OUTSIDE INFLUENCE

Analysing the process of precedent use in architectural design

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DECLARATION

The content of this dissertation is
The result of my own investigation, except
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It has not been accepted for any
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Abstract

There is a lack of understanding regarding the use of precedents in architectural practice and its relationship to the wider design process. This paper strives to provide a deeper understanding of precedent use, to highlight how it has been used in the past, the role it plays in design expertise and the ways in which its usage is developing. It will also discuss the individual and complex nature of precedent use and endeavour to use understanding to aid the education and development of precedent as it relates to the design process and design expertise. It will do this by providing a series of spectra that act as lenses through which to view precedent methods on a case by case basis. These spectra will then be used to analyse a selection of different ways of using precedent in architectural design, through this analysis the reasoning for each spectrum will be elaborated and defined and it will also demonstrate how the spectra can aid in the understanding of precedent. The paper then assesses these spectra, their potential, and opportunities for use as well as how it can be developed further and the insight gained from their use in this dissertation.

If good designers have anything in common, it is that they all seem to be equipped with a subconscious sponge, capable of absorbing a wide and unrelated range of stimuli to be tucked away at the back of the mind for future use. A builder's yard or a factory are as likely to provide a fruitful scrap of inspiration as a book on Islamic calligraphy or a visit to the Louvre. But how did that scrap of inspiration become part of a design solution? Logic? Intuition? Lateral rationalisation? Maybe thinking by jumping is as close as a description as we can get."

(Pentagram., 1986)

Where do Ideas Come From?

The origin of ideas has long been an aspect of any creative endeavour that is pondered and examined, as well as the process of how those ideas develop and come to fruition. The creative process has been extensively studied but the origin of ideas has often been portrayed a fortuitous or coincidental or due to an individual's moment of genius. But these descriptions don't paint the full picture, designers are heavily influenced by the world around them, whether positively or negatively. The use of previous design solutions is often termed as precedent and the use of these to aid a design, especially in architecture, is standard practice.

From an architect's early education, they are taught the importance of using precedents to improve their design. On a wider scale, it is accepted that design does not exist in isolation and that there is no such thing as original design, neatly described by Mark Twain in a letter to Helen Keller: *"All ideas are second hand"* (Brain Pickings, 2017). Although there are often some designers who would argue that they are completely original, all designs have been influenced by outside sources at some level, whether previous design experience, larger cultural ideas, trends in the industry or often, precedent studies. Architecture especially, being an industry that revolves around physical construction all designs have a relationship to their context, and whether this relationship is positive or negative it is also a relationship to precedent.
While the use of precedent is well known and encouraged in education, little is known about the effects, flaws, and opportunities of precedent studies. Anecdotally, it is often acknowledged by architecture students that their use and understanding of precedent is simply *"because they (the tutors) want to*

see them in your presentation". This lack of understanding from a student's perspective is reflective of the wider professional context. There is little research on how the design process is affected by outside sources, although this appears to be a trend that is beginning to change with more practices beginning to conduct their own research (RIBA, 2014).

One of the best explanations of how designers are influenced by outside sources and use them to create their design solution, this cross-pollination of ideas, is provided by Peter Mayle in the introduction to a monograph of the esteemed design firm Pentagram:

"...quite often, there won't be a precise answer. If good designers have anything in common, it is that they all seem to be equipped with a subconscious sponge, capable of absorbing a wide and unrelated range of stimuli to be tucked away at the back of the mind for future use. A builder's yard or a factory are as likely to provide a fruitful scrap of inspiration as a book on Islamic calligraphy or a visit to the Louvre. But how did that scrap of inspiration become part of a design solution? Logic? Intuition? Lateral rationalisation? Maybe thinking by jumping is as close as a description as we can get." (Pentagram., 1986)

The idea that this search for concrete description or definition is always a little beyond reach is one that runs through this paper and a large amount of the literature referenced, but that does not diminish the value of the insight gained whilst searching. The process of designing is rarely clear to the designer

themselves, and usually only in hindsight, in this anecdote from the architect Richard MacCormac describing the design process of a project he provides a clear example of this intangible nature of design:

"At the beginning of the process the centre of the scheme was a circular courtyard, but later I thought this was wrong. By then we had this V idea going in which the building opens out in a 'V' shape rather like the wings of a bird ... towards this wonderful landscape. Then suddenly I had this idea that the courtyard should be pulled into an oculus, a sort of eye shape which would reflect the dynamic of the whole project... I can't quite remember what happened and either Dorian or I said, 'it's a wall, it's not just a lot of little houses, it's a great wall 200 metres long and three storeys high ... we'll make a high wall then we'll punch the residential elements through that wall as a series of glazed bays which come through and stand on legs." (Lawson, 1994, p.60)

In that example, MacCormac rather humbly portrays his design process as something of a stumble towards a goal but expert designers, whether architect, artist or graphic designer, are often portrayed as magicians. With their process being portrayed as highly original, mysterious and often beyond the understanding of a *'mere mortal'*. Kolko (2011) suggests that clients desire this hidden, ethereal element to qualify the money being spent on a designer. This is reinforced by Jones' (1992) idea that *"the most valuable part of the design process is that which goes on inside the designer's head and partly out of reach of his conscious control, in the black box"*.

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Whilst this may be a common outside view of design processes when studied there are often logical and understandable steps that designers go through to get to their final solution. There is also a desire from architects for the general populous to understand their process to move away from the identities of style placed upon them by critics (Lawson, 1994). The initial logical progression is prevalent within architectural education with the widespread teaching of precedent, and study of prominent architects and their buildings, whether contemporary of historic. The reasons for this focus on what has gone before can be clearly explained:

"This is the case in architectural design where many design problems have been solved before, in many cases over and over again, and where many tasks can be based on modifying solutions." (Eilouti, 2009).

