high in fat, salt and sugar, including mulching offers on junk food."

One idea favoured by some campaigners is to prevent children leaving school grounds to buy unhealthy food, but that could prove difficult, she said. "The age at which pupils can be prevented from leaving the school grounds is a complex legal area."

Tim Fry, of the National Obesity Forum, said: "The Scottish government has to clean up their school provision and provide food that is healthy, exciting and attractive to children and in a setting they enjoy, to avoid them being tempted by the devil outside the school gate."

2.5 *Blaze paints the saddest picture. 2018.*

2.6 We saw massive fireball...people started crying. 2018.

Charles Rennie Mackintosh

—*Architect and figure*

Scottish architect, designer, and artist, Charles Rennie Mackintosh is widely recognized as one of Scotland's most renowned architects and influential figures. His status was established with the works of the Mackintosh Building at the Glasgow School of Art, first constructed in 1896 and completed in its second phase in 1909. Glasgow is also home to many other projects by Mackintosh that still remain today. By the end of the 20th century he was recognized as the father of the *Glasgow style* which influenced ideas on modern architecture following his reign.³⁶

Mackintosh was born on June 7, 1868 in Glasgow, Scotland not far from its medieval cathedral.³⁷ He began his formal training as an architect between 1883 and 1884 in the office of John Hutchinson where he spent five years gaining practical experience by tracing and copying drawings. During his time at Hutchinson's office he attended art classes where he then decided to enrol as a student at the Glasgow School of Art; his training involved drawing, painting, modelling, and design.³⁸ In his latter years of his Architecture program, he gained recognition from his colleagues and professors by winning multiple design and construction awards at the school. Upon his graduation in 1894, he attended sketching tours in Gloucestershire and Woucestershire, East Anglia, and Devon from 1894 to 1898.³⁹ His travels focused on the study of medieval churches and their fittings, along with vernacular buildings of the 17th and 18th century—inspiration evident in his work during his career. He was

³⁶ "Charles Rennie Mackintosh." GSofA. Accessed March 9, 2019. <http://www.gsa.ac.uk/visit-gsa/mackintosh-building-tours/charles-rennie-mackintosh/>

³⁷ Sharples, Joseph. "The Architectural Career of C.R. Mackintosh." *Mackintosh Architecture*. Accessed March 9, 2019. https://www.mackintosh-architecture.gla.ac.uk/catalogue/essay/?eid=lead_essay

³⁸ Sharples, Joseph. "The Architectural Career of C.R. Mackintosh." Accessed March 9, 2019.

³⁹ "Charles Rennie Mackintosh." GSofA. Accessed March 9, 2019.

highly influenced by his immediate context—historic Scottish architecture such as medieval churches and vernacular buildings which became highly influential in his work, alongside architecture throughout the United Kingdom.

Following his travels in abroad, he joined the office of John Honeyman and Keppie as a draughtsman. John Honeyman at the time was recognized as one of the leading architecture firms in Glasgow winning many competitions for churches, schools, public buildings, and private houses.⁴⁰ The Glasgow Art Club, 1892, is the earliest project by Mackintosh where his hand can be seen on interior design fit-outs and decoration—this was the first example of his style emerging; the idiosyncratic Art Nouveau finger plates and ventilation grills, extravagant door cases and fireplace dressed in Italian Renaissance details.⁴¹ In 1896, Mackintosh headed the Glasgow School of Art competition—and later commission—which has come to symbolize Mackintosh, his style, and his achievements as an architect. Mackintosh produced a vast range of work that still stands today as cultural landmarks such as: The Hill House, Willow Tea Rooms, and The Scotland Street School.

It must be noted that Mackintosh—as an architect and a figure—has contributed greatly to the design sense and creativity to the city of Glasgow. His works are known internationally and cherished by many. His building at the Glasgow School of Art will live on in infamy...

⁴⁰ Sharples, Joseph. "The Architectural Career of C.R. Mackintosh." Accessed March 9, 2019.

⁴¹ Sharples, Joseph. "The Architectural Career of C.R. Mackintosh." Accessed March 9, 2019.

The building

—*Masterwork of Mackintosh*

Regarded as Mackintosh's masterwork and a prized possession of the Art Nouveau era, the Glasgow School of Art symbolizes Mackintosh and his accomplishments as an architect. It is located in the historically rich, culturally diverse, and artistically charged mega-city of Glasgow. Originally founded in 1845, as Glasgow's Government School of Design—later changed to the Glasgow School of Art—the school had been the result of an economic shift with the encouragement and importance of design-based industries to the local economy.⁴² By the 1890's, it became one of the leading art and design schools in Britain, however despite this reputation, it lacked proper accommodation to suit its growth. Under new leadership of Francis H. Newbery, a new building was to be constructed as a sign of progress by the school.⁴³ In 1895, the Bellahouston Trustees, administrators of a Glasgow charity organized a deal to purchase a site to present to the school. The site was valued at £6,000, additionally with a building fund of £4,000, and a £5,000 grant from the Town Council. The Newbery building committee invited twelve leading architecture firms in Glasgow to participate in the competition and in January of 1897, Honeyman and Keppie's competition entry was chosen as the winner. The winning proposal has always been credited as Mackintosh's authorship, however the committee dealt with Keppie for most correspondence with Mackintosh's name off the official record.⁴⁴ At the time of completion of the second phase in 1909—after Mackintosh had been made partner—he was credited and publicly acknowledged as the architect responsible for both phases.

⁴² "The Glasgow School of Art." *Mackintosh Architecture*. Accessed March 9, 2019. <https://www.mackintosh-architecture.gla.ac.uk/catalogue/browse/display/?rs=133&xml=des>

⁴³ "The Glasgow School of Art." *Mackintosh Architecture*. Accessed March 9, 2019.