The influence of precedent and its value towards design is more than as just limited, inflexible puzzle pieces that can only solve limited problems, as this paper will discuss. Its use is prevalent throughout the history of architecture and plays a key role in education and development of an architect. Although it can be used poorly, as just a derivative imitation, it's potential is substantial, with the ability for new technology to make it simpler to source, analyse and integrate precedents into design as well as the influence that a deeper understanding of precedent can have regarding design process and the effect of outside influences. The influence of precedent on developing design expertise is significant, as explained by Rosenman, Gero and Oxman:

"Case-based reasoning relates a current situation to the closest most specific experience in memory and uses that past experience to solve the problem at hand". (1991)

This aspect of design is focused on solving problems, and ways in which that can be done is central to the implementation of precedent. Whilst the focus is on the part that precedent plays in solving these problems, a wider understanding of this process of problem-solving is essential, especially with regards to how creativity brings together seemingly disparate strands, as put by Steve Jobs: *"Creativity is just connecting things."* (1996).

Methods

There is a lack of understanding regarding the use of precedents in architectural practice and its relationship to the wider design process. Of the few research projects that touch on precedent use, many are from an educational process and/or are focused on the changes technology can make to precedent use such as the work by Karina Moraes Zarzar (2003) developing an evolutionary model of precedent use or the work of Senbel et.al (2013) analysing students use of 3D digital precedent data. As this paper strives to place architectural precedent use into context it is essential that prevalent, pioneering and historical methods. This paper also aims to provide a deeper understanding of precedent use, discussing it's individual and complex nature and allowing this understanding to aid the education and development of precedent as it relates to the design process and design expertise. Currently, the term precedent is limited and this paper suggests an initial vocabulary of terms that capture the wider effect of outside influence on design. It will also provide a series of spectra that act as lenses through which to view precedent methods on a case by case basis to begin to give clarity to precedent use. This paper will use these spectra to analyse a selection of different ways of using precedent in architectural design. Through this analysis, the reasoning for each spectrum will be elaborated and defined and it will also demonstrate how the spectra can aid in the understanding of precedent. As the focus of the study is a current gap in the research the methods used in this paper will be literature based, using qualitative data gained from a variety of sources. This paper aims to act as a framing of the study of precedent use to allow further research to occur in the future.

Meaning of Precedents in Design

The term precedent in architecture has many different interpretations, this is perhaps a reflection of the limited research but is also due to a variety of different activities that architects class as precedent. This would suggest that a clarification of the meaning of precedent would be beneficial to the understanding of its effect as well as a wider vocabulary to describe the use of precedents in design.

In their research paper investigating Design knowledge recycling, B. Eilouti defines design precedent in the following manner: *"to mean a prior or past design solution that has some interesting architectural or engineering formal, structural, syntactic, semantic or systematic features that may provide partial or total exemplars of new design solutions."* (2009)

In a contrasting approach, Gabi Goldschmidt in her paper looking at creative architectural design argues that precedents should be better described as references (1998). Her main point is that unlike legal precedents, architectural precedents are a point of departure as opposed to a carbon copy of the original. Although B. Lawson in his paper recognises that this argument is valid, he persists on the use of the word precedent on the basis that *"that is what most designers would call it"* (2004). Although in a paper researching precedents in design, an alternative, more condensed definition is provided:

"Precedent knowledge is here considered as the explication of the relevant insights of particular designs and the appropriate linkages of information between multiple design precedents." (Oxman, 1994)

It is hard to disagree with any of the views displayed above. The activity of using precedents is varied and necessitates for flexible terminology. Although the term precedent is used in a variety of ways, it is first useful to establish the widest definition. Combining some aspects of these views as well as the researcher's personal experience, the following definition allows for the wider influences that can affect architectural design.

Precedent: a previous or existing solution that has been used in some manner to solve a current design problem.

As the use of precedent is varied and complex, the above definition also allows for a set of terms below it that can also be considered to describe elements of precedent use. In this paper, several different terms will be used to describe precedent to be a specific as possible and to highlight the nuance that can be found within the term precedent. As this is part of an initial foray, these terms will require further research to back them up but they function for the purposes of this paper. Case study is a term often already used to signify a specific analysis of an existing built work. Inspiration is also a very commonly used term but is not necessarily always linked to precedent. This is like the use of the terms typology and vernacular which are referred to as being an element of the precedent study. The design solution is again a reference to an aspect of a precedent that can be used on a current design problem. Reference is used to describe a subtler implementation or influence that is utilised. This set of terms is by no means exhaustive and much like this paper itself is only meant as a starting point.

Historical use of Precedents in Architecture

The influence of precedents has arguably always been present in architecture, although the level of intention and implementation has developed over the years. Throughout each important architectural era, architects have taken ideas and methods from each other and from the generations before them. It remains the same today. Education has always played a key role in this, from apprenticeships under the tutelage of master craftsmen to the beaux arts, the Bauhaus and to modern RIBA accredited training, the study of existing architectural design solutions has been prevalent. Details of how this use of precedent influenced designs are limited for several reasons, the knowledge available only covers the most significant figures in architecture such as Vitruvius, Palladio, Wren and the like; with many architects not sharing their process and influences. In his book "Architecture Oriented Otherwise", David Leatherbarrow describes how this secrecy affected Frank Lloyd Wright:

"Intent on preserving the impression of his originality, Wright was never particularly open about his sources. Any attribution of influence in his case will always be suggestive." (2014)

This insight helpfully represents the difficulty of studying the historic use of precedent as well as the clear influences that have affected architecture design through history.

Due to this lack of previous discussion an extensive analysis of precedents would require a much more significant study than is possible in this paper, but it is possible to draw elements and themes from the development of precedent

use in architecture. Architecture is affected by many sources and is often rooted and reflective of the cultural Zeitgeist. Cultural themes are often represented in the built work of that time, such as the embrace of rationalism and reason and the focus on science over religion in the Renaissance, no project is more demonstrative of that than Etienne-Louis Boullée's Cenotaph for Isaac Newton (Miller 2014). Although never built, it was heavily influenced by the society of the time. Architecture is also influenced by the development of technology, as technology is tested a proven to work, it takes off, quite literal in the case of skyscrapers in America after the invention of the elevator in the late nineteenth century (Sabbagh, 1991). Whilst these two examples may not be typically thought of as precedent, the fit the description of a design being affected by, even somewhat reliant on, outside influence. Architects traditionally would look within architecture for precedent influence, but inspiration comes from a much larger sphere of influence than is given credit for.

Questions of Originality & Ownership

"It is better to be good than original"

- Robert Venturi (Lawson 1994)

"The body of architecture, like literature, is large and weighs heavily on anyone joining the profession. An architect cannot but be influenced by images seen and remembered. Because architects work both under the influence of other architects and under the onus of having to be original, there is in their minds, and in the profession, an uneasy balance between influence and originality: balancing the two is perhaps where the architect's art lies"

(Giovannini 1983)

Originality in any creative endeavour has long been perceived as a desired aspect. But often that originality is more of an illusion than it is portrayed. As already referenced, many great artists and designers through the years have referenced this, the quote: *"good artists copy, great artists steal"* which is often attributed to Picasso (famously by Steve Jobs) although its origin is more complex than appears with eerily similar quotes found in work by T.S. Eliot and earlier (O'Toole, 2013). As with many conversations on originality, it is often tied to ideas of ownership and rights, especially in modern times with intellectual property rights and copyright and a focus on clear referencing in any academic writing.

Although these views often don't stand up to close investigation. In a story originally printed in the New Yorker, Malcolm Gladwell describes his experience of confronting the flaws and complexities in copyright. His story focuses on a Broadway play called 'Frozen' about a psychiatrist that studied serial killer and the complications and consequences of it being too closely based on a profile Gladwell himself wrote about a psychiatrist called Dorothy Lewis and then goes on to elaborate on the question; *"Should a charge of plagiarism ruin your life?"*. He experiences an unexpected emotional response to the discovery of the similarities:

"...instead of feeling that my words had been taken from me, I felt that they had become part of some grander cause.... Bryony Lavery had seen one of my articles, responded to what she read, and used it as she constructed a work of art. And now her reputation was in tatters. Something about that didn't seem right."

As well as dealing with the more emotional aspects of plagiarism he also explores the legal ramifications and the use of sample in music. He uses the story of a composer bringing a lawsuit against Andrew Lloyd Webber to demonstrate the complexity of tracking the origin of ideas in artistic fields. The lawsuit came out on the side of Lloyd Webber after an expert witness discovered that the piece of music under investigation was found in an earlier piece of Lloyd Webber's music. Gladwell also discusses the problems of being strict on copyright law listing countless songs that wouldn't exist with stricter

copyright describing his friend's reaction to the pattern of similarities between songs:

"Did the examples upset him? Of course not, because he knew enough about music to know that these patterns of influence – cribbing, tweaking, transforming – were at the heart of the creative process. True, copying could go too far. There were times when one artist was simply replicating the work of another, and to let that pass inhibited true creativity." (Gladwell 2004)

This could equally be a description of architecture. Many of the points are the same, the idea that influence is inevitable and essential but also the caution of the balance and intentions when dealing with those influences. Throughout the piece, Gladwell highlights the damage strict enforcement of copyright can cause as well as the logical frailty of that practice:

"Creative property, Lessig reminds us, has many lives – the newspaper arrives at our door, it becomes part of the archive of human knowledge, then it wraps fish. And, by the time ideas pass into their third and fourth lives, we lose track of where they came from, and we lose control of where they are going. The final dishonesty of the plagiarism fundamentalists is to encourage us to pretend that these chains of influence and evolution do not exists, and a writer's words have a virgin birth and an eternal life." (Gladwell 2004)

Ownership of ideas in architecture is an even muddier area. How can a field whose main purpose is the creation of physical built work deal with these same

issues of copyright? The designer should have a level of ownership over their designs, but to what extent? For the most part this issue has not been at the forefront of architectural discourse due to the complexities and uniqueness in the location and construction of buildings as well as the common practice of precedent. In recent times there have been a few cases of alleged architectural plagiarism, a lawsuit against SOM over an early version of their design of the Freedom Tower, now One World Trade Center, (Rybczynski 2005) and a Zaha Hadid tower complex in Beijing being copied in Chongqing whilst the original was still under construction led to charges being pressed and calls for the Chinese government to properly secure intellectual property law (Wood 2018) which the alternative construction team embraced, utilising the slogan:

"Never Meant to Copy, Only to Surpass."

Whilst these issues are still relatively uncommon, it may become more of an issue in the future, especially with Chinas quite blatant copying of western architecture, and the industry as a whole will have to come to some consensus over what the extent of designer ownership was and whether it should expand from its current state as only to prevent the client taking advantage of an architect's work.

Developing Design Expertise

A key element of how novices become good or expert designers is experience. In design professions, especially architecture, designers take time to mature to become experts and prolific in their field (Lawson, 2004). If an architect becomes prominent before their 40th birthday it is a highly unusual and commendable feat which contrasts with sports or performance careers or even other research areas such as mathematics or science where that occurs earlier in their career. This highlights the necessity for experience in the advancement of design skills. But what exactly is it in experience that allows designers to learn how to improve? In her research into design metaphors, M. N. Gulari (2015) breaks it down into five key aspects: design knowledge, design skills, design outcomes, design processes and design roles. The study of precedents can develop many, if not all those areas, depending on how the precedents themselves are selected and analysed. Although, due to the limited research into this topic, the understanding is limited leaving the potential and use of precedents to remain somewhat a mystery, with the use of precedents varying from designer to designer.

One of the key images used by Brian Lawson is the creation of a catalogue of solutions in a designer's mind that they gain through experience, as they advance in their career their expertise grows in line with the expansion and use of that catalogue of design solutions. This catalogue can be developed myriad ways but typically in a designer's career, especially when they are still a student this experience of existing solutions will be gained through the study of precedent.

"...it seems important to recognise that the novice student must begin the long process of acquiring knowledge of design solutions and other related sources of potential design inspiration. There is much evidence that designers operating at the more advanced layers of our expertise model make use of this material during their design process."