⁴⁴ "The Glasgow School of Art." *Mackintosh Architecture*. Accessed March 9, 2019.

At the time, there was only a sufficient amount of funding for the first phase of construction; in 1906 the school had raised status which required the second phase of the building to be completed following the merger of the Glasgow School of Art and the Scotland Technical College.⁴⁵

2.7 Ground floor plan, Glasgow School of Art. 1910.

⁴⁵ "The Glasgow School of Art." *Mackintosh Architecture*. Accessed March 14, 2019.

2.8 First floor plan, Glasgow School of Art. 1910.

2.9 North elevation, Glasgow School of Art. 1910.

2.10 West & East elevation, Glasgow School of Art. 1910.

2.11 Building sections, Glasgow School of Art. 1910.

Designing with a tight budget, the simple plan resembles a shallow 'E' that fills the site; it is comprised of a narrow entrance block on the North side of the building facing Renfrew Street; it organizes all studios and work spaces along this axis to take advantage of natural light; water closets, staircases, cloakrooms, administration on the South side; and a corridor to join these two functions in the middle. The first floor featured a museum and the famous library; part of the building eloquently designed and detailed by Mackintosh himself with the highest level of craftsmanship including coloured botanical motifs representative of the Art Nouveau movement. The building is constructed of conventional masonry limestone units up to thicknesses of thirty-three inches for some load-bearing walls and with floors constructed of timber and supported by steel beams. The Southwest wing of the building is a six-storey tower running along the steep grade where the library is located. Composed in two contrasting halves, the lower part is ashlar with three oriel windows under bowed canopies, and the right side all ashlar with the three oriel windows repeated to the full height of the facade creating a fortress-like effect. With a tight budget it was demanded by the competition committee that the building be stripped of its details; however, Mackintosh, the artist, made sure to contrast the stark geometry of the building and include surrounding stonework to have emblematic figures representing art, sculpture, architecture and music.⁴⁶ The second floor of the building presents intricacies between a fully glazed corridor and three bays of brick arches linking the two staircases opening up to the loggia to the glass-encased pavilion. Mackintosh chose to take the circulation route inside the Eastern wing of attic studios to a passage which is carved out that leads to the Eastern stair. From within and without, these additions have an accretive, improvised character, informal, but at the same time complex and ingenious.⁴⁷

⁴⁶ "The Glasgow School of Art." *Mackintosh Architecture*. Accessed March 14, 2019.

⁴⁷ "The Glasgow School of Art." *Mackintosh Architecture*. Accessed March 14, 2019.

2.12 *Main entrance, Glasgow School of Art. 1910.*

2.13 *Southwest library wing, Glasgow School of Art. 1910.*

2.14 *Life modelling studio, Glasgow School of Art. 1910.*

2.15 *Museum, Glasgow School of Art. 1910.*

2.16 *North elevation, Glasgow School of Art. 2011.*

2.17 *South elevation, Glasgow School of Art. 2011.*

“It was a work of extraordinary skill, combining Scottish baronial architecture, innovative construction and discernible built tradition, with elegant influences from Japan.”⁴⁸ It has undergone minor renovations and conservation efforts to maintain the stable condition of the building over the years and in 2006 was granted £4,466,000 by the Heritage Lottery fund to the Mackintosh Conversation and Access project. The aim of grant was to contribute to the repair and conservation of the building and its archives and collections, along with improved access to new scholars and the public ⁴⁹. The ambitious scheme to conserve the building was handled by the architecture firm, *Page\Park* who started work following the grant and completed it later in 2009. However, despite efforts to conserve the building, in 2014 it was severely damaged by a large fire...and later in 2018 experienced a similar fate...

⁴⁸ Dunlop, Alan. “Don’t create a sad replica of Glasgow School of Art.” *Dezeen*. June 19, 2018. <https://www.dezeen.com/2018/06/19/glasgow-school-of-art-fire-dont-create-sad-replica-alan-dunlop-opinion/>

⁴⁹ “The Glasgow School of Art.” *Mackintosh Architecture*. Accessed March 14, 2019.

2.18 *Mackintosh illuminates Glasgow, 2018.*

2.19 *Firefighters fighting blaze. 2018.*

2.20 *Glaswegians watching the blaze. 2018.*

2.21 *Firefighters fighting blaze. 2018.*

The fires

—*The beginning of a new beginning*

At 11:20pm on the evening of June 15, 2018, a large fire broke out and engulfed the Glasgow School of Art for the second time in four years. More than 120 firefighters and 20 fire engines were called to the scene after a policeman called in to the station to report the blaze.⁵⁰ The building had been under construction during the final years of its restoration following its 2014 fire; the result of flammable gases from a foam canister reacting with the heat from a nearby projector. Local fire officials concluded that old ventilation ducts allowed the fire to spread to neighbouring studios and upwards throughout the rest of the building.⁵¹ A spokesperson of the British Automatic Fire Sprinkler Association stated the fire in 2018 was caused by a sprinkler system that had not yet been fitted as part of the restoration following the 2014 fire; forensic scientists are currently still investigating the ruin to find the origin of the fire. But what are the plans moving forward? Miles Glendinning, a professor at the University of Edinburgh stated “when a building has multiple fires it doesn’t mean that it can’t be saved, so long as the shell is still there it is still possible to do.”⁵² Stephen Bayley, a design critic and author expressed “You could take his original idea, his plans, and develop it, but should make something that exemplifies the spirit of the building in 2018, not its spirit from 1909.”⁵³

⁵⁰ Brooks, Libby. “Glasgow School of Art: sprinklers had not been fitted after first fire.” *The Guardian*. June 17, 2018. <https://www.theguardian.com/education/2018/jun/17/glasgow-school-of-art-fire-rennie-mackintosh-sprinklers>

⁵¹ Brooks, Libby. “Glasgow School of Art: sprinklers had not been fitted after first fire.” accessed March 15, 2019.

⁵² Brooks, Libby. “Glasgow School of Art: sprinklers had not been fitted after first fire.” Accessed March 15, 2019.

⁵³ Solly, Meilan. “Glasgow School of Art Will Be Rebuilt, But Construction Could Last Up to a Decade.” *Smithsonian Magazine*. September 24, 2018. <https://www.smithsonianmag.com/smart-news/glasgow-school-art-will-be-rebuilt-construction-could-last-decade-180970330/>

As it stands, the Glasgow School of Art and the committee dedicated to restoring the Mackintosh Building back to its *former glory* are essentially undertaking the process of duplication. To copy the likeness of an existing structure is to intervene with an act that denies change and reverse for posterity through the refusal to recognize time and space.⁵⁴ The fires of 2014 and 2018 live within the building, they redefined its character in the urban context and should be celebrated in its story and preserved through engagement, not by erasure. “Preservation begins with recognizing the diverse transformations monuments have undergone through time. This recognition is also an insight into understanding preservation as another transformation.”⁵⁵ This approach to preservation exemplifies the tradition that “all that is authentic by acknowledging three simple realities: nothing lasts, nothing is finished, and nothing is perfect.”⁵⁶

“Matter remembers. Also it files information. The earth’s layers remember geological ages, the rings of a tree recall past springs and autumns, and the archaeological mound is a reminder of the passage of cultures. The built structure remembers living habits and processes, contains information about historic vicissitudes, and forms the material basis of collective memory.”⁵⁷

In architecture, the accumulation of energy in form and information is expressed in the persistence of certain spatial organizations through time.

⁵⁴ Wong, Liliane, 39.

⁵⁵ Wong, Liliane, 85.

⁵⁶ Powel, Richard R. *Wabi Sabi Simple*. Adams Media, 2004, 19.

⁵⁷ Yates, Francis. *The Art of Memory*. Hardmondsworth, UK. Penguin, 1969.

“The tenacious survival of urban schemes or building typologies, the rare consistency of some formal layouts, and the continued adherence to certain construction solutions are evidence of the existence of a morphological memory: a memory that does not rest only in the heads of builders, inhabitants, or spectators, but is present as well in the architecture itself.”⁵⁸

2.22 *Firefighters fighting blaze into the following morning. 2018.*

⁵⁸ Fernandez-Galiano, Luis, 66.

2.23 *Aerial of destruction caused by the fire. 2018.*

2.24 *Smoke rising from the ruin after the fire was extinguished. 2018.*

2.25 *Destruction following the fire. 2018.*

2.26 *Second floor steel members distorted following fire. 2018.*

2.27 *Stone degradation and construction workers stabilizing the building. 2018.*

A consciousness of past time or passing time lives in physical traces within architecture. These impressions become a deeper feeling—it becomes an awareness of humans and life that once possessed spaces which charged them with a special sensation. A sensitive body of architecture beholds a quality that bears witness to the reality of past life.⁵⁹ The Glasgow School of Art possesses these same traces, traces privy to establishment, growth, prosperity, and events within the institution; specifically—and most notably—the two fires. The building has consumed two fires and who’s to say it won’t catch again?...

⁵⁹ Zumthor, Peter. *Atmospheres: Architectural Environments: Surrounding Objects*. Basel, Switzerland. Birkhäuser, 2006, 26.

3.1 Interior render of studio spaces following construction of new concrete casts.

Chapter 3

A building that continues to burn

"The artist cannot attain to mastery in his art unless he is endowed in the highest degree with the faculty of invention."

—Charles Rennie Mackintosh

Immortal Combustion

—*Pyroarchitectures in continuum*

Thermodynamics are grounded in science that deals with the exchange and relationship of heat and other substances; this thesis defines thermodynamics as the physics of becoming. There are two principles of thermodynamics; the first law being the law of conservation in energy; the second law directly relating to the opposing side of fire's ability to create; entropy. This oxymoronic etymology links the speed of processes to the increase of degradation while providing a valuable tool for analyzing transformations and changes through time by the effects of fire on an artifact. Newton described the changes associated with the impact of heat to be irreversible. Entropy introduces disorder, degradation, irreversible time, and allegorical change into the transformative processes of fire.⁶⁰ Increased entropy accompanies the energy changes resulting in new arrangements of material elements—or *new* architectures—of energy that cannot be recovered in the same form as it was put in; but the new arrangements of material elements represent the memory of the universe, and is in relation to them that time appears to be irreversible.⁶¹ “Time then, is associated with the “creative evolution” of the organized being, but also, necessarily, with the corresponding degradation of order in the environment.”⁶² It is important to ground these theories—between time, memory, degradation, creation, and evolution—surrounding fire in real time. The Glasgow School of Art poses question to all of these elements associated with fire and their relevance to the study of architecture and matter. The idea is to understand the Glasgow School of Art as a narrative-bearing material structure—a

⁶⁰ Fernandez-Galiano, Luis, 5.

⁶¹ Margalef, Ramón. *La biosfera entre la termodinámica y el juego*. Barcelona, Spain. 1980, 40.

⁶² Fernandez-Galiano, Luis, 61.

substance of matter—matter requires energy to maintain its form, and form, in turn, can be thought of as a wealth of stored energy.⁶³

3.2 1/3, 1:100 Sectional scale model of the Glasgow School of Art, engulfed in flame.