(Lawson and Dorst, 2009 p.140)

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We often witness the development of a designer's catalogue of design solutions through their design style. This is understandable as this catalogue is edited and refined the further into their career a designer gets, with solutions they no longer like or insufficient being discarded. This is of course, like any other artistic endeavour a much more tentative and subtle procedure that it can come across, likewise, it is a process that is only ever revealed in hindsight. The influence of outside examples is often key in the development of a designer's abilities. The ability to take inspiration from outside sources is a key skill for a designer and even more so the ability to implement that influence in a skillful and accurate manner.

"Design students then must not only learn to recognise situations but they must also be able to draw parallels with situations from other contexts. This is a subtle and sophisticated process that lies right at the very core of creative thought in design. Students will stand very little chance of carrying off this cognitive trick unless they develop their own mental structure for storing potentially useful knowledge. A major task for the design student

then must be the creation of some organising structure within which sense can be made of the design precedent gathered, Precedents are not simply stamps stuck into some mental philatelic album country by country; they are complex phenomena that need evaluation along many dimensions. As the design student develops the number and organisational complexity of these dimensions will surely increase." (Lawson and Dorst, 2009, p.148)

As the development of the architect as a profession led to larger practices, we can see this catalogue building on a collective scale in large practices as they develop their own design style or language despite being made up of a collection of individuals Richard MacCormac terms this his practices *"repertoire of tricks"* (Lawson, 1994). This becomes even more remarkable in practices that have outlived their founders yet produce buildings in a style not far removed from the initial style of the founding

Changing Climate

The use of precedents is very commonly taught in the design studio and is often used in various manners in practice. Throughout an architect's education, they are taught to show where their ideas have come from using precedents much like a maths student is required to show their working. As with many other elements of their education, their use and knowledge of precedents changes and develops as they progress, with a sixth-year student using precedents in a vastly different manner than first years using a much more solution focussed strategy that was not apparent in the first years (Lawson, 2004). The most common way for architects to research precedents is traditionally through books such as Durand's "parallele" first printed in 1800 that featured a collection of buildings drawn in standard projections without further comment. Clark and Pause's Precedents in Architecture first published in 1985 features standard architectural drawings as well as more analytical diagrams. The Floor plan atlas by Frederike Schneider published in 1994 contains much as the name implies a pattern book of floor plans (Flemming and Aygen, 2001). There are also more specific examples of precedent books covering specific typologies such as the Housing Design Handbook by the London-based architects Levitt Bernstein. But whilst the core teaching of precedents has not changed in the digital age, the tools and methods of working have (Senbel et al., 2013).

As architectural ideas have changed and progressed, so has the methods of designing with a significant amount of architect's time now spent on computers and as more and more things shift to being 'connected', the process of architecture is changing. With the use of advanced digital software, it

becomes easier to generate complex forms, entire buildings can be simulated before a single contractor moves on site but how much has the design process changed? Many architects still generate their ideas with pen and paper, or integrate manual and analogue drawing or modelling techniques into the generation of their ideas. In the abstract for their paper "Precedents reconceived" the authors state that:

"Design students are increasingly seeking precedent information through web-based digital archives of design cases. Little is known, however about the use, relative merits or opportunities of digital cases as a knowledge source for design students." (Senbel et al., 2013).

The effect that these changing techniques have on the design process is unclear. It is difficult to truly analyse the difference made in such a fast-moving industry, and the differences made in an architect's education can only be witnessed when observed over the length of a career. As with any developments, the changes brought on by an increased access to digital information comes with pros and cons. The vast amount of data available to analyse is only beneficial if there is a structure in place that can process that data. There is also the aspect of quality over quantity, does this have an effect here? This is an unprecedented point in time, technology has never been so prevalent and the pace at which it has risen to prominence makes it almost possible to make any predictions or solid deductions.

The Search for Definition

In the search for greater understanding of precedent use in architecture, it is necessary to develop a vocabulary of terms and a manner of providing a level of definition to precedent use. The use of precedent in architecture is complex, varied and everchanging as shown earlier and will be demonstrated in the following section. This requires any definition to share those same attributes, to be flexible enough to adapt to the required circumstances but still be firm enough to provide clarity. Architecture is not a field afraid of an expansive use of jargon but up to this point, the term precedent appears to have just been used as a catchall term that means different things to different people. Whilst all language suffers from this to a certain degree it has produced a lack of insight into this area of architecture. This is not always a disadvantage it acts as a barrier to understanding precedent use and communication between architects as well as with those out with the profession.

In this paper, to begin this journey of deeper study, a model is proposed to create this definition. This is based on a set of 5 spectra. The use of spectra allows for a wide base of definition and then for particular uses of precedent to be placed on the appropriate point on the spectrum. By using multiple spectra, a greater clarity can be achieved as the particular precedent use is brought more into focus. The use of spectra here is most analogous to the ideas of a political spectrum, which was initially simply a left-right spectrum but has developed over time to include more axes to represent the different aspects that can influence and define an individual's political views (Kopsick, 2017). Whilst not quite as contentious, precedent use is as equally varied and a spectrum with a variety of axes can both allow these various methods and

provide a level of definition. These spectra upon which the use of precedent by a specific architect/practice on a specific project at a moment of time can be placed. It can also be used to understand characteristic uses of precedent by architects to understand their typical approach to integrating outside influences in their design.

In the following section this set of spectra will be described and demonstrated, their definitions and limits set out, their relationship to other spectra established and examples will be used to build up an image of how this model would function and relate to the creative process.

Much like the political spectrum, this precedent model is not necessarily value based. Due to the nature of architectural design, there is a level of subjectivity but a particular precedents placement on the spectrum is not necessarily determining the quality of the precedent use. In the description of each spectrum. Although many of the examples used are of highly successful architects, their use of precedent is not the only factor in their success. Precedent use is only one piece of the puzzle that is the architect's skillset, it can greatly aid the design process but it is essential for a variety of skills to be brought together in order for design expertise to develop.