The Glasgow School of Art is composed of limestone walls for all structural partitions with all columns in-place along the structural axis. Much of the existing structure is intact, however walls toward the top of the building—slanted, or uniquely shaped by fire—have either experienced partial collapse or degradation in the form of melted stone, mortar deterioration, spalling and cracks, as well as displacement of stone courses. This has caused the existing building to become unstable in various locations; currently the building remains as a stone carcass as the internal structure was either

⁶³ Fernandez-Galiano, Luis, 63.

completely burned out or in an extremely fragile and unsafe condition. The internal floors, secondary columns, door cases, and centre stairwell was constructed of old-growth heart pine members which are either in a vulnerable state or non-existent after the most recent fire. This type of wood is durable and stable, however was not able to withstand the force of two fires.

3.3 1/3, 1:100 Sectional scale model of the Glasgow School of Art, reduced to ashes.

3-4 2/3, 1:100 Sectional scale model of the Glasgow School of Art, burning.

3.5 2/3, 1:100 Sectional scale model of the Glasgow School of Art, post-burn.

3.6 3/3, 1:100 Sectional scale model of the Glasgow School of Art, burning.

3.7 3/3, 1:100 Sectional scale model of the Glasgow School of Art, post-burn.

The building withholds a pre-existing order providing opportunity to intervene; this thesis utilizes this order as a framework to inform the new intervention and proposed system. The existing structure will play the host, new content being the guest—it is critical this relationship proposes an intervention that engages with the structure and is respectful of the host DNA—representing a deliberate intervention that delineates the past from the present as distinct efforts, but allows both parts to co-exist in partnership. A pre-existing order; a living structure which seeks to explore the degree of interface between existing context, and new content...

The host and the guest

—Existing context, new content

The quest for immortality is the stuff of legends. It gives no signal of time in suspension; buildings and objects openly continue a process of disintegration, and recreation. To intervene on an existing structure is to inherit its story, materials, and transformative interventions, while strengthening the continuation of cultural phenomena built into the structure's metaphorical DNA. Connections are established across the fabric of time and space, preservation and memory which are all densely built-in tools unique to that building.⁶⁴ What does this mean for a building which has burned and essentially become a ruin—yet still salvageable in its state of fragility? An intervention which allows the burning past (and present) to inform its future allows for the continuity of time without erasing the traces of past events. This approach perpetuates the spirit of the host and its DNA, allowing for a continuum through time offering a different type of immortality by means of a new system; a physical and metaphorical support. Ramón Margalef states:

“the information that is inherent in present structures and which can be used to reconstruct the past can be considered to be a true reflection of the energy used to degrade the past. This energy has not been altogether lost, since the structures it has formed or informed remain important in channeling future changes, rendering certain future states more probable than others. It is possible to discover or interpret the ‘utility’ of this information we are willing to accept that accumulated structures render *more efficient* the future degradation of more energy.”⁶⁵

This study is a process of revealing a reciprocal partnership between the burned artifact, and the contemporary intervention with fire as the mediator and negotiator

⁶⁴ Berger, Markus, Hermann, Heinrich, Wong, Liliane, Editorial. *The Int|AR Journal*, Vol. 01, 2009.

⁶⁵ Margalef, Ramón. *La biosfera entre la termodinámica y el juego*. Barcelona, Spain. 1980, 17.

with the role of informing a robust coexistence between two parts. The relics of the old structure become physically knit with new parts dependent on the existing confines of the old structure and the behaviour of fire. As an act of preservation, this partnership derives a retroactive approach to engage and reveal, opposed to the traditional means of preservation described by Rem Koolhaas which seeks to freeze and conceal.⁶⁶ Transformations embrace, reveal and enhance the depths and complexities of the existing structure creating a surge, a symbiosis and robust partnership built on this provisional relationship. In doing so, a natural reciprocity provokes an unfinished architecture, an inconclusive narrative of a singular process, perpetuating the spirit of the host.

⁶⁶ “*Kota Tua*.” OMA. <https://oma.eu/projects/kota-tua>. Accessed March 01, 2019.

System

Glasgow School of Art

"Legacy mode"

- 1 *Glasgow School of Art ruin*
- 2 *Pilotis*
- 3 *Slabs*
- 4 *Cast evolution*

Pilotis

New column to existing limestone wall

"Retained order"

A network of newly cast pilotis fall within the existing order of the Glasgow School of Art positioned along X and Y axis of its grid. Utilizing the existing grid retains the order of the building while strengthening the ruin. New columns provide a framework to support the existing limestone walls, while also providing the support for infill and additions following subsequent fires.

Slab

New slab to existing limestone wall

"Semi-construction"

Newly casted slab components are the second stage of intervention; they create new datums within the building and offer lateral stability between the new columns. Drop beams integrated within the slabs provide greater reinforcement for the limestone walls, thus reducing racking of the ruin.

The building acts a container for its own ruin; the idea is not to create an exhibition or museum out of the school but to allow the building to naturally degrade over time while still offering safe inhabitation

Wall

New wall to existing limestone wall

"Reciprocal partnership"

Newly casted slab components are the second stage of intervention; they create new datums within the building and offer lateral stability between the new columns. Drop beams integrated within the slabs provide greater reinforcement for the limestone walls, thus reducing racking of the ruin.

Welded wire mesh creates a new internal cage structure, jacketed over both sides of degraded stone; the stone is encased and supported by new concrete

3.12 Section i; building section illustrating the partnership of the burned artifact and the integration of new system; the colour red highlights new parts. Due to the unpredictability of fire and its effects, this section showcases one potential outcome of subsequent fires on the building.

3.13 Section ii; building section illustrating the partnership of the burned artifact and the integration of new system; the colour red highlights new parts. Due to the unpredictability of fire and its effects, this section showcases one potential outcome of subsequent fires on the building.

3.14 Section iii; building section illustrating the partnership of the burned artifact and the integration of new system; the colour red highlights new parts. Due to the unpredictability of fire and its effects, this section showcases one potential outcome of subsequent fires on the building.