#1. Imitate x Interpret

Following on from 'Questions of Originality', one of the contentious elements of precedent use in architectural practice is how that precedent appears in the final building. It is a widely held belief that imitation is an ill-considered deployment of outside influences in architecture (Wood 2018). As this paper espouses there is a great potential for outside influences to create higher quality architecture, in fact it has been so for hundreds of years (Rybczynski 2005). The skillful use of precedent is based on the combination and arrangement of the various references and how they are brought together in a functional and pleasing composition. So then, it is a combination of the manipulation, the implementation and composition of precedent influences that this spectrum is focused on.

On one end of this spectrum is the simple copy/paste, pattern book approach in which an element is lifted usually from another building and used in the design of this new building with limited if any adaption to make it specific to the project at hand. Historically this has been the dominant use of precedent, from the definition of the Greek and Roman orders up to the Beaux-arts tradition of teaching their students exemplars of various building elements for them to utilise in their own designs. A modern equivalent can be found in BIM where existing elements are used to build up the model. Whilst this is in many ways the most rudimentary approach to precedent it doesn't make it ineffective. It allows for greater efficiency in the use of repetitive elements, which allows space to exert more effort on other areas of design and it also provides a level of safety and security in the use of designs that have already been tested.

On the opposite end of the spectrum is a more interpretive approach where wider fields can be influential, but whatever example is chosen or has an influence goes through much more analysis and adaption by the designer. This allows for a greater level of control and specify, it allows for a greater appreciation and integration of the context of the building. A simple example of this is how a modern residential building can use the local buildings as precedent, referencing the fenestration but analysing and implementing it in modern materials and methods. Santiago Calatrava, whilst often compared to Antoni Gaudi, has in fact taken more inspiration from Swiss engineering traditions (Lawson, 1994 p.22) and his particular focus on folding structures is a reflection of an interest in the human skeleton which obviously requires significant development.

The imitate to interpret spectrum also provides an image of how a designer's precedent use develops over time. As an architect's expertise develops they are able to interpret wider sources and tailor them more specifically to the project at hand. Although an exception from that can be seen in certain purveyors of Postmodern architecture, with an often-gaudy appropriation of various architectural motifs deployed to create a somewhat classicism on steroids and although some of that period's work may not currently be aging well, it is an apt description of how imitation plays a role in architectural design.

#2. Deliberate x Accidental

"The canon - a body of knowledge for architects - thus established, can then be freely appropriated in design, and this prevents the necessity of reinventing architecture from scratch every time one designs a building. Moneo believes architects should have a deep knowledge of history, and this allows them to make use of solutions that have already been thought through and tested by their predecessors. The initial move in a design project is therefore to select a solution from the history of architecture; architects do not have to reinvent what has been thoughtfully created already. But this does not mean that architects cannot invent anything new. The history of architecture is a living one, but innovations should appear gradually over time, offering solutions when they are needed in order to respond to the new demands of society, which in turn are incorporated into the body of architectural knowledge that forms the canon."

(González de Canales and Ray 2015)

As discussed previously, it hasn't always been seen that precedent has been a specific task or point in the design process. Whilst this attitude has changed somewhat with precedent studies being taught at university and becoming a common term in the design studio, the intuitive/automatic/assumed use or influence of precedent in design is still significant.

This intuitive use of precedent can be seen in many areas, some beyond the remit of this paper, and is often not typically thought of as 'precedent'. For example, the ideas of typology and vernacular could be described as intuitive uses of precedent that have developed over time as a collective pattern book of suitable design solutions. The development of typology is an important one for architecture and demonstrates how the wider architectural culture provides examples of successful designs that can be adapted and adjusted to the specific requirements of the brief and context.

Of course, the rejection of the type is not uncommon in architecture, often instrumental in the development of architecture as a field, which displays the other end of the spectrum, either a rejection of this intuitive precedent or a deliberate choice to look for inspiration. This is an underappreciated aspect of precedent use; precedent can have a positive effect on design even when its used in a contrary manner. This can be demonstrated through progressive movements throughout history rejecting what has gone before. This can also be the case in unsuccessful built work, the 'Walkie-Talkie' in London was a very influential precedent but not in the way that was intended much like many other winners of the carbuncle cup (Glanfield, 2015).

The testing of new alternatives is how vernacular and typology or as Rafael Moneo puts it the 'Architectural Canon' moves forward. As these alternatives are put forward and tested they are then either accepted or rejected. This model of 'canon' can also be a helpful image for the idea of a catalogue of design solutions that is developed on an individual/practice level as an ever-changing set of possible design solutions. Richard MacCormac describing his practices development of this catalogue describes how they use it to quickly solve initial design problems:

"We have established a kind of typological repertoire which is to do with density and the main problems like car parking and so on." (Lawson, 1994, p.60)

As with several others, the deliberate to accidental spectrum is an apt description of the journey of a designer from novice to expert. As with any skill, the initial uses are often clunky and unsuccessful but as that skill is practiced and used it becomes more efficient, effective and more intuitive to the point where it is no longer thought of as using precedent.

#3. Literal x Figurative

The literal to figurative spectrum is focused on providing insight into the different fields that have an influence on architectural design. As discussed previously, the majority of precedents that influence architecture are existing buildings from the time in question. Influential buildings and architects have by definition had a large effect on architectural culture, as they come to represent the thoughts and ideas of a particular period of time. This fits the typical definition of precedent in architecture being focused on sources within architecture with a literal use of the precedent source. This, however, is not an accurate or comprehensive description of a field that has long been inspired by a wider cross-pollination of thoughts and ideas. Regarding this spectrum, the terms literal and figurative can take on various meaning. On an initial level, it could simply be viewed whether the influence comes from within architecture (literal) or from out with the built environment (figurative). But much like many terms in architecture, they have deeper levels of meaning such a looking at how an architect embraces imagery whether in a design sense or to communicate and express the design.

Using this initial definition, literal describes a precedent that is used in a very similar context to the source matter, for example, an architect working on a library would look to other libraries for precedent information, or from buildings in the surrounding area. Figurative would refer to a more abstract sourcing of precedent use, such as taking inspiration from the natural world or using process as an inspiration. Both these uses are valid and both can provide inspiration for design.

Typically, but not necessarily, literal use of precedent is often seen in novice designers, or in particular aspects of design such as the detailing as will be discussed later. Yet the figurative use of precedent can also be a helpful illustrator for novice designer, particularly in education, as the using a field outside architecture, which the designer in question may have a stronger basis in allows for greater understanding which in turns helps the designer develop. Where a designer sources influences can often provide great insight into the process and rationale behind their design styles as well as what their individual interests are in. For instance, learning that Mies van der Rohe was the son of a stonemason and worked for his father as a boy gives a greater understanding of how he came to utilise marble in the Barcelona Pavilion (Cohen, 1996). Or Herman Hertzberger's statement that he is *"inspired by the daily life going on",* (Lawson, 1994, p.40) explains how his buildings provide spaces that facilitate and celebrate the everyday such as the interaction provided within his Central Beheer Offices.

Figurative use is a more abstract interpretation of outside influences. Due to this higher level of difficulty, it often requires a certain level of design experience as Lawson and Dorst describe it:

"We shall see the modes of design available to more expert designers that enable them to see wider ranges of parallelism and to copy in more adaptive ways." (2009, p.130).

"Analogy is there all the time in our thinking, and historical analogy is very important ... Bob is quite likely to say something like 'this fountain should be like an Edwardian lady's hat.'"

(Lawson, 1994, p.100).

The figurative use of precedent also ties into the prevalent use of metaphors to explain design (M. N. Gulari, 2015) or analogy as described by Denise Scott Brown:

"Analogy is there all the time in our thinking, and historical analogy is very important ... Bob is quite likely to say something like 'this fountain should be like an Edwardian lady's hat.'" (Lawson, 1994, p.100).

The figurative use of precedent is also descriptive of the ideas of biomimicry such as Steven Holl finding inspiration from a sponge (Rybczynski 2005).

#4. Emotional x Analytical

"We have always made work in relation to the things that we have seen and experienced, and designing usually involves a discussion about a recent gallery visit, a strangely affecting encounter with a building or a part of the city, of coming across an unexpected use of a familiar material. The things that influence our practice are rather disparate and throughout conversations, we struggle to bring these to bear on the social and physical situation of the project at hand. Like Eliot's poet beyond his twenty-fifth year, after a number of years of practice, we have developed our capacity to use ever wider source material. It seems scarcely imaginable that the world around us and the traditions of architecture are not enough to sustain the remainder of our practice."

(Caruso 2008, p.14)

Architecture is often seen as the intersection of art and science and has often attracted people from all points of that spectrum. This leads to a vibrant variety of practitioners; these differences appear in precedent often through the approach and valuing of potential precedents. With the artistic response in this regard being characterised as an emotional response and the scientific as a more analytical approach in order to stray from any stereotypes that come with the terms artistic and scientific. This can be seen in both the kind of precedents chosen as well as how that precedent is used.

Much like other areas of precedent use, this aspect is highly variable, an ability that in this regard is desirable in much the same way as it is beneficial for an architect to be able to balance the emotional and analytical aspects of a project simultaneously. This idea is aptly and humorously described by Ian Ritchie as two parrots that sit upon the architect's shoulders and are engaged in a fight for attention (Lawson, 1994, p.88), and elaborated further by Richard Burton:

"There's the poet and the artist on one side and the technician on the other and this is a good metaphor for what we're up to as architects. The danger is when you see on the technical man, or the artist who doesn't have any practical skills. I see the architect is right in the middle trying to hold these two together in a kind of harmony, and if he gets it right it produces almost another dimension, and if you go into such a building you say 'ah, that's it'." (Lawson, 1994, p.16)

In an ideal world, the considered implementation of a precedent would be a balance of emotional and analytical.

The quote above from Adam Caruso describes a more emotional, experiential approach to the use of precedent. Caruso describes how he is influenced by what he felt, his response to the world around him being the source material for his designs. He qualifies what he selects based on this response whether that is positive negative or somewhere in-between. This translates in the built work of Caruso St. John, creating spaces that elicit emotional responses which are then often used a precedent by other architects. However, that is not to say that there isn't an analytical aspect to their precedent use but more so that the qualifier for a precedent to be selected is initially an emotional response, which can then be analysed in a more critical manner. It is similar to the constant influence of the world around the designer described by Lawson and Dorst:

"One advantage of being a designer is that you are literally surrounded by examples of design, good and bad. Designers then accumulate experience of designed objects both from their field of design and others. Many designers habitually carry small sketchbooks in order to draw things they see. Some do this in a very casual manner while others, like the architect John Outram, appear to use more formal analytical techniques." (2009)

As mentioned earlier, architecture requires a combination of analytical and emotional, with often these two aspects spurring on the other. For instance, Robert Venturi and Denise Scott Brown began their seminal work "Learning from Las Vegas" based upon an emotional reaction to experiencing Las Vegas which then developed into a hugely analytical thesis (Lawson, 1994, p.94). This spectrum then is focused on the qualifiers given to precedent, how designers select precedent, how they value precedent, what their approach is to judging precedent.

#5. Detail x Concept

The stage at which a precedent is used is also varied. The effect of outside influences can be seen at all points in the design process, from the development of the brief & concept to the wall build up and service layouts. There is no particular 'correct' point at which to implement precedent, to say so would falsely assume a consistent and linear design process (Lawson, 1994, p.4). Precedent can add value at all stages of design, which is not to say that a particular precedent that was useful in developing a schemes parti will be useful in the design of a window detail although there are of course exceptions.