Through the act of casting, layering becomes a physical catalogue of iterations to a historicity of additive and subtractive transformations. Fire is the designer which garners no sympathy for its consumption. With no parameters or control, fire is not meant to temporize the contemporary intervention in any way, it proposes a destructive and constructive nature at its own, unforgiving volition. This proposal aims to suggest a newly combined timezone which creates possibilities for the emergence of new realities and interventions testing and extending the capabilities of the host; the Glasgow School of Art. The phenomena of morphological permanence is understood in terms of an accumulated energy—as memory—in existing things. Present time intervenes in the conformation of the future by energetically charging objects in continuum more efficient than rupture, and renovation more efficient than demolition, through the persistence of boundaries, foundations, perceptual habits, and building traditions. This manifestation of economy is derived from the symbolic persistence of place, forms, and memory.⁶⁷

Architecture consists of structures, space, circulation, varied systems and facades which are the basic units that identify all buildings—their bones, blood vessels, organs, and skin.⁶⁸ As humans possess genetic differences—eye colour, shape, size, etc.—the same differences in architectural elements differentiate building-to-building—material, structure, details, etc.—inherently identifying each building as unique. To intervene on a building is to inherit its DNA, to alter, renovate, or extend a building requires a sensitive correspondence to its genes. Successful interventions correspond new order with existing genes, this lies in the introduction of compatible parts between the host and the guest: any incompatibility is referred to as the Frankenstein syndrome.⁶⁹ This is where it is important to define the roles of the host and the guest.

⁶⁷ Fernandez-Galiano, Luis, 66-67.

⁶⁸ Wong, Liliane, 122.

⁶⁹ Wong, Liliane, 34.

Host structures possess the principles within their own architecture —“structural elements, material properties, spatial sequences, organizing lines, geometric proportions”⁷⁰—a partnership with a new guest is to reanimate existing order while maintaining or strengthening semblance of their integrity. A reciprocity in this relationship within the proposed intervention offers a continuous dialogue—a provisional partnership between these two parts builds on their reciprocal nature. To intervene with a host structure is to make a stance on time with the host structure already characterized by a form, material and organizational identity.⁷¹ Sometimes a host structure is simply a relic. It is not transformed but rather serves as the catalyst for new construction. The spirit of these relics pervades the detailing of the new building, guiding a spatial experience that very much recalls the old one.

The proposed system outlined in the diagrams above acts as a framework upon which the architect controls the design following a fire. The relationship between the host and the guest becomes a play between action and reaction, fire and design. Physical deterioration by the infliction of fire becomes a moment where the architect becomes the editor—or the *guest* to frame the memory of the fire—the idea being the iterative process of change by fire becomes a new condition or blueprint upon which the architect acts. The section drawings above illustrate how the insertion of the new system within the ruin could achieve varied outcomes within same section cut through the building. The intention behind this series of drawings is to communicate the unpredictability fire has on buildings and the rate of deterioration, and potential outcomes of an evolving design through time. Furthermore, to suggest areas of editing, or the architect’s hand; it is crucial to characterize the role of fire, the role of the architect, and the relationship between two parts.

⁷⁰ Wong, Liliane, 130.

⁷¹ Wong, Liliane, 132.

This thesis proposes the Glasgow School of Art as the host building—characterized as a *semi-ruin*, not entirely intact and missing some elements—and also the framework suitable for insertions and additions.⁷² The purpose of such additions or alterations serve a double-function; firstly, to bring the existing structure back to a *whole* state; and secondly, to extend the capacity of the existing structure.⁷³ In doing so, the intervention is limited by the load-bearing capacity of the host for the support of new architectures which have been shaped by fire and embraces sequential fires. An articulation of adding to, subtracting from, enveloping, extending, weaving amongst, co-existing with are all operations which encapsulate the new system. The newly constructed parts come in the form of columns, slabs, staircases, etc. Following a predetermined order serves as a parameter for the formulation of new parts; this approach allows for the contemporary addition to “reflect the lost, but without imitating it,” and to co-inhabit the past without erasure or recriminations...⁷⁴

⁷² Wong, Liliane, 111.

⁷³ Wong, Liliane, 111.

⁷⁴ Wong, Liliane, 138.

Cast-in-place

—*Methodology*

When buildings burn we either demolish them completely due to safety concerns or restore them by a number of preservation techniques. But how can we begin to look at fires—or the act of *burning*—as an iterative design process? How can we look at degradation as an opportunity to reveal new relationships between form and inhabitation? This study aims to position fire as an agent for change using the Glasgow School of Art as the burned artifact. The hypothesis being the emergence of a new construction and partnership with the existing semi-ruined building seeks to immortalize the building suggesting ideas about the relationship between construction, combustion, time, and memory. Fire is one of the fundamental principles of phenomena surrounding the creation of architecture and life as we understand it today. This thesis explores the place of memory in architecture, both in terms of fire as an instrument of memory and design, and in terms of memory as a material dimension of architecture.

The project deals with the the natural effects and properties of fire as an element to resemble its true nature; inscribing, layering, cutting, adding, and subtracting—removing parameters and control in the process. Concrete was used as the cast material to characterize the new system—it takes advantage of the material properties of concrete to strengthen and to act as an agent for form-finding for the integration with its immediate context and natural conditions.