At the detail level, arguably the greatest precedent influence is in local building regulations or traditions, with those constraints providing limited possible solutions with some local authorities providing working details to implement or adjust as appropriate. This would also be a further example of a more intuitive and accidental use of precedent, a more example can be found in the work of Eva Jiricina in which her focus on detail can generate the rest of the design based on a firm belief that the study of materials and their junctions can provide the guidance for how the design should move forward. (Lawson, 1994, p.52)

The use of precedent to affect the concept design is perhaps more typical as at that point in the process there are many ways in which the design could possibly develop and a clear reference can help solidify the aims and ambitions for the design, as put by Denise Scott Brown:

"You have to have something basic that you either build on or evolve from or revolt against. You have to have something there in the first place and the only way to get it is to copy, in a good sense of the word." (Lawson, 1994, p.98).

Relevant/built examples can often be found in icon buildings, such as Jorn Utzon being influenced by the natural world for the Sydney Opera House (Perez, 2010) or Gehry being influenced by Bilbao's industrial port and the form of an unraveling lotus flower for his Guggenheim museum (Mancusco, 2014). A subtler integration of this can be seen in Peter Zumthor's Therme Vals where the desire to create space that reference a cave or quarry drove the project through from concept to detail stage.

Much like other aspects, the stage at which precedent is used is highly variable and can change within a project. Architects are often required to constantly switch the scale at which they design at, moving at pace from concept to detail and back, with the concept being tested at a detail level that being reworked if necessary, Robert Venturi emphasised this aspect of the process working from the particular to the general as well as the other way around:

"We have a rule that says sometimes the detail wags the dog. You don't necessarily go from the general to the particular, but rather often you do the detailing at the beginning very much to inform."

(Lawson, 1994, p.100)

Summary of Findings

From this initial implementation of these spectra their ability to provide insight into precedent has been displayed although there are certainly shortcomings that will be discussed later. Precedent use in architecture is a hugely deep well in which to dive into, there was a multiplicity of options in each and every example but due to these only being the first forays the bucket is yet to get near to the bottom. Although the example selected were contrasting and selected to highlight particular aspects there was always an element of overlap into a different spectrum or a spreading out within the spectrum itself. This serves to reinforce the many shades of precedent use, it's certainly not a black and white issue. A particular note on the threads running through all the examples used to reinforce the spectra, whilst they are varied demonstrations of precedent use, the success of the architects or the buildings referenced are not solely due to precedent. Whilst this paper has a focus on precedent, that is due to precedent being an under-researched part of the design process, not because it is seen as a more influential or valuable that other design skills. The skillsets of the architects discussed is as varied and individual as their influences but they also displayed the multiplicity of abilities required of an architect describe by Michael Wilford as like:

"a juggler who's got six balls in the air ... and an architect is similarly operating on at least six fronts simultaneously and if you take your eye off one of them and drop it, you're in trouble. There is a sequential development but it's on several fronts simultaneously." (Lawson, 1994)

Limits and Opportunities

As these spectra are a first step, they are very much still in an alpha testing phase, relying on existing, literature based data and hampered by the constraints of this research projects limited timescale and resources. In the future there is a multitude of ways this model could be utilised and developed.

Once it is put through testing both in terms of accuracy as well usability and effectiveness, the definitions of the spectrums would be reinforced or adjusted to fit the new findings. This would allow a much more comprehensive deployment of the model as although it would ideally always be developing, it's current iteration still needs to focus more on defining the spectrums rather that the precedent use in question.

Much like the use of precedent, this model could be used at many stages and levels of architecture and the wider design industry and process, from providing a student insight into how a great master approaches precedent to providing that master insight into their own process.

Another current limitation is that in a visual industry this model is only text based just now. Whilst that doesn't devalue or undermine the model per say, being able to portray these definitions in a more visual or solely visual manner would be advantageous. There are many opportunities for this, inherent in the use of spectrum to define it would simply be a case of setting axes and plotting various elements although there may be more advanced and illustrative ways of achieving this.

The spectrums being transposed to visual format would allow for faster understanding and allow for easier comparison and analysis between definitions. It is also possible for this model to be transposed to a digital platform, which would obviously require a great deal of work, it could have many beneficial outputs. A database of diagrams of architect's precedent use tendencies could be created or these diagrams could become part of the set of data that appears on archdaily or dezeen or the AJBL for any individual project to describe how precedent was utilised.

Conclusion

The effect of outside influence on architectural design is extensive. Architects often take design idea from a whole range of sources and in a variety of manners. This use of precedent is a common trend that runs through the history of architecture, although this has not often been studied. Whilst there is often a concern that to encourage the use of precedent will limit originality and innovation, it, in fact, can have a positive effect on the design process in many ways. Much like the rest of the design process, precedent use is beginning to be changed by technology with an increased access to information and new digital methods of engaging with that precedent but the extent of that has not been analysed.

Due to the limits of this research paper, it could not be said that the spectra model is proven, however, through its demonstration it has set up the model which allows it to be further analysed and developed as discussed in the previous section. The validity of an increased focus on how precedent effect the design process has been demonstrated. Architects have long been using precedent in a variety of ways at many stages but it is only now beginning to be fully researched. As this paper begins this process, as well as proposing a model to define precedent methods it also begins to develop a vocabulary for how we approach the use, development, education, and discussion of how we use precedent in architecture.

Bibliography

AD Classics: Sydney Opera House / Jørn Utzon, 2010. [online]. ArchDaily. Available from: http://www.archdaily.com/65218/ad-classics-sydney-opera-house-j%c3%b8rn-utzon/ [Accessed 8 May 2018].

BEHANCE, 2018. Case Study- The Guggenheim Museum Bilbao by Frank Gehry. [online]. Behance. Available from: https://www.behance.net/gallery/13493541/Case-Study-The-Guggenheim-Museum-Bilbao-by-Frank-Gehry [Accessed 8 May 2018].

CARUSO, A., 2008. The feeling of things. Barcelona: Ed. Poligrafa.

COHEN, J., 1996. Ludwig Mies van der Rohe.

D. LEVITT, 2009. Housing Design Handbook. 1st ed. London, UK: Oxford: Routledge.

DOUGLAS, N., 2018. An Artist Explains What 'Great Artists Steal' Really Means. [online]. Lifehacker. Available from: https://lifehacker.com/an-artist-explains-what-great-artists-steal-really-me-1818808264 [Accessed 3 May 2018].