3.16 *Photos of new cast material in sectional model*

3.17 *Photos of new cast material in sectional model*

3.18 *Photos of new cast material in sectional model*

The project sets out to metamorphically charge the existing building to continue its use as an art school into the future. Retaining the structure as a centralized *hearth* of the university connects the building to its history, story, and future. The function of the existing structure remains the same; its organization and order act as a framework between existing context and new content. Casting as a methodology gives an application to preserve within the study of architecture, it speculates on the cast, or the volumetric alteration as a device that preserves a material culture in a time-sensitive context. It shows how casting and burning, fabrication and reinterpretation techniques can be utilized to preserve cultural artifacts which have been consumed by a fire. Casts and burned artifacts represent the historic sculpture and transformations which become a collection of physical memories which resemble a timestamp of the event. It further explores the possibility to preserve a moment in time to document the form of architecture in continuous flux. This creates a new timezone between two parts in partnership and becomes a serendipitous, playful, and unpredictable evolution of layering and physical indexing. Having consumed multiple fires, the Mackintosh Building has experienced many changes, acquiring depth and complexity throughout its evolution, such as structural collapse and degradation.

The concept of contradiction in fire, aids the idea of disassembly and reassembly, allowing for the natural properties of fire to take-over and create new architectures *or* pyroarchitectures which cannot be described without time. Time demonstrates the outcome of a multitude of compositions; thus proving fire to be an essential tool of experimentation and exploration of the unpredictable phenomena of fire and its theoretical discourse. Indexing each casted iteration demonstrates the spatial and structural qualities achieved with underlying tectonic structures as they are developed and changed through a building's legacy. The semi-ruin becomes a semi-construction without completion—this attempts to simulate and distill abstract conceptual strategies into a built reality. This responds to a multidisciplinary approach

and reflexivity to query notions of memory within the context of architecture; specifically studying architecture's interrelation with fire. Thresholds between existing context and new content trace these effects and store time and memory physically into their material reactions and the burned artifact; expressing the exothermic reaction, thus symbolizing the burn.

The organization of the new school is generated from the evolution or act of burning inflicted on the building. Layering represents not only the memory of the building and its narrative, but also a social and cultural memory too; one linked to all human senses which seeks to store its cultural foundation *casted-in-place*. Layers begin to reflect functions of a society or culture which become a visible patchwork-type narration—a physical manifestation of change over time.⁷⁵

⁷⁵ Wong, Liliane, 45.

Conclusion

Fire is so highly valued because its elemental; it offered experiences of purity within the spiritual realm and provided a link between the physical world and our ancestors' conception of the principles of the universe.⁷⁶ The symbolism of the hearth engages the elemental force to provide thermal requirements for living and brought this primordial phenomenon to everyday experience. This experience is further accentuated by the relationship between the primitive hut and primitive fire: material and energy that form the inhabitable environment.⁷⁷ Construction and fire, matter and energy are complementary and interchangeable to either construct or combust. They become a celebration of time, and within it both life and death, both creation and degradation. The hut and the bonfire, construction and combustion ground *pyroarchitectures* in the history of inhabitation and experience through constructed order and combustible disorder. Architecture brings fire, chaos and organization together in flows between energy and processes.⁷⁸ This strong bond between architecture and fire has undergone a metamorphosis in history, yet also through this history itself, become a progressive and erosive demise of the symbolic value of fire in architecture. The importance of fire and its inherent qualities within the practice of architecture express why the Glasgow School of Art—a building with such a rich history of immortality and combustion—must be preserved in a new way that engages its relationship with fire.

Architecture, as an arrangement of material elements, must be understood both as a product of memory and as a physical support for it.⁷⁹ In architecture, the

⁷⁶ Heschong, Lisa, 55.

⁷⁷ Fernandez-Galiano, Luis, 18.

⁷⁸ Fernandez-Galiano, Luis, 8.

⁷⁹ Fernandez-Galiano, Luis, 70.

importance of time and memory play a role with our capacity to generate stronger ties to our cultural evolution and inhabitation of space. Understanding the nature of time allows one to explore what the duration of time means in regards to invention, creation of forms, and continuous elaboration of something new.

By using physical modelling and architectural documentation, the project perceives a physical experience of articulated space rather than its measured reality. By investigating these objects, it further accentuates the tension between the burned artifact and the impression of the fire on the physical structure and the translation of this relationship. The 'remembered' or nostalgic quality of physical and architectural documentation simply records the perceived permanence of the fundamental aspect of temporality and ephemeral nature of the element. The project provides the immediate site context as a built-up fossil where the monolithic intervention is juxtaposed against the filigree of the Art Nouveau masterpiece. The agenda of the additive and subtractive intervention here was to create spectacle out of the ordinary as support for structure both on the interior and the exterior. This device is a unified gesture within the heavily fortified host; the existing building is preserved within the new building. The casted layers resemble time, a multi-layered spatial experience of a permanent semblance of architecture in ruins. The systematic proposal explores the paradigm of an incomplete architecture. A variable programme directed by a means of preservation which has evolved as a process of gradual degradation and decay by the infliction of fire. Such a building should be used to inform the future while acknowledging the past and should be a symbol of prosperity and depict a message of resilience.

Glossary

Addition - a quantitative process of increase in number or degree.⁸⁰

Architecture - the construction of the artificial environment.⁸¹

Construction - the art of making a meaningful whole out of many parts.⁸²

Combustion - the process of burning.⁸³

Degradation - the process of breaking down in separate parts or elements.⁸⁴

Energy - the capacity to do work, and is required for life processes.⁸⁵

Fire - along with heat provide modes of explanation in the most varied domains, because they have been for us the occasion for unforgettable memories, for simple and decisive personal experiences. Fire is thus a privileged phenomenon which can explain anything. If all that changes slowly may be explained by life, all that changes quickly is explained by fire. Fire is the ultra-living element. It is intimate and it is universal. It lives in our heart. It lives in the sky. It rises from the depths of the substance and offers itself with the warmth of love. Or it can go back down into the substance and hide there, latent and pent-up, like hate and vengeance. Among all phenomenon, it is really the only one to which there can be so definitely attributed the opposing values of good and evil. It shines in Paradise. It burns in Hell. It is gentleness and torture. It is cookery and it is apocalypse. It is a pleasure for the good child sitting prudently by the hearth; yet

⁸⁰ Wong, Liliane, 190.

⁸¹ Fernández-Galiano, Luis, 63.

⁸² Zumthor, Peter. *Thinking Architecture: 2nd Expanded Edition*. Basel, Switzerland. Birkhäuser, 2006, 11.

⁸³ "Combustion". Cambridge Dictionary. <https://dictionary.cambridge.org/dictionary/english/combustion>. Accessed February 23, 2019

⁸⁴ "Degradation". Collins Dictionary. <https://www.collinsdictionary.com/dictionary/english/degradation>. Accessed February 28, 2019

⁸⁵ Nelson, Prof. Stephen A. "Energy Resources" October 19, 2015. <https://www.tulane.edu/~sanelson/eens1110/energy.htm>

punishes any disobedience when the child wishes to play too close to its flames. It is well-being and it is respect. It is a tutelary and a terrible divinity, both good and bad. It can contradict itself; thus it is one of the principles of universal explanation.⁸⁶

Entropy - Alters our conception of time in direction, while marking orientation of time.⁸⁷

Preservation - a property will be used as it was historically, or be given a new use that maximizes the retention of distinctive materials, features, spaces, and spatial relationships.⁸⁸

Purity - quality or condition of being pure: the state of being unmixed - freedom from manner that contaminates, defiles, corrupts, or debases; physical cleanliness.

Pyroarchitecture - a construction or architecture constructed or disarranged through the element of combustion by a means of reactionary plundering by fire.

Pyromena - phenomenon produced by fire.⁸⁹

Pyrromenon - product of fire.⁹⁰

Subtraction - the addition of negative numbers, whole or otherwise.⁹¹

Thermal homogenization - a singular space quantified by space; the changeable climate gives way to standardized comfort.⁹²

⁸⁶ Bachelard, Gaston, 7.

⁸⁷ Fernández-Galiano, Luis, 55.

⁸⁸ Grimmer, Anne & Weeks, Kay. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings*. Washington, DC: Us Dept. of the Interior. 1995.

⁸⁹ Bachelard, Gaston, 59.

⁹⁰ Bachelard, Gaston, 58.

⁹¹ Wong, Liliane, 210.

⁹² Heschong, Lisa, 213.

Thermodynamics - the physics of becoming.⁹³

⁹³ Prigogine, *From Being to Becoming*, p. xviii.

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Appendix

Precedents

The following precedent studies ground the thesis its three positions; fire has its place in the creating new architecture, casting is an effective methodology for preservation, and duplication is an insensitive approach to preservation.

—*Brüder Klaus Field Chapel* | Peter Zumthor

The field chapel finds itself rooted in biblical references and its creation with fire parallels these references with architecture. In its composition, the chapel boasts energy and memory through its material expression; the interiors of charred concrete. This case study explores one side of fire's ability; to create, however this thesis explores the opposite side of that ability; to destruct. Both this case study and thesis look at burning as a way to create new conditions, however, this thesis draws more on degradation to an existing structure which informs a new one; not simply burning a formwork to achieve a desired material condition.

Fig 1. Brüder Klaus Field Chapel interior.

Fig 1. Arch Daily. "Peter Zumthor's Bruder Klaus Field Chapel Through the Lens of Aldo Amoretti." *Arch Daily*. <https://www.archdaily.com/798340/peter-zumthors-bruder-klaus-field-chapel-through-the-lens-of-aldo-amoretti/8136a67e58ece96780002a0-peter-zumthors-bruder-klaus-field-chapel-through-the-lens-of-aldo-amoretti-photo>. (accessed January 19, 2019).

The project sought to achieve three basic objectives; to structurally consolidate the elements that were at risk; to differentiate the additions from the original structure (avoiding the mimetic reconstructions that Cádiz law prohibits) and to recover the volume, texture and tonality that the tower originally had. The essence of the project is not intended to be, therefore, an image of the future, but rather a reflection of its own past, its own origin. This case study is a beautiful example of preserving a castle at risk of collapse, allowing the structure to exist as is, yet intervening in a way which strengthens it and brings it back to a whole state. This case study creates an opening for this thesis to argue the application of a similar preservation technique of casting into a burned building which has also suffered degradation, to achieve similar objectives.

Fig 2. Cast new structure intervention with the Matrera Castle.

Fig 2. Arch Daily. "Cádiz Castle Restoration: Interesting Interpretation or Harmful to Heritage?" *Arch Daily*. <https://www.archdaily.com/783861/cadiz-castle-restoration-interesting-interpretation-or-harmful-to-heritage/56f6adi5e58ece8d20000064-cadiz-castle-restoration-interesting-interpretation-or-harmful-to-heritage-image>. (accessed March 24, 2019).

Due to deteriorating architectural columns, stonework, marble slabs and cornice work, the U.S. Capitol had undergone a restoration project to keep the building functioning. Where possible, columns and capitals, and stone masonry were laser cleaned and placed back in their original location, and over 300 new carved marble details and column flutes, and more were fabricated and installed. This technique of duplication does not acknowledge time through a building's narrative which is an insensitive response to its past and future. As previously stated by Julian Harrap, this is a disgrace to the profession, denies change and reverse for posterity through the refusal to recognize time and space. This thesis characterizes this type of preservation as an inappropriate way to commemorate and celebrate a building's legacy.

Fig 3. North wing under construction.