DURAND, J.N.., n.d. A Parallel of Architecture. Reprint of 1800 original. Helburn.

EILOUTI, B.H., 2009. Design knowledge recycling using precedent-based analysis and synthesis models. Design Studies, 30(4), pp. 340–368.

F. SCHNEIDER, 204AD. Floor Plan Atlas. Basel: Birkhauser.

FLEMMING, U. and AYGEN, Z., 2001. A hybrid representation of architectural precedents. Automation in Construction, 10(6), pp. 687–699.

GIOVANNINI, J., 1983. Architectural Imitation: Is It Plagiarism. The New York Times, 17 Mar [online]. Available from: https://www.nytimes.com/1983/03/17/garden/architectural-imitation-is-it-plagiarism.html [Accessed 3 May 2018].

GLADWELL, M., 2004. Something Borrowed. The New Yorker. [online]. Available from: https://www.newyorker.com/magazine/2004/11/22/something-borrowed [Accessed 28 Apr 2018].

GOLDSCHMIDT, G., 1998. Creative architectural design: reference versus precedence. Journal of Architectural and Planning Research, 15(3), pp. 258–270.

GONZÁLEZ DE CANALES, F. and RAY, N., 2015. Rafael Moneo: building, teaching, writing. New Haven, Conn.: Yale Univ. Press.

J. KOLKO, 2011. Exposing the magic of design: A practitioner's guide to the methods and theory of synthesis. Oxford, UK: Oxford University Press.
J.C. JONES, 1992. Design methods: Seeds of human futures. 2nd ed. London: John Wiley.

KOPSICK, J., 2017. The Evolution of the Political Spectrum. [online]. Available from: http://aquarianagrarian.blogspot.com/2017/03/the-evolution-of-political-spectrum.html [Accessed 8 May 2018].

LAWSON, B., 1994. Design in mind. Oxford [England] ; Boston: Butterworth Architecture.

LAWSON, B., 2004. Schemata, gambits and precedent: some factors in design expertise. Design Studies, 25(5), pp. 443–457.

LAWSON, B. and DORST, K., 2009. Design expertise. Oxford: Elsevier, Architectural Press.

LEATHERBARROW, D., 2014. Architecture Oriented otherwise. New York, USA: Princeton Architectural Press.

LUCAS, R., 2016. Research Methods for Architecture. London: Laurence King Publishing.

M. A. ROSENMAN, J. S. GERO and R. E. OXMAN, 1991. What's in a case: the use of case bases, knowledge bases, and databases in design. CAAD Futures '91, pp. 263–277.

M. N. GULARI, 2015. Metaphors in design: How we think of design expertise. Journal of Research Practice, 11(2), p. Article M8.

MAILONLINE, B.E.G. for, 2015. London's Walkie Talkie is voted the most hated building in Britain. [online]. Mail Online. Available from: http://www.dailymail.co.uk/news/article-3219883/London-s-Walkie-Talkie-skyscraper-voted-ugliest-hated-building-Britain-branded-gratuitous-glass-gargoyle-graffitied-skyline.html [Accessed 8 May 2018].

MILLER, M., 2014. AD Classics: Cenotaph for Newton / Etienne-Louis Boullée. [online]. ArchDaily. Available from: http://www.archdaily.com/544946/ad-classics-cenotaph-for-newton-etienne-louis-boullee/ [Accessed 8 May 2018].

MORAES ZARZAR, K., 2003. Use and adaptation of precedents in architectural design: toward an evolutionary design model. Delft: Delft Univ. Press.

O'TOOLE, G., n.d. Good Artists Copy; Great Artists Steal | Quote Investigator. [online]. Available from: https://quoteinvestigator.com/2013/03/06/artists-steal/ [Accessed 3 May 2018].

OXMAN, R.E., 1994. Precedents in design: a computational model for the organization of precedent knowledge. Design Studies, 15(2), pp. 141–157.

PAUSE, M. and CLARK, R., 2013. Precedents in architecture. 4th ed. Hoboken, NJ: Wiley.

PENTAGRAM, 1986. Ideas on Design. London, UK: Faber and Faber.

POPOVA, M., 2011. I, Steve: Steve Jobs in His Own Words via 200 Quotes. Brain Pickings [online]. Available from: https://www.brainpickings.org/2011/10/20/i-steve-steve-jobs-in-his-own-words/ [Accessed 7 Feb 2018].

POPOVA, M., 2012. All Ideas Are Second-Hand: Mark Twain's Magnificent Letter to Helen Keller About the Myth of Originality. Brain Pickings [online]. Available from: https://www.brainpickings.org/2012/05/10/mark-twain-helen-keller-plagiarism-originality/ [Accessed 7 Feb 2018].

RIBA, 2014. How Architects use research. London, UK: RIBA. Available from: https://www.architecture.com/-/media/gathercontent/how-architects-use-research/additional-documents/howarchitectsuseresearch2014pdf.pdf [Accessed 12 Jul 2017].

ROWE, P.G., 1987. Design thinking. Cambridge, Mass. u.a: MIT Pr.

RYBCZYNSKI, W., 2005. When Architects Plagiarize. Slate. [online]. Available from: http://www.slate.com/articles/arts/architecture/2005/09/when_architects_plagiarize.html [Accessed 3 May 2018].

SABBAGH, Karl, 1991. Skyscraper. New York: Penguin.

SENBEL, M. et al., 2013. Precedents reconceived: Urban design learning catalysed through data rich 3-D digital models. Design Studies, 34(1), pp. 74–92.

WOOD, H., 2018. Never Meant to Copy, Only to Surpass: Plagiarism Versus Innovation in Architectural Imitation. [online]. Archinect. Available from: https://archinect.com/features/article/150002511/never-meant-to-copy-only-to-surpass-plagiarism-versus-innovation-in-architectural-imitation [Accessed 3 May 2018].