Fig 3. NAIOP Awards. "U.S. Capitol Exterior Stone and Metal Preservation - North Extension" *NAIOP Awards*. <https://naiopdcmdawards.org/31.php>. (accessed March 27,

Charles Rennie Mackintosh

Work at Honeyman & Keppie began to lose value following the catastrophic collapse of the City of Glasgow Bank in 1878 as commissions began to dry up. At this time, John Keppie partnered with Honeyman to liven the firm with a distinguished past and youthful energy,⁹⁴ hoping this would regain value in the firm. Before the emergence of Mackintosh as an architect, little evidence or reliable documentation identifies what exactly Mackintosh's role in the firm was in his early days—typically job entry books were filled out by senior partners and not junior associates within the company.

During his time at Honeyman & Keppie, two of the firm's largest commissions in the first four years of Mackintosh's have annotations of Mackintosh's hand annotating construction materials and structural notations. At this time Mackintosh was highly involved in the working drawing stages of the design process working on technical detailing, while Honeyman and Keppie had more control over the aesthetic of the buildings.⁹⁵ He had involvement in a significant amount of projects until he began taking control of smaller scale projects himself.

Along with the Glasgow School of Art, a small number of clients within his active years between 1896 and 1910 commissioned him for his style and design attitude. A fundamental shift in architecture and his extreme individualism restricted the amount of clients who chose him for architectural taste and style. In 1901, Mackintosh bought out Honeyman's half of the partnership and a new partnership agreement was signed between Keppie and Mackintosh as partners.

During his time at the Glasgow School of Art he joined Herbert MacNair, Margaret Macdonald, and Frances Macdonald in a group who were known as *The*

⁹⁴ Sharples, Joseph. "The Architectural Career of C.R. Mackintosh." Accessed March 9, 2019.

⁹⁵ Sharples, Joseph. "The Architectural Career of C.R. Mackintosh." Accessed March 9, 2019.

Four.⁹⁶ Mackintosh and McNair were both interns at Honeyman and Keppie, and the Macdonald sisters were fellow students at the Glasgow School of Art. This formation was a creative alliance who produced controversial graphics and decorative art which contributed greatly to the recognition of modern art in Glasgow; formerly described as the *Glasgow style*.

⁹⁶ “*The Four-Mackintosh and his Contemporaries*” CRM Society. Accessed March 9, 2019. <https://www.crmsociety.com/about-mackintosh/the-four/>

Mackintosh Building

A building committee—*Newbery*—was organized with numerous subscriptions of donations from private donors in preparation for a competition.⁹⁷ With such a tight budget of only £14,000, a highly detailed brief was put together to ensure that all requirements were being met; studios were to be north facing and interconnected and be accessed from a corridor, the height of windows to be at least three-quarters the depth of the studios, no windows in-line with the building on the south-facing side, etc. Submitted designs were to have a plan of each floor, a longitudinal section, two cross sections, and all facades.⁹⁸

⁹⁷ “The Glasgow School of Art.” *Mackintosh Architecture*. Accessed March 9, 2019.

⁹⁸ Macauley, James. *Charles Rennie Mackintosh*. Verona, Italy. W. W. Norton & Company, 2010, 158.

The host and the guest

Dating back thousands of years to the worship of fire, sun, spiritual realms, and biblical references, the theories behind reincarnation act as an analogy for the rebirth of *pyroarchitectures*. An Eastern approach to afterlife is reincarnation; rebirth as another form of being. Different belief systems; Hinduism, Buddhism, Sikhism, etc. all subscribe to beliefs of immutability of the soul within changing bodies.⁹⁹ As an analogy for architecture, intervening on existing structures now gain a second, third, fourth life—each time developing deeper complexity and history within their walls, while transforming and changing through each life. This same logic with preservation can be attributed to the same ideals about preservation until the early 20th century about Christian resurrection; Jesus’ resurrection from death in perpetuity¹⁰⁰. Through resurrection, Jesus himself changed: eight days following his death, the resurrected Jesus walked through locked doors to present himself to his disciples; an ability not mentioned prior to his death. Similarly, forty days following his crucifixion he ascended to heaven and was never seen on earth again—resurrection is a transformative act which involves change.¹⁰¹ The same must be said for resurrection of a building in ruin, a fossil which can be revealed and built upon that recognizes and accepts changes inherent in time. Zumthor explains the emergence of new architectures that adapt to old ones, by integration of layers and the visual appearance of evolution—analyzing the substance of walls strips them of their make-up—examining their joints is where their complex genesis is revealed.¹⁰²

⁹⁹ Wong, Liliane, 63.

¹⁰⁰ Wong, Liliane, 85.

¹⁰¹ Wong, Liliane, 85.

¹⁰² Zumthor, Peter, 57.

Negative Mackintosh

Negative Mackintosh was an early study into the metamorphosis of the Mackintosh through iterative design changes of the effects of fire looking at the negative spaces created by fire. The study began with building scaled floors of the building and casting plaster into the rooms of each floor. The task then was to light each floor on fire and essentially burn out the building and be left with the negative of the floor plan. Then, reinterpreting changes in the plan, redrawing and rebuilding the floors based on the changes from the first iteration. The floors would then be recast and burned out again. The hypothesis behind this study was that through the act of burning and reinterpretation of the plan, each iteration would yield varied negatives of each floor; becoming a collection of changes through time.

However, once conducting this experiment, a couple observations realized some difficulties; 1. typically only the perimeter walls burned out, 2. the plaster acted as a heat sink which didn't allow the model to get to high enough temperatures to have a better result, and 3. interior partitions didn't burn out due to lack of oxygen. It was at this point where looking at the structure specifically became more interesting. Each experiment conducted to this point wanted to retain some level of control and applied parameters, however, it was this study that proved that fire takes its own control. This realization led into the thesis today.

Fig 4. Constructed scaled model floor of the Mackintosh Building (Image by author).

Fig 5. One modelled floor engulfed in fire (Image by author).

Fig 6. Model floor, post-burn(Image by author).

Fig 7. Built-up model of burned, casted Mackintosh Building (Image by author).